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From the Editor's desk

It is a matter of great pleasure to publish 50 original research papers in this issue of The Indian Journal of Home Science.

With ever increasing number of submissions of research papers for consideration to be published in The IJHSc, the editorial Board decided to increase the number of papers published per issue. Though this has increased the work of editorial office, there would not be any compromise with Editorial Board's commitment to keep up the quality standards of the Journal.

Sincere thanks are extended to the experts of Blind Peer Review for their immense support in going through all the manuscripts - some times to the volume of 25 in number!!! Their critical evaluation as per the standards has been helping the researchers to upgrade their papers. Without their honorary support it would not have been possible to maintain the quality of papers.

The magnitude of work done by the assistant is also highly appreciated. Thanks for her unstinting support.

The research papers reflect that the field of Home Science is dedicated to addressing the unique challenges faced by the communities across the country. Through impactful initiatives the researchers of the field in a richly diverse country, strive to uplift the underprivileged, empower women and youth and try to create sustainable solutions that resonate with the diverse needs of the society. The field of Home Science has a common desire and boundless potential for bringing about positive change for making the society across the country a better place.

I may go up to the extent of saying that The Indian Journal of Home Science can be considered as "Tapestry of Researches in Home Science", fostering a sense of belonging and camaraderie among the members of HSAI.

Wishing the best for rising research culture in Home Science.....

Prof. Maneesha Shukul

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1

REVIVAL OF AFRICAN TRIBAL PAINTING BY USING ITS MOTIFS ON JUTE SARI

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ABSTRACT

Africa is a very large and unique continent with many tribes and diverse ethnic groups, each with their own culture, language, customs, and history. African Tribal Painting will provide an imaginative and fresh collection to people who want to adopt tradition with minute modernization. In the present study, an attempt was made to adopt traditional African tribal painting to develop jute sari. The motifs of African Tribal Painting were collected from various sources and developed by computer-aided design software. The developed motifs were evaluated, and five selected motifs were used for designing Sari with three different placements. The placement of motifs on the sari was evaluated by a panel of thirty judges. The selected five placements of Sari were further evaluated for the selection of the two best placements for product development. The result showed that the sari design with code numbers M1a and M2a got the highest rank in visual evaluation. Thus, the selected Sari designs were developed into products using the hand-screen printing technique. The acceptability of the developed product was assessed, and its cost was calculated. The developed Saris were highly acceptable by the judges in the parameters suitability of the fabric used, neatness and clarity of the design, and overall appearance, but they were acceptable in the parameter economic feasibility. The sale prices of the developed Saris (code numbers M1a and M2a) were ₹ 2437 and ₹ 2125, respectively. Mass production of this product will reduce the cost of the product to a greater extent. The developed jute sari was very appealing and attractive, and it can satisfy the demand of women for newness in fashion.

Keywords: African Tribes, African Tribal Painting, Jute, CAD software, Screen Printing

INTRODUCTION

Tribes are called ‘Adivasi’ in Sanskrit and Hindi, which literally means the original settlers. Tribes live in rural areas, forests, and mountains. Africa is a very large and unique continent with many tribes and diverse ethnic groups, each with their own culture, language, customs, and history. There are currently 410 types of tribes residing in Africa (Isiavwe & Peter, 2021).

Traditionally, African tribes wore little to cover their bodies, leaving their skin exposed and available for decoration. African tribes adorned themselves in four general ways: scarification, body painting, beadwork, and jewellery. African tribes lived in sustained communities where

nomadic lifestyles were common in their regions (Segy, 2018). Many African cultures emphasize that art is an important way to contact the Gods or supreme power, and that art is also used to represent the God by them.

Tribal art describes the traditional art of indigenous natives from tribal societies. Tribal art derives its substances from nature, birds, animals, and plant life. It is the simplest form of expression, which includes basic lines and curves, but the profoundness of the motif is indefeasible. Tribal art exhibits the freshness of nature and youthful energy. These arts are rooted in their cultures. African tribal art consists of wood carvings (masks and sculptures), stone carvings, furniture, ceramics, metalwork, jewellery, beadwork, paintings, textiles, etc.

Among the various tribal arts of Africa, African tribal painting holds an eminent position because of its beautiful motifs and vibrant colours. Human figures, hunting scenes, and animals are the main motifs of this painting. The human figures are very important in traditional African Tribal Painting. Human figures were given human characteristics to make them more relatable. In the African imagination, the human body is also associated with true beauty and spiritual beliefs. Human figures used in African Tribal Paintings can be slightly modified to give them a modern touch by using textile design software.

According to Anita et al. (2017), textile design is a creative field that includes fashion design, carpet design, and many other cloth-related fields. Textile design is essentially the process of creating designs for woven, knitted, or printed fabrics or surface ornamented fabrics. The motifs of African Tribal Painting will provide creative designs in the sari to people who want to adopt tradition with minute modernization. In the present study, an attempt was made to adopt traditional African tribal painting to develop jute sari with screen printing technique. It will promote the traditional African Tribal Painting in the apparel market by introducing new designs. It can increase the income of the artists by giving them a new media to exhibit their paintings. This will also help in promoting the tribal painting of Africa, which is an extremely graceful painting.

OBJECTIVES OF THE STUDY

1. To develop motifs of African Tribal Painting for jute saris using CAD.
2. To design jute saris with different placements of motifs.
3. To develop jute sari through screen printing technique.
4. To assess the acceptability of the prepared product.

MATERIALS AND METHODS

The step-by-step procedure for designing saris is mentioned under the following headings:

Collection of Motifs in African Tribal Painting:

The motifs of African tribal painting were collected from various sources, such as literature, books, the internet, etc.

Development of motifs in African tribal painting through CAD:

The motifs of "African tribal painting" were made through computer-aided design software, i.e., coral drawing. A total of fifteen motifs of African Tribal Painting were made, which can be used for designing saris.

Visual evaluation of the developed motifs:

The developed motifs were evaluated by a panel of thirty judges, including teachers and students of the Department of Family and Community Sciences (Home Science), University of Allahabad, Prayagraj, Uttar Pradesh, for the selection of the five most preferred motifs of African tribal painting. The evaluation of the motifs was done on the basis of three parameters: appropriateness of the motif for the sari, colour combination, and overall appearance. A five-point ranking proforma was used for this purpose. The motifs were scored as 5, 4, 3, 2, and 1, corresponding to excellent, very good, good, fair, and poor, respectively. The data was collected and analyzed by calculating the mean of the scores.

Development of Sari with different motif placement:

Three different placements of each selected motif were made on Sari through CAD. A total of fifteen Sari designs were made.

Visual evaluation of the developed designs of Sari with different placements of motif:

To find out the best placement of each motif, the design of Sari with different placements was evaluated by the same panel of thirty judges (as mentioned in Section 2.3). The evaluation of different placements on Sari was done on the parameters “Highly acceptable”, “Acceptable” and “Somewhat acceptable”. The data was collected, tabulated, and analyzed through a weighted mean score (WMS) using the given formula:

W.M.S. was analyzed in the following ranges (Gagoi et al., 2016):

Highly acceptable (HA): 2.34–3.00

Acceptable (A): 1.67–2.33

Somewhat acceptable (SWA): 1.00-1.66

Visual evaluation of the designs of Sari for product development:

After the selection of five designs of Sari (one of each motif), the designs were evaluated again by the same panel of thirty judges (mentioned in Section 2.3) to find out the two most preferred designs for product development. The evaluation was done on the parameters: Placement of motifs, colour combination, and overall appearance. The data was analyzed through a weighted mean score (“Highly acceptable”, “Acceptable” and “Somewhat acceptable), as mentioned in Section 2.5.

Development of Jute Sari:

The jute fabric was used for developing Sari with screen printing. The raw materials for the development of jute sari, such as jute fabric, screen, binder, and pigment colours, were purchased from the local market of Katra and Civil Lines, Prayagraj, Uttar Pradesh. Screens of the two selected designs were developed, and jute sari was printed in the Textile Designing and Printing Laboratory, Department of Family and Community Sciences (Home Science), University of Allahabad, Prayagraj.

Assessment for acceptability of the prepared Jute Saris:

The screen-printed jute saris were further subjected to visual evaluation by the same panel of thirty judges to assess the acceptability of the developed product. The acceptability of the product was assessed based on the parameters, suitability of the fabric used, neatness and clarity of the design, economic feasibility, and overall appearance. The acceptance of the products was analyzed using a weighted mean score ("Highly acceptable", "Acceptable" and "Somewhat acceptable"), as mentioned in Section 2.5.

RESULTS AND DISCUSSION

Development of motifs in African tribal painting through CAD:

The motifs of "African tribal painting" were made through computer-aided design software, i.e., coral drawing. A total of fifteen motifs of African Tribal Painting were made and are shown in **Figure 1**.

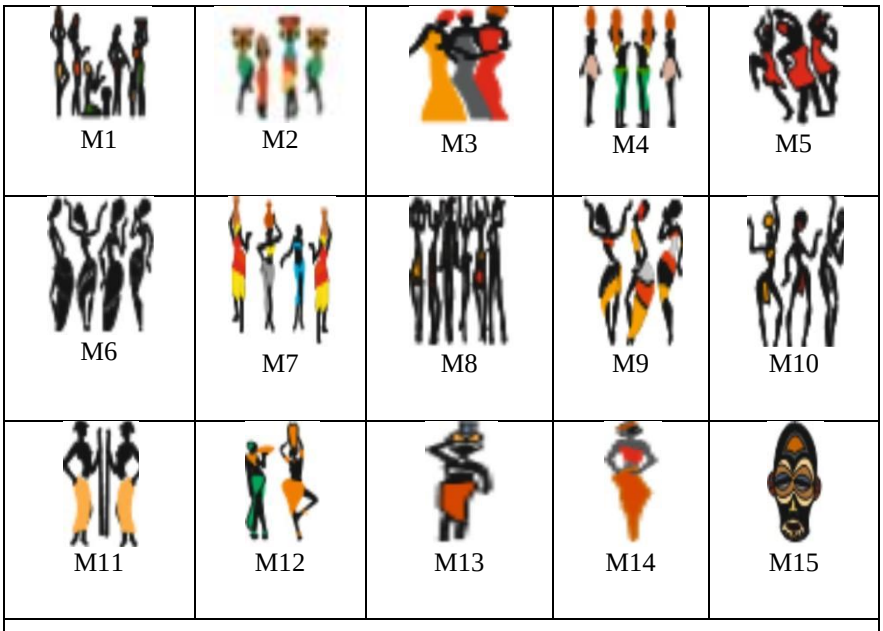

Fig. 1 Motifs of African Tribal Painting (M1-M15)

Visual evaluation of developed motifs:

The prepared fifteen motifs of African Tribal Painting were subjected to visual evaluation by thirty judges for the selection of "five" best motifs. The results of visual evaluation are shown in **Table 1**.

Table- 1 Average score obtained on visual evaluation of motifs of African Tribal Painting

S. No.	Motif No.	Appropriateness of the motif for Sari	Colour combination	Overall appearance	Total	Rank
1	M1	4.8	4.8	3.9	**13.5***	**I**
2	M2	3.9	3.8	4.2	**11.9***	**IV**
3	M3	3.2	3.5	3.9	10.6	XII
4	M4	4.5	3.0	3.8	11.3	IX
5	M5	4.0	3.8	3.7	11.5	VII
6	M6	4.9	4.9	3.6	**13.4***	**II**
7	M7	3.9	3.7	4.2	**11.8***	**V**
8	M8	3.6	3.9	3.3	10.8	XI
9	M9	4.3	3.9	4.1	**12.3***	**III**
10	M10	4.1	3.8	3.8	11.7	VI
11	M11	3.5	3.1	3.8	10.4	XIV
12	M12	3.2	3.5	3.8	10.5	XIII
13	M13	3.0	3.8	3.5	10.3	XV
14	M14	4.1	3.5	3.3	10.9	X
15	M15	3.4	4.2	3.8	11.4	VIII

***Selected motif**

Table 1 depicts the average score obtained on the visual evaluation of motifs of African Tribal Paintings. It was found that motif number M1 got the highest rank (13.5). Motif number M6 got the second highest rank (13.4), followed by motif number M9 (12.3), M2 (11.9), M7 (11.8), M10 (11.7), M5 (11.5), M15 (11.4), M4 (11.3), M14 (10.9), M8 (10.8), M3 (10.6), M12 (10.5), M11 (10.4), and M13 (10.3), respectively. Thus, the top five motifs with the highest rank were selected and used for the designing of the jute Sari.

Developed designs of Sari with different motif placement.

A total of fifteen designs for Sari were made using CAD software. Three placements were made for each selected motif. The designs are shown in **Figure 2**.

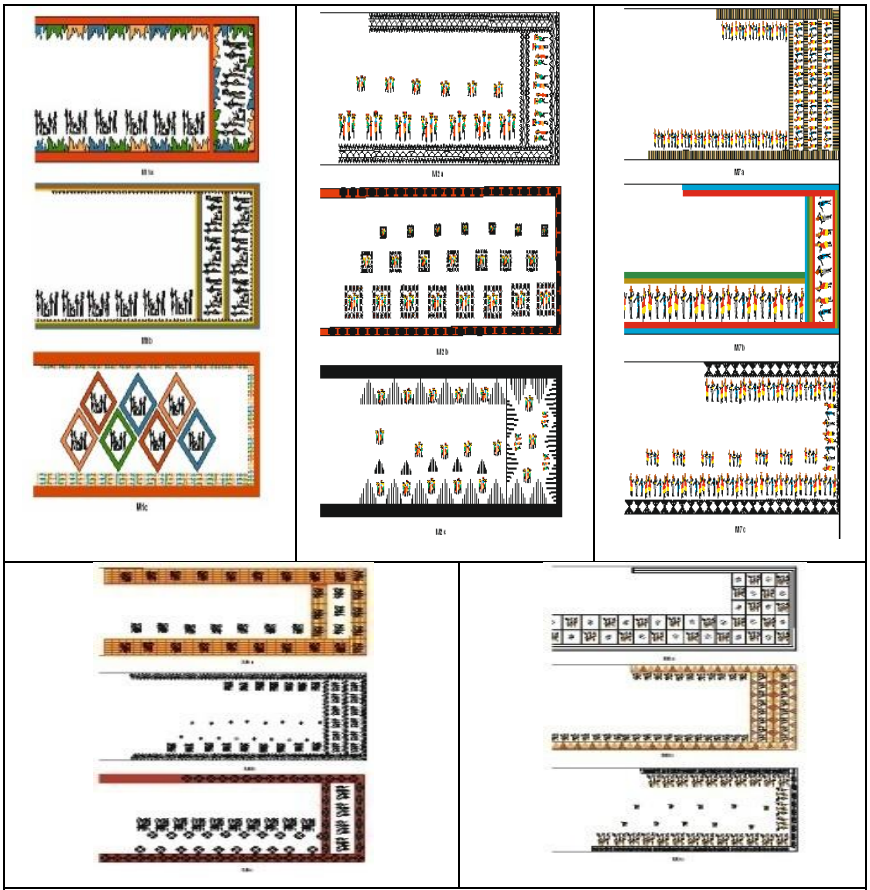

Fig. 2 Designs of Sari

Visual evaluation of Sari with different placements of motif:

All the prepared designs for Sari were subjected to visual evaluation by thirty judges for the selection of the best placement of each motif on jute Sari. The results of the visual evaluation are shown in **Table 2**.

Table 2: Average score obtained on visual evaluation of different placements of motifs

Motif No.	Code number (Sari Design)	Frequency			W.M.S.	Rank
		MP	P	LP		
M1	**M1a**	**25**	**3**	**2**	**2.8**	**I**
	M1b	20	6	4	2.6	II
	M1c	15	10	5	2.1	III
M2	**M2a**	**22**	**5**	**3**	**2.6**	**I**
	M2b	12	10	8	2.1	III

	M2c	15	10	5	2.2	II
M6	M6a	8	10	12	1.9	III
	M6b	**20**	**6**	**4**	**2.6**	**I**
	M6b	13	9	8	2.2	II
M7	M7a	17	6	7	2.3	II
	M7b	**18**	**9**	**3**	**2.5**	**I**
	M7c	15	10	5	2.3	III
M9	M9a	10	15	5	2.2	II
	M9b	8	10	12	1.9	III
	M9c	**13**	**9**	**8**	**2.2**	**I**

Table 2 depicts the weighted mean score of the visual evaluation of the Sari with different placements of motifs. It was found that placement of motif M1 and M2, placement 'b' of motif M6 and M7, and placement 'c' of motif M9 were most preferred by the judges and were used for further evaluation.

Visual evaluation of the designs of Sari for product development:

After the selection of five designs of Sari (one of each selected motif), the designs were further evaluated by the same panel of thirty judges to find out the two most preferred designs for product development. The results of the visual evaluation are shown in **Table 3**.

Table 3: Average score obtained on visual evaluation of the design of Sari.

Motif No.	Code number (Sari Design)	Placement of Motifs			WMS	Colour Combination			WMS	OverallAppearance			WMS
		Frequency				Frequency				Frequency			
		MP	P	LP		MP	P	LP		MP	P	LP	
M1	**M1a**	27	2	1	**2.86**	19	10	1	**2.60**	18	10	2	**2.53**
M2	**M2a**	25	2	3	**2.73**	18	11	1	**2.56**	17	10	3	**2.46**
M6	M6b	20	6	4	2.53	15	13	2	2.43	16	10	4	2.40
M7	M7b	15	10	5	2.33	13	15	2	2.36	14	11	5	2.30
M9	M9c	17	8	5	2.21	13	12	5	2.26	11	15	4	2.23

Table 3 clearly shows that the Sari design with code number M1a was highly acceptable on the parameters: placement of motifs (2.86), colour combination (2.60), and overall appearance (2.53); and the Sari design with code number M2a was also highly acceptable on the parameters: placement of motifs (2.73), colour combination (2.56), and overall appearance (2.46). The table also depicts that the Sari design with code number M6b was also highly acceptable on the parameter; placement of motifs (2.53), colour combination (2.43), and overall appearance (2.40). It

was found that the Sari design with code number M7b was highly acceptable on the parameter colour combination (2.36), on the parameter placement of motifs (2.33), and on overall appearance (2.30). Table 3 also reveals that the Sari design with code number M9c was acceptable on the parameters of placement of motifs (2.21), colour combination (2.26), and overall appearance (2.23). Thus, the two Sari designs that had the highest weighted mean score on the parameters, placement of motifs, colour combination, and overall appearance were selected for the development of Saris.

Development of products:

Two selected jute Sari designs with code numbers M1a and M2a were developed through screen printing technique. The pictures of the developed products are shown in **Figure 3**.

M1a

M2a

Fig. 3 Jute Sari Design Code No. M1a and M2a

Cost calculation of the prepared jute Sari:

The cost of Saris (code numbers M1a and M2a) was calculated on the basis of the raw materials used and the labour charge. Twenty-five percent profit margins were added to the actual cost to get the sale price of the Sari. The calculated sale price of the Sari design with code number M1a was ₹2437 and M2a was ₹2125.

Acceptability of the prepared product:

The prepared product was subjected to a visual evaluation by thirty judges to assess the acceptability of the developed products. The acceptability of the prepared products was evaluated on various parameters. The result of the acceptability of the prepared products is shown in **Table 4**.

Table 4. Acceptability of the developed Saris

Sari design (Code No.)	Suitability of fabric used				Neatness and clarity of the design				Economic feasibility				Overall appearance			
	Frequency				Frequency				Frequency				Frequency			
	MP	P	LP	WMS	MP	P	LP	WMS	MP	P	LP	WMS	MP	P	LP	WMS
M1a	16	11	3	**2.43**	18	11	1	**2.56**	8	10	12	**1.86**	27	2	1	**2.86**
M2a	16	10	4	**2.40**	25	2	3	**2.73**	7	10	13	**1.8**	25	3	2	**2.76**

Table 4 depicts that the developed Sari design with code number M1a and M2a was highly acceptable, with a weighted mean score of 2.43 and 2.40 on the parameter suitability of the fabric used. The jute fabric used for Sari was highly liked by the judges.

The neatness and clarity of the design of the prepared product (design numbers M1a and M2a) were also assessed. It was found highly acceptable, with a weighted mean score of 2.56 and 2.73. The motifs in the developed product were printed very neatly and clearly.

The economic feasibility of the prepared product was assessed by the judges, and the data in Table 4 depicts that design number M1a and M2a were acceptable with a weighted mean score of 1.86 and 1.8, respectively. The Sari was a little more expensive than the saris available in the market. This is due to the fact that two Saris were developed. If it is put into mass production, the cost of the product will be reduced to a great extent.

The overall appearance of the Sari (design number M1a and M2a) was accessed by the judges, and the data in Table 4 depicts that design number M1a and M2a were highly acceptable, with a weighted mean score of 2.86 and 2.76, respectively. Thus, the overall appearance of the Sari was good and liked by the judges.

Table 4 on the acceptability of the prepared product reveals that the design of Sari with code number M1a and M2a was highly acceptable in the parameters such as suitability of the fabric used, neatness and clarity of the design, and overall appearance, but the product was acceptable in the parameter of economic feasibility. The sale price of this product was a little high, but mass production of this product will reduce its cost to a greater extent.

CONCLUSION

It can be concluded that the prepared sari designs were highly acceptable by the respondents because the motifs of the African Tribal Painting are so attractive with a beautiful colour combination. Jute Saris became very attractive and appealing by printing the motifs of African Tribal painting through the hand screen printing technique. Therefore, designing saris through screen printing technique using motifs of "African tribal painting" was highly acceptable to the respondents and satisfied the demand of women to give newness to fashion. The application of African tribal motifs can also be used on other articles for home furnishing and accessories with the screen-printing technique or other printing technique.

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2

A GENDERED STUDY ON HOME-BASED WOMEN ZARI WORKERS- WITH SPECIAL REFERENCE TO BAURIA AREA OF BENGAL

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ABSTRACT

Though study abounds on the expropriation of home-based women workers in informal sector, but a viable gap is felt in addressing the gendered hierarchy in Zari craft and understanding the quality of lives and precarities of livelihood crisis of Zari workers. The paper is based on the empirical study of sixty home based Zari working women of Bauria area of West Bengal aims to address this gap. The study conducted on these women strives to understand their socio-economic conditions, study the production process, incomes, expenditures, working conditions. It highlights the deplorable condition in which they work and brings to notice the work process, the exploitation done by middlemen and the contractor. It explores the choice less condition faced by women Zari workers in seeking alternate employment. An attempt is made to understand the kind of work these workers do and why do they do it. Last but not the least, the paper seeks to show the gender-based hierarchy and discrimination faced by female workers compared to male Zari workers. It aims to bring into focus the ideological and gender considerations by which home based Zari workers continue to form the most exploited, vulnerable and expropriated labour force of the Zari industry over decades.

Key Words: Home Based Women Zari Workers, Gender Hierarchy, Exploitation, Zari Work.

INTRODUCTION

Despite, decades of struggle for recognition, visibility, and conceptual clarity in relation to women's economic activity, major gaps persist in not only the prevailing statistical system, but also in understanding the true nature of their work. It is estimated that informal workers make up nearly 90% of India's labour force, and among women who work, more than 90% work in the informal economy, which is called the grey economy (Bonnet et al 2019). They earn less than men on average, have inadequate access to markets, formal sources of credit, and have limited bargaining power to improve their working conditions and earnings. Within the informal sector, perhaps nowhere is the vulnerability more marked than in the sphere of non-farm home-based production, in which a vast, uncounted, and expanding numbers of women are being concentrated. As per the report of NSSO, 66th Round, home based workers are those who carry out their work for remuneration in the premises of their choices without any social security or at low wages.

The paper is an empirical study of sixty home-based Zari working women of Bauria, West Bengal. The study conducted on the given sample of women over a period of three years shows an in-depth understanding, on the various aspects of their life, their work process, challenges associated with it.

It vividly portrays their gendered subjugation in the home-based craft of Zari industry. It shows the lack of bargaining power, agency and vulnerabilities associated therein. Most significantly, it shows the gender disaggregated work, skill set and income in the Zari industry of the area.

A Brief Outline of Zari Work, in Howrah, Bengal

The word Zari has come from the Iranian word Zardozi, which means gold wire The art was brought to India by Persian migrants between 1700-1100 BC. However, Zari work flourished during the Mughal era specially under the patronage of emperor Akbar. Today Zari work is recognized by the Government of India as one of the most ancient forms of handicrafts. Zari work has a wide range of forms. The entire production process of Zari work is a complicated integration of skilled tasks involving a gamut of activities. These includes making designing motifs, to embossing them, to transfer the designs in the fabric, to involvement of skilled craftsmanship in supervision and direction, to stitching and inputting Zari work, to semi-skilled work to unskilled work.

This entire business of Zari production is mediated by different levels of *Ostagars* (middlemen) and traders who control the supply of raw materials to workers, to collecting the work in due time to sending the merchandise to the traders, to marketing of finished goods. In these complex webs of Zari work women are engaged as semi-skilled to unskilled workers, with the least of wages. Based on the unique techniques of production, types of threads used, Zari work are categorized as *Badla work, Gota work, Kalabattu, Kamdani, Kataoki bel, Kinari, Makaish, Kora, Sitara, Tikora, Tilla, Zardozi* etc. (Lynton, 1995). Prasad (1990) elaborates on two types of zardozi work – *Karchobi and Kamdani.* Angira (1998) stated that embroidery work may be done individually or collectively. This is a skill that is practiced by both men and women. This type of work can either be carried out within the four walls of the house (by women) or can be done in workshops (by men).

Zari work, used to be the primary source of employment for a substantial percentage of male and female population in Bauria over generations. Especially for women, home based Zari work got embedded in the gendered normativity of feminine domesticity. Women found Zari work as the most culturally compatible, convenient, and traditional source of livelihood. Since home-based Zari work is carried in the four walls of the house therefore it has never caused any disruption in the domestic duties of women, nor has it questioned the gender division of labour.

OBJECTIVES

The main objectives of this paper are-

1. To look into the lives of home-based women Zari workers,-understand their socio-economic conditions, their working conditions.
2. To make a gendered comparative between Male and Female Zari workers, understand the gendered hierarchy between them.
3. To estimate the vulnerabilities faced by the women Zari workers and highlight the deplorable condition in which they work, to understand the kind of work they do it, to bring to notice the exploitation done by middlemen and the contractor on the women workers

RESEARCH METHODOLOGY

Research Method.

The present work is primarily **Qualitative** in approach. It is **triangulated** with some **quantitative** data as well. The present research has employed the following research methods.

1. **In-depth Case study of 60 women Zari workers -** An in-depth case study on the selected samples of Zari working women has been taken in their households over an extensive period of time. After securing background history about each woman from the key informant, visit is made according to the convenient time of the respondents. After initial ice breaking stage and rapport building with samples, the researcher has attempted to gain an intensive knowledge about the lives, work conditions, problems accounted, socio economic status etc. A questionnaire is used to get certain quantitative information, which thereafter got enhanced with their own account narratives. Their narratives have been recorded (with their consent) which is later transcribed by the researcher. The transcribed case history along with the questionnaire has been further analyzed and tabulated.

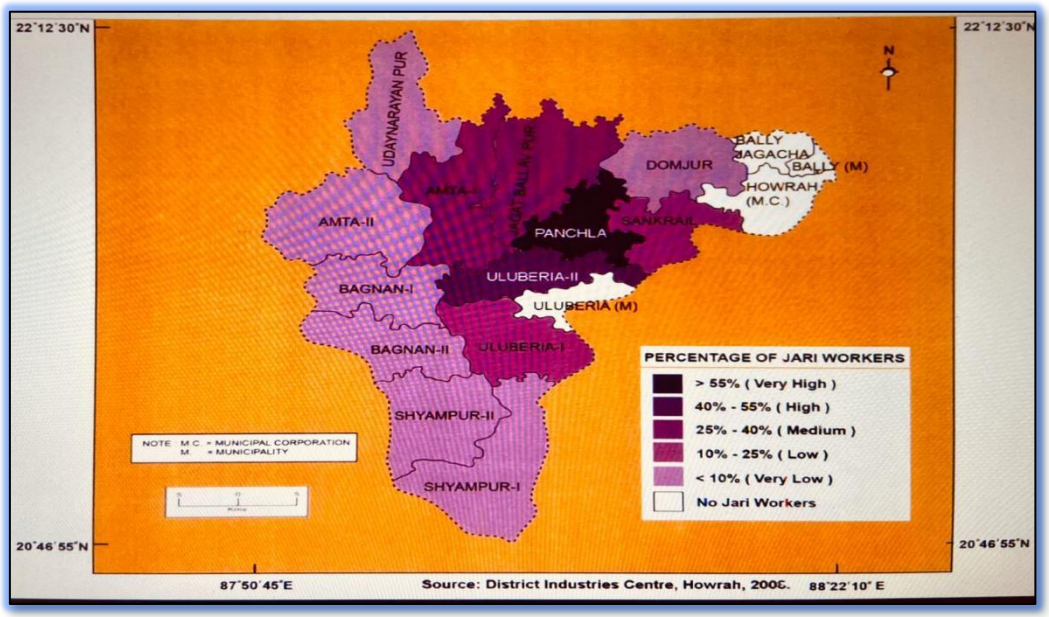
2. **Field Study of selected wards of Bauria** - The Field Study on the selected wards of Bauria is made with the visit to the Municipal Corporation of Uluberia, the Zari Hub of Howrah, the SHGs in the selected wards, the Zari workshops along with the household visits.

3. **Sampling Design** - The given research is based on **Purposive Sampling**. It is a type of Non-Probability Sampling. Here the researcher selected those sample who best fit into the profile of the population that one's need. The total number of Wards in the Bauria area are nineteen. Initially the aim was to select households from each ward to give a dispersed and accurate representation. However, because of pragmatic constrains 10 wards were selected. The total sample size of households turned out to be 60, where 6 from each ward were selected.

Snowball Sampling, popularly known as **Chain Referral Sampling** and forms a very important type of purposive sampling. Researchers began by identifying several participants who fit the research parameters. Women Zari workers in the selected field form the key samples. They have been purposively selected with the recommendation of SHG (Self Help Group) leader, who are the key informant of the area.

Research Tools Used - The above discussed research method is based on the use of four basic research tools i.e. of In-Depth Interview, Oral Narratives, Observation. Questionnaires,

Locale of The Study – The study is based on Bauria an area that falls under the Uluberia Muicipal Corporation of Howrah. Bauria, falls in the suburban area under the Municipal Corporation of Uluberia, Howrah. According to the Census 2011 Bauria is a large village with total 890 families residing. It has a population of 3926 of which 2032 are males and 1894 are females. In Bauria village out of total population, 1411 were engaged in work activities. 73.78 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 26.22 %



Map showing the percentage of Zari workers in the different area of West Bengal. Source: District Industries Centre, Howrah.

were involved in Marginal activity providing livelihood for less than 6 months. Of 1411 workers engaged in Main Work, 148 were cultivators (owner or co-owner) while 410 were Agricultural labourer (Census District Handbook, 2011.

LIMITATIONS OF THE STUDY

- The Study has been limited to Bauria Area of Howrah, Bengal. A cross sectional, wide spread study on the other Zari hub of Bengal has not been made possible due to paucity of time.
- Only a Sample of 60 women are selected due to time and resource constraints.

RESULTS AND DISCUSSIONS

The central fulcrum of the current paper is the crisis of 700 years old Zari industry, which Bauria has been witnessing over the years. Women in Bauria have been a significant part of the household based informal economy of piece rate Zari work since generations. Though they have not been formally trained but they constitute a very important part of the low waged labour force. Based on the empirical study of Zari workers in Bauria Area, the given section highlights the following key findings, related to the Research Objectives. –

a. Gender Differences of Zari Work Between Male and Female Zari workers.
b. Socio economic condition of Female Zari Workers.
c. Vulnerabilities of Zari Working Women.

A. Gender Discrepancy in Zari Work – Comparing the Male and Female Zari workers

One of the primary reasons for selecting Zari work is that it forms a cohesive ground for understanding the gendered disaggregation of work. The sexual division of labour becomes extremely palpable in the given work, that decides site of work, volume and nature of work, bargaining power and most importantly the rate of payment and wage. There are several Zari based households, where all the members- men, women, even children are engaged in Zari work in various capacities. While men are the recognized as the visible part of the labour force, women Zari workers contrarily remain invisible shadow workers concentrated in low skilled, poorly waged work. This dichotomy of masculine and feminine labour force and labour power in Zari industry is one of the fulcrums of the given paper.

The following section shows the gender hierarchy in Zari industry, of Bauria Area of Howrah.

- Gender disparity exists in wages between the Home-based Women Zari Workers and the Male workers who work in work shades.
- Home Based Zari Working Women are paid on piece rate while men are paid on hourly basis. Men are paid much higher compared to women Zari workers.
- Women Works get less skilled, low paying work compared to men.
- While Men Zari Workers who work in Work Shades get the opportunity to enhance their skill, women remain concentrated in low skilled work. As women Zari workers work in isolated manner, therefore they fail to learn from their peer groups.

Work of men is recognized. They are considered as artisans. Most of the Women Zari workers on the contrary are considered as Housewives. Their craft is considered as spare time leisure time activities.

Table 1. Gender Hierarchy Between Male and Female workers of Zari Industry, Bauria.

Pattern of Work	**Persons Engaged**	**Gender**	**Incomes (per day/Per design)**
Designing Motifs	Designer	Male Only	Rs 250- Rs 300 per design.
Imposing designs on paper and perform punch work and embossing	Embroider and punch maker	Male only	Rs100-125 per design.
Transfer of the design into the fabric of the wear (Saree, Kamij, Kurti etc.)	Drawing Expert	Male only	Rs 100-125 per design.
Supervision and direction with expert skills to artisans	Master Craftsman	**Male only**	Rs 350-500 per Day
Stitching and inputting the Jari	Skilled Artisan	Male and some Women.	Rs 350-500 per hour

using the tools Dhadda			
Home Based Zari workers.	Unskilled worker	Women Only	Rs 20- 200 per piece depending on the intricacy of work.

B. Socio Economic Condition of Zari Working Women In Bauria.

The Socio-economic conditions of women Zari workers in Bauria is evidenced by the following factors of Kinship Status, Health Status, Religious Background, Types of Home where women Zari workers reside, Number of Rooms in households of Zari workers, Livelihood Training, Basic Household Essentials, Types of Fuel availed and so on.

1. Kinship status of women Zari workers

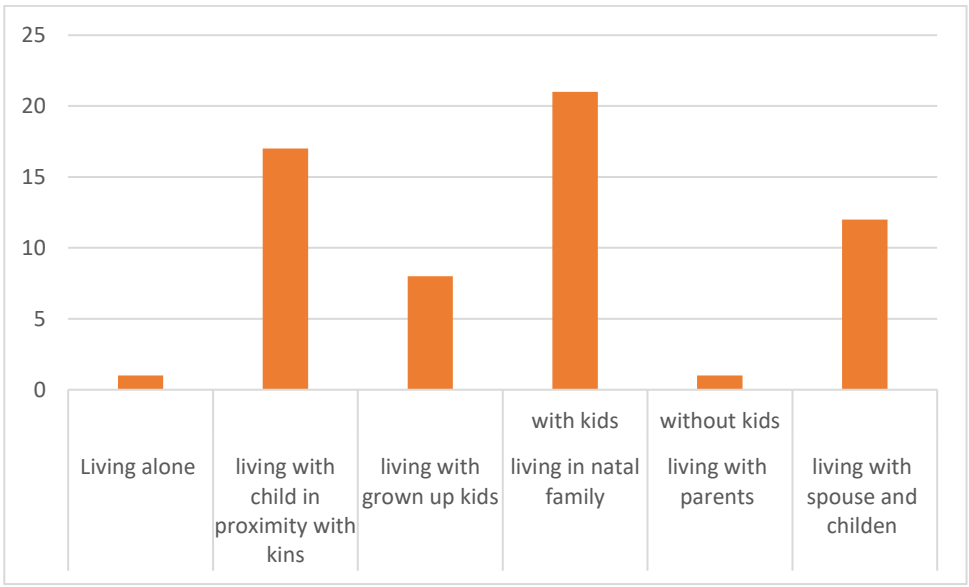


Figure 1 Kinship status of Women Zari Workers

Of the 60 women Zari workers focused in the study, it is found that 17 lives with their children in proximity to their kins, 8 lives with grown up kids, 21 lives in natal family with kids, 12 lives with spouse and kids, 1 lives with parents without kids, 1 lives alone.

2. Religious Background of Women Zari Workers

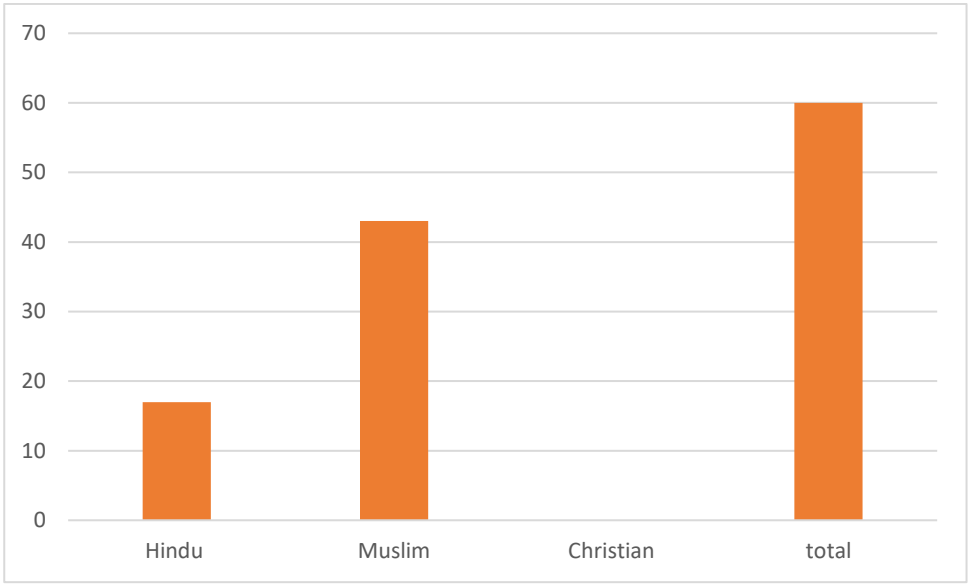


Figure 2 Religious Background of Women Zari Workers

The Religious Backdrop of the respondents shows that out of the total number of 60, 17 women happens to be Hindu while the rest of 43 are Muslim. There happens to be none other religious followers.

3. Health Status of Zari Working Women

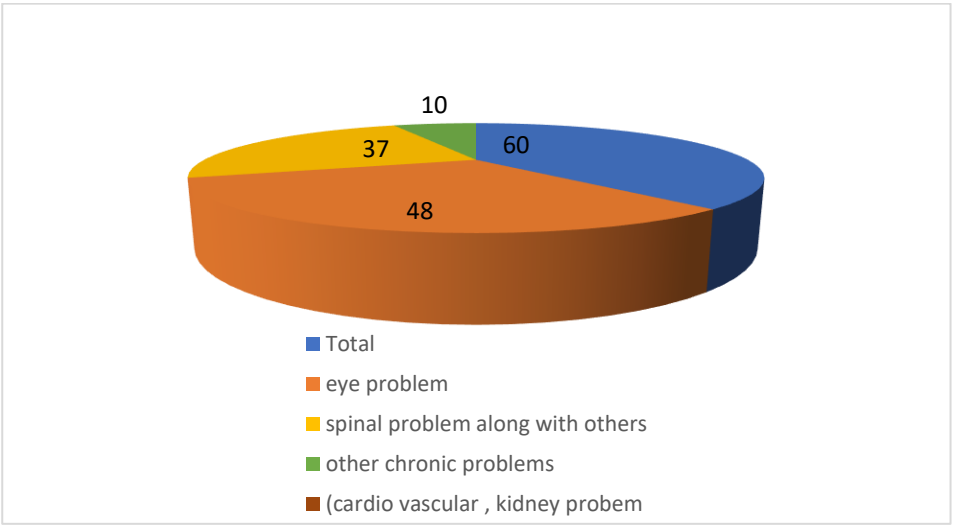


Figure 3 Health Status of Zari Workers

The health status of the women Zari workers shows that out of the total number of 60, workers, 48 have got eye problem, 37 have spinal problems along with others and 10 others have chronic ailments like kidney problem, cardio vascular disease, cancer etc.

4. Marital Status

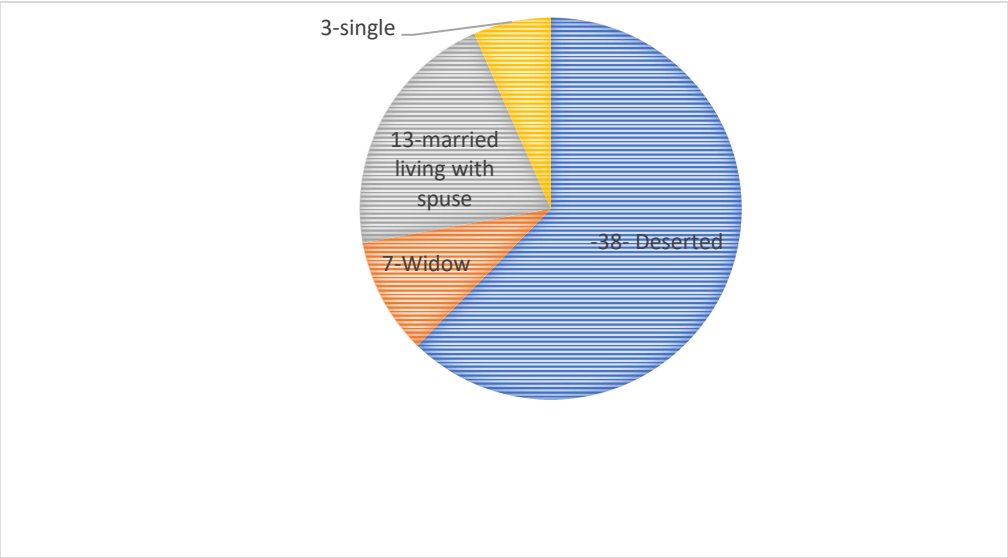


Figure 4 Marital status of Women Zari Workers

Out of 60, 38 women Zari workers are deserted, 7 are widow, 13are married and living with spouse, while 3 are single / unmarried.

5. Alternative Occupation of Women Workers

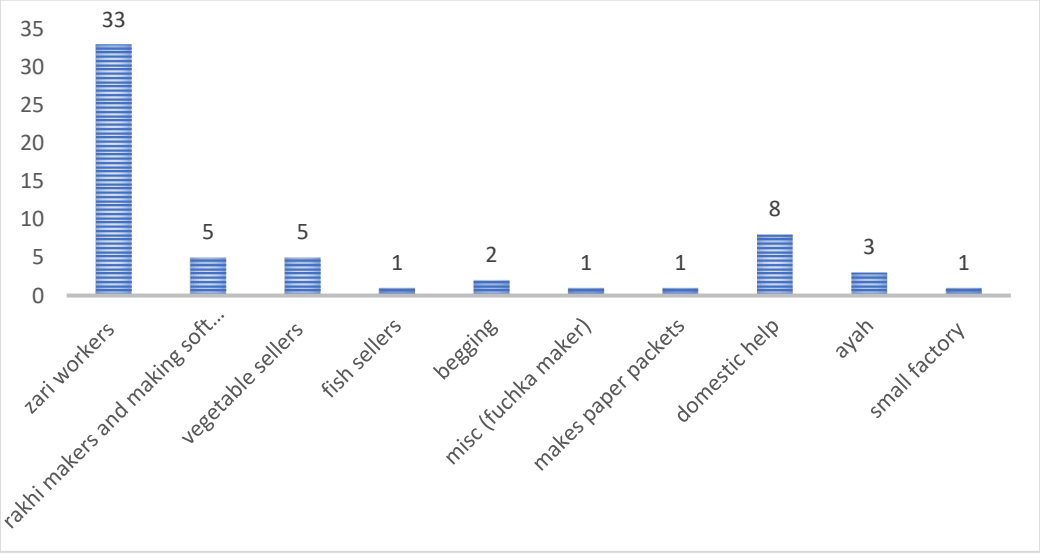


Figure 5 Alternative Occupation of Women Zari Workers

Of the 60 Zari led households studied, many have shifted to other occupations. One woman has started to work in small factory as pasting lebels, three have started to work as *ayah*, 8 have worked as domestic help, one helps in making *fuchka*, two resorted to begging, one started selling fish, 5 selling vegetables.

6. **Basic Household Essentials**

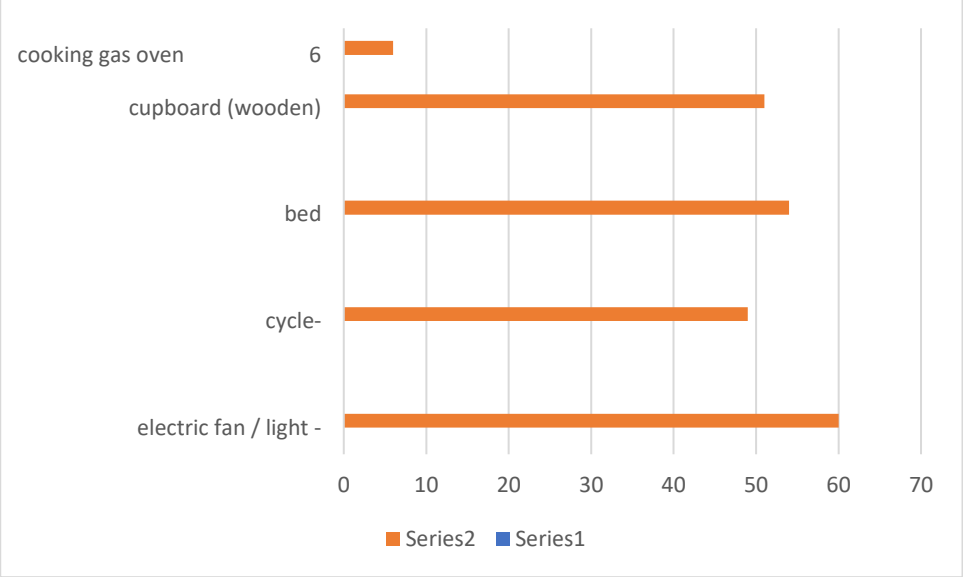


Figure 6 Basic Household Essentials

Of the basic physical utilities in the Households of Zari working women, 6 have got their own cooking oven (though they are unable to sustain them), 51, have got their own cupboard, 54 have got one bed, 47 have got their own cycle, while all the 60 have got electric connection.

7. Vocational Training Programs

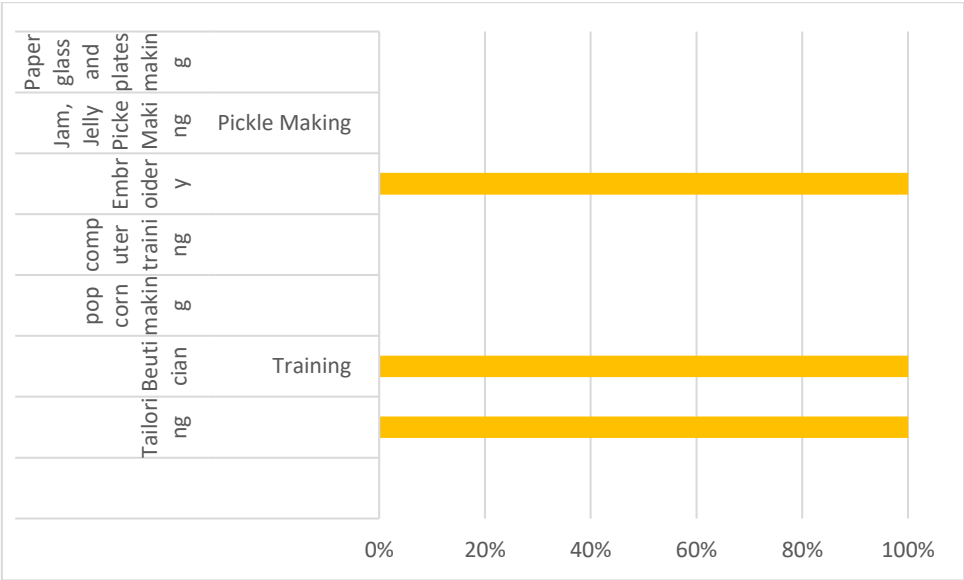


Figure 7 Vocational training Programme

The Livelihood Training Programme that is conducted by the Municipal Corporation of Uluberia, Bauria, offers multiple programmes. Of the sixty respondents, only 3 women opted for Tailoring

training, 2 for Beautician Training, 2 for embroidery and none for other trainings like pop-corn making, computer training, jam, jelly, pickle making, paper glass and plates making etc

8. Types of House of Women Zari Workers

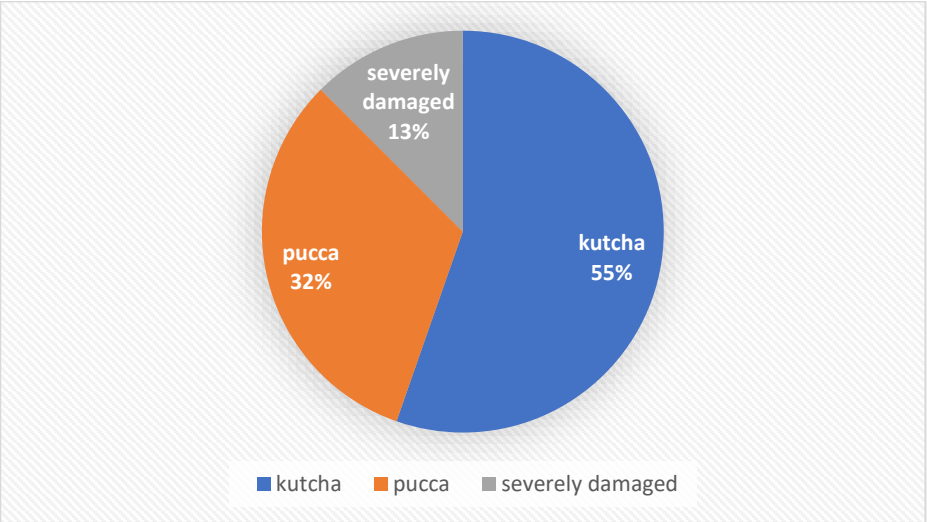


Figure 8 Types of House of Women Zari Workers

The given chart shows the distribution of the types of houses available. 55% of households have kutcha houses. 32% have pucca houses. 13 % live in severely damaged houses.

9. Types of Fuel availed by Women Zari workers.

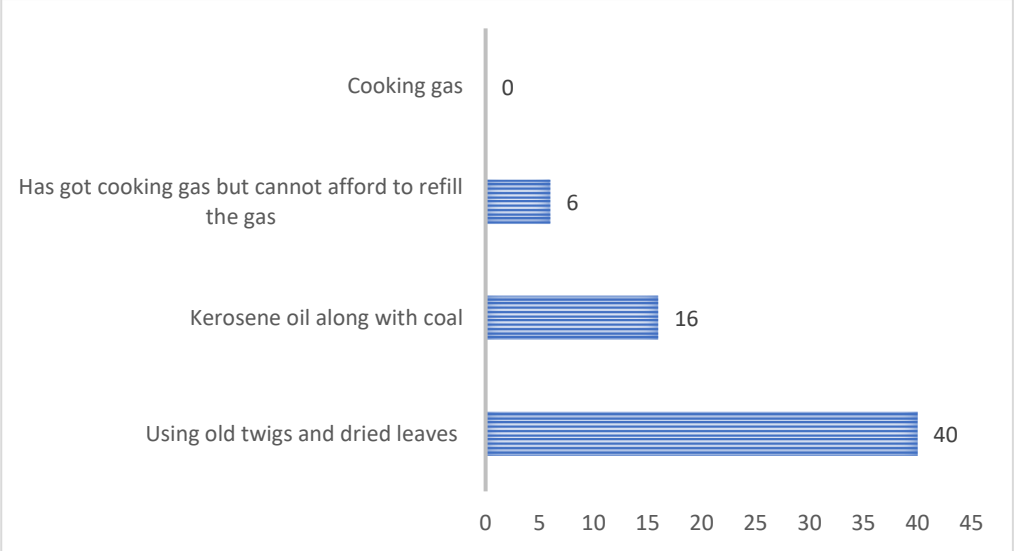


Figure 9 Type of Fuel availed by Women Zari Workers

40 Households out of 60, use old twigs and dried leaves as everyday fuel. 16 use kerosene oil along with coal, 6 households have got cooking gas but cannot afford to refill them.

10. Number of Rooms in Households of Women Zari Workers.

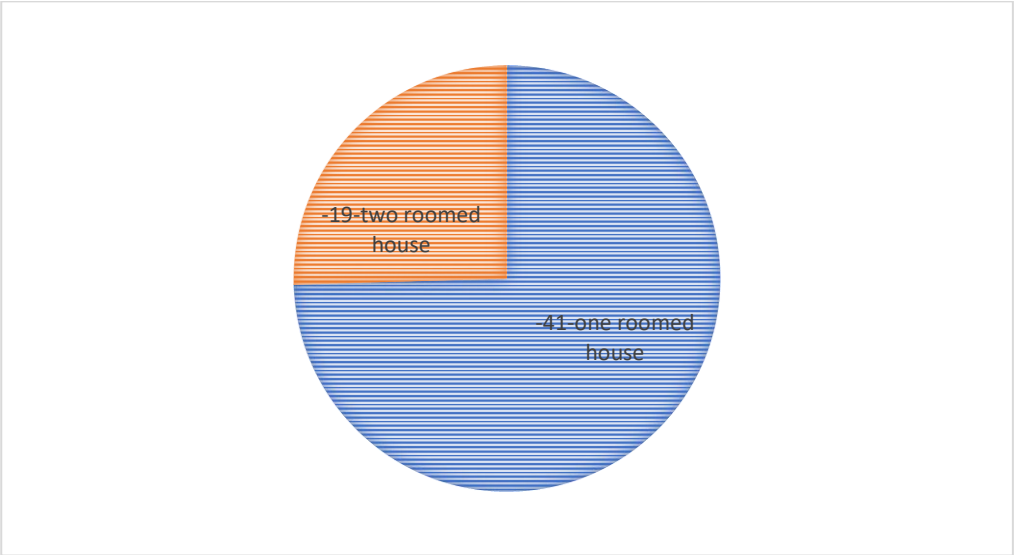


Figure 10 Number of Rooms in Household of Women Zari Workers

Out of 60 Zari working women studied, 41 live in one roomed house while 19 in two roomed house.

11. Availability of Electricity in Households of Zari Working Women

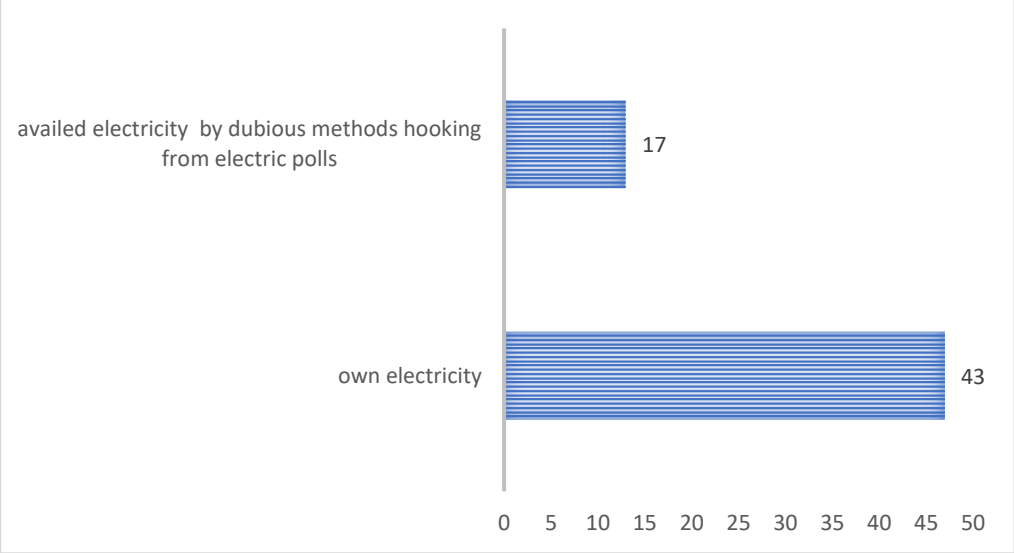


Figure 11 Availability of Electricity in Households of Zari Working Women

All the 60 households of Zari working women have got electric connection. 43 households have their own electricity while 17 families confided that they use various dubious method to avoid electricity bill like hooking from electric polls, tampering of electric meter reading etc.

C. Vulnerabilities of Zari Working Women.

The empirical realities of the Zari working women in Bauria shows that they form the bottom tier of the Zari industry. They are semi-skilled, piece rate workers, working in isolated manner within their homestead, having the least of bargaining power, forming the most vulnerable group. The given section lists down the vulnerabilities faced by Zari working women of Bauria.

- **Seasonality** - There is lack of continuity of Zari work. The demand of handcrafted Zari products varies during different seasons. There are certain lean periods (March- May) during which the demand for semi-skilled Zari work lowers. During this period, there is lack of work and women workers remain virtually jobless. During the Pandemic times, home based women Zari worker was literally jobless.
- **Very meagre wages -** The most significant vulnerability found in Zari industry is the decreasing wage rate of Zari work. Due to competition from machine made Zari work, the market for hand-made Zari products has been depreciating gradually. Currently there is too much availability of workers compared to the availability of work. As a result of which Women Zari workers lack the Bargaining power. The wage rate of hand-made semi-skilled, home based Zari work is getting worse day by day.
- **Uncertainty of Work / Fluctuating Income.** – Hand-made, home-based Zari work is extremely uncertain. There was no work during Pandemic, leaving the women Zari workers literally jobless.
- Lack of access to credit, technology, and skill results in marginality of women Zari workers.
- Health Hazards commonly associated with women Zari workers are eye problem, Musculo-skeletal problem, shoulder pain, upper back ache, lower back ache, neck pain, pain in legs, pain in arms etc.
- Poor working condition in home, cramped space, improper lighting, sitting in the same position for a prolonged time results in the aforesaid health hazards of women Zari workers.
- Women face difficulty in concentration in house, especially with young children, and other domestic responsibilities which the male workers do not face.

CONCLUSION

The realities point out that in the huge numbers of Zari working households in Bengal, the conditions under which women sell or withdraw their labour power tend to be different from those in which men sell their labour power. Women's employment is governed not by their free choice in the labour market, but by multiple ideological and gender considerations.

Social and Cultural norms continue to mediate decisions regarding work- whether to work, the type of work and how to work. Unlike wen, women, thereby lack the agency and freedom to work. Thus, despite the highly exploitative nature of work, Home-based Zari work continues to remain a feasible and conventional work option as it runs in the family and do not confront the patriarchal norms of domesticity. Thus, what needs to be done is to reduce the vulnerability and exploitation of women Zari workers, by initiating several empowerment and skill development initiatives. Educating, raising awareness on different livelihood programs, enhancing the direct linkage with various SHGs by reducing the exploitation of *ostagars* can be some meaningful endeavors in empowering the hugely exploited home based women workers.

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TRAINING OF PERSONS WITH VISUAL IMPAIRMENT IN MODULE ON PACKER UNDER APPAREL SECTOR SKILL COUNCIL

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ABSTRACT

Persons with visual impairment are highly sensitive, disciplined people, they are very keen to learn new things, have a much-focused attention span, and their weaknesses are primary lack of vision. They can perform variety of tasks for which sight is not needed after receiving a certain amount of training. Thus, given an opportunity, person with visual impairment can become productive citizens and participate in National Development. In the view of the above, research study was planned to conduct the training of persons with visual impairment in the module on 'Packer' to check its feasibility. The purposive sampling technique was used to select three trainees with visual impairment who were willing to undergo training in the Packer module. Training on different tasks as mentioned in the module was conducted with the help of an experienced trainer from the NGO using appropriate training strategies and predetermined training sequence under constant supervision. During the training, any limitations faced were recorded and alternative solutions and tactile learning aids were suggested. Time taken by the trainees for learning each task was noted so that the total duration of the course can be decided. The performance of trainees was assessed daily as well as after the completion of each unit of the module. Towards the end of the training, efforts were made to place the trainees in the packing department of garment manufacturing units. Results revealed that persons with visual impairment could perform many of the tasks mentioned in the module on packer. The speed and accuracy of the trainees improved significantly with practice.

KEY WORDS: Disability, garment industry, garment packer, training module

INTRODUCTION

Visual impairment is a sensory impairment more that 40% in one or both eyes leading to severe or total loss of vision (PWD Act, 1995). It limits the individual's developmental processes and integrated functioning for the rest of the life (Mohapatra, 2004). It includes both blindness and low vision (PWD Act, 1995). Blindness refers to a condition where a person suffers from total absence of sight, visual acuity (sharpness of vision) not exceeding 6/60 or 20/200 in the better eye even with correction lenses or limitation of the field of vision subtending an angle of 20 degree or worse. Low vision is defined as the impairment of visual functioning of a person even after treatment or standard refractive correction. However, he / she can use vision with appropriate assistive devices (Banerjee, 2004).

According to The Department of Empowerment of Persons with Disabilities (Divyangjan), Government of India, 2.68 crore population is suffering from some kind of disability, out of which 19% have visual impairment (Disability in India, 2021). The Rights of Persons with Disabilities Act, 2016 recognizes persons with disabilities (PwDs) as a valuable human resource seeking to create an environment of equal opportunities, and full participation in society. The Sustainable Development Goals (SDGs, 2015) also pledges for 'leaving no one behind'. Vocational rehabilitation of persons with visual impairment aims at developing and enhancing their functional abilities, resulting in economic contribution to self and restoring confidence (Pandey and Advani, 1996; Kundu, 2003).

The garment industry can play a significant social role by opening vast employment potential for persons with visual impairment as it is highly labour intensive in nature. The garment manufacturing process involves lots of routine and repetitive operations on which persons with visual impairment can be trained easily (Chahal, Sekhri & Mathur, 2015). Malik (2001) conducted a study on training of persons with visual impairment in tasks involved in manufacturing of men's shirt like cutting of fusing with fly press, armhole/side seam fusing and pocket creasing. Goel (2007) made an attempt to train persons with visual impairment in the tasks of buttonholing and button stitching using gauge developed by Singh (2002) from IIT-Delhi. This gauge was improvised by Nigam and Jain (2006) from NIFT- Delhi, to make it smaller and usable attachment in the industry.

Hence, the garment manufacturing industry can help them rehabilitate by providing adequate training and suitable jobs. Persons with visual impairment are considered suitable for working in the industry because they have a remarkable capacity for learning and they can overcome their natural shortcomings by heightened concentration, sensory powers and a sense of commitment to the job.

In order to cater to the needs of PwD "Skill Council for Persons with Disability" (SCPwD) was established in October 2015 under "Ministry of Skill Development and Entrepreneurship". It aims at providing skill development to PwDs as per industry requirements which in turn would help them in gainful employment (http://scpwd.in/). As a result, the SCPwD collaborated with different organisations / institutions to take this initiative forward.

This study was conducted in association with "National Association for Blind- India Centre for Blind Women and Disability Studies" (NABCB). It is the centre for empowerment and rehabilitation of women with visual impairment in India and the only centre to conduct job mapping studies for persons with visual impairment in India (http://nabcentreforwomen.org/about-us/). Field testing of course on packer offered by "Apparel Made-Up and Home Furnishing Sector Skill Council" (AMHSSC) was conducted for persons with visual impairment. Packer is a job role in finishing department of garment manufacturing unit. Responsibilities of a packer include folding of garments, tagging, poly-packing, box packing and maintaining all the quality parameters while performing these tasks.

OBJECTIVES

Keeping in view the above, the study was undertaken with the following objectives:

1. To conduct training of Persons with Visual Impairment in module on "packer in Apparel Industry" proposed by Apparel Made-Up and Home Furnishing Sector Skill Council.
2. To identify the problems faced during the training program and accordingly suggest appropriate solutions.
3. To document the performance of the trainees during the training program.

METHODOLOGY

It was a need-based study directed towards analysing the feasibility of the module on Job role "Packer" for training of persons with visual impairment. One of the major concerns requiring immediate attention for persons with visual impairment is to identify job roles in which they can be trained leading to their gainful employment.

The methodology adopted for carrying out the research was as follows:

Locale selection

The study was conducted at National Association of Blind- India centre for Blind Women and Disability Studies (NABCB) located in Hauz Khas Enclave in Delhi, an NGO with hostel and training unit for women with visual impairment.

Sample selection

The purposive sampling technique was used to select three trainees with visual impairment who were willing to undergo training in the Packer module. They were selected by the training coordinator at NABCB, New Delhi based on their capabilities and aptitude. The sample size was kept small due to the time constraint and individual attention required for training persons with visual impairment. The criteria for selection of trainees were as follows:

- The trainees were having visual impairment more than 40%.
- They were students of the selected NGO and staying in its hostel.
- The trainees were above 18 years of age.

Training of persons with visual impairment

Training of persons with visual impairment on different tasks as mentioned in module was conducted with the help of the trainer from the NGO who had the experience of dealing with persons with visual impairment. The training was conducted five days a week from 10 a.m. to 5 p.m. for three months. The progress was constantly measured in terms of learning ability, attention span, accuracy, and working speed. Any limitations faced by the trainees were recorded and efforts were made to suggest alternative solutions and tactile learning aids.

Training strategies

The module on Packer was developed keeping in mind persons with normal sight. This was the first time when persons with visual impairment were trained in this module. Working with them is very challenging as they often require specific adaptations to ensure their emotional and educational growth. Hence, following strategies were followed while training:

- The language used in the module was simplified for ease in understanding and remembering. While explaining some concepts, objects were used for three-dimensional representations like material required for packing, different sizes of carton boxes, labels, tags, etc.
- Tactile sense was used to familiarize them with the various parts of an object one by one so that they can visualize the comprehensive picture in their mind.
- The language used was descriptive and specific in nature like straight, forward, left, etc. in relation to trainee's body orientation. The trainees were called by their name if his or her attention was required.
- Work area was kept safe and materials were always kept in one place for ease in locating.
- The trainer did not leave without informing the trainees.

Training Sequence

The training sequence followed for the training process was as follows:

- They were trained in social skills related to work behaviour for initial adjustment/ rapport formation.
- The theoretical content and the practical tasks were broken into small steps and explanation / demonstration was given to each trainee individually.
- Basic motion skills isolated through scientific analysis of each task were described slowly and clearly to trainees individually using the training strategies specified above.
- Regular reinforcement of the task was done and ample time was given to learn and practice till he/she acquired the desired level of mastery over the skill.
- Trainees were encouraged to give their opinions, raise questions, and discuss problems with the trainer and with each other.
- Care was taken to ensure the correct workmanship from the beginning itself, so that they developed it as a habit.
- Adaptations and alternative solutions were suggested wherever required to make the content aligned for training of persons with visual impairment.
- The performance of trainees was recorded daily as well as after the completion of each task and compared with industry standards (standard allowed minute for each task) to establish the level of efficiency achieved.
- Visit to garment manufacturing unit was planned every 2-3 weeks for better understanding and learning.

FINDINGS AND DISCUSSION

Trainee A was born with normal vision, but she lost 100% vision at age of 2 years (adventitious impairment) due to some medical complication. Trainee B was suffering from congenital impairment i.e., vision was 100% non-functional since birth. Trainee C, was born with vision only in left eye which further got affected at the age of four leading to 75% impairment (Table 1).

Table 1: Demographic details of the Trainees

Trainees	Age	Gender	Severity of Impairment	Educational Qualification	Technical Qualification
A	20 years	Female	Profound degree of impairment (100%)	Higher secondary level (10th standard), Regular School	Nil
B	20 years	Female	Severe impairment (75%)	Elementary level (8th standard), National Institute of Open Schooling	Computer applications
C	22 years	Female	Profound degree of impairment (100%)	Senior secondary level (12th standard), Regular School	Nil

Specific tasks related to job role

Training was initiated based on the sequence followed in the module.

Task 1 involved familiarizing the trainees with the functioning of apparel industry and its expected growth rate, its sectors, basic terminology related to garment manufacturing and fabrics, the roles, and responsibilities of a packer. This basic understanding helped the trainees in visualising the vastness of the industry and importance of his/her role as a packer in the industry.

The statistical data on growth rate of Apparel sector mentioned in the module was confusing and difficult to remember. Hence, only very important data was required to be given. The content was explained verbally along with the tactile charts and models. It was reinforced in subsequent classes for better retention.

Task 2 focussed on introducing the trainees to the processes performed in finishing department, objectives of packing, materials and accessories required for packing. The trainees were given hands-on experience of visualising the packing material through tactile sensation. A visit to the garment manufacturing unit was planned for further understanding through interaction with the operators and the supervisor of the finishing department (Figure 1). The trainees were provided with Braille slate stylus for taking notes during the visit or they could record the conversations for further reference.

Figure 1: Trainees at Garment Manufacturing Unit

The purpose and use of each item was explained side-by-side for ease in remembering. Trainee B achieved maximum efficiency (92.8%) followed by trainee C (71.4%). Whereas trainee A achieved 57.1% efficiency only.

Task 3 was to practically learn methods of folding different garments. The folding of the garments was successfully done by the trainees through step-by-step demonstration and practice. The trainees learned and performed folding of various garments like men's shirt, pants, short skirt, T-shirt, and kurta as shown below (Table 2). The table highlights the time taken by trainees for folding different garments and the improvement in performance after continued practice. Assessment of the performance in comparison to standard time allowed for the task in the industry, it was found that all the three trainees were able to achieve efficiency above 70%.

Table 2: Time taken for folding of garments at the initial and final phase of training

Garments	Trainee A		Trainee B		Trainee C	
	Initial	**Final**	**Initial**	**Final**	**Initial**	**Final**
Men's shirt folding	4m9s	1m13s	6m8s	2m29s	5m37s	1m49s
Pant folding	2m41s	1m43s	2m17s	1m34s	1m47s	1m18s
Skirt folding	1m53s	1m9s	1m36s	1m2s	1m19s	55s
T-shirt folding	3m9s	1m13s	2m44s	1m16s	2m24s	1m9s
Kurta folding	4m	2m19s	3m26s	1m29s	2m57s	1m19s

The constraints faced during training on folding of garments included forgetting some steps involving use of packing material and confusion between materials like inner / outer collar bands, crepe paper / tissue paper and back support boards. However, constant supervision and practice helped them in doing it correctly.

Analysis of overall performance of trainees in folding of garments revealed that trainee C had achieved maximum efficiency (92%). Moreover, trainee A and trainee D also showed good performance of 84% and 88% efficiency respectively (Figure 2).

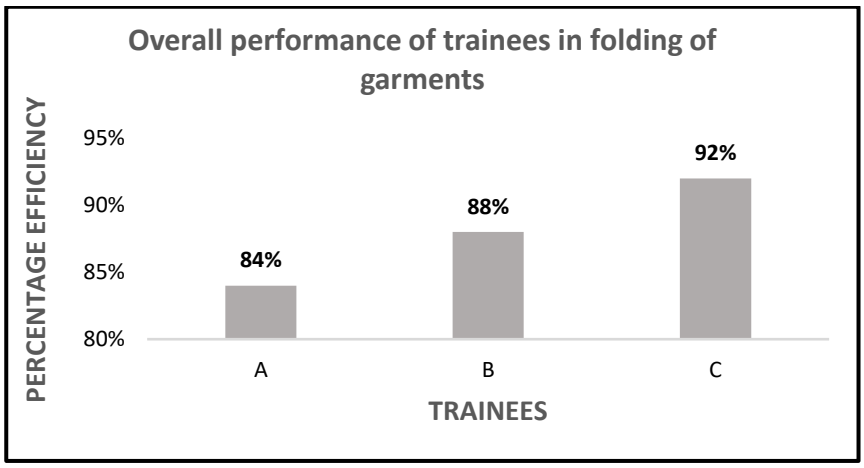

Figure 2: Overall performance of trainees in folding of garments

Task 4 involved familiarizing the trainees to different types of cartons, packing types with respect to garment colour / size and practically performing the task of carton making. These cartons or boxes were used for packing of garments before sending for shipment. The procedure of making carton boxes was demonstrated to the trainees (Figure 3). All the trainees were able to learn and perform the task well after some practice.

Figure 3: Trainees learning to make corrugated boxes

Task 5 was focussed on carrying out the actual packing of garments in the polybags as per the job card specifications. Hands-on training was given for performing the process and enough time was given for practice. Quality aspects related to packing of garments were ensured during the training. In the shirt packing activity, trainee A achieved maximum efficiency (95%). However,

trainee B had achieved minimum efficiency (73%), and trainee C achieved 87% efficiency (Figure 4).

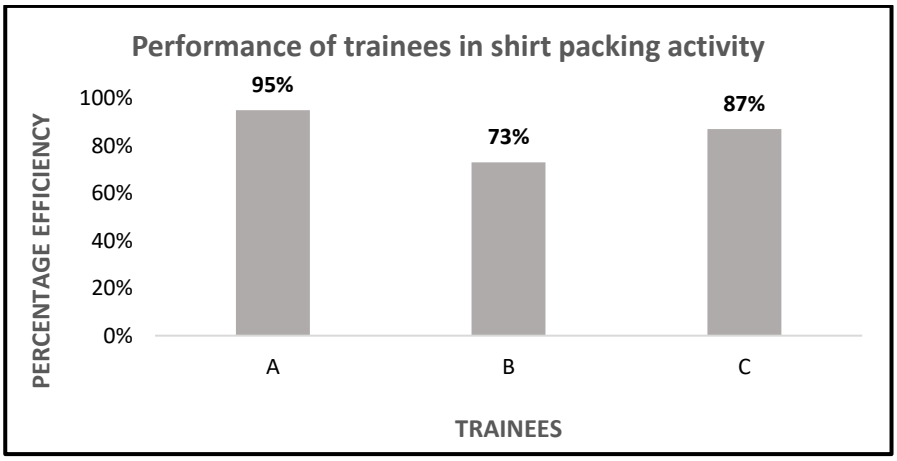

Figure 4: Performance of trainees in shirt packing activity

Besides these tasks, some additional tasks like identification and rectification of defects in garments, understand and identify labels, weighing of garments prior to packing and preparing for shipment were also included in the module.

The content included defects related to fabric, accessories used in garments, stitches and seams used for assembling garments etc. Persons with visual impairment would not be able to identify or rectify defects, hence, this content can be removed or minimized. It was further felt that information on defects at different levels of manufacturing is too wide and not directly related to the job of Packer in the industry.

Similarly reading and understanding of garment labels would not be possible for persons with visual impairment. Trainees were made to feel different types of labels for their size, shape and texture along with verbal instructions. Assistive devices such as pen friend or labeller / code reader was provided to the trainees for reading the contents of the label. It was suggested that since detailed theoretical content on care labelling systems was not required for this job role, it can be simplified.

The concept of weighing was explained by giving a demonstration individually to each trainee. Audio weighing machine was used for this purpose so that the persons with visual impairment can function independently.

The task of preparing for shipment of garments is a very crucial responsibility involving lot of documentation and cannot be handled by persons with visual impairment. At the industry level, packing department has group of people working as a team and performing only specific job responsibilities assigned to them by the supervisor. Also, the Job Role of Packer is level 3 course where the person works under close supervision. Hence, all the additional information mentioned in the training module can be removed.

General tasks on preparation for employability and better adjustment at workplace

Besides, the job specific tasks discussed above, the curriculum included some general topics which helped the trainees to prepare for employability and better adjustment at workplace.

The module included a unit on basic knowledge required to maintain health, safety, and security at the workplace. Orientation to the workplace and awareness on occupational safety and health hazards is essential for a person with visual impairment so that he/she is well adjusted and performs adequately. It was suggested that trainees are trained in independent mobility and signage should be installed in Braille for ease in identification. Support should be provided to the person with visual impairment through buddy system were a sighted person assists him/her during mock drills and evacuation.

Another unit in a module laid emphasis on providing training for correct handling, maintenance, and storage of tools and equipment. Trainees should be able to maintain their work area and dispose off waste in the right place. This will help in avoiding any accidents and wastage of time in locating the materials.

Unit on organizational work ethics, policies, regulations, etc. was also part of the module so that the trainees are well-informed and better adjusted in the new work environment. It was suggested that the detailed description on the topics could be avoided and only very basic information which is directly related to the job of packer should be included. Workshops should be organized from time to time during the training period, emphasizing one aspect at a time for better retention.

For better adjustment in the work environment, a unit was included in the module which focussed on having a positive attitude towards work, time management, good communication skills, healthy interaction with co-workers and supervisors, personal grooming and hygiene etc.

Three additional units on IT Skills; carrying out first aid and CPR; employability & entrepreneurship skills were not found related to the level 3 job role of packer and hence were not recommended to be included in the training.

The module on Packer was developed keeping in mind persons with normal sight. This was the first time this module was conducted for persons with visual impairment. This module takes 180 hours to be conducted for a normally sighted person. However, after training of persons with visual impairments in this module on Packer, it was found that 260 hours would be required for training them as they would be taking more time in understanding and remembering the concepts and practical tasks. After the completion of the training module, trainees were inducted into an internship in different GMUs. Trainee A was very good at work and got a job opportunity in the same unit.

It was recommended that the module on Packer could be slightly modified as per the needs of persons with visual impairment. These were as follows:

- The content could be simplified and given very briefly to avoid confusion. Only very basic information which is directly related to the job of packer should be included.
- Few tasks mentioned in the module like identification and rectification of defects, weighing of goods, final carton packing etc. could not be performed by persons with visual impairment.
- Exercises and activities in the module should be modified so that these can be done orally or through practical demonstration.

- It was also suggested that the packer module could be in Braille and have tactile charts/graphs or voice recordings cab be provided.
- Assistive devices such as Braille Memo/Braille slate stylus or angel recorder, Pen friend or Labeller / code reader, tactile measuring tape, audio weighing machine and audio calculator can be provided to the trainees.
- Training strategies, preparatory work for trainer, training sequence and process of assessment should be added in the module.
- Mobility training, orientation to the workplace and awareness on occupational safety and health hazards is essential in order to maintain health, safety, and security in the Packing Department.
- Support should be provided to the person with visual impairment through buddy system were a sighted person assists him/her during mock drills and evacuation.
- Workshops by the HR Manager of the Apparel Industry should be organised for understanding Compliance Standards and various Regulatory and Organizational Requirements.

SUMMARY AND CONCLUSIONS

Results of the study highlight that persons with visual impairment could perform many of the tasks mentioned in the module on packer. To conclude, it can be stated that persons with visual impairment belong to a special category who require sensitivity and proper guidance. There are many jobs, which can be easily performed by them if appropriate strategies are adopted while training as suggested above. With practice and guidance, persons with visual impairment can gain competency in repetitive tasks.

SUGGESTIONS FOR FUTURE RESEARCH

Due to limitations in time and logistics, the study could be conducted with only three trainees. The study can further be carried out in number of organisations working with persons with visual impairment. The trainers in these organisations can be trained so that they are well equipped to independently conduct training of the trainees. Moreover, other modules under apparel and textile sector skill council can also be taken up for feasibility testing.

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4

ENHANCING INDO-WESTERN ATTIRE WITH WARLI PRINT: A STENCIL PRINTING EXPLORATION

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ABSTRACT

This research endeavor is dedicated to investigating the incorporation of Warli prints on Indo-western attire using the stencil printing method. Warli prints, deeply rooted in tribal artistry, draw inspiration from nature and hold a significant place in the realm of textile and fashion design. Indo-western dresses represent a fusion of traditional Indian garments and Western fashion, steadily gaining favour among fashion enthusiasts. Stencil printing, a technique that employs stencils to apply ink or paint to surfaces, plays a pivotal role in textile printing, particularly in the crafting of intricate designs. The research adopts a qualitative research approach, encompassing a comprehensive review of existing literature concerning Warli prints, stencil printing, and Indo-western fashion. In addition, interviews were conducted with fashion designers and textile printing experts to gain valuable insights into the application of Warli prints through stencil printing on Indo-western attire. The findings suggest that Warli prints can be effectively transferred onto Indo-western dresses through stencil printing, resulting in a sophisticated and high-quality finished product. The utilization of stencils facilitates precise and accurate print application, lending a distinctive and creative touch to the garments. Consequently, Indo-western attire featuring Warli prints stands out in the landscape of traditional Indian and Western wear. This study ultimately underscores the potential of Warli prints and stencil printing as powerful tools for elevating the design and aesthetic allure of Indo-western dresses.

Keywords: Warli Tribal Art, Stencils, Fabric Printing, Traditional Indian wear, Tribal Design, Precision printing.

INTRODUCTION

Art is a profound manifestation of the human soul, transcending specific forms and encompassing both the tangible and the abstract. It speaks through the eyes but resonates in the spirit, serving the primary purpose of evoking joy and peace (Tribhuwan, 2003). In all its myriad forms, art is a direct conduit for the artist's emotions, embracing a diverse spectrum of human creativity and modes of expression, including music, literature, sculpture, and painting. It arises from an intrinsic desire to embark on a painstakingly creative journey, leaving a lasting impact Anjum and Kunwar (2019).

Indian art stands as one of the world's most enriching artistic traditions, casting an irresistible spell once experienced. This nation boasts a multitude of art forms, each celebrated for its unique designs and textiles. Notably, the rural folk paintings of India boast vibrant, religious, and magical motifs. Distinguished examples include the Patachitra paintings of Orissa, Nirmal paintings of Andhra Pradesh, Madhubani paintings of Bihar, and the Warli paintings of Maharashtra, representing folk and tribal art (Dadawala, 2022).

The term "Warli" derives from "warla," meaning 'piece of land' or 'field.' Warli paintings, originating from Maharashtra, are an ancient form of Indian art dating back to the Neolithic Joshitha (2023), This tribal art form exemplifies the remarkable skill of local artisans and preserves the rich cultural heritage of the region period (Masram,2019). It conveys religious reverence, socio-cultural traditions, and collective experiences handed down through generations, echoing the significance of historical events and locations. Warli art, a specialized form of wall painting, showcases distinctive designs that can be adapted for use on textile products with minor modifications. These paintings primarily employ a set of basic geometric shapes-circles, triangles, and squares-each symbolizing different elements of nature. The circle symbolizes the sun and moon, while the triangle represents mountains and trees. The square signifies human intervention, indicating cultivated areas or parcels of land. Central to ritualistic paintings is the square, known as "chauk" or "chaukat," comprising two main types: Devchauk and Lagnachauk. Devchauk often features an image of Palaghata, the mother goddess symbolizing fertility (Yakar, J.,2017).

Warli art seldom depicts male deities, as they are rare in this culture and are usually associated with spirits taking human form. Besides depictions of religious ceremonies, these paintings capture everyday life in the village, with the walls themselves made of a mixture of branches, earth, and cow dung, providing a reddish-brown backdrop (Dipika,2018). White is the sole pigment used in Warli paintings, created from a blend of rice paste, water, and gum as a binding agent. One prominent theme in Warli paintings is the Tarpa dance, where a trumpet-like tool is played by different village men in turns. This dance involves men and women intertwining their hands, moving in a circle around the Tarpa player (Uberoi et al., 2002).

The dancers, imitating a symbolic snake, never turn their backs to the Tarpa. The Tarpa player's notes guide the dancers, determining whether they move clockwise or counterclockwise, creating a dynamic and engaging spectacle that reflects the circle of life.

OBJECTIVES

Create stencil printing based refined Warli motifs and integrate them with diverse patterns, and customize them for application on Indo-Western attire.

RESEARCH METHODOLOGY

The research methodology for the investigation titled " Enhancing Indo-Western Attire with Warli Print: A Stencil Printing Exploration" comprises two main phases: the exploratory phase and the experimental phase. Here is a detailed discussion of the material and methods employed in each phase:

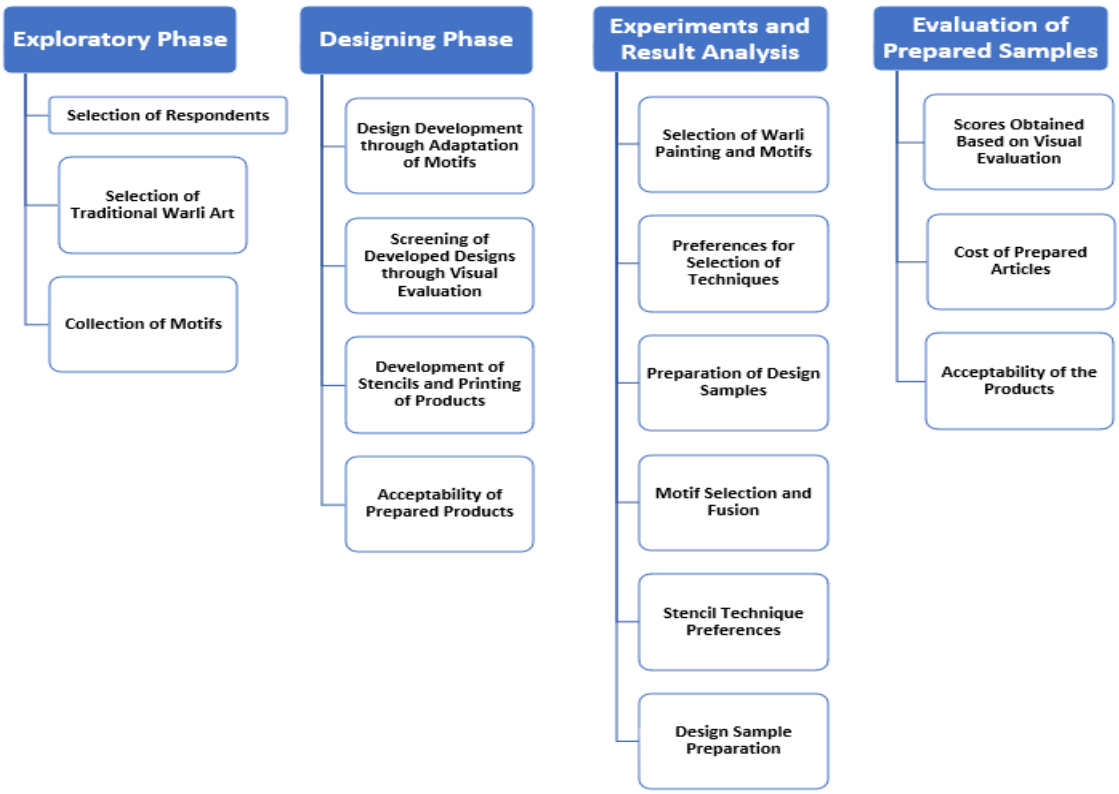


Figure 1: Design of Research Methodology adopted

Figure 1 illustrates the research methodology's design, which is structured into four distinct phases. The research journey commences with the exploratory phase, primarily aimed at data collection and the identification of respondents, which encompasses the Selection of Traditional Warli Art and the Collection of Motifs. The second phase is dedicated to comprehensive design tasks, including Motif Selection and Fusion. The remaining two phases are centered on conducting experiments and assessing the results. Detailed descriptions of each phase are provided below.

Exploratory Phase

- **Selection of Respondents:** The study was conducted in Patiala city, chosen for easy accessibility. Due to pandemic conditions, experts were selected through Zoom app. These experts, comprising peers knowledgeable in the field, were asked to provide their preferences for motifs and designs suitable for adaptation into Warli art.
- **Selection of Traditional Warli Art:** Traditional Indian paintings were researched through various sources such as the internet, books, magazines, and newspapers. Warli paintings were chosen based on information gathered regarding their motifs and designs, with experts ensuring their suitability for stencil motifs on apparel.
- **Collection of Motifs:** Motifs from Warli paintings were gathered from various sources, including the internet, magazines, and newspapers.

Design Phase

- **Design Development through Adaptation of Motifs**: Suitable motifs were carefully selected and adapted for creating new designs for different apparel articles. The arrangement of these motifs was performed both manually and with the assistance of design software like "Corel Draw" and "Adobe Photoshop." A total of five designs were developed for Indo-Western apparel.
- **Screening of Developed Designs through Visual Evaluation:** The five designs were visually evaluated to select the two most preferred designs from the pool. This evaluation was conducted by an evaluator and peers. The designs were ranked based on various attributes, including motif arrangement, design appropriateness, color combinations, and overall appearance. A five-point scale was used for evaluation, with ratings of 1 to 5 corresponding to poor, fair, good, very good, and excellent, respectively.
- **Development of Stencils and Printing of Products:** The selected designs were used to create stencils. These stencils were prepared by tracing the motifs onto blank stencil sheets and carefully cutting them with a sharp-edged knife for precise finishing. The stencils were then used to print the selected designs onto various apparel items. The cost of each product was calculated by considering raw material costs (fabric, stencil, colors, etc.), labour charges, and finishing costs. A sale price was determined by adding a 25% profit margin to the cost price.
- **Acceptability of Prepared Products:** Each prepared apparel article underwent evaluation to determine its acceptability. Fourteen individuals participated in the evaluation, and they were provided with a ranking form to assess the products. Attributes considered for evaluation included color combinations, design suitability for the end products, cost range, suitability of surface enrichment techniques used, and overall appearance. Products were ranked on a scale of 1 to 5, where a rank of 1 indicated poor acceptability and a rank of 5 signified excellent acceptability.

This research methodology enabled a systematic investigation into the adaptation of Warli art for stencil motifs on apparel, from the initial exploratory phase through to the experimental phase, encompassing motif adaptation, design evaluation, stencil creation, product printing, and final acceptability assessment.

EXPERIMENTS AND RESULT ANALYSIS

- **Selection of Warli Painting and Motifs:** Due to the pandemic, experts were selected through Zoom to give preferences for motifs and designs for adapting Warli art. Traditional Indian paintings were researched online and in various publications to gather motifs and designs. Experts assessed the suitability of Warli paintings for stencil motifs on apparel, considering their cultural and artistic relevance. Some of the samples are shown in Figure 2.
- **Preferences for Selection of Techniques:** Stencil techniques were chosen as they provide a different, more accessible approach to create Warli art, especially during the pandemic. Stencil techniques were favored for their distinctiveness and time-saving advantages.
- **Preparation of Design Samples:** Suitable motifs were selected for creating new designs for apparel. Motifs were arranged manually and using software like "Corel Draw" and

"Adobe Photoshop." Five designs were generated for Indo-Western apparel. Visual evaluation was conducted to select the two most preferred designs based on motif arrangement, appropriateness, colour combinations, and overall appearance, using a five-point rating scale.

- **Motif Selection and Fusion:** During the pandemic, experts selected motifs via Zoom, merging traditional Warli motifs with online resources. The fusion of motifs from Warli art, reflecting rituals and village life, was refined by experts to create new designs (Rao,2022).
- **Stencil Technique Preferences:** Stencil techniques were chosen due to their distinctiveness and ease of use, particularly during pandemic restrictions**.**

Figure 2: Design Sample

Source: Varalakshmi (2023)

Design Sample Preparation: Suitable motifs were manually arranged and digitally designed using "Corel Draw" and "Adobe Photoshop."

Five Indo-Western apparel designs were created and assessed visually, resulting in two preferred designs.

This succinct version captures the key steps of the study's methodology, emphasizing motif selection, technique preferences, and design preparation.

Evaluation of Prepared Samples

The evaluation of the designed samples is a crucial aspect of this investigation, which has been summarized as follows:

Developed Designs: The designs created for various apparel articles were visually represented using "Corel Draw."

- **Scores Obtained Based on Visual Evaluation**: A scoring system was employed to assess the designs of the Western dresses, with the scores recorded within "Corel Draw."

Table 1: Evaluation label description

Label	Description
D1	The design labeled "Plain White Shirt with Full Circular Tie and Dye Skirt with Stencil Printing (D1)" secured the fourth position.
D2	Following closely in terms of the score was the "White Shirt with Brown Stencil Printing and Half Circular Printed Skirt (D2)," which secured the second highest rating.
D3	Notably, among the designs developed for dresses, the design denoted as "White Shirt with Frock and Tie and Dye Full Circular Skirt (D3)" garnered the highest score. This design was distinguished by its unique combination.
D4	The "Brown Printed Skirt with White Shirt and a Border (D4)" was rated third, with the design incorporating a brown printed skirt and a shirt adorned with a border.
D5	Lastly, the "Randomly Stencil Printed Shirt with Full Circular Skirt (D5)" was awarded the fifth score. All these designs were created and implemented using stencils.

Table 1 shows the evaluation process, based on visual assessments and scores, and provides a comprehensive overview of the designs for Western dresses. It highlights the preferences and performance of each design, offering valuable insights into their appeal and potential success in the context of the study.

The financial feasibility and cost estimation aspects of the study highlight the balance between cost and product acceptability, showcasing the value of appealing design and colour combinations in the apparel industry (Patil,2017).

The financial aspects of the study are summarized with a focus on the cost of the prepared articles and the acceptability of the products.

- **Cost of Prepared Articles:** The costs of the prepared products are documented in a detailed table.
- **Acceptability of the Products:** Each printed article underwent a visual evaluation to determine its acceptability. The results of this evaluation are presented in a separate table.

It was noteworthy that, despite the higher cost associated with "D3" (featuring a sky-blue tie and dye printed skirt and a white kurti with Warli art in sky-blue color), it was the top preference. This was attributed to its appealing colour combination and overall neatness.

Similar trends were observed among the various prepared dresses, emphasizing the significance of these attributes in determining product acceptability.

Table 2: Estimation and profit margin

Items	Consumption (Units)	Rate (Per Unit)	Value (in Currency)
Sky Fabric	5 meters	150/meter	750
White Fabric	4 meters	120/meter	480
Stitching	1 unit	1000	1000

Stencil Cost	1 unit	100	100
Colors	4 packs	20	80
Embellishment	6 units	-	150
Printing	1 unit	-	500

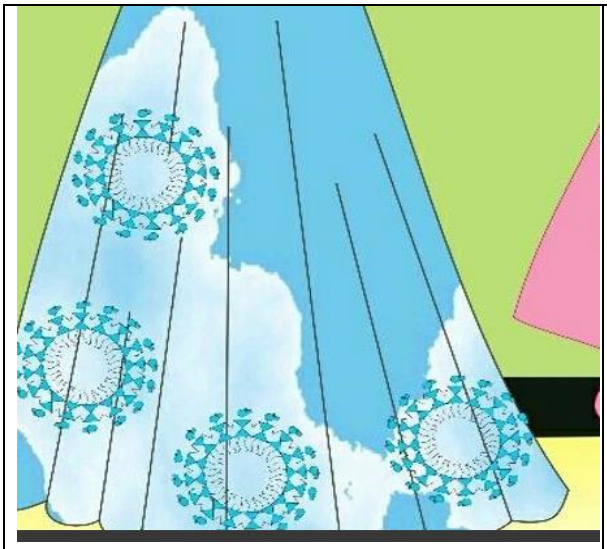
| Actual Cost =3,060 | | Profit Margin =440 | | Sale Price= 3,500 |

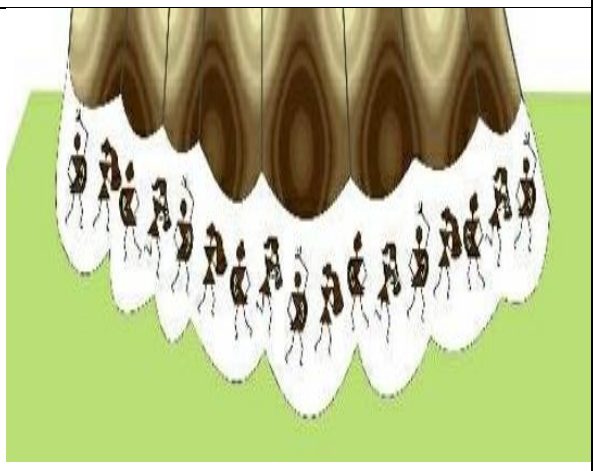
As shown in Table 2, the results of this evaluation were recorded and summarized in a table for clarity. Notably, despite the fact that one of the dresses, denoted as "D3," had a higher production cost (specifically, a sky-blue tie and dye printed skirt combined with a white skirt-type kurti featuring Warli art in a matching sky-blue colour), it was consistently preferred as the top choice.

FINAL OUTCOME OF THE PRODUCT

Each printed article was meticulously examined through a visual evaluation process to determine its acceptability, which essentially means assessing how well it met certain criteria or standards.

Table 3: Samples of the final product design and printing





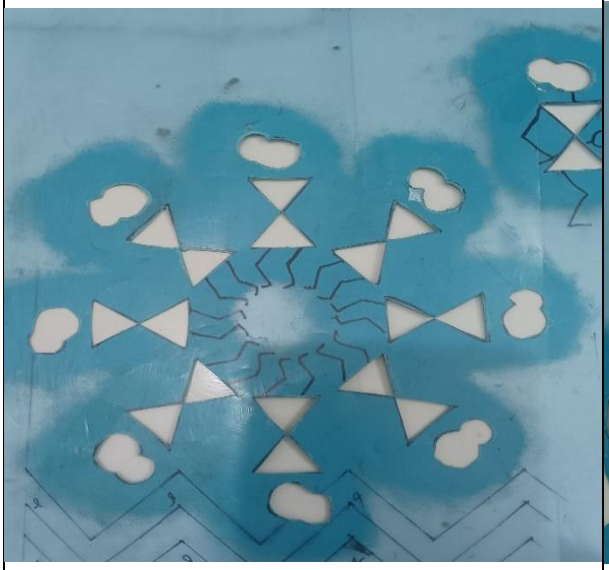


Table 3 shows some of the sample design and printing performance of the present research work(Fusion of Warli Motif). This preference was attributed to the exceptionally appealing colour combination and the overall sense of neatness in its design and presentation. Importantly, similar trends of preference were observed among the other prepared dresses, indicating the significance of colour coordination and visual appeal in determining the acceptability of the products.

SIGNIFICANCE OF THE STUDY

The significance of this study lies in its potential to revolutionize the time-consuming and labor-intensive process of designing through the intricate Warli painting technique. By amalgamating Warli art with diverse artistic methods, this endeavor seeks to make the design process more cost-effective. This innovative approach addresses the contemporary demand to preserve our ethnic designs and art forms. It ensures that our rich cultural heritage remains alive and thriving, adapting to the needs of the present era.

Furthermore, this initiative is a means of safeguarding our traditional heritage while seamlessly integrating it into modern textile production. In doing so, it paves the way for the creation of a new range of textiles that harmoniously blend tradition and innovation, thus propelling the textile industry forward.

CONCLUSION

It can be concluded that the adaptation of Warli motifs for designing apparel articles through stencil printing proved to be highly successful, with a particular emphasis on the remarkable appreciation and acceptability of the prepared products. Among them, the sky-blue tie and dye printed full circular skirt paired with a white shirt type kurti featuring sky-blue stencil printing garnered significant acclaim. The cost of these apparel products fell within the range of 3,200/- to 3,500/-. This study highlights the efficacy of utilizing Warli art motifs in the development of stencils, which can be preserved for extended use. It also underscores the craftsmen's deep awareness of the craft's history, and how the method has evolved to meet the growing market demand. Traditionally, Warli art adorned mud walls, but today, it finds its place on a wide array of fashion apparel and home textiles. Unfortunately, a lack of an organized market creates challenges in marketing these products. Additionally, the younger generation is exploring different career avenues, impacting the continuity of this traditional craft. Meanwhile, the discussion on Georgette

fabric, its versatility, and the choice of Indo-western dresses for incorporating Warli art emphasizes the fusion of Western and Asian fashion, adding a contemporary and creative twist to traditional artistry.

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5

ANTIBACTERIAL EVALUATION OF *BAUHINIA VARIEGATA* L. EXTRACT FINISHED COTTON AND BAMBOO FABRICS

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[2]HSAI Membership No. HSAI-2023-TN-1389-LF

ABSTRACT

With the aim of finding optimum finishing conditions on two different fabrics using *Bauhinia variegata* L. extracts. Optimization of dyeing parameters are herbal concentrations (1, 2 and 3%), binder concentrations (1, 2 and 3%) and wet pick-up percentage (50, 100 and 200%) was used for finishing two different fabric samples (100% cotton, 100% bamboo). Antibacterial activity (EN ISO 20645 test method) was used as a functional test to experiment with all the samples finished using different optimized conditions. In cotton and bamboo, RUN-15 finished with 3% herbal concentrates showed maximum inhibitory zones. The thickness of the finished fabric did not differ significantly from the control samples. Air-permeability and wicking properties were also not altered after finishing with selected herbal concentrates; indicating that the optimum finishing conditions do not affect the ideal properties of all two fabric samples. The obtained results showed that the *B. variegata* herbal extract finished cotton and bamboo fabrics, which are nontoxic, antibacterial and eco-friendly natural dyed fabrics for home textiles. Significantly, this can protect from different nosocomial infections which spread through contaminated textile materials.

Key words: Antibacterial, Dyeing parameters, Incubation, Inhibitory zones, Natural dye

INTRODUCTION

Nosocomial infections are caused by different microorganisms that disseminate from one person to another through various sources in the health care sectors. Textiles and fabrics are one among the significant sources that harbors bacteria and other microbes. As different antibacterial agents were used to finish textile materials, herbal extracts were considered a safe and natural agent to prevent the attachment of microbes onto the surface or interstices of the fabric materials. Although the manufacture of textiles is an ancient craft, mass production of textile has drastically altered the pace and size of mass production with the advent of modern techniques (Thomas, 2006). A range of natural fibers and man-made fibers, with enhanced comfort and anti-microbial properties, have been introduced in the market. Wide-ranging opportunities exist for substantial development and research which transform the range to high value products, such as functional bed linens, sanitary products, wound dressings, tissue engineering scaffolds, gowns and medical linens (Rajendran and Anand 2002). Antimicrobial fabrics are especially beneficial nowadays in hospitals and in environments where microbes are a threat (Morris et al., 2020).

Research on environmentally friendly antimicrobial textile treatments made from plant extracts, essential oils, and other natural ingredients is now necessary as a result (Gupta et al., 2000). Research on environmentally friendly antimicrobial textile treatments made from plant extracts, essential oils, and other natural ingredients is now necessary as a result (Sarkar et al., 2003). Plants have long been used to treat human illnesses. Since these bacteria have a high variety and plants produce a sizable number of metabolites, called as antimicrobial agents (Copp, 2003). The most common pathogens that cause illnesses in humans are microorganisms like bacteria and fungus (Kaushik and Dhiman, 2000).

The present research intends to develop antibacterial finishing agents that are environmentally friendly using extracts from medicinal plants. Herbal extracts from *Bauhinia variegata* Linn were selected for this study (Bouchekrit et al., 2016). *Bauhinia variegata L.* is an orchid tree that belongs to the legume family, Fabaceae and commonly known as Kachnar. Flowers are lavender or purple colour clustered in leaf axils. The leaves are shaped like cow hoof structure in nature (Kalpana Pachouri et al., 2015). *Bauhinia variegata* Linn. Stem and roots are used as anti- inflammatory in skin diseases, indigestion and used to cure snake poison (Y. Kamal et al., 2022). Used traditionally as a tonic and treatment for ulcers, tumors, thyroid issues, and neck pain (K. Sudheerkumar et al., 2015). Additionally, this plant is used in traditional medicine to treat a number of diseases, including inflammatory conditions (Yadava and Reddy, 2003). Flavone glycosides, dimeric flavonoids, lutine and β-sitosterol are found in the plant's aerial portions (Pettit et al., 2006).

OBJECTIVES

Based on the biological significance of these above plant extracts, following objectives were framed.

- To study the Soxhlet extractions of *Bauhinia variegata*
- To optimize the finishing conditions of plant extract on Cotton and Bamboo fabrics
- To convert the herbal extract as reactive dyes for effective binding on to fabric samples
- To examine the antibacterial properties of finished fabrics
- To end use of finished fabrics for Home Textiles

METHODOLOGY

Selection of the source

Organic Cotton greige fabric of 140 GSM in plain weave and Bamboo fabric of 140 GSM in dobby weave are used for the present study and respective image was presented (Fig.1). Cotton and bamboo fabrics were procured from Weaving loom industry, Erode, Tamil Nadu, India.

Cotton **Bamboo**

Fig. 1 Selection of fabric samples

Selection of Medicinal Plant

In this present study, the plant *Bauhinia variegata* leaves were collected from various regions of Yercaud hill station, Salem district in South Indian State of Tamil Nadu. The plant specimens were identified and authenticated by Botanical survey of India, TNAU, Coimbatore, Tamil Nadu and respective image was presented (Fig. 2).

Fig. 2 *Bauhinia variegata* L.

Processing of plant – Drying, milling and extraction

The leaves of *Bauhinia variegata* L. were oven dried at 40° to 50°C for 24 hours on aluminum trays to a water vaporization level below 10% for grinding mill and ground to smooth powder. The powder was sieved and kept in a sealed container and extraction was done using Soxhlet Extractor apparatus.

The Soxhlet apparatus idea is an infusion-based technique for extracting compounds from plants. In this extraction procedure, a porous bag composed of cellulose, a strong filter paper, was employed to retain finely powdered plant powder. The bag was introduced into the gadget. This investigation employed the Soxhlet Extraction infusion procedure. The solvent used in the extraction was heated, evaporated into a thimble compartment, and then condensed and discharged into the condenser on top. This cycle is repeated up to the siphon arm, when the liquid content is dumped into the bottom flask and the process is restarted. Plant powder was extracted using a Soxhlet apparatus at 60°C for 6 hours, progressively increasing to a maximum of 100ºC. An extraction is carried out through a side arm tube in a flask with a round bottom and the heating

mantle below.

Reactive dyeing (Chun and Gamble, 2007)

To make the herbal extract reactive and effectively attach to fabric structures, a modified Chum and Gamble (2007) approach was applied. In a water bath heated to 37°C, 2% (2g) of plant extract was suspended in 100ml of deionized water to make reactive dye. To activate the extracts, 0.04M sodium cyanide was added to the solution. The suspension was held at 37°C while 0.04M NaOH was added drop by drop. As a consequence, the reactive herbal extracts obtained were stored in a brown bottle and kept at room temperature before finishing the fabric materials.

Finishing of fabric

In Table-1, five standard steps were involved in finishing the fabrics using herbal extract were illustrated.

Table-1: Fabric finishing with plant extracts

S. No.	Steps
1	Recipe solution (Reactive dyeing)
2	Padding (Standard conditions)
3	Drying at room temperature
4	Drying @ 80^0C/10min
5	Curing @ 120^0C/5min

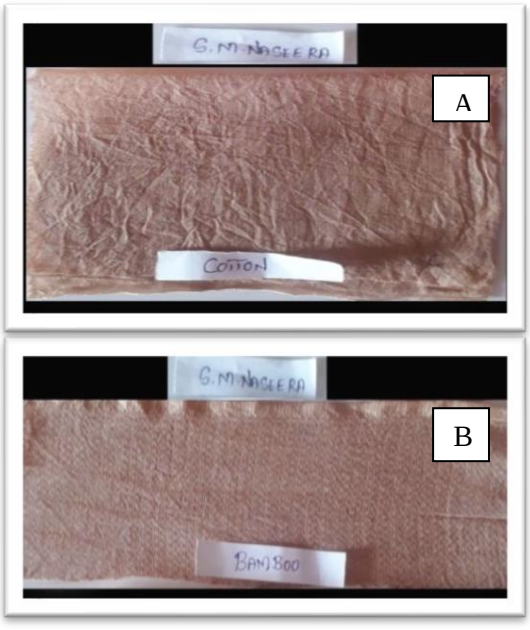


Fig. 3: Finished fabrics with *Bauhinia variegata* extract (A-Cotton fabric, B- Bamboo fabric)

Optimization of dyeing factors for effective antibacterial finishing

Optimizing the finishing conditions using three different factors were selected for providing effective antibacterial properties onto both types of fabric materials using herbal

extracts. Optimization parameters selected in this study was presented (Table 2). The selected parameters and their respective concentrations are herbal concentration (1%, 2% and 3%), binder concentration (1%, 2% and 3%) and wet pick up (50%, 100% and 200%). From the above studied optimization studies, one best optimized finishing conditions for each fabric type was selected based on functional tests (antibacterial activity).

For each fabric type about 21 experiments were conducted. Each experiment was nomenclature as "RUN" and sequentially numbered from 1 to 21. Each RUN was performed separately. First herbal extracts were prepared in three concentrations (1%, 2% and 3%). The herbal extracts were converted to reactive herbal dyes as discussed. For each RUN, finishing and testing was done separately.

Table-2: Optimization of different factors for effective antibacterial and aroma finishing

S. No.	Optimization Parameter	Concentration (%)		
1	Herbal concentration	1%	2%	3%
2	Binder Concentration	1%	2%	3%
3	wet pick up	1%	2%	3%

Concentration value 1% - 1g of herbal extract in 100ml of water, 2% - 2g of herbal extract in 100ml of water, 3% - 3g of herbal extract in 100ml of water.

Optimization study - Functional tests

After finishing all the test swatches as per optimization factors, functional tests were performed to identify the best optimized parameters for each type of fabric finished separately with each type of reactive herbal dyes.

Antibacterial activity (EN ISO 20645)

After finishing all of the fabrics, about 21 samples were evaluated for antibacterial activity using the EN ISO 20645 test method. Each test specimen was tested with two common bacterial cultures (E. coli and S. aureus), each of which were cut into 20mm pieces. Both test bacteria were cultured in a microbiology lab on Nutrient Agar slants. The media are the ingredients in nutritious broth. To achieve turbid bacterial growth, all inoculation broth tubes were incubated at temperature of 37°C for up to twelve hours. A sterile 4mm inoculating loop was used to swab the Mueller-Hinton agar (MHA) plate surface and the center of the petri dish, transferring one loop of each test bacterial culture. Each organism was tested in a sterile setting using Mueller-Hinton agar plates. Following swabbing with the test microorganisms, each test fabric swatch (finished fabric and unfinished control fabric) was put on opposite sides of each MHA plate. The same process was followed for all test swatches. In a typical incubator, all plates containing test swatches were incubated at the same temperature for the same number of hours. After the specified incubation period, each test plate was checked for a distinct zone of inhibition around the finished fabric. The zone of inhibition for each kind of fabric sample was measured in millimeters (mm) and the findings were recorded.

Physical properties of finished fabrics

After selecting an optimized condition [(Herbal concentration (2%), binder concentration (3%) and wet pick up (200%)] for each type of fabric, the physical properties were evaluated and

compared with control unfinished fabrics. The physical properties such as fabric thickness (ASTM D1777), absorbency test - Wicking properties (AATCC TM 197) and air-Permeability test (ASTM D 737-96). All the finished samples were compared with unfinished control samples. Statistical difference was calculated between the finished fabrics and between the unfinished and finished fabrics.

RESULTS AND DISCUSSION

Optimization of different factors for effective antibacterial finishing

Optimization of effective antibacterial finishing of reactive plant extracts on to cotton fabrics were studied using selected factors. The functional parameter of each sample for antibacterial activity was measured in terms of inhibitory zones and the values and its respective images were presented in Table-3, Fig. 3 & 3.1 for cotton, and Table-4, Fig. 4 & 4.1 for bamboo.

Cotton

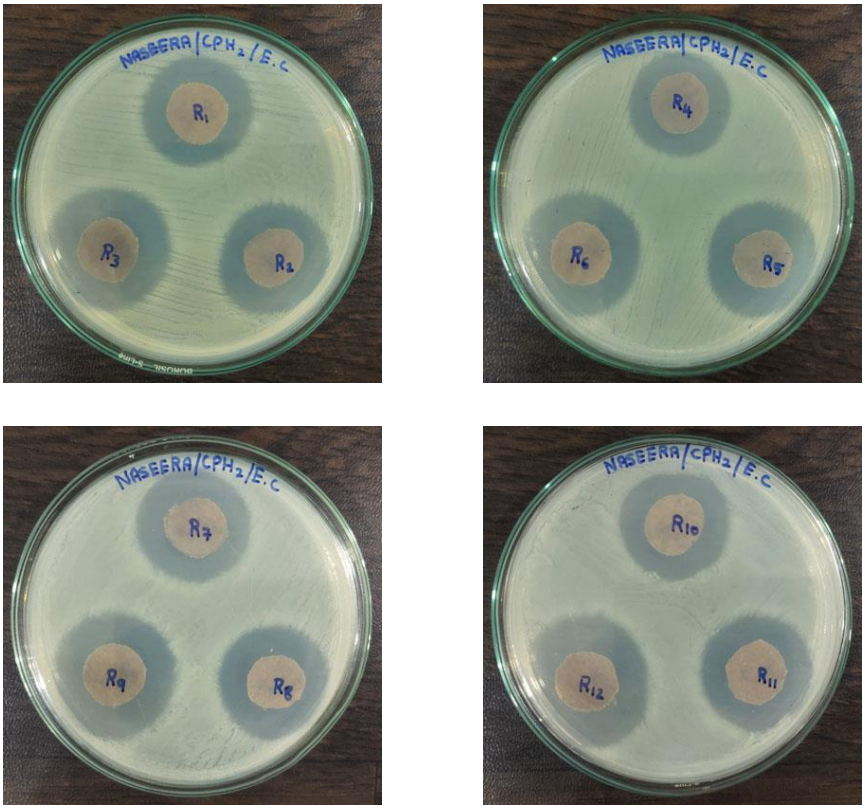
In Table-3, antibacterial activity for each RUN was presented. During the analysis, all the RUNs showed inhibition zones against both test bacteria for the *Bauhinia variegata* extract finished Cotton fabric samples. However, to select optimum condition, one best RUN was selected for the final product development. Among the 21 experiments, RUN-9 showed maximal inhibitory zones of approximately 31mm and 33mm against bacteria, respectively. RUN-21 demonstrated nearly identical inhibitory zones of 30mm and 33mm for the test organisms. RUN-12 exhibited zone size of 30mm and 32mm against the respective bacterial cultures. RUN-15 expressed inhibitory zones of 31mm and 30mm; and RUN-18 showed about 30mm and 31mm of zone size against *Escherichia coli* and *Staphylococcus aureus* respectively (Fig.3 & 3.1).

Table-3: Experimental setup for optimization studies

Run	Factor-1: Herbal concentration (%)	Factor-2: Binder concentration (%)	Factor-3: Wet pick up (%)	Response: Antibacterial activity (ISO 20743)	
				E. coli	*S. aureus*
1	1	1	50	27	24
2	1	2	100	28	25
3	1	3	200	29	27
4	1	1	100	26	25
5	1	2	200	27	26
6	1	3	50	28	27
7	2	1	50	28	30
8	2	2	100	28	29

9	**2**	**3**	**200**	**31**	**33**
10	2	1	100	27	27
11	2	2	50	28	29
12	2	3	100	30	32
13	3	1	50	28	27
14	3	2	100	29	28
15	3	3	200	31	30
16	3	1	100	28	27
17	3	2	200	29	28
18	3	3	100	30	31
19	1	1	200	27	30
20	2	1	200	28	31
21	3	1	200	30	33

Selected optimized condition – Run-9 [(Herbal concentration (2%), binder concentration (3%) and wet pick up (200%)]



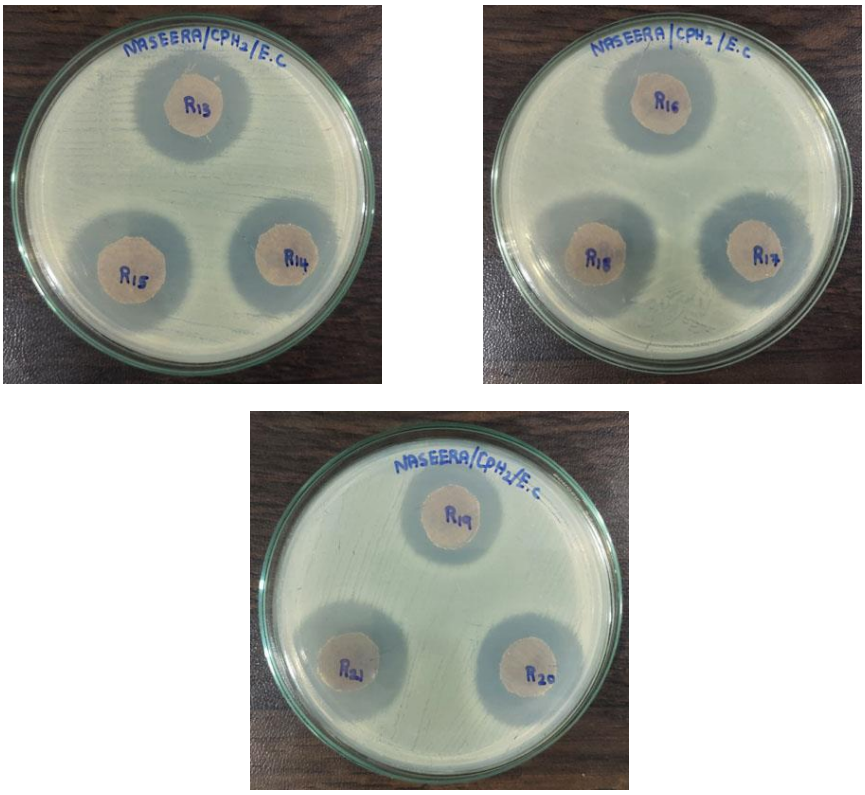
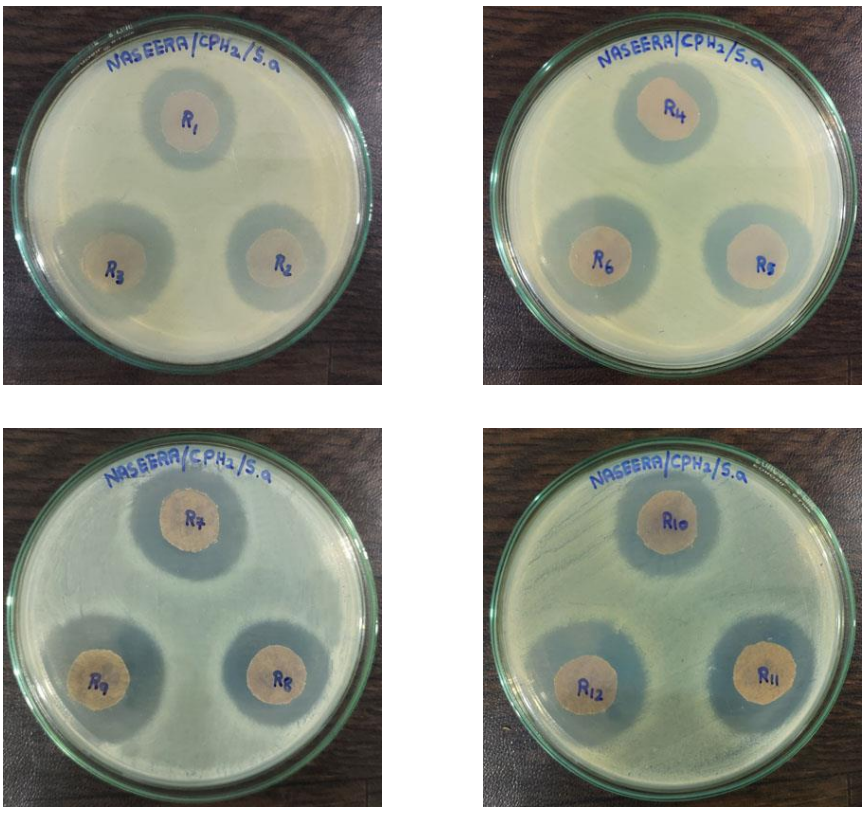


Fig.-3: *Escherichia coli* activity of finished cotton fabric



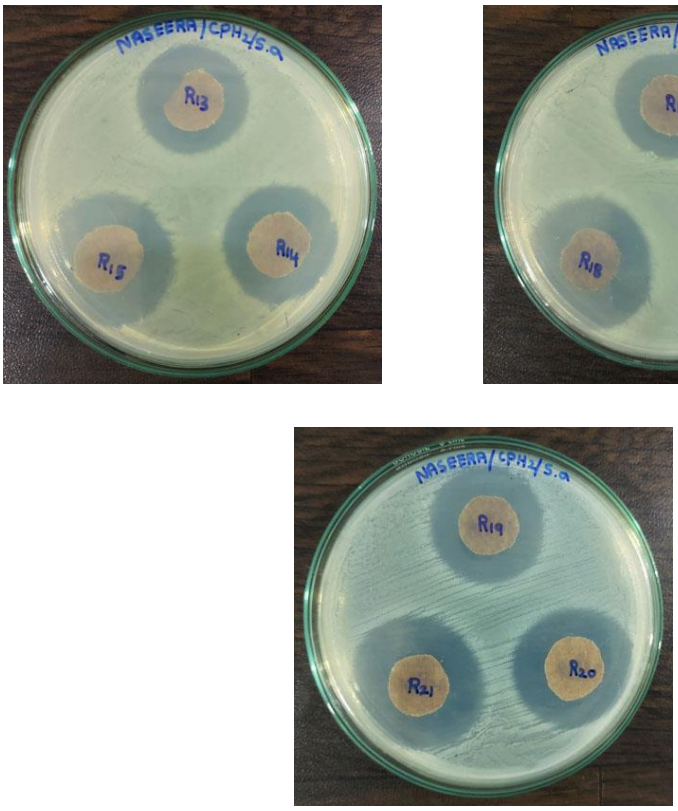


Fig.-3.1: *Staphylococcus aureus* activity of finished cotton fabric

Bamboo

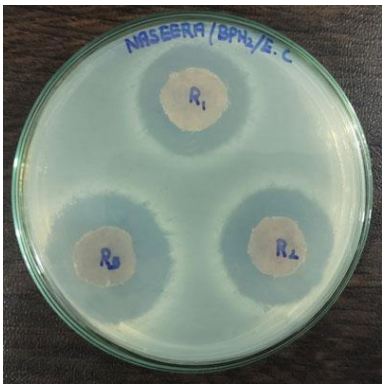
In Table-4, antibacterial activity for each RUN was presented. During the analysis, all the RUNs showed inhibition zones against both test bacteria for the *Bauhinia variegata* extract finished bamboo fabric samples. Among all the experiments, RUN-12 showed maximal inhibitory zones of approximately 31mm and 32mm against the test microorganisms., respectively. RUN-9 demonstrated nearly identical inhibitory zones of 32mm and 31mm, RUN-6 produced inhibitory zones of 30mm and 31mm and RUN-15 and RUN-11 were both demonstrated similar zone sizes of 30mm and 30mm against the respective bacterial cultures (Fig.4 & 4.1.).

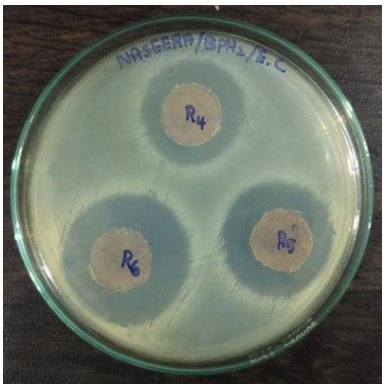
Table-4: Experimental setup for optimization studies

Run	Factor-1: Herbal concentration (%)	Factor-2: Binder concentration (%)	Factor-3: Wet pick up (%)	Response: Antibacterial activity (ISO 20743)	
				E. coli	***S. aureus***
1	1	1	50	26	26
2	1	2	100	28	28
3	1	3	200	30	29

4	1	1	100	25	27
5	1	2	200	27	29
6	2	2	100	30	31
7	2	1	50	29	27
8	1	3	200	30	28
9	**2**	**3**	**200**	**32**	**31**
10	2	1	50	27	27
11	2	2	200	30	30
12	2	3	100	31	32
13	3	1	50	26	25
14	3	2	100	27	26
15	3	3	200	30	30
16	3	1	100	25	25
17	3	2	200	26	26
18	3	3	50	27	28
19	1	1	200	28	26
20	2	1	200	28	28
21	3	1	200	29	30

Selected optimized condition – Run-9 [(Herbal concentration (2%), binder concentration (3%) and wet pick up (200%)]





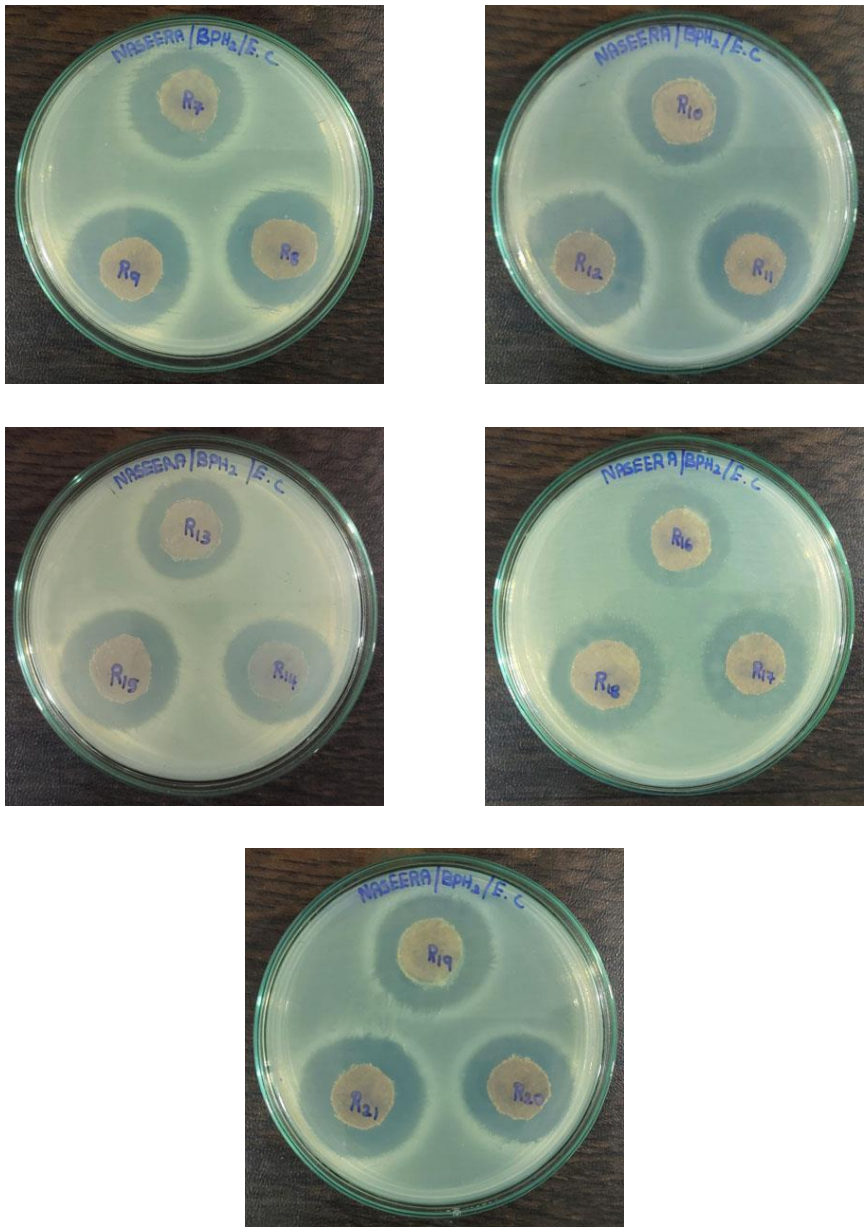
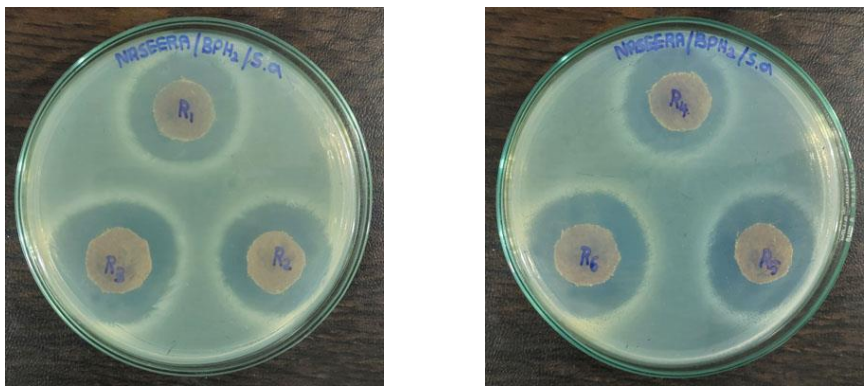


Fig.-4: *Escherichia coli* activity of finished cotton fabric



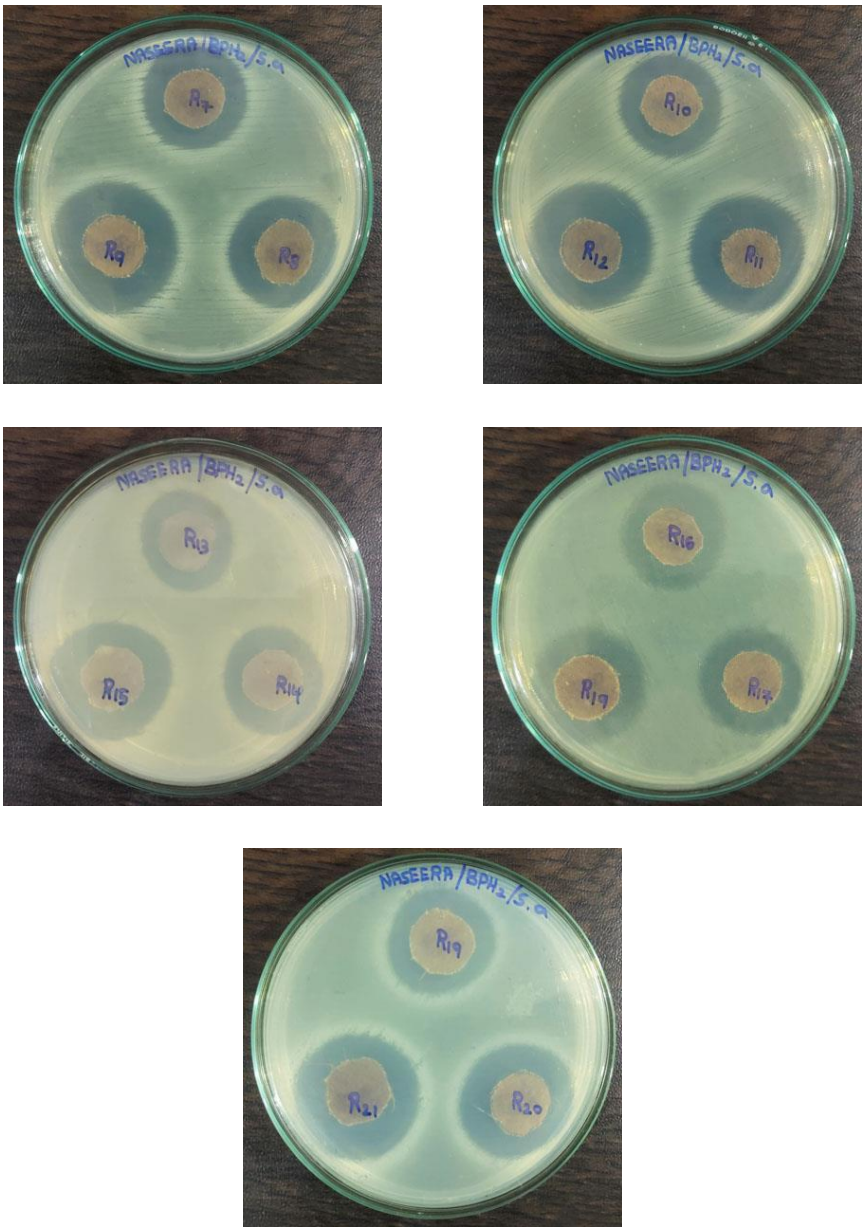


Fig.-4.1: *Staphylococcus aureus* activity of finished cotton fabric

The reason for the effective antibacterial activity of herbal extract was to identify from the literature source available. While investigating, we discovered several study publications indicating the importance of biological molecules and phytochemical substances were found in B. variegata that contribute to antibacterial, antioxidant, and anticancer characteristics, among other things. The promising and potent antibacterial activity of *Bauhinia variegata* in the present study emphasize the presence of anthraquinones, alkaloids, flavonoids, saponins, phenolics, terpenoids and tannins in their solvent extracts as secondary metabolites; which are directly responsible for the antimicrobial properties. Many research articles were also found supportive to this concept illustrating the significance of different phytochemical compounds of the selected herb.

Earlier, Dixon et al., (1983) described the role of flavonoids in *B. variegata*; According to their states, plants respond to microbial infection by producing flavonoids, which are hydroxylated

phenolic molecules. Tsuchiya et al., (1996) described the phytochemicals' way of action on the bacterial cell components resulting cell death. Their ability to interact with extracellular and soluble proteins as well as bacterial cell walls to produce complexes that disrupt microbial membranes, which represents the antibacterial properties. Aboaba and B. M. Efuwape (2001) stated that these plants have non-toxic glycosides that, when hydrolysis, produce phenolics that are poisonous to microbial pathogens.

Sikkema et al., (1994) reported the significance of terpenoids and its antimicrobial efficacy against different microbes; the researchers also reported that, antibacterial activity was exhibited by the membrane destabilization and proton motive force loss in the bacterial membrane structures; leading to cell disintegration and cell death.

The antibacterial activity of *B. variegata* extract finished fabrics samples have been contain different types of phytochemical compounds which were found to be responsible for the obtained results and provide justification for the antibacterial activities identified in the present study.

Physical and comfort properties

Different types of physical properties attributing to its comfort properties were studied in the present research. The finished and unfinished samples were nomenclature in Table-5 for better understanding. The same nomenclature was used in the following analysis.

Table-5: Nomenclature of the finished and unfinished fabric samples

S.No.	Types of fabric samples	Nomenclature
1	Cotton	C1
2	Bamboo	B2
3	Cotton finished	CF1
4	Bamboo finished	BF2

Fabric thickness

The finished and unfinished fabric samples fabric thickness was measured in millimeters. It is the significant physical and comfort characteristics of the fabric both before and after finishing with herbal extract. Among the herbal extract finished fabrics, CF1, exhibited +2.85% increase in thickness when compared to unfinished fabric samples (Table-6 & Fig.5). Similarly, BF2 exhibited +3.03% increase in fabric thickness compared to its respective unfinished B2 samples.

Bauhinia variegata extracts finished in all the fabric samples influenced negligible increase in thickness.

Table-6: Unfinished and finished fabric samples to determine fabric thickness

Samples	Fabric thickness (mm)	% loss or gain	Statistical analysis Between the fabrics and between unfinished and finished fabrics	
			F-Value	Significance
C1	0.34	-	F = 1.0	P = 1.0
CF1	0.35	+2.85		
B2	0.32	-		
BF2	0.33	+3.03		

* The F value was statistically used to assess the fabric thickness of control fabric samples that were finished and unfinished. In above Table, it was shown that there was no statistically significant change in fabric thickness between the finished fabrics and the control fabrics (P = 1).

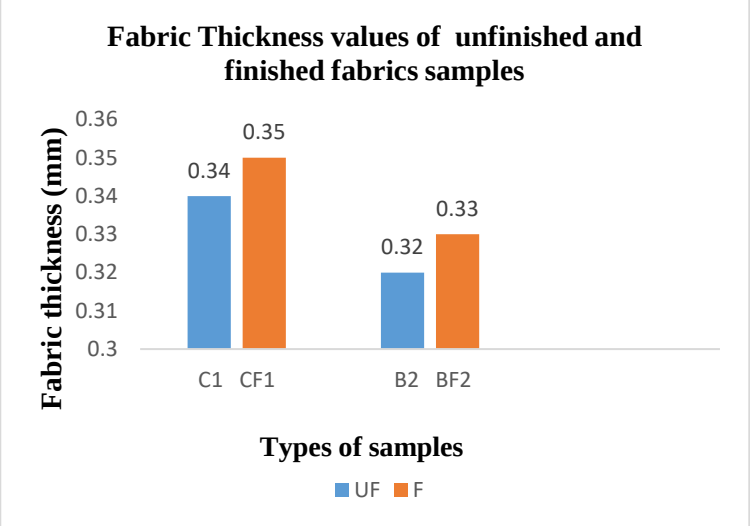


Fig.-5: Fabric thickness of unfinished and finished fabrics samples

In the present study, *Bauhinia variegata* extract was used for finishing all the fabric samples (C1, B2); and its influence in increasing the fabric thickness investigated separately. In Table-7, the difference in fabric thickness before and after finishing with herbal extracts was presented in terms of percentage loss or gain among the samples. From the table values and statistical analysis (F = 1 and P = 1), it was found that shown no significant difference in the fabric thickness in finished fabric when compared to unfinished fabrics. This was mainly due to the dyeing effects of herbal extracts binds onto the surface and interstices of the yarns in all fabric samples. Hence, thickness was not increased significantly and instead colour change in the fabric samples were found evident.

Air permeability Test

In Table-7 and Fig.6, air permeability in terms of unit (m3/cm2/sec) was evaluated for all unfinished and finished fabric samples.

Table-7: Air permeability values of unfinished and finished fabric samples

Samples	Air-permeability ($m^3/cm^2/sec$)	% loss or gain	Statistical analysis Between the fabrics and between unfinished and finished fabrics	
			F-Value	Significance
C1	18.3	-	F = 1.0	P = 1.0
CF1	18.1	-1.09		
B2	19.5	-		
BF2	19.3	-1.53		

* The F value was statistically used to assess the air-permeability of control fabric samples that were finished and unfinished. The preceding Table shows that there were none statistically significant differences in air permeability between the finished and control textiles (P = 1).

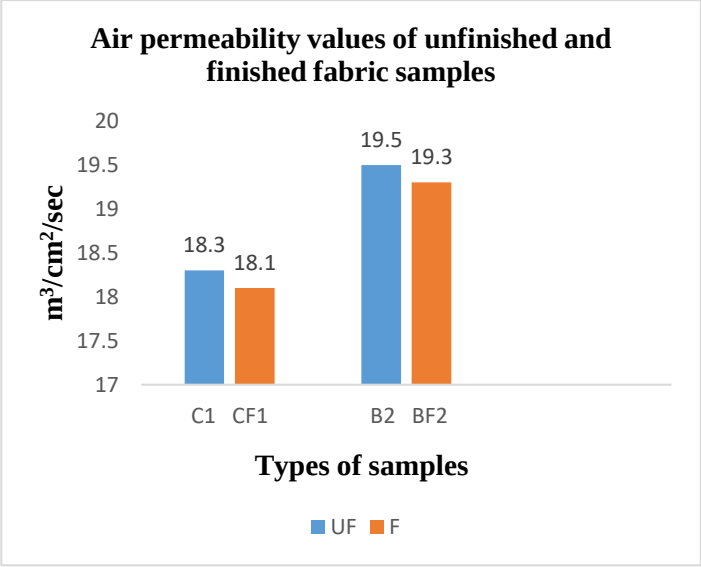


Fig.-6: Air permeability of unfinished and finished fabric samples

The air-permeability between the unfinished fabrics was analysed first and found no significant difference among the samples. Air-permeability of 18.3m3/cm2/sec was observed for C1 samples; followed by B2 samples exhibited of 19.5m3/cm2/sec. When the herbal extract finished samples (CF1, BF2) were compared with unfinished fabric samples (C1, B2), were noted. Among the finished fabric samples the air permeability was found to be 18.1m3/cm2/sec in CF1; followed in BF2 19.3m3/cm2/sec air permeability was evident. From this analysis in terms of air-permeability, *Bauhinia variegata* extract finished samples showed almost similar air-permeability values of unfinished fabric samples. This was evident from a marginal percentage loss of about -1.09%, -1.53% between the finished and unfinished samples (Table-8). As the size of herbal extract particles were found compatible in all fabric interstices, no statistical significance in the air-permeability values between finished and unfinished fabrics were found evident.

Wicking properties

In Table-8 and Fig. 7, wicking or absorbency properties for samples were evaluated. The results were interpreted based on the ability of fabrics absorb more water vertically; the height of water absorbed along the fabric surface was noted and measured in centimetre.

Table-8: Wicking properties of fabrics finished and unfinished samples

Samples	Wicking absorbency (cm)	% loss or gain	Statistical analysis Between the fabrics and between unfinished and finished fabrics	
			F-Value	Significance
C1	4.2	-	F = 1.0	P = 1.0
CF1	4.1	-2.43		
B2	4.8	-		
BF2	4.7	-2.12		

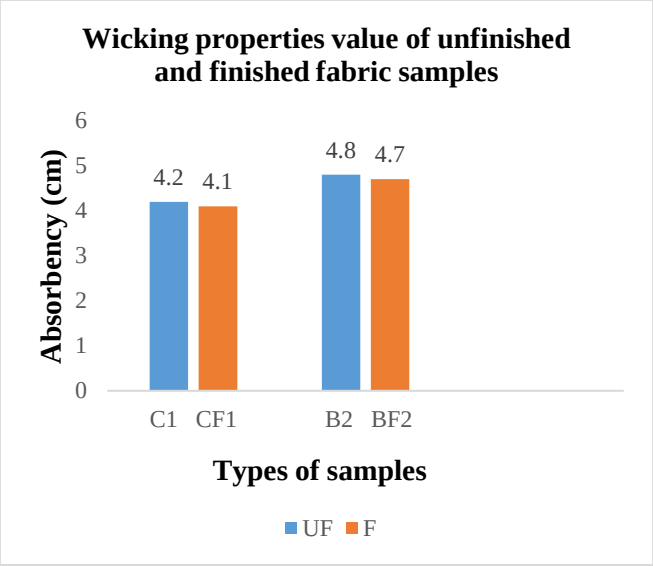


Fig.-7: Wicking properties of fabrics unfinished and finished samples

The wicking ability between the unfinished fabrics (C1, B2) was analyzed first and found no significant difference among the samples as the values ranged only between 4.1cm to 4.8cm. Maximum absorbency of 4.8cm was noted for the fabric B2 (100% bamboo). C1 showed wicking of 4.2cm. When all the unfinished samples were compared with herbal extract finished fabric samples, following observations were noted. Among the *Bauhinia variegata* extract finished fabric samples, CF1 showed absorbency of 4.1cm which was found to be slightly less than the unfinished C1 sample. This was proved from the percentage loss value (-2.43%); similarly, BF2 samples also showed negligible decrease in absorbency (-2.12%) respectively; which was confirmed from percentage loss values presented in Table-9. From the analysis, no statistical significance between the fabrics and between the unfinished and finished fabrics in terms of wicking properties were found evident. To determine the comfort properties before and after finishing with herbal extract.

There is no statistical difference in these two properties and hence the nativity of the fabric remains same even after finishing.

CONCLUSION

The present research aimed to determine the best finishing conditions for two different textiles utilizing *Bauhinia variegata* extracts. During the research, it was discovered that greater herbal concentrations of 3% in the best selected RUNs produced stronger antibacterial inhibitory zones against both test microorganisms. The present research found that herbal extracts include a variety of important phytochemical components that contribute considerably to various biological and biochemical uses. These components would have antibacterial, antifungal, antiparasitic, and antiviral effects. In the future, the development of antimicrobial textiles treated with herbal extracts will meet the demand for sanitary textiles in various health-care sectors to avoid nosocomial infections caused by various pathogens.

CONFLICT OF INTEREST

No conflict of interest

Orchid ID
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6

EXTRACTION AND CHARACTERIZATION OF NATURAL FIBERS FROM *CANNA INDICA*

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ABSTRACT

The current state of the world has prompted the creation of environmentally friendly and biodegradable goods that benefit the long-term sustainability of the environment. Many researchers focus on natural fibers mainly due to their biodegradability and mass availability. Nature has blessed us with abundant fibrous plants. Among them, only a few fibers have been explored. *Canna Indica* is a perineal herbaceous plant. The fibers are extracted from the pseudo stems by the water-retting process. The extracted fibers showed 66.20% of cellulose which is responsible for its strength. The density was 1.20 g/cc and XRD indicates the peak at 22.5^0 signifying the crystalline nature of the fiber. The mean breaking strength of 316 gf justifies the use of CI plant fibres, as a potential source for the composites in Technical Textile Applications.

Keywords*:* natural fibers, *Canna Indica*, fiber characterization, FESEM, water retting.

INTRODUCTION

The use of natural or nature-derived fibers has become increasingly important due to their biodegradable and eco-friendly properties. In recent times, many man-made fibers have been replaced by non-conventional and underutilized fibers like hemp, nettle, banana, etc. *Canna Indica* (CI) also known as canna lily, belongs to the Cannaceae family and is widely found in countries such as the Philippines, Australia, America, and India (Kanase V. et al. 2018). Canna plants grow wild or are cultivated for their flowers in gardens. They are also used as an ornamental plant in some parts of the world.

The Canna Indica plant has been found to have medicinal properties. Its roots can be used in the treatment of fever and edema or fluid retention in humans (Odugbemi et al. 2007 and Thepouyporn A et al. 2012). This plant is native to tropical and sub-tropical regions and is often considered an invasive species as it grows rapidly and can be found in dump areas, discarded gardens, along rivers, lakes, and ditches. In India, the plant is often seen in backyards and kitchen gardens, and while some consider it a weed as it can hinder the growth of other species in the ecosystem, it has many valuable uses.

The plant's flowers and seeds are commonly harvested, while the rest of the plant is discarded as waste. However, recent studies have indicated that the fibrous parts of the plant,

which are typically used in the paper-making industry, can also be used to create natural fibers. This presents an opportunity to extract and evaluate fibers from the *Canna Indica* plant, meeting the rising global demand for natural textile sources, whilst making use of agricultural waste. The focus of this research is to extract and evaluate fibers from the *Canna Indica* plant.

OBJECTIVES

- To extract underutilized natural fibers from the *Canna indica* plant
- To conduct physical, chemical, and characterization studies

METHODOLOGY

Plant Description

The CI plant is a perennial herb that grows between 0.9 to 3 meters in length. It has large leaves that are attached to the stem by broad and fibrous leaf sheathes (Mishra S et al. 2013). The plant's upright and sturdy pseudo stem grows to a height of two meters and is adorned with bright-colored flowers such as red, orange, and yellow. While the plant looks similar to the Plantain tree, it is comparatively smaller. It takes approximately 180 to 360 days to attain its full growth (Ali Esmail et al. 2015). The seeds of the plant are used to extract natural dye, and different parts such as leaves and roots are used as a remedy for various diseases.

Collection of Plants

The Canna Indica plant was collected from Senjerimalai, a village in the district of Coimbatore, Tamilnadu, India. Care was taken to use only the non-edible parts of the plant. The pseudomonas stems with the leaf sheath were collected for fiber extraction.

Extraction of fibers

The method used for fiber extraction was stagnant water retting, as it gives uniform and high-quality fibers (Paridah et al 2012). The leaves of the Canna Indica plant were removed and the stems and leaf sheathe were washed thoroughly in clean water. Before the retting process, the stems are slightly beaten with a wooden hammer to ease the retting process (Vasugi N et al. 2019). The hammered stems were made into bundles, which were immersed in a large water tub containing soft water. Stones were placed on the top of each bundle to get uniformly retted fibers. The total time taken to complete the retting process was 40 days and water was changed every alternative day to reduce the decay of fibers. The fiber bundles were taken out, scraped slightly with a knife, and washed. The cleaned fibers are combed and dried under the sun for 3 days. The yield percentage (R%) was calculated by the formula (Chakma et al. 2017):

$$R\% = (Mf/Mi) \times 100 \qquad \text{……..(1)}$$

Wherein Mi, is the initial weight of the plant and Mf, is the final weight of the extracted fiber (Chakma Koushik et al. 2017).

Fig. 1. Fiber Extraction

Physical Analysis

Length and Diameter

Fiber length is an important parameter that helps researchers determine the fabrication and end use of the fibers. The ratio of 100:1 tells us that the length should be 100 times the measure of the diameter. 100 individual fiber samples were taken and measured with a calibrated scale. The fibers are made to stick on an adhesive surface to the exact length of each fiber strand. The values of 100 fibers were noted and the mean value was calculated which gives the value of length. The diameter was calculated using Field Emission Scanning Electron Microscopy. The cross-sectional value was measured at ten different places and the mean value was calculated.

Single fiber tension and Elongation test

The tensile strength and elongation of the CI fibers were done in Zwick/ Roell (F2203410-1). The crosshead speed was set to be 30mm/min and the gauge length was 50 mm. Fifty samples were tested for maintaining consistency and the mean breaking length and elongation were calculated.

Chemical Analysis

The chemical composition analysis including cellulose, hemicelluloses, lignin, wax, moisture content, ash, and density of CI fibers was analyzed at SITRA using the standard test method. The density following the standard method SITRA/TC/FCC/03 was obtained by the Mettler Toledo XS205 balance method.

Morphological analysis

The morphological surface and the cross-section of the CI fibers were analyzed using FESEM. The images captured by the sample were attached to an adhesive tape and a high-energy electron beam was used to scan the samples. The surface of the samples was observed at various magnifications and the values are recorded.

FTIR analysis

The functional groups present in CI fibers were identified by Fourier Transform Infrared Spectroscopy. The assessment was done by SHIMADZU (Miracle 10) Potassium bromide pellets were mixed with the powdered CI fibers in a ratio of 200:2. They were compressed and the functional groups were analyzed in the wavelength ranging from 4000-500 cm^{-1}

X-ray diffraction analysis

The CI fiber's amorphous and crystalline phases were analyzed by X-Pert Pro diffractometer. The powdered CI fibers were scanned at 2Ɵ ranging from 10^0 to 80^0. The position of the peak is compared with the standard data and the results are interpreted. The Crystallinity Index (CI) is calculated using the following equation:

$$CI\% = \left[\frac{I_{002} - I_{AM}}{I_{002}}\right] \times 100 \qquad \text{.....(2)}$$

Thermogravimetric analysis

The thermal stability of the canna indica fibers was estimated by TG/DTA - EXSTAR/6300 (Thermo Gravimetric Analyser). 2.85 mg of the given sample was ground to a fine powder and heated in an alumina pan. The heating temperature was 20^0 C per minute. The range of the temperature ranges from room temperature to 700^o C. Nitrogen environment was maintained throughout the process.

RESULTS AND DISCUSSION

Fiber Yield

The yield percentage of CI fibers was intended to be 6.3%, calculated using Equation 1. The yield of CI fibers was greater than Jute which is 3-4%, sisal (4%), and PALF which is 3-4%.

Physical Analysis

Length and Diameter

The thickness of a fiber is determined by its diameter which plays a vital role in its spinning and ability to withstand stress. The diameter of a fiber can be determined through FESEM analysis. Upon analysis, the mean value of the diameter was found to be 281.0 µm. The length of a fiber can determine its end use. After calculating the mean length value of 100 fibers, it was found to be 44.2 cm which makes it ideal for hand spinning making a novel natural fiber yarn [Ali M et.al 2012].

Single fiber Tension test

The *Canna Indica* (CI) fiber sample underwent testing at 65% (+/- 2%) relative humidity and was exposed to a temperature of 210°C. The mean breaking strength (F max) of the fibers was 316 gf, with an elongation at Fmax (Dl) of 1.5%. This indicates that the elongation of CI fiber is greater than that of baggage (1.1%) and almost equal to that of kenaf (1.6%) (Madhu, P et al. 2019) and hemp fibers (1.6%), which suggests that CI fibers can be a viable replacement for existing fibers.

Chemical Analysis

The chemical properties of CI fibers are expressed in Table 1. Every natural fiber is unique and varies based on its habitat and climatic conditions (Roy, 2013). The cellulose content was 66.20% which is more than that of Jute (64.1%) and Hemp (64.4%) indicating that the CI fibers have good tensile strength. The high values of hemicellulose and non-cellulosic contents such as lignin and wax are responsible for the brittleness of the fiber and high moisture content is in charge of the smooth surface of the fibers. The lower ash content (2.74%) improves the resistance characteristics which might contribute to enhancing the properties of the end products (A Khan et al. 2020). The low density of CI fibers is ideal for lightweight applications ((Natarajan T et al. 2016).

Table 1. Physical and Chemical properties of *Canna Indica* and other bast fibers

Fiber name	Density (g/cm^3)	Cellulose (wt.%)	Hemicellulose (wt.%)	Lignin (wt.%)	Wax (wt.%)	Moisture content (%)	Ash (wt.%)
Canna indica	**1.2**	**66.20**	**19.05**	**13.46**	**0.85**	**12.73**	**2.74**
Jute (Mishra S et al. 2004)	**1.44**	**70.49**	**-**	**11.8**	**0.7**	**1.1**	**-**
Flax (Madhu et al. 2018)	**1.5**	**79.0**	**11.0**	**3.0**	**1.5**	**-**	**-**

Morphological analysis

The morphological analyses are observed in FESEM and are expressed in Figure 2. The smooth surface of the image indicates the presence of lignin. Few impurities are also seen which is common in most of the natural fibers. The cross-sectional image has a porous structure as indicated in Fig.2 (b), which will enhance the performance when used as reinforcement in a composite matrix.

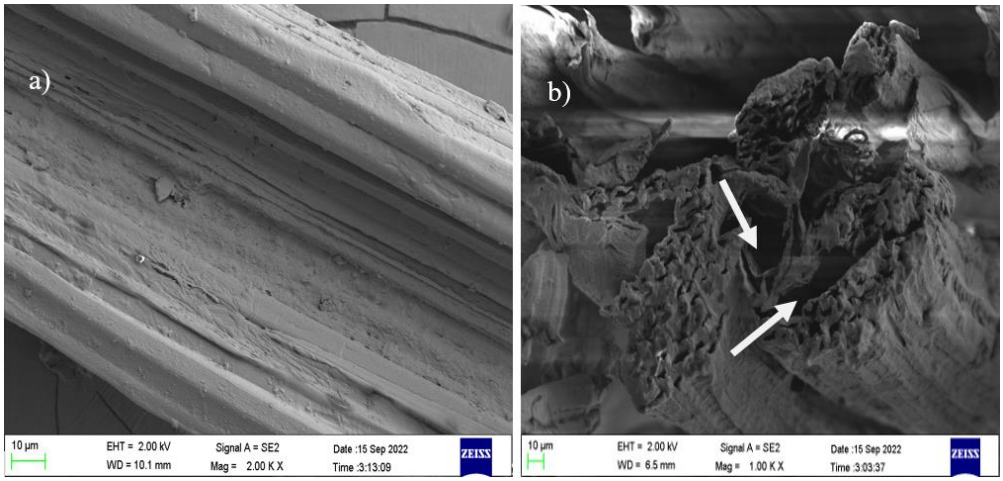

Fig.2. FESEM Images of CI fibers: a) Longitudinal view b) Cross-sectional view

FTIR analysis

Fig. 3, represents the FTIR Analysis of CI fibers. It gives a deeper insight into the presence of vital functional groups in CI fibers. Each peak on the graph corresponds to different functional groups present in them. The fiber contents from chemical analysis can also be verified through FTIR analysis. The peak at 3278.99cm^{-1} indicates the presence of OH stretch of cellulose- I. The next consecutive peaks at 2978.09cm^{-1} represent the presence of cellulose and hemicellulose (Vinod A et al. 2021). The next peak at 1597.06cm^{-1} and a predominant peak at 1033.85cm^{-1} confirm the presence of lignin and hemicellulose (Sonia A et al. 2013).

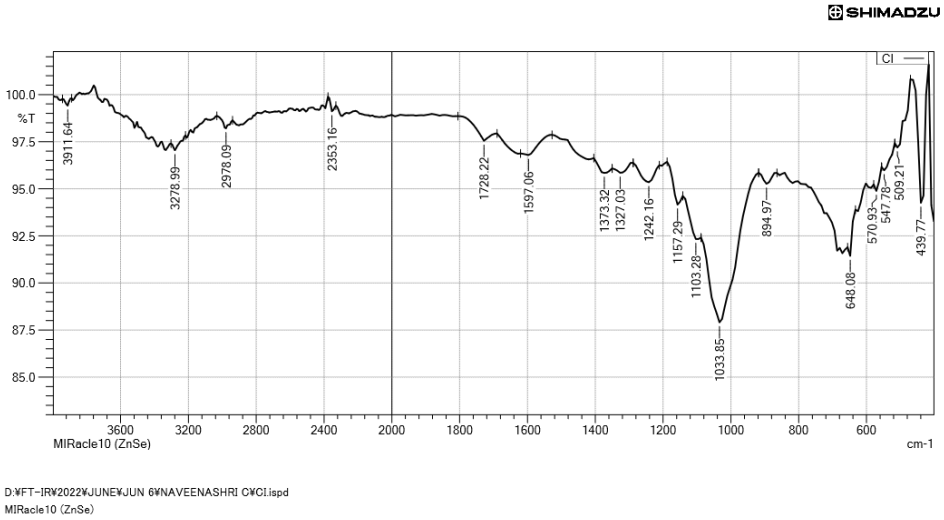

Fig. 3. FTIR Graph of CI fibers

X-ray diffraction analysis

The X-ray diffraction analysis of CI fibers is given in Fig. 4. The graph indicates one well-defined peak at $2\Theta = 22.5^0$ in the region of crystallographic plane 002 representing the presence of Cellulose I which occurs commonly in all natural fibers (Natarajan T et al. 2016). The Crystallinity Index CI was calculated to be 32.46% which is higher than *Vachellia farnesiana (13*%) (Vijay R et al. 2022*) and Grewia tilifolia (8%) (*Jayaramudu, J et al. 2010). It is almost equal to *cardiospermum halicababum (32.21*%) (Vinod, A. Et al. 2019). The results imply that the CI fibers have lower strength and stiffness compared to Jute (71%). The results further verify the presence of high hemicellulose and lignin contents making it an amorphous substance (Ibrahim MM et al. 2013).

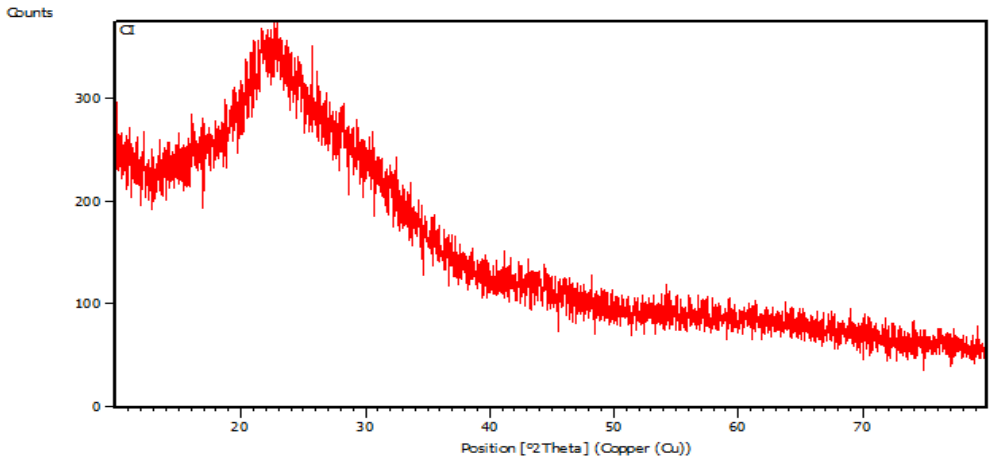

Fig. 4. XRD Graph of CI fibers

Thermogravimetric analysis

The thermal stability of the CI fibers is shown in Fig. 5. This test was done to determine the mass in the fiber mass as it is exposed to high and low temperatures. This test helps the investigator to decide the process usability such as compression molding, heat resistant finishes, etc., The initial weight loss of 50.7% was noticed between the temperature ranges of 50^0 to 380^0 C due to the moisture evaporation from the fiber. The immediate mass loss was observed at 390^0 C, which is due to the depolymerization of hemicelluloses. The second major decomposition was initiated at 390 C and ended at 600^0 C, which represents cellulose decomposition (63.6%). The final degradation progressed from 610^0 C and vanished at 710^0 C in which components such as lignin and wax got decomposed with 77.9% weight loss. The residual weight of 22.1% at 715^0 C remained in the sample.

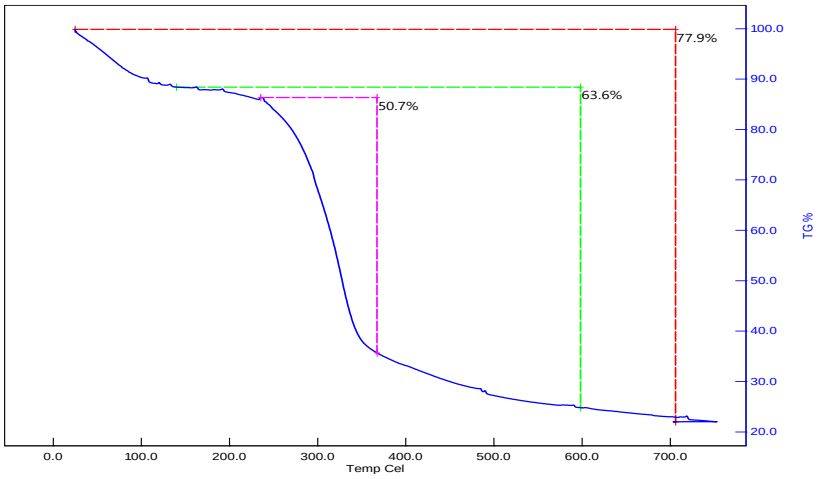

Fig. 5. TGA Graph of CI fibers

SUMMARY AND CONCLUSIONS

The morphological, crystalline index, thermal, physical, and chemical properties of the CI fibers were evaluated and the following conclusions were drawn.

- The high cellulose content of 66.20% and the length of 44.2 cm may favor spinning the CI fibers and further can be fabricated
- The high hemicellulose, lignin, and low density contribute to the faster biodegradability and lightweight applications in Agro-textiles
- The TGA analysis and morphological smooth surface of the fibers showed the ability of CI fibers to withstand heat and bind with the matrix making it ideal for bio-composite preparation through molding operations.

Thus, *Canna Indica* fibers can be converted into non-woven mats and bio-composites. Further, the fibers can be used in Agro-textile in such a way that the fibers end up serving the fertility of the soil sustainably and organically.

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7

WORKSHOP FOR COLLEGE GIRLS ON UPCYCLING OF TEXTILES – AN INCREMENTAL STEP TOWARDS ZERO WASTE

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ABSTRACT

Fashion is an expression of oneself that is accepted by a group of people over time. Today's fashion has a short life cycle, high purchase desire and high volatility of market demand. At present unwanted textiles- clothes are mostly thrown away than donated, less than half of used clothes are recycled or reused, and only 1% of used clothes are recycled. Hence this study was conducted at the academic level to study the knowledge of college students on the impact of fast fashion on textile pollution. The study also focussed on ways to upcycle post-consumer textile waste by creating value-added products. This vocational training initiative was taken to create value from waste and to promote circular economy. Hence to impart a sustainable entrepreneurship behaviour among students. At the end of the study, value-added products such as night pant, ¾th Pant, baby dress, storage bag, place mat, pencil pouch, bag, doll, mask, scrunchies, apron, bed room chappal, door mat, cell phone case, letter holder and pot holder were made from unused clothing or fabric and unused jeans. The products were all evaluated based on its utility, creativity, maximum utilisation of the material to be upcycled etc. An exhibition was conducted where the products were displayed to create an awareness among the college students on upcycling.

Keywords: fast fashion, sustainable, upcycle, value-added products.

INTRODUCTION

The textile industry plays a major role in the economy of a nation. Despite being indispensable to consumers, the textile and fashion sectors, emerge as the foremost contributors to environmental pollution (Shen, B, 2014). These industries inflict damage at every phase of production, spanning from the raw material cultivation to finished goods disposal. The detrimental impacts encompass excessive water usage, chemical utilization, high energy consumption, air emissions, solid waste generation, and the formation of odors (Gbolarumi, F.T., 2021).

Fashion is an expression of oneself that is accepted by a group of people over the time. In the present situation, Fast fashion retailing is on the rise which is leading the consumers towards an increased purchase of clothing and a trend to use clothes for a shorter time. This has led to the rise in clothing disposal. Hence the clothing and textile industry faces problems due to over consumption of textiles and the waste produced by this industry negatively affects the environment (Ekström, K. M., and Salomonson, N, 2014).

Fashion means to be trendy, up to date, and latest whereas sustainability focuses on products that are long-lasting, durable, have a low impact and environmentally friendly, the term "sustainability" carries a plethora of meanings. Sustainability is defined as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (Sustainability | United Nations). Over recent years, sustainability has gained increased significance. (Gazzola, P. et al., 2020).

As fast fashion encourages a throwaway mentality it contributes to the accumulation of clothing waste, and planned obsolescence, due to the inexpensive resources and manufacturing process it leads to textile pollution (Hayes A, 2021). In today's economy planned obsolescence is a business strategy restricting product usage, benefiting private profit at the expense of consumer interests and environmental sustainability. It contributes to products becoming prematurely obsolete and discarded, consequently contributing to a growing pile of textile waste. (Wrbka, 2018). This is common in the clothing and fashion industry too.

Waste is any material that serves no purpose in its current location and is likely to be discarded, posing challenges to both society and the environment. A multitude of problems are related with the generated textile waste, and the harm it causes to humans and the environment leading to the depletion of valuable natural resources (Goldsworthy, nd). According to Jacoby, et al. (1977) when it comes to waste disposal, consumers have three options: retaining the product, permanently getting rid of it, or disposing of it temporarily. Waste represents a societal challenge, and there is a shortage of research on effective strategies to minimize waste. (Ekström, K. M., N, 2014). One of the greatest concerns to most industries, communities and government is the quantity of waste that is being produced and its adverse effects on the environment (DEEP, 2016).

Textile waste can be categorized as pre-consumer waste and post-consumer waste. Waste materials from industry and commercial processing of textiles during the manufacture of the garments (scraps, excess inventory, damaged or defective pieces) are termed as Pre-consumer waste. While post-consumer waste includes used products or clothes disposed by the consumer (Ali et al., 2021).

Upcycling is the process of transforming waste or discarded products into new items of equal or superior quality, often with enhanced environmental value. (Fernie, J., and Azuma, N.,2004). The objective of upcycling is to avoid wasting potentially valuable materials by repurposing existing ones. Supporters of this practice argue that developing countries have long engaged in upcycling old clothing by finding new uses for it. Recently, upcycling has gained traction in developed countries as well. (Teli et al., 2015).

Upcycling was explained by Reiner Pilz as the concept of enhancing the value of old or used products, in stark contrast to the conventional concept of recycling, which often diminishes the value of the products. Therefore, upcycling involves creating or modifying a product using used items,

components, or materials, with the aim of producing a final product of superior quality or value compared to its original components (Sung, Cooper & Kettley, 2014).

Recycling requires energy and resources for the collection, sorting, and processing of waste to create something of lesser value. Hence, upcycling is better environmentally and an even greener way of recycling. The philosophy of zero waste promotes the reuse of materials, minimizing the amount of trash sent to landfills. Upcycling is an incremental step towards achieving zero waste.

People choosing to deal with upcycling are moving towards 'Cradle to Cradle' concept. In upcycling a closed-loop cycle emerges from the possibility of an unlimited number of products from the same available resource. The brand Upcycling utilises textile waste as a resource to create new products, green jobs and promote sustainable innovation. Upcycling can also be a profitable enterprise generating revenue by selling the upcycled products to customers. In addition to contributing to environmental sustainability, businesses engaging in upcycling can realize cost reductions and gain marketing benefits, further enhancing the overall appeal of their products in the market. (Teli et al, 2015).

Upcycling aims at the development of products that are truly sustainable, innovative creative and affordable. For example, Downcycling involves the transformation of worn T-shirts into cleaning rags, typically resulting in a decrease in the overall value of the material, whereas, Upcycling transforms T-shirts into value-added products, such as unique handmade braided rugs, showcasing a more creative and sustainable approach. (Vadicherla, T., and Saravanan, D., 2014).

As per EU 'In a circular economy, the value of products and materials is maintained for as long as possible'. In a circular economy Wastage and use of resources are minimized, and on reaching its end of its life, a product is used again creating further value. This is economically beneficial, adds to innovation, enhances growth and creates additional jobs.

The enhancement of living standards and the global growth in population have contributed to a notable increase in both textile consumption and production in recent years. Therefore, there arises a need for a sustainable approach. This study is an attempt to solve the gap and broaden the knowledge of sustainable use of post-consumer apparel waste which would have otherwise been considered as waste whereby introducing the concept "Cradle to Cradle".

In a study conducted by Teli et al., (2015) on Upcycling of Textile Materials, it was found that various textile materials from waste and unused fabrics were revamped thereby new products were created. At the end of the study 12 products were created by subjecting it to various treatments like washing, bleaching, dyeing, printing etc.

In another study conducted by Kagitci & Paoletti, (2022) which explores the circular textiles system for innovative sustainable materials and the use of textile waste fibers which could be converted to higher-quality products. The study aimed to find novel ways to use textile leftovers for building materials hence contribute to green interior designing. The results showed that textile waste composites were combined with aluminum profiles and various products like screens (room dividers), wallcoverings, and furniture. were made. Therefore, the study highlighted the use of textile waste fibers as a raw material for interior building materials, showcasing their potential to provide environmentally friendly architectural applications within the framework of the circular economy model.

OBJECTIVES OF THE STUDY

1. To conduct a survey among college students on the impact of fast fashion and upcycling of textiles.
2. To create an awareness campaign on sustainable textiles with regard to used garments among college students.
3. To develop Value added products (considering the product's utility, creativity and maximum utilisation of the material to be upcycled) from the knowledge gained after the awareness campaign.

MATERIALS AND METHODS

Fast fashion has led to an increase in wants of the people and an increase in pollution hence Upcycling of textiles is considered to be the next step in environmentally responsible clothing. This study was conducted to college students in Chennai city.

The study was conducted in four stages which consisted of a survey, an education program, training session (researcher), practical session (students) followed by the evaluation of the products and the display of the value-added products developed by the students.

Fig 1 gives the schematic representation of the study conducted

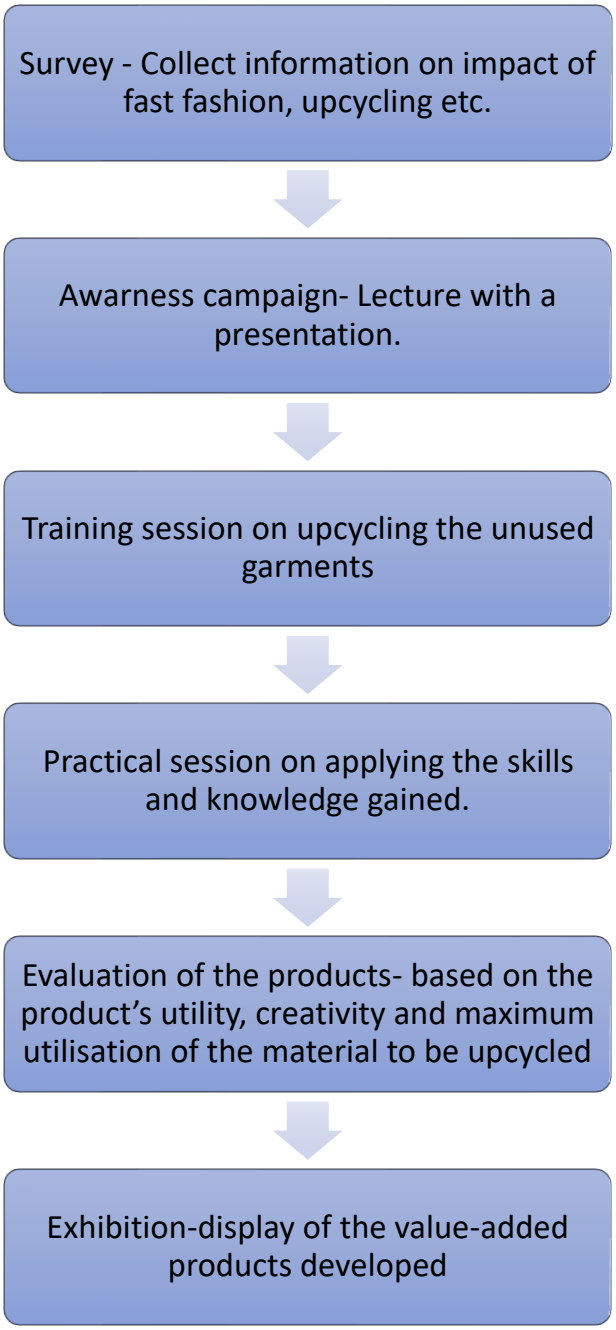

Fig 1-Flow chart of the study conducted

1. Survey conducted to collect information on the knowledge of college going girls on fast fashion, the purchase of clothing, ways followed in the recycle textile waste, etc.
2. Followed by a presentation highlighting the importance of textiles and fashion industry to consumers, the pollution caused by the same and the amount of textile landfills that go into the earth due to fast fashion. The various methods of sustainable approaches emphasising upcycling of textiles and introducing the concept of 'Cradle to Cradle', were explained to the students.

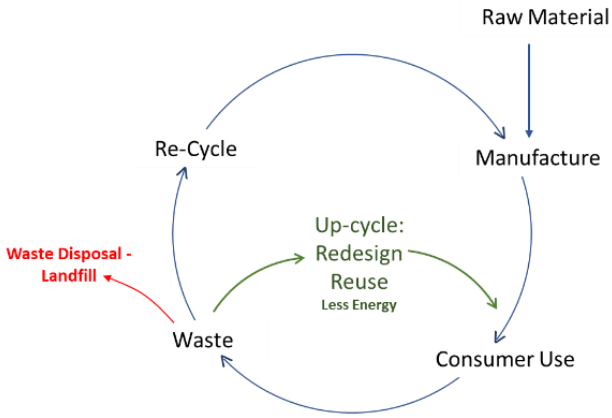

Fig. 2 Upcycling in Cradle-to-Cradle Circular Economy

3. The presentation was followed by a vocational training program (workshop) to the college students. The students were trained to use the sewing machine in order to aid in quick completion of the products. They were also given a hands-on training on embroidery to enhance the value addition to the products created by them.
   Proportionate and mapping techniques for converting waste products into value added products were demonstrated in the workshop. Importance of choosing end product based on the colour, texture of the fabric, and applicability based on the material of construction were explained to the students in order to create value. The student's interest was further kindled by displaying samples of various value-added products such as Tote Bags, laptop bags, pouches, placemats, aprons and water bottle holder made using T-shirts, nighty, kameez, saree and jeans. 40 students participated in the training program.

4. For the practical session the 40 students who participated in the training program were asked to bring garments which could be upcycled like garments, which could not be used due to size limitation (old jeans, t-shirts, kurtas, nighties, etc). Fabric swatches, which were the remains after stitching garments were also used to create value added products. The raw materials brought were washed and ironed. Based on the maximum utility of the raw material brought by the students, various inputs were given and the students were allowed to be creative and to choose the best.
4. The products created by the students were evaluated based on factors like the value-added product's utility, creativity, neatness and maximum utilisation of the material to be upcycled.
5. An exhibition was organised in which all the value-added products created by the students were displayed. It was organised to create an awareness to other students.

RESULTS AND DISCUSSION

In India there is an increasing amount of post-consumer textile waste that is being generated due to fast fashion, especially among college going girls. But only a few studies have been carried out to create awareness and to find ways to recycle post-consumer apparel waste hence this study was taken

up to impart skills needed for the transition towards sustainable development among college students in Chennai city.

The results of the study are as follows

1. Based on the survey conducted, the following observations were made. It was evident

    a. That all the students were unaware of the fast fashion trap they were into. It was observed that the purchase of clothing has increased among college students and the majority of the students' purchased garments without any special reason or occasion.
    b. Online purchase was a major contributor to their purchase. It was also found that a-majority of the students did not even have a count of the garments in their wardrobe.
    c. The money spent on clothing was not budgeted. The majority of the students took time to list out the number of garments purchased in the past two months.
    d. Almost 40 percent of the clothing was lying in their wardrobe without use for a few to several years (2-8 years) although it was selected by the student herself while purchasing.
    e. The students, when asked what would have been done with the raw materials, got for the workshop, 50 percent of the students replied it would have been given to someone known or donated while the others mentioned that they were lying in the wardrobe without any use for more than two years because they ran out of the size or they were not happy with the colour of the garment.
    f. Majority of the students were unaware of the channels available for the donation of used clothing, though most of them were willing to donate.
    g. When asked if they have done any upcycling of the post-consumer apparel waste, a high majority of the students were unaware of it. The only recycling known to them was using torn clothes to clean the home or as a mat.
    h. It was also found that all of the students showed interest to recreate value-added products out of the waste and unused items.

2. With regard to the vocational training program the results can be summarised as follows

    a. All the students showed willingness to participate in the study hence eagerly learnt the skills in sewing and embroidery.
    b. Each student brought the necessary items for the workshop and came up with her own idea hence a variety of products were designed from used garments and unused fabric pieces. Hence, the students explored ways to upcycle textile items which would have otherwise gone as a waste the students were guided by giving step by step instructions to construct the chosen value-added item in college.
    c. The products done during the workshop were designed and constructed by the students. To mention a few products created during workshop - Night pant, ¾th Pant, Baby dress, Storage bag, Place mat, Door mat. Cell phone case, Place mat, Letter Holder, Pot Holder and Bags. Few images of the products made by the students are presented in Fig 2 and Fig 3

.

Before	Nighty 	Skirt 	Shirt 	Rice bag and table cloth 	Fabric swatches 	Old Leggings 
After	Night pant 	¾th Pant 	Baby dress 	Storage bag 	Place mat 	Door mat 

Figure 3: Workshop Output

Cell phone case	Place mat	Letter Holder	Bag 1	Bag 2	Pot Holder
					

Figure 4: Workshop Output using Jeans - Cell phone case, place mat, different types of bags and pot holder.

Undersize jeans and leggings were common items brought for the workshop to be upcycled. Products like nighty being converted to pant, shirt being converted to a baby dress, jeans being converted to a place mat, letter holder, bag and pot holder were appreciated as it was unique. Some products like door mat, mask, scrunchies and pencil pouch being made from fabric swatch were common. Different styles of bags and pouches were created by the students.

The items created by the students were all evaluated and marks were awarded to students as part of internal assessment. The average score of the students was 9 out of 10.

CONCLUSION

Textile waste as a resource can be used to create new products and hence green jobs. The survey conducted proved that the students were unaware of the pollution caused due to fast fashion. Online shopping was very convenient and hence it played a major role in the accumulation of clothing in the wardrobe. The concept of upcycling was new to the students and they showed a lot of interest to learn necessary skills to upcycle the unused clothing hence creating value-added products. Workshop score reveals the interest exhibited by the students, their understanding and success of the program. Hence this activity has been added as regular part of the curriculum.

Zero waste is a philosophy that promotes the reuse of materials, striving to minimize the amount of trash sent to landfills. It is seen as an ultimate goal, and upcycling is an incremental step towards achieving zero waste. Promoting awareness on sustainability and sustainable innovation are the key aspects of such initiatives. This entrepreneurship-based vocational training program organized for the college students is a kind of simulating activity on Sustainability at academic level. It can be carried forward by the students with the available resources and minimum cost. It is evident from the Refashioned and Value-Added product creations by the students in the workshop, the objectives have been realized.

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8

OPTIMIZING NATURAL DYE EXTRACTION AND APPLICATION FOR SUSTAINABLE DEVELOPMENT: A STUDY OF DYE SOURCES AND TECHNIQUES

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ABSTRACT

This research aims to explore the multifaceted realm of natural dyes, encompassing their diverse origins, extraction methodologies, and broad applications. Through a comprehensive literature review and experimental analysis, this study identifies optimal extraction and dyeing methods. The research also examines the influence of mordants on colorfastness and sustainability and the interaction between natural dye and wool yarn. This research contributes to the promotion of natural dye as a viable and environmentally friendly option, facilitating a shift towards more sustainable dyeing practices across industries. Hence, the study was undertaken with the aim of developing the dyeing conditions of the bark of *Myrica nagi* thumb, locally known as Naga tenga, and the bark of *Morinda angustifolia Roxb.*, locally known as Achu gos, on wool yarn. The natural mordant used in the research work is aluminium potassium sulphate (alum) for better fixation of the dyes. The alkaline method is used for the extraction of the dyes, and the dyeing time is optimized on the basis of optical density values. The method used for mordanting the yarn was pre-mordanting. Different shades of yellow are obtained from the selected dyes, which are very suitable for wool yarn. The fastness grade of the dyed samples was found to be good with sunlight, washing, perspiration, and rubbing. The physical properties of dyed yarn are also better observed. Hence, the dyes are found to be an ideal source for dyeing wool yarn.

Key words: colorfastness, extraction, mordants, natural dye.

INTRODUCTION

Natural dyes, an age-old tradition of coloration and textile arts, represent humanity's earliest foray into the world of pigments and hues. These dyes, sourced from an array of plants, minerals, animals, and other organic materials, have left an indelible mark on cultures throughout history, imparting colors that tell stories, symbolize identities, and adorn fabrics with the vibrancy of nature itself. The use of natural dyes dates back millennia, with archaeological evidence suggesting that as far back as 2600 BCE, the ancient Egyptians were employing substances like madder and indigo to imbue their textiles with rich, earthy tones. Subsequent civilizations, from the Mesopotamians to the Romans, and from the Chinese to the Indigenous peoples of the Americas, all harnessed the bountiful colors that nature offered (Kareem, 2012).

Natural dyes are remarkable not only for their historical significance but also for their profound connection to the ecosystems from which they are derived. Unlike synthetic dyes, which are often petroleum-based and environmentally taxing, natural dyes are sourced from plants, insects, and minerals that are renewable and biodegradable. This intrinsic link to the natural world underscores their ecological value and aligns them with contemporary sustainability ideals.

In recent times, natural dyes have undergone a renaissance of sorts, as environmental awareness and the desire for eco-conscious choices have come to the forefront. The revival of interest in these dyes is not solely driven by their reduced environmental impact but also by the unique aesthetic qualities they impart. Natural dyes have a depth and subtlety that synthetic dyes often struggle to replicate. Each batch of natural dye carries a distinctive character, influenced by factors like soil composition, climate, and even the age of the plant, resulting in colors that possess a warmth and authenticity cherished by artisans and designers alike.

This resurgence of interest in natural dyes has spurred research and innovation, leading to a deeper understanding of the dyeing process, improved extraction techniques, and innovative applications. Beyond textiles, natural dyes are finding their way into diverse fields, from food coloring to cosmetics, and from art restoration to the development of sustainable technologies.

OBJECTIVES

- To standardize the dye extraction method from the selected dyes.
- To develop the dyeing conditions for the selected dyes on wool yarn.
- To access the colourfastness properties and fiber properties of the dyed yarn.

MATERIALS AND METHODS

Selection of yarn for dyeing: Wool yarn was selected for dyeing.

Dye yielding plants selected for the study are:

Table 1: Dye yielding plants selected for the study are:

Kingdom:	Family:	Genus:	Botanical name:	Habit:	English name:	Assamese name:	Part of used:
1.Plantae	Myriaceae	Myrica	*Myrica nagi* Thumb.	Evergreen Tree /Small tree /Tropical plant	Bayberry	Naga tenga	Bark

2. Plantae	Rubiaceae	Morinda	*Morinda angustifolia* Roxb.	Evergreen Tree /Small tree /Tropical plant	Noni	Achu gos	Root

Selection of mordant: Mordants form the link between dyestuff and fibre, which allows the dye with no affinity for the fibre to be fixed. Among the mordants used for fixing natural dyes, metallic mordants are the most common. The mordant used in the research work is aluminium potassium sulphate (alum), which is considered eco-friendly.

Selection of mordant concentration: The amount of mordents used in dyeing plays an important role as the mordents form the link between the dyestuff and fibre. After much preliminary work, the mordant concentration was determined, which was mainly based on the percentage of absorption of the dye and the visual assessment of the shade. Three mordant percentages were used, and the observations were made at three levels, i.e., 5, 10, and 15% concentrations.

Mordanting method: The pre-mordanting method was used for this study. In this method, the yarns were mordanted in the first stage and then dyed. The first optical density of the extracted dye liquor was recorded. 5, 10, and 15% solutions of alum were prepared by dissolving in water. Yarn samples were then treated with each of the mordant solutions and dyed in the prepared dye bath for various time periods for each dye. The optical density value of the dye liquor was recorded before and after dyeing. Samples were then washed, rinsed, and dried in the shade.

Extraction of dyes: Selected natural dyes were extracted by the alkaline method. In this method, 1% of an alkaline solution was prepared by adding 1 ml of sodium carbonate to 100 ml of soft water. The dye materials i.e. the bark of bayberry and the root of noni was boiled at 80–90 °C for half an hour to one hour. After that, the value of the maximum optical density of the extracted dye solution of the bark of bayberry and the root of noni was recorded.

Determination of dye absorption using a spectrophotometer: For determining the percentage of dye absorption by the yarn, the dye solution before and after dyeing was subjected to visual light of a specific wavelength using a spectrophotometer. The optical density value was recorded from the beam of light that transmitted from the dye sample, and it was noted from the hue that the dye produced. To arrive at the peak wavelength suitable for the dye liquor, scanning of the dye liquor was done, and the peak at which optical density was high was recorded.

Test for colour fastness: All the dyed yarn samples were evaluated for colour fastness to washing, sunlight, rubbing, and perspiration by the standard procedures laid down by the Bureau of Indian Standards.

RESULT AND DISCUSSION

The findings of the present work are discussed below.

Optimized dyeing conditions:

Optimized dye material extraction time

Table 2. Optimized dye material extraction time by determining optical density

Dye yielding plant	Extraction time (min.)	Wave length (nm)	Optical density
M. nagi	40	470	0.470
M. angustifolia	30	500	0.324

The data presented in Table 2 shows that the optimized dye extraction time is 40 minutes for *M.nagi* and 30 minutes for *M. angustifolia* dye based on the optical density value. The suitable wave lengths are 470nm and 500nm for *M. nagi* and *M. angustifolia* respectively.

Optimized concentration for dyeing

Table 3. Optimized concentration of various parameters for dyeing

Dye yielding plant	Concentration of dye material in g/100g of yarn	Concentration of alkali g/100g of dye material	Concentration of the mordant g/100g of yarn	Mordanting time (min)	Dyeing time (min)
M. nagi	300	10	10	30	35
M. angustifolia	250	5	5	30	30

Table 3 revealed that 300 g of dye materials are required for the dyeing of 100 g of wool yarn for the dye of *M.nagi,* whereas 250 g of dye materials are required for the dyeing of 100 g of wool yarn for the dye of *M. angustifolia* . The concentration of alkali required 10 g and 5 g for *M.nagi* and *M. angustifolia* , respectively for 100 g of dye material. The optimized mordanting time is 30 minutes for both dyes and dyeing times are 35 mins and 30 mins for *M.nagi* and *M. angustifolia* , respectively The concentration of mordant per 100g of yarns are 10g and 5gm for *M.nagi* and *M. angustifolia* , respectively.

Colour produced: The selected natural dye produced different shades of yellow and red, which are suitable for wool yarn.

Fastness grades of the dyed samples:

The colour fastness tests were carried out to assess fastness towards sunlight, washing, perspiration and rubbing. The dyed yarns were assessed with grey scale as recommended by the ISO 105-A02:1993 method for colour change and ISO 105-A03:1993 method for colour staining. Colour Fastness of the dyed samples are presented in Table 4

Table 4: Fastness grades of the dyed wool yarn at optimum dyeing conditions

Dye yielding plant	Washing fastness grade		Rubbing fastness grade				Light fastness grade	Perspiration fastness grade			
	CC#	CS*	Dry		Wet			Acidic		Alkaline	
			CC	CS	CC	CS		CC	CS	CC	CS
M. nagi	5	4-5	5	4-5	4-5	4-5	5	5	5	5	4-5
M. angustifolia	5	4-5	5	4-5	4-5	4-5	5	5	5	5	4-5

CS* = Colour staining CC# = Colour change

Table 4 revealed the fastness grades of the dyed wool yarns. It can be seen from the table that the fastness grade rated for the dyed samples was found to be good. As far as the dry rubbing samples are concerned, no colour change was observed. Lightfastness was also found to be good in all the dyed samples. As regards washing and perspiration fastness, all the samples showed a negligible change.

Physical properties of wool yarn before and after dyeing

The physical properties in terms of tensile strength, elongation, and stress of wool yarn before and after dyeing were tested, and the results are presented below:

Table 5. Physical properties of wool yarn before and after dyeing

Sl.No.	Yarn properties before dyeing	*M. nagi*		*M. angustifolia*	
		Dyed sample	% change	Dyed sample	% change
1.	Weight (0.016 g)	0.019	+18.75	0.017	+6.25
2.	Denier (68.57)	68.57	0.00	68.57	0.00

3.	Breaking load (2.199kg)	2.232	+1.50	2.212	+0.59
4.	Breaking strength (32.07 g/denier)	32.55	+1.50	32.21	+0.44
5.	Elongation (18.50 mm)	18.66	+0.86	18.62	+0.65
6.	Stress (10.43%)	10.61	+1.73	10.50	+0.67

Note: '+' indicate increase, '-' indicate decrease

Table 5 revealed the data on physical properties of wool yarn before and after dyeing with the selected natural dyes. From the data it was observed that the physical properties of the yarn remained same after dyeing. It was also revealed that, in some properties, dyed yarn showed better result than the undyed yarn.

PLATES

Fig.1 Plant: *M. nagi* **Fig.1.1 Dry bark and powder** **Fig.1.2 Aqueous extraction** **Fig.1.3 Dyed sample**

Fig.2 Plant: *M. angustifolia* **Fig.2.1 Root** **Fig. 2.2 Aqueous extraction** **Fig.2.3 Dyed sample**

SUMMARY AND CONCLUSION

In an era marked by increasing environmental consciousness and a growing concern for sustainable practices, the utilization of natural dyes has resurged as an invaluable avenue for reducing the ecological footprint of various industries. The quest for vibrant colors and textiles rich in cultural and historical significance has led to a resurgence of interest in harnessing the potential of dyes derived from nature's palette. This research focuses on two primary facets: the sources from which these dyes are derived and the techniques employed in their extraction and application. However, challenges related to colour consistency, fastness, and scalability remain, requiring ongoing research and innovation to fully integrate natural dyes into modern textile and artistic practices. Within this context, the chosen natural dyes—specifically, the bark of bayberry and the root of noni—have proven themselves to be resilient in terms of colour retention despite exposure to washing, sunlight, perspiration, and rubbing. This finding underscores the suitability of these selected natural dyes for dyeing wool yarn, offering a promising pathway towards sustainable and aesthetically pleasing textile creations.

Recommendation for Further Studies

• A similar study can be carried out with cotton and silk yarn.

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FABRIC WASTE GENERATION IN READYMADE GARMENT UNITS OF KOLKATA

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ABSTRACT

One of the most polluting industries is allegedly the textile industry. The study, which was exploratory in nature, provided information on the industrial landscape of fabric waste production. In order to learn more about the organization of the industry, the manufacturing processes, the generation of waste, and their desire to adopt this new idea into their organization or not, sixty readymade garment factories in Kolkata, a significant center for the readymade garment industry in India, were surveyed. A comparative study was taken between the practices of the micro, small, medium and large industries. More than 70 percent of the total waste was that of fabric waste. Micro and small industries majorly being unorganized, had greater amount of mixed waste generation. T-test result showed that significant difference was seen in the cutting department, as far as the two categories of industries were considered: category A (micro and small units) and category B (medium and large industries). A positive correlation was found between fabric waste generations in sampling and prototyping department and cutting department. Small units resisted adopting waste management procedures, maybe because doing so might be challenging given their constrained financial resources and lack of technical expertise.

Keywords: Fabric waste, Garment industry, Sustainability, Waste generation.

INTRODUCTION

The garment industry is a vast sector that encompasses the design, production, and distribution of clothing and accessories. It's a dynamic field that combines creativity, technology, and business acumen. From haute couture to ready-to-wear, the garment industry caters to diverse consumer needs and preferences, reflecting trends in fashion, culture, and lifestyle.

Today, developing countries generate half of the world's textile exports, particularly after the Multi- fiber Arrangement phase-out on January 1, 2005 (AEPC, 2021). The textile industry in India as a whole, account for approximately 14% of industrial output and more than 10% of overall exports, totaling approximately $31 billion in 2011-12 (Roy, 2009). India’s garment manufacturing is concentrated in Tirupur (Tamil Nadu's Coimbatore district), Karnataka, particularly Bangalore, and the National Capital Region, particularly Noida, Manesar, and Gurgaon. However, there are significant pockets in West Bengal, Orissa, and Andhra Pradesh.

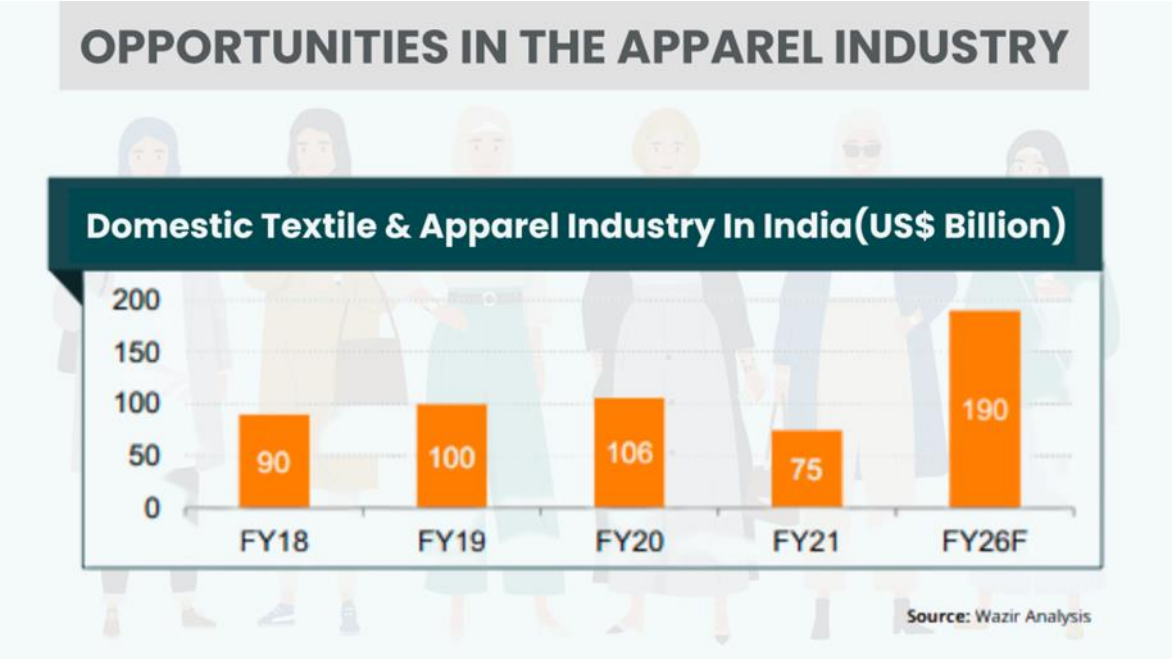

Figure 1: Opportunities in the Apparel Industry

West Bengal Garment Industry: West Bengal has a sizable garment sector that produces roughly Rs. 720 crores in wage income annually despite the fact that the majority of garment manufacturing is concentrated in South India. It resembles an iceberg in that there is a small formal, registered section and a sizable, unregistered, submerged informal portion. This industry is characterized by outsourcing, a dispersed manufacturing process, and a complicated web of tiny businesses that exchange a single garment back and forth. Pay is below the minimum wage, and the industry has only modest unionization (Sen, 2013).

Textile Fabric Waste: Textile fabric waste refers to any discarded material generated during the production, consumption, or disposal of textiles and clothing. This waste can occur at various stages of the textile supply chain, from manufacturing scraps and offcuts to end-of-life garments that are thrown away. Textile waste poses significant environmental and social challenges due to its sheer volume, slow decomposition rates, and harmful effects on ecosystems and human health (Ayres, 2008).

Pre-consumer textiles waste: It is produced during the first stage of the supply chain and is also referred to as production waste. Pre-consumer waste generated during the industrial processing of textiles by the producer is never visible to the consumer. It contains leftover fabric from the cutting process, damaged or defective material samples, fabric selvages, and scraps of fabric (Lau, 2015). On an average, about 15 per cent of fabric used in garment production is cut, discarded and wasted. These types of textile waste have negative impacts on the environment by occupying landfill spaces, polluting water and soil, and polluting the atmosphere when burned. Hence, it's important to reduce the amount of textile waste produced and find ways to recycle them (Fletcher, 2008).

Figure 2: Cutting Department of a Garment Manufacturing Unit with Waste Fabric

A study by Das (2011) focused on the management of solid waste in the knitwear garment industry of Kolkata. The study found that the industry generated a significant amount of solid waste, including fabrics, yarns, and packaging materials, which were disposed of in landfills or open dumping. The authors suggested that there was a need for better waste management practices in the industry, including recycling and reuse of waste materials (Das, 2011). The varying waste percentages of the cutting department of an apparel business were shown in a study by Nizam *et. al*. (2020). Here, the fabric waste generated in five knitwear industries of Tirupur was studied and it was found that maximum waste generation occurred in the cutting department (Nizam *et. al.*, 2020). An assessment of the textile waste produced by Lithuanian apparel companies was carried out where the analysis showed that waste from pattern cutting accounted for 20–25 percent of the total amount of raw materials used in production. The implementation of computer-aided technologies and other technological advancements proved insufficient in drastically reducing the amount of waste; instead, a reorganization of the garment design process was required, with a primary focus on the zero-waste production technique. (Dobilaite, 2021).

The previous studies suggest that waste generation is a significant challenge facing the garment industry, and there is a need for better waste management practices to reduce the negative impacts on the environment and public health. With this concern and need for awareness, this study was undertaken with the aim of studying the fabric waste generation by micro, small, medium and large garment manufacturing units of Kolkata so that suitable waste management policies can be employed.

OBJECTIVES

The following goals were conceptualized for the study:

1. To study the industry composition in terms of industry organization, manufacturing processes, fabric and trims used in the readymade garment industry of Kolkata.
2. To study the current state of fabric waste generation in the readymade garment industry of Kolkata and find the effect of size of RMG the industry on fabric waste generation.

HYPOTHESIS

The hypothesis for the study was as follows:

H_0: There is no significant difference in fabric waste generation of the various RMG industry departments by varying the size of garment manufacturing unit

H_1: There is a significant difference in amount of waste generation of the various RMG industry departments by varying the size of garment manufacturing unit

METHODOLOGY

RMG (readymade garment) units were surveyed to know about the industry organization, manufacturing processes, fabric and trims used; generation of waste and would they like to incorporate waste management concept in their organization or not.

Sample Selection: Purposive sampling was employed for data collection (Emmel, 2013). Garment manufacturing units in the city of Kolkata (units from garment parks such as Paridhan Garments Park, Budge Budge Garment Park, Metiabruz and other stand-alone industries) were approached and questionnaire was administered on technical staff from sixty garment manufacturing units comprising of large, medium and small-scale units. Division was done as per the standards given by MSME.

Construction of the Main Questionnaire: The questionnaire was administered on respondents from five garment manufacturing units first as part of the pilot study. As per the data obtained, the final structured questionnaire was framed which was broadly divided into three sections: section I: Industry composition, section II: Information on products made, processes engaged in and raw materials used by the garment-manufacturing units, section III: Types and amount of waste generation by the units.

Collection of Data: Data was collected from a sample of 60 garment-manufacturing units, comprising of 15 micro, 15 small, 20 medium and 10 large industries, using questionnaire method. 30 industries in Category A (micro and small industry) and 30 industries in Category B (medium and large industry) were surveyed.

Analysis of Data: Rating of fabric waste generation sources department wise for the two categories, of industries was done with a rating scale from 5 to 1 equivalent to most significant source to least significant source of fabric waste generation. In order to analyze whether fabric waste generation by various departments of RMG industries is affected by the size of the industry, two-sample t- test (independent t- test) was used in the analysis. Pearson's Correlation coefficient

was calculated for various departments of RMG units to find any correlation in fabric waste generation.

FINDINGS AND DISCUSSIONS

The study was divided into sections to understand the industry composition in terms of industry organization, manufacturing processes, fabric and trims used in the readymade garment industry of Kolkata and thereafter its current state of fabric waste generation.

Industry Composition

The readymade garment industry in Kolkata primarily operates in small and medium-sized enterprises. Division of the surveyed industries was done as per the Notification by Ministry of Micro, Small and Medium Enterprises (S.O. 170E) dated 1st June 2020.

Table I: Industry Composition of the RMG Industries Surveyed

Number of workers working in the company	**Percentage of Industries**	**Factory production capacity per week**	**Percentage of Industries**
Under 50 employees	50	Less than10,000 pieces	50
Between 50-250 employees	33.3	Between10,000 to30,000 pieces	33.3
More than 250 employees	16.6	Above 30,000 pieces	16.6
Approximate investment in plant and machinery in the industry	**Percentage of Industries**	**Approximate annual turnover of the company**	**Percentage of Industries**
Less than 1 crore	25	Less than 5crore	25
Between 1 -10 crores	25	Between 5 -50crores	25
Between 10-50 crores	33.3	Between 50-250 crores	33.3
Above 50 crores	16.6	Above 250 crores	16.6
Type of Industry	**Percentage of Industries**	**Type of Industry**	**Percentage of Industries**
100% Export oriented industry	0	100% catering to domestic market	20
Catering both to domestic and export market	60	Only taking job works from various manufacturers	20
n=60			

15 units (25 percent) surveyed were micro enterprises, with investment in plant and machinery of less than 1 crore and with annual turnover of less than 5 crores, 15 units (25 percent) surveyed were small enterprises, with investment in plant and machinery between 1 to 10 crores and annual turnover between 5-50 crores, 20 units (33.3 percent) surveyed were medium enterprises, with investment in plant and machinery between 10-50 crores and annual turnover between 50-250 crores, and 10 units (16.6 percent) were large-scale units with approximate investment in plant and machinery more than 50 crores and annual turnover above 250 crores as given in Table 1.

Processes Employed and Products Constructed

The industries were surveyed for the industry processes that they were involved in and also about the type of product range they were manufacturing. All the companies surveyed had in-house pattern making, fabric cutting, stitching, ironing, packaging and dispatch. Fewer companies had composite processes which included all the processes in house. However, a number of medium and large companies had knitting machines as well, manufacturing their own hosiery fabrics as seen in Table 2. According to the data obtained (Table 2), women's wear and children's wear were the most popular garments constructed and most of the units manufactured t-shirts. West Bengal is primarily made up of manufacturers who produce innerwear, the majority of which is for men. T-shirts, briefs, and vests were the most commonly produced items.

Table 2: Industry Processes and Products Manufactured by the RMG Units Surveyed

In house Processes of the Industry							
Process	**Percentage of Industries**			**Process**	**Percentage of Industries**		
	S	M	L		S	M	L
Yarn Manufacturing	0	0	0	Pattern making	100	100	100
Fabric Construction	0	20	60	fabric cutting	100	100	100
Dyeing	0	0	20	Stitching	100	100	100
Printing	20	40	60	Ironing and Packaging	100	100	100
Embroidery	30	40	60	Dispatch	100	100	100
Garment Category Manufactured							
Category	**Percentage of Industries**			**Category**	**Percentage of Industries**		
Infant wear	50			Men's wear	40		
Children's wear	60			Women's wear	70		
Teen wear	40			Inner wear	50		
Type of Garments Manufactured							
Garment	**Percentage of Industries**			**Garment**	**Percentage of Industries**		
T-shirts	70			Kurtis	5		
Dresses	30			Shorts/ Bermudas	50		
Tops	30			Pants/ Culottes	40		
Leggings	20			Romper/ Dungarees	5		
Night suit	30			Vest for men	40		
Nighty	10			Briefs for men	30		
Shirt	10			Undergarments (Female)	0		
S- Micro and Small-Scale Industry (n=30), M- Medium-Scale Industry (n=20), L- Large-Scale Industry (n=10)							

Raw Materials

Majority of the industries surveyed used both knitted and woven fabrics. Most widely used knit fabric used was used single jersey and double jersey knitted fabrics followed by rib fabric. In

the woven category, denim and modal were very popular. Cotton was the most widely used material in the garment manufacturing units followed by cotton synthetic blends and Lycra. Polyester and synthetic blends were not commonly used by the RMG industry in Kolkata. Few medium and large units used dyes, pigments, and chemicals which were used to color the fabrics as well as chemicals such as textile finishing agents, softeners, and other chemicals used during production.

Waste Generation

The survey gave in depth insights into the percentage of different types of waste generated when compared with the total waste generation in the readymade garment units.

Table 3: Waste Generated by the RMG Industries in Relation to Total Waste Generation

Percent of waste generated out of the total waste	Percentage of Waste in Relation to Total Waste		
	S	M	L
Fabric Scrap	80	75	70
Defective Products	8	6	4
Thread waste	2	2	2
Paper waste	8	7	4
Plastic waste	8	6	4
Chemical waste	1	5	15
Trimming Waste	8	7	4
Electronic waste	1	2	3
Metal waste	5	4	3
Mixed waste	15	10	5
S- Micro and Small-Scale Industry (n=30), M- Medium-Scale Industry (n=20), L- Large-Scale Industry (n=10)			

Details of waste generated by readymade garments units of Kolkata as given in Table 3 are as follows:

1. Fabric scraps are small pieces of fabric that are left over after cutting and sewing garments (Cao *et. al*., 2009). More than 70 percent of the total waste was that of fabric waste in all the micro, small, medium and large industries surveyed. The primary sources of fabric waste in these units are fabric remnants, fabric cuttings, and unfinished garments that do not meet quality standards (Jordeva *et. al.,* 2015). The fabric waste generation was found to be highest in smaller units in comparison to the medium and large-scale units, probably because of better waste management practices followed in bigger units.
2. Defective Products: Garments that do not meet quality standards or have manufacturing defects may be considered waste and contributes less than 10 percent of the total waste generated.
3. Thread waste includes leftover thread from sewing machines and also broken or tangled threads from garment production and contributes less than 10 percent of the total waste generated.
4. Paper waste is generated as paper is used for pattern making, packaging, and labeling, and the waste produced includes scraps of paper, packaging material, and discarded labels. It contributes to less than 10 percent of the total waste in all the industries surveyed.
5. Plastic waste: The garment industry often uses plastic bags for packing and packaging, leading to plastic waste that is difficult to degrade. It contributes to less than 10 percent of the total waste in all the industries surveyed.

6. Chemical waste: The industry uses various chemicals such as dyes, bleach, and finishing agents, and the waste generated can be hazardous to the environment if not disposed of properly (Palm, 2011). Since micro and small-scale industries surveyed were not engaged in chemical processes; it was found that 90 percent of the small-scale industries did not have any chemical waste. Little chemical waste generation was from use of stain removal chemicals and detergents used. Also, 30 percent medium-scale industries surveyed were not engaged in any chemical processes, and had no chemical waste generation. The rest of medium-scale industries had in house printing units as well as used stain removal chemicals and detergents and had chemical waste generation of up to 5 percent of the total waste generation. However, 30 percent of large-scale industries which had in-house dyeing, printing and other chemical processes and had chemical waste generation between 10 to 30 percent.

7. Trimming waste: During production process, excess trims which are wasted contribute to less than 10 percent of the total waste. The trims waste included labels, interfacing and fusing, embellishments such as sequins and beads, elastic which were either ordered in excess or were a part of rejects.

8. Electronic waste: Small garment units may have electronic equipment such as sewing machines, computers, and printers and generate 1-3 percent of electronic waste.

9. Metal waste: The garment industry uses metal components like hooks, buttons, and zippers, which can result in metal waste during the production process. All the industries generated less than 5 percent of metal waste.

10. Mixed waste: Waste from garment production can become mixed and often includes a range of materials, such as fabric, paper, plastics, and metals. Probably because of better segregation of waste was seen in large-scale organized industry, the mixed waste was much less than in medium industry. The micro and small industries majorly being unorganized, had greater amount of mixed waste generation.

Table 4: Ranking of various Departments of the RMG Industries in terms of Fabric Waste Generated

Department of the factory generating fabric waste	Category A			Category B			Cum. Mean	Rank
	WS	Mean	Rank	WS	Mean	Rank		
Design and Pattern Waste	25	0.83	IV	22	0.73	IV	0.78	IV
Sampling and Prototyping Waste	36	1.20	III	44	1.46	III	1.33	III
Cutting Waste	110	3.66	I	90	3.00	I	3.33	I
Sewing Waste	46	1.50	II	52	1.73	II	1.61	II
Finishing Waste (including trimming, pressing, and quality control)	16	0.53	VI	20	0.66	V	0.59	V
Packaging and Shipping Waste	10	0.33	VII	7	0.23	VII	0.28	VII
Waste due to faulty Resource planning (order cancellation/excess fabric/delays/over production)	20	0.66	V	15	0.50	VI	0.58	VI
Category A- Micro and Small-Scale Industry (n=30), Category B - Medium and Large-Scale Industry (n=30)								

As given in Table 4, the fabric waste seen in various departments from most significant fabric waste source to the least significant one was found. Fabric waste generation is seen to be

more in micro and small units than medium units and least is seen in the large units. This could probably because small units may face challenges in implementing waste management methods due to limited financial resources and lack of technical expertise. They may also have limited access to institutional support and face difficulties in complying with environmental regulations.

Most Significant Fabric Waste Source to the Least Significant One	
Category A (micro and small units)	Category B (medium and large units)
Cutting > Sewing > Sampling and Prototyping > Design and Pattern > Resource planning > Finishing > Packaging	Cutting > Sewing > Sampling and Prototyping > Design and Pattern > Finishing > Resource planning > Packaging

t- Test result showed that significant difference was seen in the cutting department, as far as the two categories of industries were considered. For the cutting department, the two-tailed P value equals 0.0003. By conventional criteria, this difference is considered to be extremely statistically significant. Confidence interval: The mean of Category A Cutting waste minus Category B Cutting waste equals 0.6600, 95% confidence interval of this difference: From 0.3178 to 1.0022 Intermediate values used in calculations: t = 3.8602, df = 58, standard error of difference = 0.171. This could be probably because medium and large units may have more access to resources and technical expertise while micro and small units may still struggle to meet environmental regulations due to the costly nature of waste management measures.

Pearson's Correlation coefficient was calculated for various departments of RMG units to find any correlation in fabric waste generation. A positive correlation (Coefficient value 0.53) was found between fabric waste generations in sampling and prototyping department and cutting department. Therefore, if the fabric waste at the sampling and prototyping department can be controlled, it can control the cutting waste to a great extent. Also, a positive correlation (Coefficient value 0.56) was found between fabric waste generations in sewing department and finishing department. Therefore, it can be inferred that if the fabric waste at the sewing department is controlled, the rejections at the finishing stage will be less.

Minimizing fabric waste can be achieved by putting waste reduction techniques into practice, such as optimizing cutting layouts, enhancing pattern effectiveness, and reusing fabric leftovers (Tanvir and Mahmood, 2014).

Willingness to adopt waste management

As shown in Figure 3, it was found that small units were reluctant to adopt waste management practices probably because they may face challenges in implementing waste management methods due to limited financial resources and lack of technical expertise. They may also have limited access to institutional support and face difficulties in complying with environmental regulations. Medium units may have more access to resources and technical expertise and were found to be more willing to implement waste management methods. However, they may still struggle to meet environmental regulations due to the costly nature of waste management measures. Large units were found to be more inclined to adopt waste management methods probably due to their financial resources and economies of scale. They may also have more institutional support and the ability to leverage their size and influence to comply with environmental regulations.

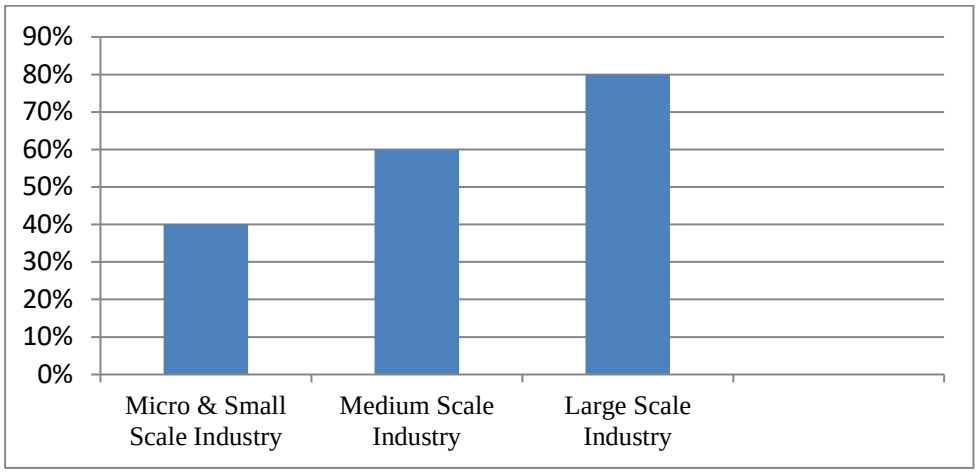

Figure 3: Willingness to adopt waste management by RMG industries surveyed

Overall, it is crucial for ready-made garment units in Kolkata to implement effective waste management policies to reduce their environmental impact and ensure sustainable production practices. The readymade garment industry needs to adopt responsible practices to minimize fabric waste generation and manage fabric waste effectively. Efficient cutting techniques and recycling/up cycling practices are the best ways to minimize fabric waste. Moreover, donation and reverse supply chains can add more value to the waste generated by the industry. All these practices are important for promoting sustainability and reducing the negative impact on the environment.

SUMMARY, CONCLUSION AND IMPLICATIONS

The micro and small industries majorly being unorganized, had greater amount of mixed waste generation. Significant difference was seen in the cutting department, as far as the two categories of industries were considered. It was found that small units were reluctant to adopt waste management practices probably because they may face challenges in implementing waste management methods due to limited financial resources and lack of technical expertise. Depending on their resources, capacities, and dedication to sustainability, small, medium, and large-scale readymade garment manufacturers have to adopt different degrees of fabric waste reduction strategies for reduction in waste generation.

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DANKE-KA-KAAM OF UDAIPUR – A STUDY ON PRODUCT DIVERSIFICATION

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ABSTRACT

Danke-ka-kaam is a rare gold embellishment work done on fabrics in the Udaipur city of Rajasthan. The work was practised by Bohra muslim community and was done specifically on royal dresses and attire of the rajput families.Traditionally, small pieces of gold were fixed on to a fabric with thread of matching colour. In the present time, the gold has been replaced by plastic pieces coated with twenty-four carat gold polish. Nevertheless, it is still a costly art and the embroidered *sarees, lahenga, odhni* and *choli* are very expensive ranging from twenty-thousand to two lakh in price. As a result, the art is out of the reach of the common man. Since the demand is next to negligible and due to lack of government and non - government initiatives, the craftsmen are reluctant to pass on the skill and knowledge to the younger generation. Thus, an attempt was made to create a new range of small products so that the beautiful *danke-ka-kaam* embroidery can continue to be part of the glorious cultural heritage of the country.The new products selected were those which could be part of a bride's trousseau or those which could be used for ceremonial purpose or for gifting. A total of six products were developed which were evaluated by ten subject experts on the basis of their visual appearance, design, quality and price of the product. All the products were appreciated by the respondents but the *potli* bag and jewellery box were rated good on most parameters.

Keywords: *Danke-ka-kaam*, Metal Embroidery, Product diversification, Traditional art form, Udaipur.

INTRODUCTION

India is a vast country which has a remarkable range of different traditional textiles that are woven, printed, tie-dyed or embroidered. Each region has its own distinctive, individual style which reflects the culture, values and in many cases the lifestyles of the inhabitants.

Out of the various types of embroideries which are done by the nimble fingers of the men and women of India, metal embroidery is a unique type of embroidery made using small pieces of metal. Initially, metals such as copper, tin, platinum and bronze were commonly used. But the most popular one is gold *danka*. Being the noblest of all metals, gold has been used in textiles in variety of ways-gold and silver pigment is used in painting the fabric, decorating the fabric with embroidery and applique work, weaving the patterns with gold thread, embroidering with gold and

silver thread, etc. (Gupta, 1996). Gold along with silver and precious stones, were considered as symbols of great respect and were often offered as gifts. Also, gold and silver embroidered garments reflected the wearer's wealth (Bhandari, 2015). Mehta (1994) referred to metal embroidery as *Bharat – kaam*. In addition to this, terms like *karchobi and kamdani* have also been used to describe metal embroidery.

Danke-ka-kaam, a distinctive method of ornamenting textile surfaces was practiced in the Udaipur city of Mewar region of Rajasthan. *Maharanas* of Mewar used to decorate their garments with gold and silver embroidery in order to enhance the richness of their wearing apparel used on auspicious occasions, festivals and ceremonies.

Kashyap, Ojha and Soni (2012) have reported that the embroidery was practised by Bohra Muslim community. They have narrated an incident that took place during the rule of Rana Sajjan Singh. A strike was held by the businessmen of Udaipur which was not supported by the Bohra community. Therefore, the emperor gave them many promotional facilities. The Bohra community did *danka* and *zari* work on garments worn by elite class and rulers of Udaipur.

The embroidery derives its name from '*danka*' which is a small, square, metal plate of 1.25 cm × 1.25 cm in size. Originally, *danka* was made using real gold. Later, silver metal plated with twenty - four carat gold was used in place of gold. These days, a plastic sheet is coated with twenty - four carat gold polish and pieces are cut from it. Earlier, *danke-ka-kaam* was mostly done on silk and satin fabric. Currently, the work is also done on crepe and blended fabrics. The motifs used in *danke-ka-kaam* are mainly inspired from nature such as moon, paisley, flower, *gamla* (flower pot) peacock, *bel patti* (for borders) etc. Generally, two types of threads are used in this embroidery. One is cotton thread and other is the gold polished cotton thread which is termed as *kasab*. The main stitch used in *danke-ka-kaam* is couching stitch. The embroidery is done by first fixing the fabric on a wooden frame. The fabric is tightly stretched and fastened with cotton thread on *adda.* If the embroidery has to be done on some shaped garment then the outline of the garment is drawn on the fabric. The *khakha* with the design is placed on the fabric and it is rubbed with cloth dipped in a solution of kerosene oil and *neel* or zinc. *Neel* is used for light coloured fabric and zinc is used for dark coloured fabric. The coloured solution passes through the holes leaving the traces of design on to the fabric. The plates of *danka* are placed according to the design. Pieces of *danka* are stitched using sharp needle with cotton thread to keep it in place. The colour of the thread used is in the shade of yellow as it merges with the gold colour of *danka.* Nine to ten strands of *kasab* is used for couching stitch around *danka* pieces. At one corner on the outer edge of the design a loop is formed to enhance the look of *danka.* For the border and designs such as *bel*, golden *dori* is used to enhance the design of *danka* work. The designs are filled by chain stitch using *kasab* thread. The a*ri* needle is pressed against the surface of the fabric. The thread is held below the cloth and it forms a loop around the tip of the hooked awl. The loop is then pulled through the surface of the cloth to form a couching stitch and chain stitch. Likewise the entire fabric is embroidered patiently and carefully.

Significance of the Study

Danke-ka-kaam was mostly done on rajput costumes which were worn on auspicious occasions. This form of embroidery was and is still restricted to a small region in Rajasthan. The craftsmen executing this embroidery are also very limited in number. Babel and Karen (2010) have

reported that the craftsmen practicing *danke - ka - kaam* are not willing to teach this form of art to their children. They gave reasons such as the task being laborious and eye straining because of which they did not find it right for their children to learn this skill. Their children had therefore taken alternative jobs. Another problem is that the customers are always skeptical about the purity of the gold and silver used in *danke-ka-kaam* as there is no certification or authenticity mark that can guarantee or assess the purity of the metal used. All this is unfortunate as it might lead to extinction of the beautiful art. In times to come this art form might be visible only in museums. Unfortunately, there are no government and non-government organisations taking any steps to spread this art out of its region or to support or promote this in any other way. Probably this is the reason why people are not aware of this rich craft. There is no doubt that lack of awareness is a major issue but it is also a fact that this embroidery becomes very expensive when done on *sarees, lehenga choli* and *odhni* as it includes gold and silver metal for embroidery. This makes it out of reach of many people who might not want to spend on items that are not used on daily basis. Therefore, the researcher felt the need to introduce a new range of small products which could be used more often than traditional garments. The use of this embroidery on smaller pieces will also bring down the cost. This may in turn lead to an increase in demand which would subsequently encourage the artisans to learn this art and promote it amongst others as well. The craftsmen whose families have been doing *danke – ka – kaam* since many generations might also find it lucrative to pass on this knowledge and skill to their younger generation. As the embroidery is expensive and bought by limited buyers, it was planned to develop a trousseau collection which can be bought for the bride or for the purpose of gifting or for use during ceremonial occasions.

OBJECTIVES

- To develop new range of products embroidered with *danke-ka-kaam*.
- To evaluate the market acceptability of the developed products.

METHODOLOGY

The research was divided into the following three distinct phases–

Phase I – Selection of Products

Phase II – Development of the Product

Phase III – Evaluation of the Product

The details of each stage are given below-

Phase I – Selection of Products

Traditionally, *danke-ka-kaam* was done mainly on garments. But in today's time, with the ever-rising increase in the price of gold, a garment made exclusively with pure *danke-ka-kaam* will be very costly and away from the reach of most of the general public. In order to make this embroidery popular among people it was felt that a range of small products should be developed at a price which would be within the reach of at least some consumers. After a number of deliberations, it was decided to develop the following six products which would then be embroidered using *danke-ka-kaam*.

The products were-

- Jewellery Box
- *Potli* Bag
- Clutch Purse
- Mirror Frame
- Jewellery item - earrings and pendant
- Wall Frame

Phase II – Development of the Product

The development of product involved the designing of the items by the researcher. A number of similar products were analysed and blue prints of the designs were made. The appropriate raw materials — base cloth, accessories such as beads, strings etc. were selected. The base material selected was velvet for all products except for the purse which was made using *chanderi* silk. The motifs were chosen from the collected set of designs. All the specifications related to each product was given to the artisans. The artisans located in *Bada Bazar*, Udaipur embroidered the design on the fabric for each item. After the samples were embroidered, the finishing of each product, except for that of the wall frame and jewellery box, was done by the researcher. The wall frame and jewellery box were made by craftsmen who were experts in making the two products.

Phase III – Evaluation of the Products

The products were displayed at the Institute of Home Economics, and evaluated by ten subject experts. An evaluation form was prepared in which the experts were asked to rate the six products as good, average or poor based on their visual appearance, design of the product, quality of the product and price of the product.

FINDINGS AND DISCUSSION

Figure 1 depicts the products developed during the course of the study.

(a) Jewellery

(b) *Potli* Bag

(c) Clutch purse **(d) Jewellery Box**

(e) Mirror Frame **(f) Wall Frame**

Fig.-1 Products of *Danke-ka-kaam*

Evaluation of Products

The products were evaluated on the basis of their visual appearance, design of the product, quality of the product and price of the product.

Visual appearance of the products

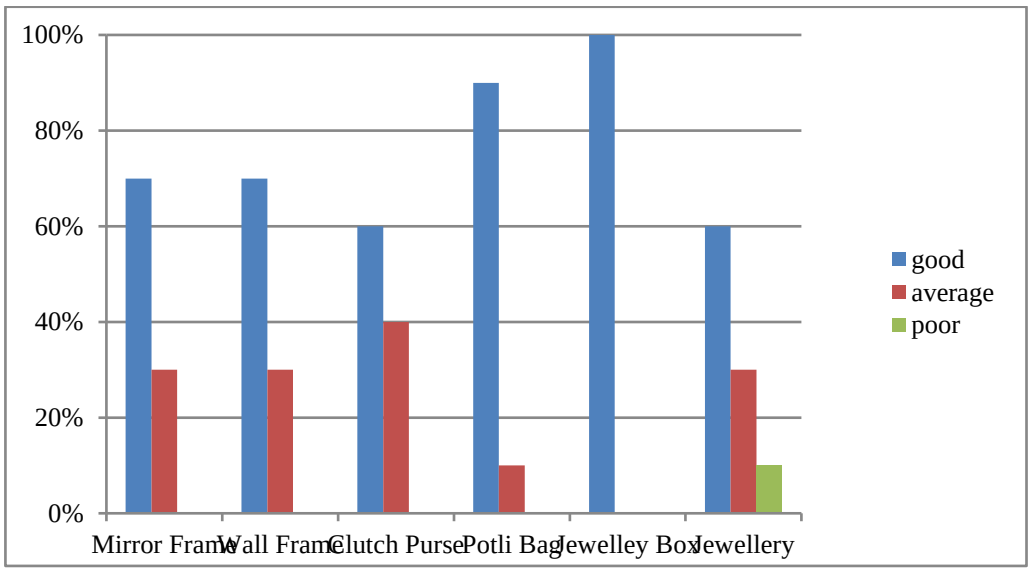

Fig.- 2 Visual Appearance of the Products

From figure 2, it can be seen that all the products were highly appreciated in terms of their visual appearance. The jewellery box got 100 percent appreciation whereas jewellery received a 'poor' review too. *Potli* bag was also appreciated by 90 percent of the experts. Wall frame, mirror frame and clutch purse were mainly rated good but they also received an 'average' rating.

Design of the products

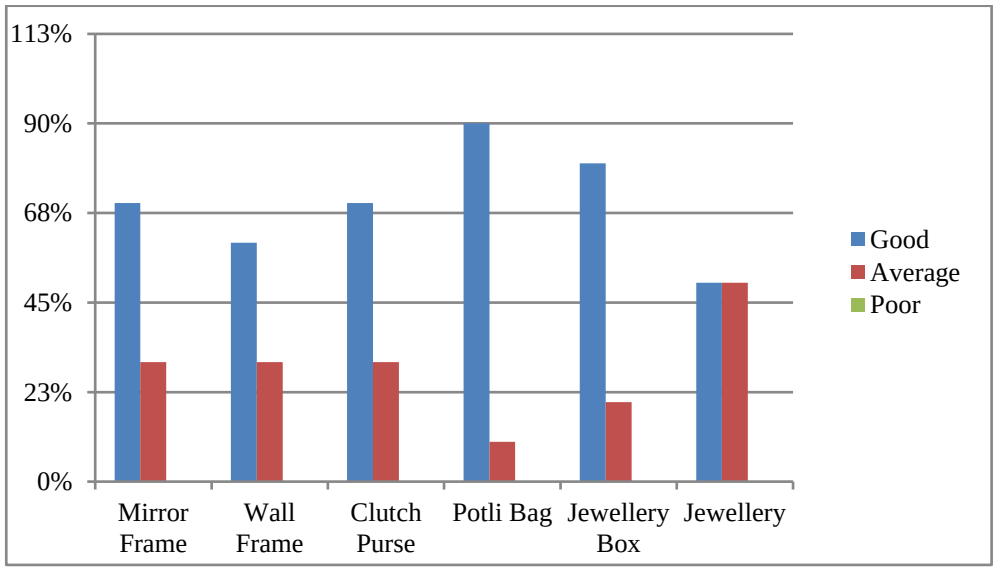

Fig- 3 Design of the products

Figure 3 represents the design of the developed products. It can be seen that 90 percent of the experts appreciated *potli* bag in terms of its design followed by jewellery box. Clutch purse, mirror

frame and wall frame had more or less similar ratings – more experts rated them as good then average. Jewellery was rated equally as good and average.

Quality of the Products

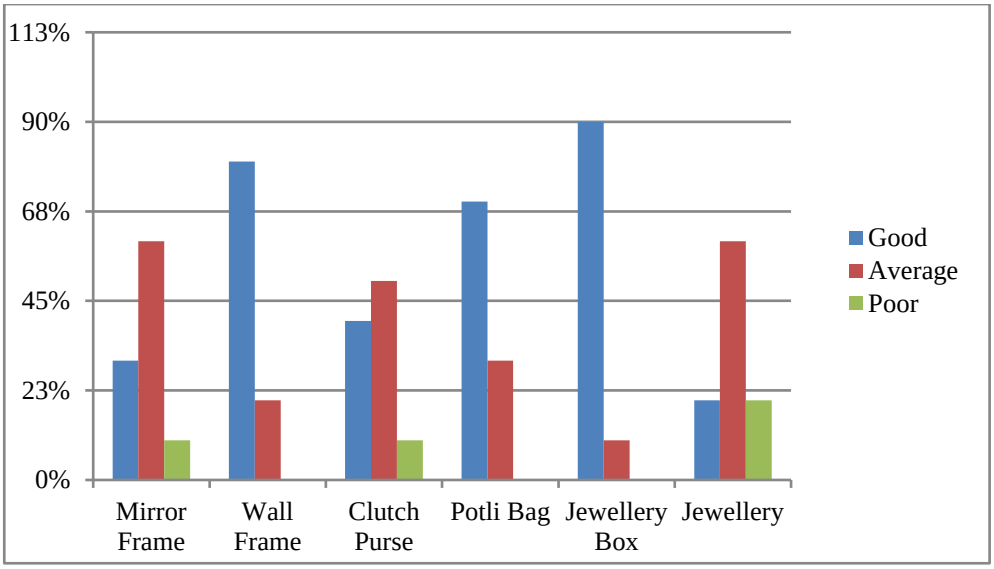

Fig.- 4 Quality of the products

In terms of quality of products (figure 4) jewellery box was ranked good by 90 percent of the experts followed by wall frame (80 percent). Mirror frame and clutch purse had mixed ratings in terms of quality. Jewellery was rated as average quality by 60 percent of the experts but also ranked poor and good by 20 percent respondents each.

Price of the Products

The price of the products was decided after taking into consideration the raw material cost, labour cost, miscellaneous and profit. The final price of the products was as given below-

- Jewellery Box ; Rs 2500
- Wall Frame ; Rs 2000
- *Potli* Bag ; Rs 1500
- Mirror Frame; Rs 1000
- Clutch Purse; Rs 800
- Jewellery; Rs 700

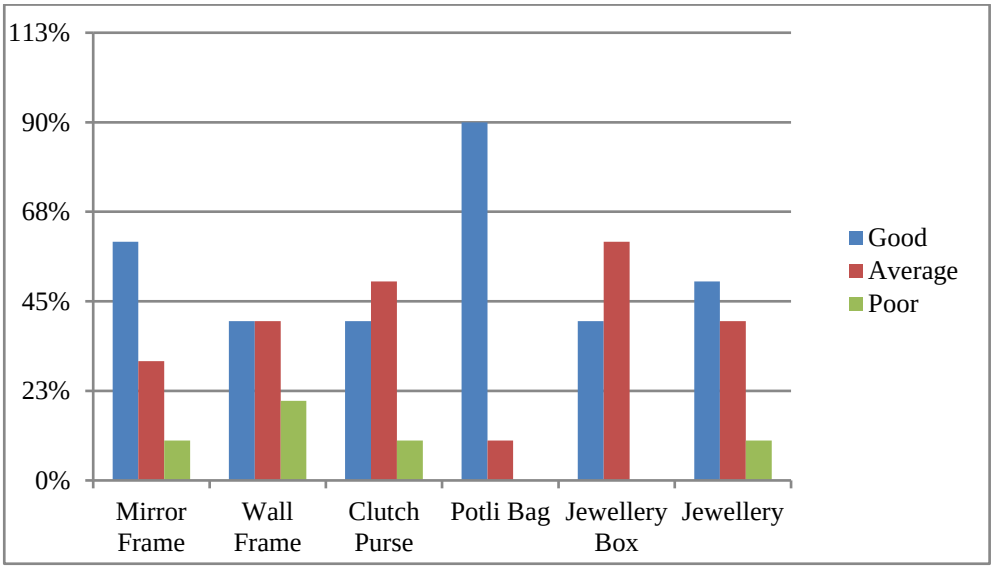

Fig.- 5 *Price* of the Products

As seen from figure 5, the data revealed that 90 percent experts were satisfied with the price of *potli* bag. Also, 60 percent experts rated the price of mirror frame and 50 percent rated the price of jewellery as good. The price of wall frame was rated as poor by 20 percent of experts. The rating 'poor' implies that the experts found the cost of the product to be high.

SUMMARY, CONCLUSION AND IMPLICATIONS

It was concluded that since *danke–ka–kaam* at present is only limited to products such as *sarees*, *lahenga*, etc., there is a need for product diversification. An attempt was made by the researcher and new products were developed. The results revealed that the experts were satisfied with all the products. The jewellery box and *potli* bag were appreciated by most of them in terms of visual appearance, design, quality and price of the products. The two did not receive any poor rating. The visual appearance and design of the mirror frame was liked by many experts but the quality was found to be average by 60 percent of experts. Although around 60 percent found the visual appearance and design of the wall frame to be good, its quality was rated good by 80 percent of the experts. However, the price was rated as poor by 20 percent. The clutch purse was appreciated in terms of its visual appearance and design and was rated as average in terms of quality and price by 50 percent experts. Jewellery was rated good in visual appearance and average in quality by 60 percent. 20 percent found its quality to be poor. The prices of mirror frame, wall frame, clutch purse and jewellery were found to be too high or 'poor' by some experts but since they were sample pieces the cost would be high as compared to the products manufactured in bulk.

Further, we can say that *danka* embroidery is an expensive embroidery as it is done using gold and silver metal thus making it out of reach of most people. But it is a beautiful form of art and an important part of our rich cultural heritage. Thus, all efforts should be made to protect this and popularise it in indian and foreign markets. Since doing this on large clothing items increases the cost, it is important to use it on other products so that the cost can be reduced - as has been done in the present study. The findings of the present study prove that it is possible to do

embroidery on non - traditional items which are more widely used then the traditional articles of apparel and these are still preferred by people.

Another problem relates to the purity of the *danka*. As the work involves gold and silver, the customers doubt the purity of the materials used. There is a no certification or authentication mark which can assure or assess the purity of *danka*. A certification agency which can give some mark of authenticity or purity is needed and the government can play a major role in either setting up such an agency or delegating this work to a government agency already involved in the promotion of textiles.

The biggest danger to the survival of this embroidery however, is the fact that the present generation of workers do not want to pass on this art to the future generations. The reason is not just the lack of market but also the effect the activity of embroidery has on the health of the workers. This factor can result in its extinction. Therefore, the government as well as non - government organisations involved in traditional embroidery, designers, etc., should come together on one platform not only to find ways of making this embroidery commercially viable but also of improving the working conditions of the workers. Only if the present generation is able to see its benefits will they pass on the skill and knowledge to the next generation. If immediate steps are not taken then this form of embroidery will be visible only in books or behind the glass walls of the museum.

SUGGESTIONS FOR FUTURE RESEARCH

The present study examined ways of popularizing the traditional embroidery of *danke – ka – kaam.* But there are many other types of not - so – famous, traditional forms of art which are gradually dying. It is important to conduct research on other such forms of embroideries and find ways of keeping them alive.

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SHORT FILMS AS A MEDIUM FOR BRINGING SOCIAL CHANGE

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ABSTRACT

Short films have emerged as an incredibly powerful medium for conveying complex messages. The present study was an experimental study. The sample included 110 adolescent girls, aged 10 to 15 years, who had experienced menarche, and were studying in 7th and 8th grades of selected government schools of Vadodara city. Purposive sampling method was used to select the sample. The data collection was done through a questionnaire. The pre and post experiment method was used for data collection. Various statistical measures were used for data analysis, such as frequency and percentage distribution; intensity indices, correlation test, and Mann Whitney 'U' test. The study found high significant difference in the effectiveness of the selected short films in terms of gain in knowledge and desire to change in practices regarding menstrual health and hygiene amongst the adolescent girls. Further it was found that there was significant difference in the effectiveness of selected short films as a medium for gain in knowledge and desire to change practices in relation to their exposure to audio-visual medium. Further, it reveals that the all three selected short films were liked by the adolescent girls. The storyline and characters were more liked by them and reported that the short films were able to impart information regarding menstrual health and hygiene. Therefore, the study concludes that selected short films were effective as medium for gain in knowledge and change in practices reading menstrual health and hygiene amongst the adolescent girls studying in the government schools of Vadodara city.

KeyWords: Adolescent Girls, Effectiveness, Knowledge, Practices, Menstrual Health and Hygiene, Short Films .

INTRODUCTION

The digital revolution has brought about a significant transformation in the way people consume and interact with media. Short films have emerged as an incredibly powerful medium for conveying complex messages, ideas, and emotions. In many ways, short films are like short stories in literature, capturing the essence of an idea in a concise and impactful manner.(https://link.springer.com/chapter/10.1007/978-3-030-48442-2_5)

Short films are an incredibly versatile medium for storytelling, as they provide endless opportunities to convey a message in a visually stunning way. Short films can communicate a wide range of messages in various styles, from music videos to political commentary, and can be used to connect with an audience, engage them, and provoke a response. What sets short films apart from other forms of media is their ability to deliver a message in a concise and compelling manner through the use of cinematography, sound, music, and other elements of film. The combination of these elements can create a powerful and emotional impact on the audience that is difficult to replicate through other forms of media. (Forms of Storytelling in Film | The Edge Picture Company)

Short Films and Youth

Short films have been gaining popularity among the youth in recent years due to their accessibility and affordability, as well as their ability to convey messages in a concise and impactful manner. One reason for the appeal of short films among youth is their ability to address issues that are relevant to them in a relatable and engaging way. Short films are often used as a tool to raise awareness about social issues such as gender inequality, mental health, and environmental concerns. For example, the short film "Period. End of Sentence." directed by Ray ka Zehtabchi won the Academy Award for Best Documentary Short Subject in 2019 and brought attention to the taboo surrounding menstruation in India. (https://timesofindia.indiatimes.com/life-style/spotlight/short-filmsinspire-youngsters/articleshow/1503391.cms)

In addition to the creative potential of short films, their accessibility and affordability have made them a popular medium for aspiring filmmakers and film enthusiasts. With the rise of smartphone technology and free editing software, anyone with a camera and an internet connection can make a short film and share it with the world. This has led to a democratization of the filmmaking process, where anyone can tell their story and make their mark on the industry. With their accessibility and affordability, short films have the potential to engage and inspire a new generation of filmmakers and audiences. Decoding Short Films on Menstruation on YouTube (beyondblood.org). Thus, research study was carried out to evaluate how short films can be effective tools in educating and promoting knowledge and practices related to menstrual health and hygiene among adolescent girls attending government schools in Vadodara City with the below listed objectives.

OBJECTIVES OF THE STUDY

1. To assess the pre-knowledge level and practices regarding Menstrual Health and Hygiene amongst adolescent girls studying in Government schools of Vadodara city.
2. To assess the post-knowledge level and practices regarding Menstrual Health and Hygiene amongst adolescent girls studying in Government schools of Vadodara city.
3. To study the overall effectiveness of selected short films regarding Menstrual Health and Hygiene amongst adolescent girls studying in Government schools of Vadodara city in terms:

- Gain in Knowledge
- Desire to Change Practices

4. To study the differences in the effectiveness of selected short films as a medium for gain in knowledge regarding Menstrual Health and Hygiene amongst adolescent girls studying in Government schools of Vadodara City in relation to the following variables:

- Exposure to Short Films
- Exposure to Audio-Visual Medium for the Purpose of Study

5. To study the differences in the effectiveness of selected short films as a medium for desire to change practices regarding Menstrual Health and Hygiene amongst adolescent girls studying in Government schools of Vadodara City in relation to the following variables:

- Exposure to Short Films
- Exposure to Audio-Visual Medium for the Purpose of Study

6. To study the effectiveness of short films as a Medium for imparting messages related to Menstrual Health and Hygiene amongst adolescent girls studying in the Government schools of Vadodara city in terms of:

- Story Line
- Dialogue Delivery
- Speed of Narration
- Language
- Characters
- Time

Null-Hypotheses of the Study

- There will be no significant differences in the effectiveness of selected Short Films as medium for gain in knowledge and desire to change practices regarding Menstrual Health and Hygiene among adolescent girls studying in Government schools of Vadodara City in relation to the Exposure to Short Films and Exposure to Audio-Visual Medium for the Purpose of Study

METHODOLOGY

The adolescent girls of 10 to 15 years, studying in the 7^{th} and 8^{th} grade in government school of Vadodara City and who had attained menarche were selected as sample for the present study, where sample size comprised of total 110 adolescent girls. Three short films entitled ‘Paheli Ki Saheli’, ‘Laali: A Tail of Blood’ and ‘Every Girl Bleeds’. These short films were finalized on the bases of the expert’s suggestions and the reviews provided by the adolescent girls during the pre-testing of short films. These short films were produced by the UNICEF (United Nations International Children’s Emergency Fund) and StayFree. The self-administered questionnaire was used for the present study, where reaction scale was developed to record the reactions of the adolescent girls related to three short films. Pre and Post-test method was used for data collection, where after pre-test the adolescent girls were exposed to three short films. The frequency and percentage distribution, Intensity Indices, Mann Whitney U-test and Correlation test were used for data analysis. This study was conducted in the accordance with ethical standards and obtained approval from The Institutional Ethic Committee for Human Research (IECHR).

The experiment was conducted in each school with each session lasting for 3 hours and 35 minutes with the break of 10 minutes after the screening of each short film. The schedule of research experiment was prepared by the researcher on the bases of the pre-decided schedule of the selected government schools of Vadodara City and provided to them a day before the date of experiment.

Pre-Testing of the Tool and Selected Short Films

A pre-testing of tool and the selected short films was conducted with ten adolescent girls of Kundhela Primary School, Kundhela. The sole purpose of this pre-testing process was to identify the potential issues and problem faced by the adolescent girls while filling out the questionnaires and to decode the messages or information imparted through the selected short films.

MAJOR FINDINGS

1. Demographic Profile of the Adolescent Girls:

Table 1: Frequency and Percentage Distribution of the Adolescent Girls According their Background Information

(n=110)

Background Information	Category	Frequency (f)	Percentage (%)
Age (in years)	10 to 11	6	5.5
	12 to 13	55	50
	14 to 15	49	44.5
Grade	7th grade	39	35.5
	8th grade	71	64.5
Type of Family	Extended	63	57.3
	Nuclear	43	39.1
	Joint	4	3.6

Table 1 reveals that half (50%) of the adolescent girls fall in the age group of 12 to 13 years, further it shows that majority (64.5%) of the adolescent girls were studying in 8th grade, whereas the nearly sixty per cent (57.3%) of the adolescent girls, were living in an extended family setting. The study also found that approximately forty per cent (39.1%) of them were living in a nuclear family, which typically includes a married couple and their children.

2. Exposure to Audio-Visual Medium for the Purpose of the Study of the Adolescent Girls:

Table 2: Frequency and Percentage Distribution of the Adolescent Girls who had studied through Audio-Visual Medium

(n=110)

Studied through Audio-Visual Medium	Frequency (f)	Percentage (%)
Studied	107	97.3
Did not studied	3	2.7

Table 2 indicates that a very high majority, 97.3 percent, of the adolescent girls had studied through audio-visual medium

3. Exposure to Short Films of the Adolescent Girls:

Table 3: Frequency and Percentage Distribution of the Adolescent Girls who had Viewed Short Films till date (at the time of data collection)

(n=110)

Viewed Short Films	Frequency (f)	Percentage (%)
Viewed	56	50.9
Did Not Viewed	54	49.1

Table 3 reveals that almost half of the adolescent girls, 50.9 per cent, had viewed short films, while nearly the same percentage.

Table 4: Frequency and Percentage Distribution of the Adolescent Girls According to the Location or Media Platform through which they had viewed Short Films

(n=56)

Locations or Media Platforms	Frequency (f)	Percentage (%)
In school	37	60
At friend's home	17	27.7
On television (Shorts TV Channel)	6	9.8
In cinema hall	2	3.2

*Multiple choice question

Table 4 reveals that majority (60%) of the adolescent girls who had viewed short films did saw in the school.

Table 5: Frequency and Percentage Distribution of the Adolescent Girls According to the Purpose of Viewing Short Films

(n=56)

Purposes	Frequency (f)	Percentage (%)
To Seek information	23	41.1
To Learn something new	23	41.1
For Studies	15	26.8
For Entertainment	13	23.2
For Time pass	2	3.6

*Multiple choice question

Table 5 reveals that 41.1 per cent of the adolescent girls reported viewing short films to seek information. The most commonly viewed short films by adolescent girls were those on the topic of good and bad touch, with almost thirty-four per cent (33.9%) of them had viewed such films. Nearly ninety percent (89.3%) of the adolescent girls were viewing short films on YouTube.

3. Information Related to First Menstrual Period of the Adolescent Girls:

Table 6: Frequency and Percentage Distribution of the Adolescent Girls According to the Information that they had Regarding Menstruation before getting into Periods (n=110)

Information Regarding Menstruation	Frequency (f)	Percentage (%)
Had information	53	48.2
Knew little bit	39	35.5
Did not had information	18	16.4

Table 6 reveals that nearly half (48.2%) of the adolescent girls had information of menstruation before getting into periods.

Table 7: Frequency and Percentage Distribution of the Adolescent Girls According to the Age (in years) at which they experienced their First Menstrual Period (n=110)

Age (in years)	Frequency (f)	Percentage (%)
10 to 11	17	15.5
12 to 13	75	68.2
14 to 15	14	12.7
Did not remember	4	3.6

Table 7 shows the age distribution when the adolescent girls had their first menstrual period. The majority (68.2%) of the adolescent girls had their first menstrual period between the age of 12 to

13 years. Very high majority of the adolescent girls (91.8%) were having regular periods. Findings revealed that 42.7 per cent of the adolescent girls had their first menstrual period for 4 to 5 days.

Table 8: Frequency and Percentage Distribution of the Adolescent Girls According to the Type of Sanitary Product Used during their First Menstrual Period (n=110)

Sanitary Products	Frequency (f)	Percentage (%)
Pad	83	75.5
Cloth	29	26.4

*Multiple choice question

Table 8 reveals that almost seventy-six per cent (75.5%) of the adolescent girls had used pad during their first period.

4. Knowledge regarding Menstrual Health and Hygiene amongst Adolescent Girls:

Table 9: Frequency and Percentage Distribution of the Adolescent Girls According to their Overall Knowledge Level before Intervention regarding Menstrual Health and Hygiene (n=110)

Knowledge	Frequency (f)	Percentage (%)
More knowledge	47	42.7
Less knowledge	63	57.3

Table 9 reveals the percentage distribution of the adolescent girls according to their knowledge level before intervention regarding menstrual health and hygiene. It reveals that, almost forty three percent (42.7%) of the adolescent girls had more knowledge and among them 57.3 percent of them had less knowledge about menstrual health and hygiene before intervention

Table 10: Frequency and Percentage Distribution of the Adolescent Girls According to their Overall Knowledge Level after Intervention regarding Menstrual Health and Hygiene (n=110)

Knowledge	Frequency (f)	Percentage (%)
More knowledge	54	50.9
Less knowledge	56	49.1

Table 10 reveals that, almost half (50.9%) of the adolescent girls had more knowledge regarding menstrual health and hygiene, and among them 49.1 per cent of them had less knowledge regarding menstrual health and hygiene after intervention. The table indicates the percentage distribution of the adolescent girls' knowledge regarding menstrual health and hygiene is concerning, as almost half of them had less knowledge regarding menstrual health and hygiene.

5. Overall Effectiveness of the Selected Short Films in terms of Gain in Knowledge amongst Adolescent Girls

Table 11: r-Value for the Overall Effectiveness of the Selected Short Films amongst Adolescent Girls regarding Menstrual Health and Hygiene in terms of Gain in Knowledge (n=110)

Variable	Category	N	Mean	SD	DF	r-Value
Gain in Knowledge	Pre score	110	23.4	8.1	109	**0.71***
	Post score		30.8	7.7		

***Significant at 0.05 level**

The fact that the study found a high significant difference in knowledge gain amongst the adolescent girls who watched the selected short films, this suggests that the short films were an effective educational tool in the present study.

Table 12: Mann Whitney U-test showing Difference in the Effectiveness of the Selected Short Films as a Medium for Gain in Knowledge Amongst Adolescent Girls in relation to their Exposure to Audio-Visual Medium for study purpose (n=110)

Exposure to Audio-Visual Medium	N	Mean Rank	SD	p-Value
Pre-Test	110	23.4	8.1	0.07
Post-Test		30.8	7.7	0.006

***Significant at 0.05 level**

Table 12 reveals that there was significant difference in gain in knowledge of the adolescent girls regarding menstrual health and hygiene in relation to their exposure to audio-visual medium. Therefore, the null hypothesis stating that there will be no significant difference in the gain in knowledge regarding menstrual health and hygiene in relation to their exposure to audio-visual medium was not accepted.

Table 13: Mann Whitney U-test showing Difference in Effectiveness of the selected Short Films as a Medium for Gain in Knowledge Amongst Adolescent Girls in relation to their Exposure to Short Films (n=10)

Exposure to Short Films	N	Mean Rank	SD	p-Value
Pre-Test	110	23.4	8.1	0.73
Post-Test		30.8	7.7	0.45

NS= Not Significant

Table 13 reveals that there was no significant difference in the gain in knowledge of the adolescent girls regarding menstrual health and hygiene in relation to their exposure to short films. This means

that the adolescent girls' knowledge was equal, irrespective to their exposure to short films. Therefore, null hypothesis stating that there will be no significant difference in gain in knowledge of the adolescent girls regarding menstrual health and hygiene in relation to their exposure to short films was accepted.

6.Practices regarding Menstrual Health and Hygiene amongst Adolescent Girls:

Table 14: Frequency and Percentage Distribution of the Adolescent Girls According to the Overall Practices followed Before Intervention regarding Menstrual Health and Hygiene

Practices	Frequency(f) (n=110)	Percentage (%)
Good Practices	45	40.9
Poor Practices	65	59.1

Table 14 reveals that almost forty-one per cent (40.9%) of the adolescent girls were following good practices before intervention while majority of them (59.1%) were following poor practices before intervention regarding menstrual health and hygiene.

Table 15: Frequency and Percentage Distribution of the Adolescent Girls According to the Overall Desire to Change Practices followed After Intervention regarding Menstrual Health and Hygiene

Desire to Change Practices	Frequency(f) (n=110)	Percentage (%)
High Desire	52	47.3
Low Desire	58	52.7

Table 15 reveals that nearly half (47.3%) of the adolescent girls had desire to follow good practices and almost fifty-three percent (42.7%) of them had desire to follow poor practices during periods after intervention.

Table 16: r-Value for Overall Effectiveness of the selected Short Films amongst Adolescent Girls regarding Menstrual Health and Hygiene in terms of their Desire to Change Practices

Variable	Category	N	Mean	SD	DF	r-Value
Desire to change in Practice	Pre score	110	52.5	7.3	109	**0.64***
	Post score		57.2	7.4		

***Significant at 0.05 level**

Table 16 reveals that there was high significant difference in desire to change practices amongst adolescent girls regarding menstrual health and hygiene. This indicates that the selected short films were effective amongst adolescent girls in term of their desire to change practices regarding menstrual health and hygiene.

Table 17: Mann Whitney U-test showing Difference in Effectiveness of the selected Short Films as a Medium for Desire to Change Practices amongst Adolescent Girls in relation to their Exposure to Audio-Visual Medium

Exposure to Audio-Visual Medium	N	Mean Rank	SD	p-Value
Pre-Test	110	52.5	7.3	0.494
Post-Test		57.2	7.4	0.023

***Significant at 0.05 level**

Table 17 reveals that there was a significant difference in desire to change in practices of the adolescent girls regarding menstrual health and hygiene in relation to their exposure to audio-visual medium. The supportive finding in the study by Bhatnagar et. al. (2017) reveals that a health education program improved the practices of menstrual hygiene amongst adolescent girls in Rajasthan.

Table 18: Mann Whitney U-test showing Difference in Effectiveness of the selected Short Films as a Medium for Desire to Change Practices amongst Adolescent Girls in relation to their Exposure to Short Films

Exposure to Short Films	N	Mean Rank	SD	p-Value
Pre-Test	110	52.5	7.3	0.731
Post-Test		57.2	7.4	0.708

NS = Not Significant

Table 18 reveals that there was no significant difference in desire to change in practices of the adolescent girls regarding menstrual health and hygiene in relation to their exposure to short films. Therefore, null hypothesis stating that there will be no significant difference in desire to change in practices regarding menstrual health and hygiene after watching short films was accepted.

6. Reactions and Feedback of the Adolescent Girls related to selected Short Films:

Table 19: Frequency and Percentage Distribution of the Adolescent Girls According to the Ratings given by the them for the selected Short Films (n=110)

Ratings of the Short Films	Paheli Ki Saheli		Laali: A Tail of Blood		Every Girls Bleeds	
	(f)	(%)	(f)	(%)	(f)	(%)
Very Good	93	84.5	84	76.4	93	84.5
Good	17	15.5	25	22.7	16	14.5
Average	0	0.0	1	0.9	1	0.9

Table 19 shows that a large majority (84.5%) of the adolescent girls reported that the ‘Paheli Ki Saheli' short film was very good, for 'Laali - A Tale of Blood’ short film, 76.4 percent, whereas for 'Every Girl Bleeds’ short film, a very high majority (84.5%) of the girls rated it as very good.

Table 20: Frequency and Percentage Distribution of the Adolescent Girls According to their Preferences related to the Subject of the selected Short Films (n=110)

Subject of Short Films	Paheli Ki Saheli		Laali: A Tail of Blood		Every Girls Bleeds	
	(f)	(%)	(f)	(%)	(f)	(%)
New	51	46.4	56	50.9	54	49.1
Familiar	28	25.5	36	32.7	37	33.6
Boring	11	10.0	9	8.2	1	0.9
Entertaining	6	5.5	9	8.2	11	10.0
Enlightening	14	12.7	1	0.9	7	6.4

Table 20 reveals the responses of the adolescent girls regarding their preferences of the subject matter of the selected short films "Paheli Ki Saheli", "Laali: A Tail of Blood", and "Every Girl Bleeds”. Almost forty-seven per cent (46.4%) adolescent girls reported that the subject matter of "Paheli Ki Saheli" was new to them, for "Laali: A Tail of Blood" almost fifty-one percent (50.9%), and for "Every Girl Bleeds", the half (49.1%) of them found the subject matter to be new.

CONCLUSION

Short films are known for their versatility in conveying messages in a visually stunning way. They offer a medium that can effectively raise awareness about various topics, including menstrual health and hygiene. Unfortunately, in many societies, menstruation is still considered a taboo topic, leading to a lack of awareness and education among women and girls. They also believe that the menstruation is curse of god and should not be discussed openly, especially with male members of the family. This leads to lack of information about menstruation among the adolescent girls, the lack of information leads them to followed wrong practices and ultimately it affects their health.

Therefore, the negative consequences of lack of information about menstruation can be severe. For instance, women and the adolescent girls may not have access to proper hygiene products, leading to health issues. Additionally, social stigma surrounding menstruation can limit women and the adolescent girl’s participation in daily activities. Therefore, it is important to educate the women and the adolescent girls about menstrual hygiene and healthy practices to be followed during menstruation. They should be informed about the facts and consequences of following wrong practices.

The short films used in the present study, were not only providing knowledge, but also entertained and kept the adolescent girls engaged throughout the learning process. This makes learning through such a medium easier for adolescence to grasp knowledge. The reactions of the adolescent girls related to the short films indicates that the language used in the short films were easy to understand

and provided more useful information in simple manner, and it can be concluded that the short films were well-received by the selected adolescent girls. Hence, by considering the facts and findings of the present study it can be concluded that the selected short films were effective in imparting knowledge and motivating the adolescent girls to change practices regarding menstrual health and hygiene.

RECOMMENDATIONS FOR FUTURE RESEARCHES

1. A similar study can be conducted with adolescent girls or women of different age group.
2. The study can be conducted using short films as a medium to create awareness about social issues such as domestic violence, gender equality, self-defence, sexual harassment, eave teasing, and mental health.
3. A qualitative research, including Focus Group Discussions (FGDs), can be conducted to understand the attitude of the adolescent girls regarding myths and taboos related to menstruation.

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12

AGRIBUSINESS AND RURAL YOUTH: A STUDY IN BAGHPAT DISTRICT OF UTTAR PRADESH

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ABSTRACT

In the new technological era, agriculture needs to be diversified and agribusiness can play a vital role. Now, there is a demand to have a set of smart and enthusiastic people who can help accelerate the economy of the country with the help of new technologies and strategies. Youth is an important stakeholder in society and sometimes it is heard that youth is getting detached from agriculture. The technology driven society and globalized nature of the economy attracts today's youth. Therefore, the study attempted to explore the Rural youth's understanding and opinion about traditional Agriculture practices and Agribusiness sector. The research used a descriptive design to study the perception of rural youth. A semi-structured interview schedule was used with rural youth residing in Baghpat district of Uttar Pradesh. The sample for the study was 60 youths comprising 30 males and 30 females in the age bracket of 22-27 years. The study's findings indicate that rural youth are aware of the benefits of agribusiness and identify the activities involved in it. It emerged from the study that rural youth are less motivated to start any agribusiness activity of their own. Majority of them did not find agriculture and allied activities profitable and some of them did not have proper land holdings which makes them disinterested in it. In response, the majority of the rural youth feel that if any skill training and hand-holding support is provided to them then they can start their agribusiness ventures in the future.

Keywords: Rural Youth, Agriculture, Agribusiness, Uttar Pradesh, Vocational Preferences

INTRODUCTION

Agriculture is the main source of livelihood for 2.5 billion people, including 1.3 billion smallholders and landless workers. 75% of all poor people live in rural areas, 86 percent of whom rely on agriculture for a livelihood. Hence, enhancing agricultural growth and productivity is essential to meet the worldwide demand for food and reduce poverty, particularly in the poorest countries (World Bank, 2007). India is the youngest country in the BRICS (Brazil, Russia, India, China, and South Africa). It has the largest number of young people. In other words, this has been understood as the 'youth bulge' that is expected to lead to a demographic dividend—the idea is well-known, and extensively researched (National Youth Policy, 2014).

In the study, Elias et al. (2018) found that Youth's aspiration for agriculture ranked third among all categories. Being an agricultural scientist (in India), getting a job on a "modern farm" (in Morocco), helping communities through agriculture (in Malawi), being an agronomist to apply "knowledge in farming learning centres in rural areas" (in Mali), having "everything needed to engage in farming" (in Malawi), and being a "great farmer" (in Nigeria) were among the agricultural

pursuits of these people. When practiced under' modern' circumstances, these youth thought farming was a desirable profession. In contrast, very few female youths cited jobs associated with agriculture as their desired occupation.

Youth empowerment is an attitudinal, structural, and cultural process whereby young people gain the ability, authority, and agency to make decisions and implement change in their own lives and the lives of other people, including youths and adults. It is an unconditional posture for nation-building as the strength of the future development of a nation depends solely upon it. The future of any country is always predicated on its present youth productive force. A society with an inefficient and irresponsible youth force is not far from an abyss of serious irreparable damage (Raheem, 2016).

It is crucial to support job creation in the food-related services and processing industry. With a more vibrant entrepreneurial culture, new skills, and access to capital, young people should be able to create their own jobs. If agriculture and agri-food systems represent a strategic and growing sector for Indian development, they nonetheless hold a negative perception by most young people due to very low remuneration and harsh working conditions (e.g., low mechanization). Re-engaging youth in agriculture also requires addressing limited access to resources (i.e., land), inadequate access to financial services; limited access to markets, and low levels of involvement in decision-making processes.

Rural youth are a very important section of the rural community and they play a very important role in the development and upliftment of rural areas. As rural youth participate very enthusiastically in various developmental activities of the village with keen interest, it makes them very important stakeholders in society.

Youth reflect the huge potential and represent the lifeblood of a nation. The development of youth determines the development and growth of a community and country. Hence, there is a need to study the aspirations, attitudes, and personal, psychological, and socio-economic characteristics of rural youth for their progress and development, which in turn ensures the development of a country. Today unemployment is a major problem among the rural youth and now they are trying to come out of this problem by migrating from rural areas to urban areas, as employment opportunities are more in urban areas.

Agribusiness: Agribusiness delves into production, marketing, and processing within agricultural-associated industries, including horticulture, forestry, fishery, livestock, etc. Improved farming practices, advanced agricultural equipment, fertilizer, pesticides, pre- and post-harvest preparation, storage, transport, packing, and labelling of agricultural products are also included. The phrase "agribusiness industry" refers to the complete chain of agriculture-related businesses, including seed distribution, food processing, and machinery. It is also defined as a corporate method of farming (Bairwa et al., 2014).

It is an effort aimed at strengthening the socioeconomic conditions of rural inhabitants, with a particular focus on the development of agriculture and related activities (Parmar, 2015). Agribusiness is defined as an amalgamation of agricultural producers, input providers, merchandisers or first handlers, processors, retailers, and consumers that make the complete and meaningful sequence in the Agrarian sector.

The concept of agribusiness takes into account the fact that agriculture is part of the business world. It is integral to link agriculture with its business otherwise a comprehensive agribusiness cannot be created. The agribusiness system includes both small farmers and major corporations. Everyone has their place and value (Zylbersztajn, 2017). It enables farmers with fresh opportunities to generate value, whilst agro-processing companies provide them with essential supplies and services and take on some of their risks. Agribusiness is experiencing a boom in investment, and the phrase "agribusiness and supermarket retail boom" has become popular. Several businesses have already made billion-dollar investments either directly or through regional collaborations (Acharya, 2007).

OBJECTIVE

To study the Rural youth's opinion about traditional agriculture practices and Agri business sector

METHODOLOGY

A descriptive research design was employed in the present research and a semi-structured interview schedule was used. The tool was divided into 2 parts. Part A identified Socio-economic profile of Rural Youth. Part B of the tool explored in-depth information regarding the rural youth's awareness and opinion about agribusiness.

The study was conducted in Baghpat district of Uttar Pradesh. The district is 50 km away from Meerut and 40 km away from New Delhi. Three villages were selected for the study i.e., Tavelagarhi, Sarora, and Gaidabara. The total sample size of the study is 60 which was further divided into 30 male and 30 females. Further, 20 rural youth i.e., 10 male and 10 females were selected from one village.

National Youth Policy (2021) has defined the age of youth from 15-29 years old. For the study, youth in the age group of 22-27 years were selected to minimize the age gap and clarity of thought.

The objectives of the study are:

- To explore the awareness of Rural Youth regarding agribusiness
- To study the motivation level of Rural Youth to start their own agribusiness

As per the objectives envisaged, the collected data were classified and tabulated in order to arrive at meaningful and logical inferences. Further, the analysis of data involved the computation of frequency and Percentages.

FINDINGS AND DISCUSSION

1. Demographic Profile of Rural Youth

Table 1: Demographic profile of respondents
***N=60**

Occupation	**Female (n=30)**	**Percentage**	**Male (n=30)**	**Percentage**
Student	15	50.00	13	43.33
Self-employed	1	3.33	0	0.00
Private job	2	6.66	1	3.33
Into Agriculture	0	0.00	15	50.00
Government Job	2	6.66	1	3.33
Homemaker	10	33.33	0	0.00
Educational Qualification	**Female (n=30)**	**Percentage**	**Male (n=30)**	**Percentage**
Middle High School	6	20%	7	23.33%
Higher Secondary	4	13.33%	13	43.33%
Undergraduate and above	20	66.66%	10	33.33%

Table 1 depicts the demographic profile of rural youth in which their occupation and educational qualifications are described. Since purposive sampling was used, 30 males and 30 females were selected to gain perceptions of both genders. Figure 1 indicates that the majority of the respondents (65%) were from the age group of 22-24 years. The majority of the female respondents were students and homemakers i.e., 50 % and 33.33% respectively. Very few female respondents were engaged in occupations like Self-employment (3.33%), Private jobs (6.66%), and Government jobs (6.66%). On the other hand, most of the male respondents were into agriculture and academics (students) i.e., 50% and 43.33% respectively.

It was interesting to note that 66.66% of female respondents had studied the highest educational qualification as an Undergraduate. On the other hand, only 16.67% of male respondents were found to have this qualification.

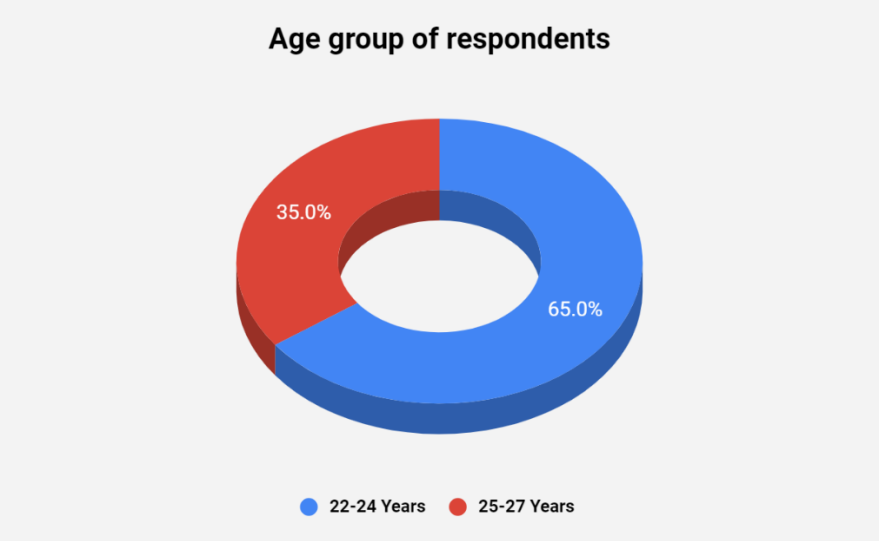

Figure 1: Age groups of respondents

Table 2: Vocational Preferences of Rural Youth
***N=60 (*Multiple answers were given by the respondents)**

Interest in vocational activities	Female (n=30)	Percentage	Male (n=30)	Percentage
Yes	19	63.33	17	56.66
No	11	36.66	13	43.33
If Yes:				
Technician	3	10	6	19.35
Electrician	0	0	6	19.35
Tailoring/boutiques	16	53.33	0	0
Beauty Parlours	10	33.33	0	0
Private business	1	3.33	3	10
Government initiatives	6	20	13	43.33

Vocation is described as a commitment to the work in which an individual engages with a religious zeal. Table 2 depicts the interest of respondents in various vocational activities. This data is bifurcated into responses based on male and female respondents as the researcher observed that there is a difference in the vocational preferences based on the gender of the rural youth. 63.33% of the female respondents were interested in any vocational activities and 36.33% of the female respondents did not want to get involved in any vocational activities. On the other hand, 56.66% of the male respondents were interested in getting involved in vocational activities and 43.33% of the respondents did not show any interest in such activities.

Further analysing the interest in vocational activities, the researcher found out that the majority of the female respondents were interested in tailoring/boutiques (53.33%). While 33.33% of the female respondents had an inclination toward beauty parlours. Other preferred vocational activities for them were any government job (20%), private business (3.33%), agriculture activities (3.33), and technician (10%). No female respondents had an interest in the electrician profession. Contrary to this, 19.35% of male respondents showed interest in becoming electricians and technicians. The majority (43.33%) of male respondents wanted to get into the government sector. Private business (10%) and agricultural activities (6.66%) were other areas of interest. Male respondents showed zero interest in tailoring and beauty parlour vocations.

Table 3: Knowledge about the agribusiness sector
***N=60 (Multiple responses were given by the respondents)**

Difference between Conventional Agriculture and agribusiness	**Frequency**	**Percentage**
Yes	31	51.67
No	29	48.33
Activities involved in Agribusiness		
Agricultural inputs	57	95.00
Agricultural Production	57	95.00
Agro-processing	57	95.00
Marketing & Trade	41	68.33
Can't say	3	5.00
Positioning of Agribusiness		
Primary sector	15	25.00
Secondary Sector	7	11.67
Tertiary Sector	34	56.67
All of the above	4	6.67

Table 3 depicts the difference between conventional agriculture and agribusiness. It was noted that 51.67% of the respondents don't find any difference between traditional agriculture and agribusiness. While 48.33% of respondents could differentiate between conventional agriculture and agribusiness. It also reflects the activities involved in the process of agribusiness. 95% of the respondents confirm that Agricultural inputs, Agricultural Production, and Agro-processing are the activities that are involved in Agribusiness. 68.33% of respondents say that Marketing and trade is one of the activities of Agribusiness. Rural Youth was also asked about the nature of the agribusiness sector. 25% of the respondents said that Agribusiness comes under the Primary sector, 11.67% of the population confirmed that it is a part of the secondary sector while the majority of the population

i.e., 56.67% of the respondents believed agribusiness to be a part of the tertiary sector. 6.67% of the respondents studied said that agribusiness comes under every sector mentioned.

2. Benefits associated with agribusiness

Figure 2 shows the data regarding benefits associated with agribusiness. The majority (96.67%) of the respondents find agribusiness to be innovative. 85% of people believed that advanced techniques are used in it and can reduce the drudgery of labour. 81.67% of respondents find agribusiness trendy and has the potential to accelerate the growth of the economy. 60% of them felt that all the options are valid for benefits associated with agribusiness.

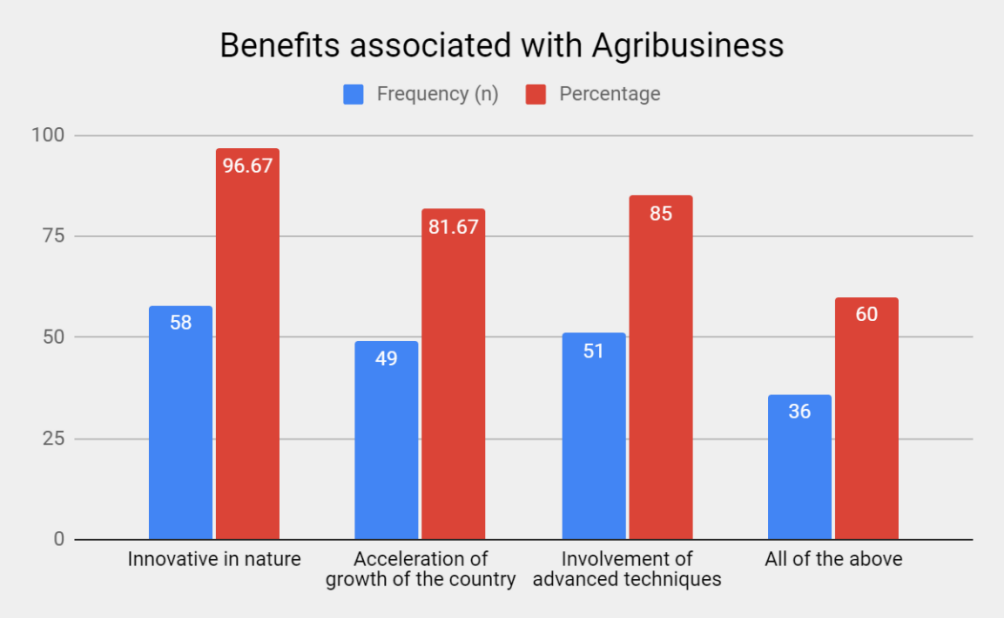

Figure 2: Benefits associated with Agribusiness

3. Opinion about the involvement of youth in agribusiness

This section discusses the opinion about the involvement of youth in agribusiness. The majority of the respondents feel that youth should engage with agribusiness as per their ability. If they have expertise and interest in other areas, they should join that particular field and if they have interest and expertise in agribusiness then they should join this. Some of the respondents believe that agribusiness has the capacity to bring prosperity and it will provide employment as well. On the contrary, very few respondents suggest not joining agribusiness as it does not yield any profit.

Rural Youth were also asked about their opinion on farming as a career. Almost all the respondents feel that nowadays youth are not interested in agriculture. They do not find agriculture to be profitable which makes the youth detach themselves from agriculture. A substantial number of respondents believe that there are no prospects available in agriculture. Interestingly, some of the respondents said that insufficient land holdings are the major factor to detach them from agriculture. On the contrary, very few respondents do not believe that youth is getting disinterested in agriculture. They feel that since agriculture is a family occupation, it is difficult to leave farming. A meagre percentage of youth has an interest in farming as a career.

They were also probed about the employment crisis that is prevailing for youth in the country. All of the respondents agree and feel that youth do not get the opportunity as per their expertise and potential. The majority of the respondents found overpopulation to be the cause of the employment crisis. Many respondents feel that rural areas lag behind which creates an employment crisis for rural youth.

4. Motivation to start their own agribusiness

Figure 3 describes the motivation to start agribusiness. 23.33% of respondents reported being motivated enough to start agribusiness. 58.33% of respondents were not motivated enough to start agribusiness. While 18.33% of respondents did not answer the question. On further investigation, it was found that the interest drives the motivation level of respondents. Some respondents said that their zeal and commitment as well as the availability of financial support can motivate them enough to start agribusiness. Some of the respondents felt that agribusiness has the potential to provide employment as well as profit which can ensure the bright future of Youth.

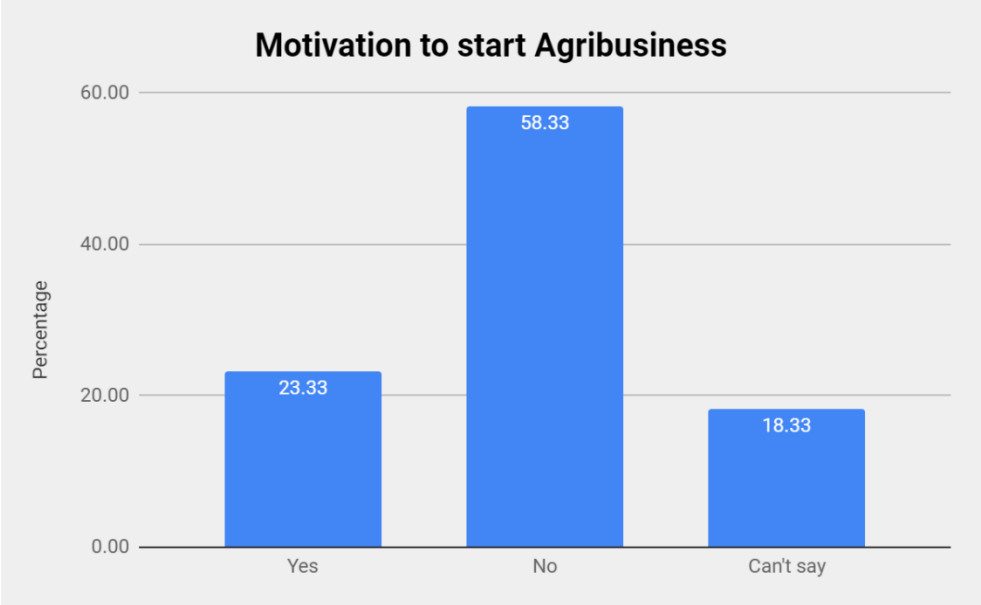

Figure 3: Motivation to start Agribusiness

During the discussion, respondents were also probed to reflect upon the reasons for saying no to starting agribusiness. The majority of the respondents reported that they find agribusiness to be a laborious work which stops them from engaging in it. Female respondents provided a major insight and stated that there are fewer opportunities available for women in the field of agribusiness. Some respondents reflected that they never got such opportunities to start agribusiness. On the other hand, a handful of respondents mentioned that agribusiness do not provide any financial securities which makes them think otherwise.

Interestingly, Uttar Pradesh being rich in terms of agriculture production and land holdings, however it was found out that rural youth are not interested in joining their family occupation. They don't find agriculture interesting and perky enough to invest their time on it. With the advent of new technologies like Artificial intelligence and Machine Learning in the world, they find agriculture and allied activities mainstream.

Table 4: Need for training in the agribusiness sector
***N=60 (*Multiple responses were given by respondents)**

Need of any training in the agribusiness sector	Frequency	Percentage
Yes	53	88.33
No	7	11.67
Training Areas		
Vegetable Cultivation	5	8.33
Fruit Cultivation & processing	15	25.00
Nursery Management	15	25.00
Sericulture	6	10.00
Each activity related to agriculture	41	68.33

Table 4 shows the need for training in the agribusiness sector. The majority (88.33%) of the respondents felt the need for training in the agribusiness sector. Upon deliberation, respondents mentioned the areas which require further training. 8.33% of people felt the need for training in the Vegetable Cultivation area. On the other hand, 25% of the respondents felt the need for training in Fruit Cultivation & processing and Nursery Management. Interestingly, the majority of the respondents (68.33%) wanted training in every activity of agriculture. They also mentioned that better training and hand-holding support will motivate them to take on agribusiness activities as career prospects.

CONCLUSION

It was evident from the study that mostly male respondents were directly involved in agriculture. It was observed that Female respondents had less participation in agricultural activities as compared to male respondents. Further insights were given by female respondents that a married woman does not go to agricultural field, they visit their field only at the time of festivals (for dev-bhoomi pooja). Rather they provide input in intangible portions of agricultural activities e.g., preparing tea for laborers in the field, looking after livestock at home, participating in the storage of grains, etc. When reasons for this system was asked, they reported that agriculture is a laborious work and requires hard work therefore it is a man's job.

Majority of the respondents were in the age group of 22-24 years. As per the findings, half of the respondents can differentiate between traditional agriculture and agribusiness activities and had a high level of awareness about the agribusiness sector and the activities involved in it. Findings also suggest that youth are aware of the benefits associated with Agribusiness and find it an innovative field and are very sure that it can bring improvement in the field of agriculture and can accelerate the overall growth of the economy. Rural youth showed great enthusiasm in learning about agribusiness but they feel that Skill-based training and handholding support is very important to equip them with a solid base and create a pool of knowledge and skills. Respondents were also

interviewed about their motivation to start agribusiness of their own. Motivation is an intrinsic trait that is influenced by many socio-economic factors; hence it was observed in the study that very few respondents were motivated enough to start their own enterprise of agribusiness activities but they are more willing to get employed in an enterprise and get paid on a salary basis. Lack of opportunity, future security, and agribusiness being laborious work were some of the reasons that inhibited these youth from starting their own business.

SUGGESTIONS FOR FUTURE RESEARCH

- To compare the aspirations of urban and rural youth regarding Agribusiness
- To explore emerging trends in Agri-allied activities
- To explore gender differences in Agribusiness

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13

COMPARATIVE STUDY: AWARENESS LEVELS OF RURAL WOMEN REGARDING CHILD REARING PRACTICES IN ICDS AND NON-ICDS AREAS IN CHANDAULI DISTRICT, UTTAR PRADESH

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ABSTRACT

Integrated Child Development Services (ICDS) is a flagship program in India aimed at improving child and maternal health by providing essential services like nutrition, healthcare, pre-school education, and support to pregnant women, mothers, and young children. It focuses on the holistic development of children under 6 and their families.The present investigation was carried out in the six villages of Naugarh Block; district Chandauli (U.P.), which aimed to find out the women's knowledge about child rearing practices under ICDS and Non ICDS area. Total sample comprised of 480 women, out of this 280 women were enrolled as beneficiaries under ICDS and 200 were women, selected randomly from Non ICDS area. A self constructed interview schedule was used to collect the relevant information. Date was analyzed in terms of percentage, chi-square and probability test and it shows that majority of respondent belong to Kharwar caste, majority of study sample was illiterate and having three to four children. In ICDS area 71.42% women are aware about the knowledge of breast feeding. 70.71% mothers of ICDS area have knowledge of introducing semi-solid food to the child after five months. Taking intoxicants during pregnancy and lactation period is very dangerous but still there are 50.71% mothers in ICDS and 50% in Non ICDS area who don't know about this. The findings revealed that ICDS intervention have positive effect in improving the child rearing practices in women.

Key words: Breast feeding, Child-rearing, Knowledge level, ICDS, Non-ICDS, Perception

INTRODUCTION

In India, as per the 2011 census, approximately 13.12% of the population comprised children under the age of six. The Integrated child development service (ICDS) of Government of India initiated in 1975 is the largest nutrition & health intervention programme in the country providing a package of services to pre-school children and women in an integrated manner. The ICDS programme is designed in such a way that it is of utmost importance for mother and children in rural areas where most of the mothers are illiterate, unaware of nutritional and health needs and proper child rearing practices (Jadav et al., 2021). The package of services include supplementary nutrition, health check-up, immunization, referral services, pre-school education and nutrition and health education (NHED) delivered through the 'Anganwadi' at grass root level, child care centre, under the charge of the Anganwadi worker (AWW). In a study conducted by Nirmal G et al.

(2013), it was found that 60.5% of mothers exhibited average knowledge, 25.5% demonstrated good knowledge, and 14% showed poor knowledge regarding ICDS services.

The ICDS is supposed to act as a changing agent in the rural areas so that their beliefs and faiths can be changed and they should be induced to take an effective part in main developmental stream of the nation. This research paper investigates the awareness levels of rural women in Chandauli District, Uttar Pradesh, regarding child-rearing practices. The study aims to compare the knowledge and practices of women in areas with Integrated Child Development Services (ICDS) against those in non-ICDS areas, shedding light on the impact of government intervention on maternal and child health in rural communities. Chaunlai Hu et al (2009) observe the change in nutritional status from base line to fourth fallow-up to measure the effect of ICDS interventions on nutritional status of under six children over a period of the year. A significant difference in nutritional status between base line to fourth follow-up of children in ICDS and Non ICDS area was found. Children of ICDS area maintained better nutritional status than children of Non ICDS area.

OBJECTIVES

In view of the above the present investigation was carried out for following objectives-

- To find out women's socio-demographic classification under ICDS and Non ICDS area.
- To investigate knowledge of rural women regarding selected child-rearing practices in ICDS and NON-ICDS areas.

METHODOLOGY

This study was conducted in six villages Malevar, Gangapur, Majhgawan, Baghi, Jasmati and Jaimohini at Naugarh block of district Chandauli, were selected purposively as about 50% area belong to SC/ST community, who live in close vicinity to the forest area.

The sample consist of total 280 pregnant and nursing mothers, who were enrolled as beneficiaries of all the Anganwadi centers spared at Naugarh block. Another group comprised 200 mothers selected randomly from the same villages but were not receiving the ICDS services. A self-constructed interview schedule was used to find out women's knowledge about child rearing practices under ICDS and Non ICDS area. The present study was a comparative evaluation in ICDS and Non ICDS area to study the effect of interventions of ICDS keeping all other variables control like caste, education, family size and type and monthly income. Collected data was analyzed and calculated in terms of percentage, chi-square and probability test.

Limitation of the study:

While this study rigorously examines specific facets of child rearing, such as feeding habits, birth spacing, and intoxicant use, it's important to note that the broader landscape of child rearing practices encompasses a multitude of factors beyond the scope of this research. Areas such as educational methods, disciplinary approaches, and cultural influences remain unexplored within this study's framework. Therefore, while our findings offer valuable insights into select practices, they may not fully represent the entirety of factors influencing child rearing practices.

RESULTS AND DISCUSSION

Table 1 Indicate that in the ICDS Area, the majority of the respondents belong to the Kharwar caste (55.36%). Musahar and Kale castes also have significant representation, with 78 respondents (27.86%) and 47 (16.79%), respectively. In the Non-ICDS Area, the Kharwar caste still has the highest representation with a frequency of 88 (44%). Kale and Musahar castes comprise only 28% in this area.

In both the ICDS Area and the Non-ICDS Area, there is a notable prevalence of illiteracy. In the ICDS Area, a significant 238 (85%) of the population are illiterate. Conversely, a smaller percentage of individuals are literate, accounting for 35 (12.5%) of the population, while those with primary education make up only 2.5%. Similarly, in the Non-ICDS Area, a majority of the population, 92.5%, is characterized as illiterate. In contrast, a smaller percentage of individuals are literate, comprising 12 (6%) of the population, while those with primary education represent only three respondents of the total population. These statistics reflect the educational disparities in both areas.

Table-1: Distribution of respondents according to their socio-demographic characteristics

Sr. No.	Characteristics	ICDS Area (N=280) Frequency (n)	Non ICDS Area (N=200) Frequency (n)
1.	Caste		
	a) Kale	47 (16.79)	56 (28)
	b) Musahar	78 (27.86)	56 (28)
	c) Kharwar	155 (55.36)	88 (44)
2.	Education		
	a) Illiterate	238 (85)	185 (92.5)
	b) Literate	35(12.5)	12(6)
	c) Primary	7(2.5)	3(1.5)
3.	Family Type		
	a) Nuclear	192 (68.57)	140 (70)
	b) Joint	88(31.43)	60 (30)
4.	Family Size		
	a) 3-4	105 (37.5)	69 (34.5)
	b) 5-7	157 (56.07)	119 (59.5)
	c) 8 and above	18 (6.04)	12 (6)
5.	No. of Children		
	a) 0-2	59 (21.07)	54 (27)
	b) 3-4	119 (42.6)	100 (50)
	c) 5-6	93 (33.21)	39 (19.5)
	d) above 6	9 (3.21)	7 (3.5)
6.	Monthly Income		
	a) Less than 3000	192 (68.57)	147 (73.5)
	b) 3001-4000	48 (17.15)	33 (16.5)
	c) 4001-5000	38 (13.58)	18 (9.0)
	d) above 5000	2 (0.7)	2 (1.0)

Figure in parenthesis indicates percentage

From the above table it is clear that In the ICDS Area, a significant proportion of families have a family size of 5-7 members, 56.07% of the total respondents. Similarly, in the Non-ICDS Area, the majority of families also exhibit a family size ranging from 5-7 members, with a frequency of 119 respondents (59.5%). Notably, in both areas, family sizes of eight members and above is the least common among the surveyed households. Dandotiya et al.'s (2018) study in urban Bhopal supported our findings, showing high utilization of immunization (99.39%) and supplementary nutrition services (83.7%) through ICDS. Furthermore, ICDS improved knowledge and protective measures for 17.8% of women and children.

In the ICDS Area, it is noteworthy that a substantial portion of the surveyed respondents have a family size of 5-7 members, with a frequency of 157 (56.07%). Similarly, in the Non-ICDS Area, the majority of respondents also have family sizes in the 5-7 member range, with a frequency of 119 (59.5%). This indicates a prevailing pattern of larger families in both areas, with a preference for family sizes within this range. Interestingly, the least common family size category in both areas appears to be 8 members and above, suggesting that families with more extensive membership are comparatively rare in the surveyed populations. In both the ICDS and Non-ICDS Areas, the most common number of children is three to four, representing 42.6% and 50% of the respondents, respectively, while very few respondents have above six children in both areas. It is obvious from the table in both the ICDS and Non-ICDS Areas, the majority of individuals have a monthly income of less than 3000, representing 68.57% and 73.5%, respectively, followed by other categories Rs. 3001-4000 (17.15% in ICDS and 16.5% in Non-ICDS), 13.58% in ICDS and 9.0% in Non-ICDS areas of respondents have income more than four thousand but less than five thousand rupees. Only two respondents of ICDS and Non-ICDS areas have income above Rs. 5000. These income distributions provide insights into the economic conditions of the studied populations.

Education, annual average income, socio-economic status, extension contact, and utilization of mass media were the important factors that contributed to the knowledge gained by the rural women (Roy. P 2017).

Table-2: Knowledge regarding child rearing in ICDS area and Non-ICDS area

Sr. No.	Knowledge Regarding Child rearing	ICDS (N=280)		Non ICDS (N=200)		Test of Significance
		Frequency	(n)	Frequency	(n)	
	Breast feeding to the Child from the first day of birth					
	a) Known	200	(71.42)	8	(4.00)	$X^2 = 5.99$
	b) Not known	45	(16.07)	163	(81.5)	df = 2
	c) No response	35	(12.5)	29	(14.5)	*p < 0.001
	Semi Solid food to the child after five months					
	a) Known	198	(70.71)	19	(9.5)	$X^2 = 9.21$
	b) Not known	70	(25)	178	(74)	df = 2

	c) No response	20	(7.14)	33	(16.5)	*p < 0.001
	Have two or three children, two or three years apart					
	a) Known	200	(71.42)	8	(4.00)	$X^2 = 9.22$
	b) Not known	45	(16.07)	163	(81.5)	df = 2
	c) No response	142	(50.71)	29	(14.5)	*p < 0.05
	Not using intoxicants during pregnancy or lactating					
	a) Known	108	(38.57)	81	(40.5)	$X^2 = 5.99$
	b) Not known	142	(50.71)	100	(50.00)	df = 2
	c) No response	30	(10.71)	19	(9.5)	*p < 0.05

(Figure in parenthesis indicates percentage)

* The 'p' value of probability test obtained in the following ways-

p > .05 = Not Significant

p < .05 = Most Significant

p < .01 = Moderate Significant

This data table appears to represent a comparison between two groups (ICDS and Non-ICDS) in terms of their knowledge regarding child rearing. The main points and results of the analysis are as follows: In the ICDS group, 71.42% of participants are aware of the importance of breastfeeding from the first day of birth, 16.07% are not aware. In the Non-ICDS group, only four percent of respondents are aware, 81.5% are not aware, and 14.5% did not respond. Ceasar et al. (1999) have carried out a detailed study and have rightly termed breastfeeding as the first immunization of a newborn child.

In the ICDS group, 70.71% of participants know when to introduce semi-solid food to a child (after five months), 25% do not know, and 7.14% did not respond. In the Non-ICDS group, only 9.5% know, 74% do not know, and 16.5% did not respond. The ICDS group has a significantly higher level of awareness compared to the Non-ICDS group. Huffman (1994) have noted that since the stomach size of a child is small energy-dense food should be given to the child and since energy requirement of a child at the age of six months goes up by about 60 calories only breastfeeding is not enough.

In the ICDS group, 71.42% of participants are aware of the recommended spacing of two or three years between children, 16.07% are not aware, and 50.71% did not respond.

In the Non-ICDS group, only four percent of respondent are aware, 81.5% are not aware, and 14.5% did not respond. In the ICDS group, 38.57% of participants are aware of the importance of avoiding intoxicants during pregnancy or lactating, 50.71% are not aware, and 10.71% did not respond. In the Non-ICDS group, 40.5% are aware, 50% are not aware, and 9.5% did not respond. These results are consistent with the findings of several other studies, Prabhavathi C and Kokilamma B et al. (2015) conducted a descriptive cross-sectional analysis in Tirupati, Andhra Pradesh, involving 100 mothers of children under the age of five. Their study found that 53% of the mothers possessed a moderate level of knowledge about ICDS, 38% had an adequate

level of knowledge, and 9% had inadequate knowledge regarding ICDS services. These collective findings underscore the variability in knowledge levels among different populations regarding ICDS services and highlight the importance of targeted interventions to improve awareness and understanding of ICDS programs among beneficiaries.

SUGGESTIONS FOR FUTURE RESEARCHERS

Considering the comprehensive nature of child development, exploring additional facets could be beneficial. Here are a few suggestions for potential future research directions:-

1. Parental Involvement in Education and Its Impact on Academic Success.
2. Various Disciplinary Methods and Their Effects on Child Behavior.
3. Emotional Support & Attachment in Early Childhood Development.
4. Cultural Backgrounds' Influence on Parenting Styles.
5. Effects of Household Technology Use on Child Development.

CONCLUSION

A comparative study sheds light on the varying levels of awareness among rural women in Chandauli District, Uttar Pradesh, regarding child rearing practices in ICDS and Non-ICDS areas. The findings underscore the positive impact of ICDS interventions on improving child rearing practices compared to their non-ICDS counterparts. Several notable distinctions emerged from our analysis, including a higher representation of Kale and Kharwar castes in ICDS areas, elevated illiteracy rates in non-ICDS areas, and a prevalence of nuclear families within ICDS areas. Moreover, we observed larger family sizes and lower monthly incomes in ICDS areas.

Significant disparities in awareness were evident across various dimensions. ICDS participants demonstrated enhanced knowledge of breastfeeding practices and the timely introduction of semi-solid foods to their children. Furthermore, a greater proportion of ICDS participants were informed about maintaining an appropriate age gap between two or three children. Nevertheless, both groups exhibited a comparable level of awareness when it came to abstaining from intoxicants during pregnancy or lactation, with no statistically significant difference noted.

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14

ANALYSING THE FUNCTIONS OF GRAM SABHA IN GRAM PANCHAYAT

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ABSTRACT

Gram Sabha is the corporate body and Panchayat is the executive body under the Panchayati Raj System, for the benefit of the people. The study was carried out to assessing the role of Gram Sabha in Gram Panchayat and analysing the functions of Gram Sabha in Gram Panchayat. The study is based on the primary data collection from the three blocks of Coimbatore district. Through questionnaire data was collected and carefully securitize and analyses with percentage analysis. Cent per cent Gram Panchayat presidents from Karamadai block stated that in order to prepare Gram Panchayats budget, the Gram Sabha meeting was conducted. Seventy-seven per cent of the Gram Panchayat presidents from P.N Palayam block and ninety per cent of the Gram Panchayat presidents from Thondamuthur block stated that setting of Gram Panchayat budget Gram Sabha was conducted regularly.

Keywords: Functions, Gram Sabha, Gram panchayat etc.

INTRODUCTION

"The 'Panchayati Raj' was promoted by the father of nation Mahatma Gandhi. The 'Panchayati Raj' as a system of self-governance was first introduced in 1959, based on the Balwant Rai Mehta Committee report (1958), which recommended a three-tier structure of local self-government, with Gram Panchayats at the village level, Taluka Panchayat Samiti at the sub-district level and Zilla Parishad at the district level. As a result, the Panchayati raj system has been implemented throughout the nation."

"The Gram Sabha is intended to be the pinnacle of participatory and direct democracy. It is the sole entity that should offer meaningful contributions to Gram Panchayat for it to run local government successfully. At the same time, Gram Sabha serves as a watchdog in the interests of local communities by reviewing Gram Panchayat's operations."

"Gram Sabha is the corporate body and Panchayat is the executive body under the Panchayati Raj System, for the benefit of the people. According to the state panchayat raj act, the Gram Sabha must meet four times in a year, which is on 26th January,1st May,15thAugust and 2nd October every year. Gram Panchayat president preside the meeting of Gram Sabha. The Gram Sabha performs several vital functions: aiding the implementation of Panchayat development programs and schemes,

identifying beneficiaries for various programs, seeking public support in cash, kind, or voluntary labour for community welfare initiatives, discussing and suggesting actions regarding the vigilance committee's reports, and deliberating on matters such as taxation, rates, rents, fees, and rate adjustments."

"The Gram Panchayats are constitutionally required to prepare comprehensive Gram Panchayat Development Plans (GPDP) focusing on economic development and social justice by utilizing available resources. These plans should be participatory, involving the Gram Sabha, and aligned with schemes related to the 29 subjects outlined in the eleventh schedule of the constitution."

OBJECTIVES

- Assessing the role of Gram Sabha in Gram Panchayats
- Analysing the functions of gram Sabha in Gram Panchayat.

Need for the study:

- With limited research studies on the Gram Sabha, this article aims to serve as a future guide for researchers in the field, offering valuable insights and direction.
- It aims to serve as a guiding resource for upcoming researchers in the realm of Gram Panchayat Raj.

REVIEWS AND LITERATURE

" Mahatma Gandhi, the father of the Nation of India, viewed that "the Panchayat is the executive body of Gram Sabha to provide civic facilities to the people in its jurisdiction. Indian independence must begin at the bottom. Thus, every village will be a republic of Panchayat, having full powers"."

" Himanshu and Sanjana ,(2016) on study "Panchayat raj in Rural India" expressed that the Gram Sabha the power only to discuss, debate of examine and scrutinize. There is no binding on the part of the gram panchayat to implement its direction and decision of gram Sabha. "

"The 73rd Amendment Act of 1992 acknowledges the Gram Sabha as a statutory entity. It constitutes individuals listed in the village's electoral rolls within the jurisdiction of the village-level Panchayati Raj. The Gram Sabha, a constitutional entity in India, is authorized as a legitimate statutory body responsible for multifaceted tasks at the village level. **(Dwarakanath, 2013)"**

"Gram Sabha or people's forum has always been an integral part of the concept of a Gram Panchayat. The Gram Sabha is as 'watchdogs' coming between the politician-bureaucratic nexus. It is unfortunate that both grassroots leadership and grassroots bureaucracy both could not strengthen the Gram Sabha. The institution of Gram Sabha is dysfunctional due to the lack of leverage of local leaders to initiate meaningful participation in the Sabha and there in capability to persuade people to support local initiatives. **(Ramesh, 2013**)"

"As per **Devenda (2007)**, the Gram Sabha comprises all men and women above 18 years residing in the village. It convenes four times a year. These meetings aim to foster community development through participatory cooperation. Matters concerning the village are presented to the Gram Sabha for deliberation and endorsement."

"The MNREGA, (2005) has also recognized the role of gram Sabha. Gram Sabha will be monitoring of all schemes in Gram Panchayat. Gram Sabha will regularly socially be auditing of all schemes which is done by Gram Panchayat. Gram panchayat will available all needy documents like master role, bill voucher and others to gram Sabha."

"According to Palanithurai, (2002) Under the 73rd constitution amendment act 1992, Gram Sabha at the grassroots level constituted an important institution in the Panchayati Raj set up of the country. It is being seen as an institution of 'direct democracy'-an institutional forum through which people can directly participate and play a meaningful role in the governance and development their village. The successful functioning of the Panchayati Raj system, to some extent, depends upon the role played by Gram Sabha."

"Narwani, (2002) stated that Gram Sabha is the meeting of adult votes of the village who are to meet at least twice years as per the act. In Tamil Nadu it has to be called thrice a year and in Kerala once in three months. In Orissa, the Palli Sabha have to be called if one third of the voters want it to be held and give a written requisition for it. Such Gram Sabha has been convened within 15 days."

METHODOLOGY

The research was carried out in the Coimbatore district of Tamil Nadu, which comprises a total of 12 blocks. Three specific blocks, namely Karamadai, Periyanayakkanpalayam, and Thondamuthur, were chosen due to the presence of both a model Gram Panchayat and an award-winning Gram Panchayat. The study employed a multi-cluster sampling method, involving the selection of large sample units such as states, districts, blocks, Gram Panchayats, and villages. Out of the 229 Gram Panchayats in Coimbatore district, 36 were selected for the study, along with 36 presidents chosen based on their experience and insights into Gram Panchayat functioning. To conduct the study, the researchers first established a friendly rapport with the Gram Panchayat presidents. Subsequently, they obtained authorisation from three administrative blocks. Questionnaire was designed to collect data from the presidents. Primary data were collected through survey. The information gathered through the questionnaire was meticulously examined and analysed using percentage.

RESULT AND DISCUSSION

Role played by the gram sabha

Gram Sabha play as a key role in making the Gram panchayat function effectively. Gram Sabha mobilize the people to participate and also to take decision making in order to implement the programmes. Table 1 depicts the role played by Gram Sabha in Karamadai Block, P.N Palayam and Thondamuthur Block.

Table -1: Role played by the gram sabha

Role	N=36					
	Karamadai (17)		P.N Palayam (9)		Thondamuthur(10)	
	F	%	F	%	F	%
Mobilized village people to participate	15	88	7	77	9	90
Satisfied the needs of the village people	9	53	8	89	8	80
Provided the opportunity for decision making	12	70	7	77	8	80
Maintained the transparencies and accountability & execute the programme	14	82	6	66	7	70
Disseminated knowledge on waste management and sanitation.	11	65	5	55	6	60

The data from the table indicates about that the role played by the Gram Sabha. Eighty eight percent presidents from Karamadai block, seventy-seven per cent from P.N Palayam block and ninety per cent from Thondamuthur block presidents stated that Gram Sabha played role on mobilize village people to participate. About role of Satisfied the needs of the village people fifty-three per cent from Karamadai block, eighty-nine per cent from P.N Palayam and eighty per cent from Thondamuthur block presidents were agreed. Sixty-five per cent presidents from Karamadai block, fifty-five per cent from P.N Palayam block and sixty per cent presidents from Thondamuthur block were stated that Gram Sabha's role is to disseminate knowledge on waste management and sanitation.

Functions of gram sabha

The term Gram Sabha is defined in Article 243 of the Indian Constitution (b). People can exercise their rights, obligations, and requirements through the Gram Sabha, which is a constitutional organization. Gram Sabha was given constitutional status and is now known as the people's parliament. The Panchayat Raj and local development are centered on the Gram Sabha. The Gram Sabha is a platform where people can discuss local administration and development, as well as make plans for the village based on their needs. The Gram Sabha's overarching mandate, supervision, and monitoring are used to implement development projects by the Panchayat. The Gram Sabha is the body that makes all of the Panchayat's decisions. Any decision made without the Gram Sabha is invalid. Details about Gram Sabha express by Gram Panchayat presidents is explained in the Table 2

Table- 2: Functions of gram sabha

Details of Gram Sabha	N=36					
	Karamadai(17)		P.N Palayam(9)		Thondamuthur (10)	
	No	%	No	%	No	%
Functions of Gram Sabha						
Village action plan	15	88	8	88	7	70
Setting of Gram Panchayat Budget	17	100	7	77	9	90
Passing of account	7	41	5	55	5	50
Preparation of BPL list	17	100	9	100	10	100
Preparation of beneficiary list	17	100	9	100	10	100
Preparation of labour budget under MGNREGA	15	88	9	100	10	100
Managing implementation of Public distribution Scheme	8	47	6	60	7	70
Time of organizing Gram Sabha meeting every year						
4	12	71	7	78	7	70
5	5	29	2	22	2	20
Conducted special Gram Sabha	5	29	2	22	2	20
Number of special Gram Sabha						
1	5	29	3	22	2	20

According to Table 2, Cent per cent Gram Panchayat presidents from Karamadai block stated that in order to prepare Gram Panchayats budget, the Gram Sabha meeting was conducted. Seventy seven per cent of the Gram Panchayat presidents from P.N Palayam block and ninety per cent of the Gram Panchayat presidents from Thondamuthur block stated that setting of Gram Panchayat budget Gram Sabha was conducted regularly .Cent per Gram Panchayats presidents from three block stated that Gram Sabha was conducted for preparing of BPL list and preparing the beneficiary list. The Gram Sabha's overarching mandate, supervision, and monitoring are used to implement development projects by the Panchayat. The Gram Sabha is the body that makes all of the Panchayat's decisions. Any decision made without the Gram Sabha is invalid.

Cent per cent of the presidents from the three blocks stated that Gram Sabha is a mandate in Gram Panchayats. Cent per cent of the presidents mentioned that Gram Sabha is a system of Gram Panchayats to monitor and ensure the mandated Panchayat quorum.

Seventy-one per cent of the presidents from Karamadai block, seventy-eight per cent of the presidents from P.N Palayam block and seventy per cent of the presidents from Thonamuthur block stated that Gram Sabha meeting was conducted 4 times in a year. Because 4 times Gram Sabha is compulsory for all the Gram Panchayat. Twenty-nine per cent of the presidents from Karamadai block, twenty-two per cent of the presidents from P.N Palayam block and twenty per cent of the presidents from Thondamuthur block stated that they had conducted one-time special Gram Sabha meeting.

Table-3: Details about questions raised and types of people participated in the Gram Sabha

							N=36
Number of questions raised in every Gram Sabha during the periods		**Karamadai (17)**		**P.N Palayam(9)**		**Thondamuthur (10)**	
		No	**%**	**No**	**%**	**No**	**%**
Less than 10 questions		9	53	5	50	9	90
More than 10 questions		8	47	4	40	1	10
Categories of people participation in Gram Sabha	Farmers	10	58	5	55	9	90
	Businessman	2	12	2	22		-
	SHG members	9	53	6	66	7	70
	Youth	2	12	1	11	2	20

Table 3 depicted the number of questions raised in Gram Sabha fifty-three per cent of the Gram Panchayats from Karamadai block, followed by fifty per cent of the Gram Panchayats from P. N palayam block and ninety per cent of the Gram Panchayats from Thondamuthur block presidents stated that less than 10 questions were raised in the Gram Sabha.This shows the satisfaction level of the people with the work of Gram Panchayat.

Fifty-eight per cent of the presidents from Karamadai block, fifty-five per cent of the presidents from P.N Palayam block and ninety per cent of the presidents from Thondamuthur block stated that the most of farmers were attended Gram Sabha.From the three blocks it was identified that comparing to Karamadai block, P.N Palayam bloc and Thondamuthur block Gram Panchayats presidents stated that more farmers were attended in the Gram Sabha.This might be the reason they think in Gram Sabha they will get new information about Agriculture development. Only twelve per cent presidents from Karamadai block, eleven per cent presidents from P.N Palayam block and twenty per cent presidents from Thondamuthur block stated that less youth were attended in the Gram Sabha.This might be the reason of time was not convenient for them.

The Gram Sabha, the general assembly of villagers, active participation of its members and monitoring its functioning will make the meaningful meeting of the Gram Sabha.

CONCLUSION

The Gram Sabha is regarded as the fourth tier of the Panchayat Raj. Gram Sabha considered as the voice of bottom level, those who are residing in the panchayat residing are the members of Gram Sabha. People can free to express their opinion. The active participation of maximum number of farmers from the three blocks in the Gram Sabha shows that its functional role and impact created in local governance.

Recommendation

- Gram Panchayat president should conduct motivational talk to village people in Gram Sabha.
- Gram Panchayat president should motivate the youth to participate in Gram Sabha.
- Village school principal should allow their student to participate in the Gram Sabha.
- Gram Panchayat may give prizes or incentives for those who participate and ask doubts.
- Gram Sabha meeting should be telecasted on the day itself in local buses in the same panchayat.

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OPINION AND PRACTICES OF FAMILY PLANNING IN SLUM AREA OF WOMEN IN VARANASI DISTRICT

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ABSTRACT

Family planning has a widespread positive impact on population health and well-being. India holds the record with pride to launch a national family planning program in 1952. The single highest threat to India's health, political, economic, and social development is the rampant population growth therefore unmet need for family planning is a tool to monitor the family planning program initiated by the government. Family planning is considered to be the utmost important factor for population stabilization it will overall promote reproductive health and reduce maternal, infant, and child mortality and morbidity. The aim of this study was to know the opinions and practices of family planning and its uses and methods as well as different factors associated with it. The present study was based on primary data which has been collected from different slums of Varanasi through an interview schedule based on field survey. Total of 162 married women of reproductive age group between 18 and 45 years sexually active residing in the slums of Varanasi were included in the study. The majority of the respondents were Hindu, among whom 40 % were between the age group of 25-31 years. Around 40.1 % of women were using some form of contraceptives at the time of the study and 59.87% did not use any contraceptives most nonusers said that they fear about the side effects of various contraceptives. The tubectomy method was used by the majority of women.

Keywords: Contraceptive, Family planning, Myths and misconceptions, Slum.

INTRODUCTION

Family planning services are "the ability of individuals and couples to anticipate and attain their desired number of children and the spacing and timing of their births according to Wikipedia. Family planning incentives have been introduced mainly for persuading eligible couples to accept family planning. Enke and Pohlman (1971) propose large incentives to couples for encouraging small families. They argued that children, especially sons, are considered important more significantly to society. Hence, it would not be wrong if an individual is paid compensation to acceptors of sterilization and IUD insertion for wages lost, food and drugs during their stay at the hospital and transport to the place of services. The family planning movement began in earnest in the 1950s, with the launching of national family planning programs in developing nations around the world. In pre-industrial, developing nations, large families were the norm(Zweier, 2014).

Women in India, for example, had an average of six children in the mid-1950s (Kulkarni and Rani, 1995). Because of the high birth rate, enough children survived childhood to contribute to the household's income and to care for their parents as they grew older. The high birth rate was countered by a high mortality rate, which was caused by illness, drought, and other natural calamities, limiting total population increase.

Improvements in public health (e.g., sanitation), food production (e.g., crop rotation), and medicine (e.g., vaccinations and antibiotics) were brought about by research and development, which reduced both child and adult mortality and resulted in substantial increases in population growth rates (Ashford and Noble, 1996).

In India, for example, despite long-standing worries about the pace of population increase and efforts to curb it by offering free or subsidized contraception supplies, services, and education, population growth has mainly remained uninterrupted for more than two decades (Khan and Prasad, 1980). By the mid-1950s, the federal government was frantically looking for program to assist lower average family size and slow population increase. One of the innovative techniques used was the provision of monetary or other in-kind incentives in exchange for the usage of family planning. The government of India currently provides compensation for lost wages and expenditures (for drugs, diet, transportation and miscellaneous purposes) to acceptors of sterilization and the IUD. About 10 percent of the government’s total expenditure on the family welfare programme is estimated to be for wage compensation and another 5 percent for related family planning expenditures. While the need for incentives and their impact on the family planning programme has been controversial ever since their introduction, in recent years, much of the debate is on the quantum and mode of payment of incentives needed for obtaining better results in view of achieving India’s national goal of Net Reproductive Rate. So far, the number of incentives has been decided by administrators and planners based on judgment and other assumptions and there has not been much empirical research on this subject.

In the developing world, 881 million people were estimated to be living in slums in 2014 as compared to 792 million in 2000 and 689 million in 1990. The figure has been growing by about 9 million a year since 2000. The single highest threat to India’s health, political, economic, and social development is the rampant population growth. It is all established to catch up with China and become the most populous country in the world in 2045. Since the launch of the nationwide Family Planning Program in 1951, attempts have been made from time to encourage the women to accept and adopt contraception. In spite of the efforts of the programs, there are women who have not at all used a method of family planning during the course of their reproductive life.

Several researches on rural and urban women have been conducted. However, there have been few researches on the use of contraceptives among slum residents. In terms of their usage of family planning services and the difficulties they confront, slum dwellers cannot be considered as a homogeneous population. To determine the perception of women about practices of contraceptives usage and barriers for not using the contraceptives among slum women, this study has been undertaken. Varanasi city is the district headquarters of Varanasi district and well-known pilgrim tourist place in India. Family planning is beneficial not only for parents and children but it is overall beneficial for society and nation by controlling the new birth it allows to control population growth which leads to proper utilization of resources already existing giving them better standard of living, employment opportunity economic growth better health facility for every citizen.

Growth of slum population in Varanasi city

Year	Total Population	Slum Population	Percentage of total city population
1941	266002	26100	9.8
1951	355771	48300	13.57
1961	489684	69600	14.21
1971	617934	86700	14.03
1981	773865	100812	13.02
1991	1000747	112987	11.29
2001	1170897	137977	11.78
2011	1201815	407036	33.86

The city has 209 slums with 78,253 households. About 34% of the city population lives in slums. Among the slum population, 79% belongs to OBC and SC division of social groups and 44% are living below the poverty line (BPL). In concern to Infrastructure, 54% of the slum households do not have access to individual water supply connections and 37 out of 209 slums are not connected to city wide water supply system. Ironically, it is found that about 24% of the slum households practice open defecation.

OBJECTIVES OF THE STUDY

- To study the socio-economic characteristics of respondents.
- To examine the opinions of respondents regarding the use of contraceptives for family planning.
- To study the practices of respondents concerning the utilization of various contraceptive methods.

MATERIALS AND METHODS

In Varanasi district, there are a total of 227 identified slums. For this study, five specific slums-Nagwa, Mandudih, Bajardiha, Sigra, and Durgakund, were chosen through convenience sampling. The research involved a cross-sectional study of married women aged between 18 and 45 years. All eligible married women within this age range and living in the aforementioned slums, who were sexually active, were included and interviewed using an interview schedule during a field survey. Exclusions comprised women who were divorced, not cohabiting with a partner, pregnant, had undergone hysterectomy, or reached menopause. A total of 162 female participants were selected for this study.

RESULT AND DISCUSSION

Validated, pre-tested questionnaire was used to collect the data. Questionnaire was adopted from different literatures and also considered the local situation of the study subjects. It was initially constructed in English language and it was validated by the experts from different discipline. The questionnaire comprised data on socio-demographic.

The age of women in the study population were ranged between 18–24 years and 25–31 years, were almost in equal proportion (39% and 40 %). Majority (96.91 percent) of women belong to Hindu religion only 2.47 percent of women were from Muslim religion. From 162 women only 57 had attained primary education, 20 and 25 women had attained middle and high school education respectively, rest 32 percent of women were still illiterate. Regarding occupation of the women, 69.13 percent were the unskilled worker such as housemaid, caretaker, cleaner assembler etc. and 26.54 percent were the homemakers.only four percent of women worked in skilled sector such as tailoring, beauty parlors, toys making etc. information regarding monthly income shows that56 percent of womenhad monthly income between rupees 5001 to 10,000 and27.16 percent have between rupees 10,001 to 15,000 and only 7.41% of women expressed their monthly family income was more than rupees 15000.

Table 1. Distribution of respondents on the basis of socio-economic characteristics.

S. No	Sample characteristics (N = 162)	Frequency(f)	Percentage (%)
	Age in years		
1	18-24	63	38.8
	25-31	65	40.1
	32-38	26	16.04
	39-45	08	4.93
2	**Religion**		
	Hindu	157	96.91
	Christian	001	0.61
	Muslim	004	2.47
3	Education Status		
	Illiterate	52	32.09
	Primary	57	35.18
	Middle	20	12.34
	High School	25	15.43
	Undergraduate	05	3.08
	Postgraduate	03	1.85
	Above	0	0
4	**Occupation**	007	
	Skilled	112	04.32
	Unskilled	043	69.13
	Home maker	162	26.54
5	**Monthly Family Income**		
	<5000	15	9.26
	5001-10,000	91	56.17
	10,001-15,000	44	27.16
	>15,000	12	7.41
6	**Duration of marriage**		
	0-5 years	56	34.57
	6-10 years	63	38.89
	11-15 years	26	16.05
	>15 years	17	10.49

7	**Number of living children**		
	Zero	16	9.87
	One	55	33.95
	Two	60	37.04
	Three and more	31	19.14

From the above table no.1, it shows that 38.89 percent of respondents fall in the category of six to ten years duration of the marriage and 34 percent having up to five years of marriage.37.04 percent of women had two children, 33.95 percent of women had one child and 19.14 percent were having more than two children.

Table 2. Distribution of the respondents on the basis of opinions regarding the use of contraceptives for family planning.

S. No.	Sample characteristics	Frequency(f)	Percentage (%)
1	**Perceived reasons for contraceptive use**		
	For happiness of the family	16	9.88
	For spacing	55	33.95
	To avoid pregnancy	66	40.74
	To avoid financial problem	25	15.43
2	**Importance of spacing**		
	Health of the mother	62	38.27
	Health of the child	78	48.15
	To avoid financial problem	22	13.58
3	**Proper timing of contraceptive use**		
	Soon after marriage	18	11.11
	After the birth of the first child	51	31.48
	After having desired number of children	88	54.32
	When husband desires	05	3.09
4	**Who should be responsible for deciding the number of children?**		
	Husband	36	22.22
	Wife	28	17.28
	Both Husband and wife	86	53.09
	In Laws	12	7.41
5	**Sources of information about contraceptives (multiples answers)**		
	Media	75	46.30
	Friends/relatives	50	30.86
	Health care workers	26	16.05
	others	11	6.79
6	**Not following the two child norms**		
	For want of son	59	36.42
	For want of more children	75	46.3
	Fear of child/infant death	05	3.09
	Opposition in the family	10	6.17
	others	13	8.02

The above table revealed that 40.74 percent of respondents use contraceptives to avoid pregnancy and 33.95 percent used them for spacing between children. 48.15 percent and 38.27percent of respondents accept that contraceptives use helps to maintain good health in child and mother respectively. Same study was conducted in Varanasi slums area regarding knowledge source and practice of spacing methods of contraception among eligible women of Varanasi slums. Researcher found out that 61.2% women had the knowledge of spacing method and 44.4% of them practiced ever in married life (Singh, Mishra and Mishra 2019). Majority of respondents 54.32percent thought that contraceptives should be used after having desired number of children and 31.48 percent of them had opinion that it should be used after birth of first child. Majority of respondent expressed their opinion that both husband and wife would be responsible for deciding the number of children.

Information regarding source of information about contraceptive methods it was revealed by respondents that 46.3 percent of get information from different media, 30.86 percent from their friends and relatives and only 16.05 percent from health care workers. In the present study, the prevalence of respondents not follow two child norms was 46.3 percent with want of more than two children where as 36.42 percent respondent want son. Similar results were obtained in other studies where there was a positive association between the number of living children and contraceptive use. Furthermore, women in India are more likely to use contraception if they already have a son (Jayaraman, A., Mishra, V., & Arnold, F. 2009), (Ramasubban, R. 2000).

Table 3. Distribution of the respondents on the basis of practices concerning the utilization of various contraceptive methods.

S. No.	Utilization of contraceptives (N=162)	Frequency	Percentage
1.	Presently are you using any form of contraceptive		
	Yes	65	40.12
	No	97	59.89
2.	If yes, name of the contraceptive (N-65)		
	Tubectomy	47	29.01
	Copper –T	10	6.18
	Condom	06	3.70
	Contraceptive pills	00	00
	Injectable contraceptive	02	1.23
3.	Do you experience any problem due to use of contraceptive?		
	Yes	01	0.62
	No	64	39.50

Table 3. Shows only 40.12 percent were using contraceptives presently. Among the women using contraceptives, 29.01 percent were sterilized (tubectomy), 6.18% were cited copper T, 3.70 percent use condom and none of respondent had taken contraceptive pill, only one subject experiencing irregular menstrual cycle. Since our study aimed to understand the prevalence of utilization of contraceptives, did not attempt to ask multiple contraceptive usages in the past. Similar study was conducted among urban slum communities in Mumbai with the objective to examine the prevalence of unmet need of family planning among women. The result shows that every 4th woman is at the risk of unwanted pregnancy due to lack awareness for family planning and only one fourth of the women had ever used contraceptive use (Begum S.*et al.*, 2014).

CONCLUSION

Only 40% of slum-dwelling women in Varanasi use contraceptives. Their primary reasons involve avoiding unwanted pregnancies and spacing children, but knowledge about available methods and access to them remain limited. Most rely on media and friends/relatives for information, while healthcare workers play a surprisingly minor role. Notably, nearly half don't follow the two-child norm, often driven by the desire for a son or simply wanting more children. To address these complexities, targeted interventions promoting awareness, accessibility, and informed decision-making among couples are essential, along with tackling the deeply ingrained son preference. Awareness can be conveyed through electronic and print media. In slum communities, socio-demographic factors play a significant impact in the use of family planning services. Campaigns should be held in various locations to educate people about the use of various contraceptives. Family planning is the key factor that is responsible for the delay in a rapid growing population and showing its adverse effects on the human population society and their economic growth. There is a major need of awareness about techniques of family planning and providing adequate information family planning methods. Only through such multifaceted efforts can we hope to improve contraceptive use and contribute to population stabilization in Varanasi's slums and beyond.

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START-UP PREFERENCES BY YOUTH OF INDIA

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ABSTRACT

This study has been conducted to explore the interest of youth toward startups and entrepreneurships and found that 70% of the youth responded an urge to go for start-up, and preferred agriculture sector for potential start-ups. In addition, this study found that there is no significant relation between choice of start-up and degree (of education), place of residence (i.e. urban and rural) and parents' occupation. The study applied qualitative analysis using constructed questionnaire targeting predefined objectives. Qualitative analysis involved identifying, examining, and interpreting patterns and themes from the collected data. This study also exhibits knowledge of youth towards startups and source of their knowledge. This study can help to know interested field of youth for start-up, also encourage and train them toward unrecognized fields and expand the area of interest among youth to grow and build more start-ups.

Keywords- Youth, Start-ups, Knowledge, Agriculture, Interest, Entrepreneurship.

INTRODUCTION

India is a country with global advantage of 65% of youth. The major advantage of being a young country can turn into a disadvantage if this youth after turning 30 is still unemployed. India is getting a position globally among powerful countries like America, UK etc. Still this young and powerful India is facing problem of unemployment. This can be because of increase in age of retirement or lack of desirable skills or awareness. The average age of entrepreneurs when they found a start-up is 45, in small businesses like restaurants and dry-cleaning etc. average age is 42, unlike in software start-ups where average age of the founder is 40 years whereas in oil, gas or biotechnology start-ups the average age of entrepreneurs is 47 (Azoulay et al., 2019). In today's time many young people are moving towards self-employment. If they get success, support, and encouragement, it motivates others also to turn toward self-employment. Startup is not an easy path to follow but for those who has courage to invest his or her years in it and has the ability to work hard should be encouraged with motivation, support and resources. Our youth should be encouraged to establish enterprise, so that along with self-employment they can provide livelihood to others too.

With the increasing economy, every country should concentrate on creating a robust ecosystem that is conducive to the development of new firms. India has a vast population, which means there

is a large potential market for any company that develops creative inventive systems. Shri A.P.J. Abdul Kalam once talked about his vision for India in 2020 by saying "an educated, equal and well-equipped country that can face its problems on its own". Clearly, 2020 was not as it was expected for India. Even before pandemic where India was getting International fame it was lacking in several sectors. While covid-19 collapsed many well-developed economies there is no doubt that India was in dire straits even from a time before the pandemic. Unemployment rate increased too rapidly, regular and necessary commodities price remain same and India was (and it is still) in a big import-export trade dearth. It means more import and less export which didn't benefit any employment. India exports more natural resources than the products.

The entrepreneurial ecosystem has improved in the country, however, there is a pressing need for greater awareness via government interventions. The start-ups are required to be designed with stronger business skills which can adapt to environmental shifts and changing trends (Goyal and Prakash, 2011). In a study by Sharma (2013) on women entrepreneurs in India, the problems faced by women in entrepreneurial activities like legal issues, social barriers, lack of awareness and family support etc. were highlighted. Community problems like healthcare, education etc. also require focus of the start-ups in India. In terms of attracting capital investments, Indian start-ups ranked third globally. This fact greatly implies that start-ups in India can go a long way in addressing community-based issues as well (Mehrotra, 2018). Researchers are reporting entrepreneurship as a encouraging career in India, however, the success can be attributed greatly to effective trainings, favorable government policies and education initiatives. "Start-up India, Stand-up India" initiative is one such step which aims at building a dynamic environment of encouraging start-ups (Wagh, 2016). When Hon'ble Prime Minister Shri Narendra Modi talked about "Atmanirbhar bharat" or self-reliant vision for India, he was talking about future of our country. While the emotion, the idea and meaning behind this was very strong, there are lots of changes and efforts required for "Atmanirbhar bharat". We need to identify what our youth want, how they choose the area of enterprise and what factors really affect the choice and success of start-ups. This will help in better planning and implementation of policies and campaigns to attract our youth towards entrepreneurship.

This study was done to explore the interest of youth toward startups and entrepreneurships and also preferred field (among all corporate list by GOI) for the same.

OBJECTIVES

- To explore the inclination of Indian youth behind the idea of Startup.
- To find out most preferred sectors for startup by Indian youth.
- To compare the association of start up with place of residence, Degree of Education, and Parents' occupation

METHODOLOGY

The present study has objective to explore the attraction of Indian youth toward start-ups along with identification of the most desirable sector for startup among youth. The study was conducted all over India among youth. Data has been collected through Google form (due to covid-19, physical data collection was not possible) by contacting youth (18-30 years) digitally (through E-mail, social media, and telephonic communication) using snowball method from all over India.

Care was taken while analysis as the respondents in between the age of 18-30 was considered as final sample. Thus, the total sample was 223. Total 260 respondents were contacted to fill questionnaire through Google forms among which 223 responded. Sample (N-223) covered all zones of India i.e., North zone – 29, East zone - 35, West zone - 45, South zone - 54, Central zone - 33, North east zone - 27.

The data collection tool had two sections, one was general information (age, education, specialization, residence, parents' occupation etc.) and the second section included specific information (area of interest for start-ups, fascinating factors, sources of information about start up, preferred field for startup etc.). To finalize the major areas of start up, a list of sector skill council was taken from National Skill Development Council website. There are total 36 sector skill councils and the names of all were mentioned in the tool to facilitate respondents to find out their preferred area for start up. The data collected from each respondent was analyzed, documented and concluded as per objectives and significance (The association of 'urge to go for a start up' with the education of respondents, place of residence and parents' profession) was proved with the help of Chi-Square calculation formula.

RESULTS AND DISCUSSION

Entrepreneurs are the most valuable assets for Indian economy. They can create product and services that can be outsourced to abroad and generate revenue. Also these products can be sold in India and provide employment to rural areas. Startups can empower our rural area's workforce by providing employment, spreading awareness, developing products and services over there. Results of the present study on the inclination and preferences of youth towards startup are presented below-

I- **Background information of respondents** –As per the objective of the study, the respondents were youth and had completed their undergraduate (53%) or postgraduate degree (37%). Majority of respondents were male (67%) from urban society (61%). Regarding the profession of parents, it was observed that the parents of maximum respondents (33%) worked for privately owned organisations or businesses) followed by parents serving the Government (24%), doing agriculture (22%) and having their own businesses (21%) respectively. With the increasing emphasis over motivating women towards the entrepreneurial ecosystem, more research focussed on female respondents is needed.

II- **Fascination of youth towards startup-** The majority of Indian company founders claim being driven by their passion, curiosity, satisfaction from problem solving, and desire to make a positive influence in society. Many Indian founders have previously worked in a corporate setting, but despite the job security and rewards of high wages and other perks, they saw that employment was stifling their creativity. Because they couldn't identify with a corporate culture, they typically built a concept on their own, allowing them to establish their own ideals and steer their own course. This is the fascination behind attracting youth towards startups. Data regarding awareness and fascination of youth towards Start up showed that most of the respondents (93%) had heard about Startups but were not much aware about its concept.

Table –1 Distribution of respondents on the basis of their awareness about start up

N=223

S.No.	Particular	Percentage
1	Ever heard about start up	93
2	Concept of Start up	
	2.1 Start-up is a new idea	19
	2.2 Company in the first stage of operation	18
	2.3 Solution to a problem	7
	2.4 It comes with high risk	2
	2.5 Profit making venture	59
	2.6 Employment provider	10
3.	General awareness of Start-up idea	
	3.1 Digital platform/ Online are better for startup	12
	3.2 Own setup/ Offline modes are better for start-up	9
	3.3 Blend of online and offline mode can provide better business	80
4	Urge to go for start up	71

Startup is a new idea and during start up the company is at the first stage of operations; this was known to only 19% and 18 % respondents respectively. But more than half of the respondents were well aware about the profit-making component of startup whereas, the characteristics that it comes with higher risk was known to only 2 percent respondents. It shows that youth get attracted towards the end-result more rather than the struggle during the journey that comes in form of high risk. The aspect of "Startup may be initiated to provide solutions to the prevailing problems and they can be a source of employment for the unemployed masses" was recognized by less than 10 percent respondents. Now a day's very innovative startups are being introduced which are usually started by Youths. Respondents in the present research (table 1) feels that the startups which had a blend of online and offline mode can provide better opportunities (80%) as compared to only digital based (12 %) and only Offline based (9%) startups. In spite of lack of awareness, the encouraging fact is that 71 percent of youth from the research area is having an urge to go for startup and explore Indian markets to offer a plethora of prospects.

III- **Source of information about Startup**-

Information seeking is natural phenomena which are fulfilled by each and every individual in order to fulfill their day to day needs, to complete everyday tasks and gap filling in the process of gaining knowledge. It is clear that information has grown increasingly important in everyone's life, and people seek knowledge at all stages of their lives for various reasons. It could be for a variety of causes, including academics, amusement, knowledge enrichment, commercial expansion, and so on. People seek knowledge from a number of sources in order to receive reliable information. When a need for information arises and people realise they need it, they start thinking about how to get it. People explore information through a variety of media, including auditory, visual, written, library, personal collections, book stores, workshops, information centers, and online sources.

Table – 2 Source of information and knowledge regarding start up

N=223

Name of source	Percentage
Friends	24
Family	9
Newspaper/bulletin	10
Broadcast (TV, Radio, videos)	5
Social media	46
College/ Institute	6

When the respondents were asked about their sources of information regarding startups (table 2), it was very obvious that maximum people (46%) receives information from social media because the respondent's group is from youth population. Friends were also the source of information for 24% percent respondents. Government is investing great funds to make people aware about latest developmental schemes and programmes but still News papers and Broadcast media was the source of information for only 10% and 5% respondents respectively.

IV- Preferred field for Startup- Self-employment is becoming more popular among today's youth. If individuals who pursue self-employment can find encouragement and support, as well as a high rate of success, a big segment of the population who has been looking for government positions will follow in their footsteps and pursue self-employment. To facilitate ambitious youth National Skill Development Council under Sector Skill Councils identifies thirty-six sectors for imparting skill education, development of various job roles and classification of sectors for startups. These areas are Agriculture, Food industry, Psychology and counseling, Healthcare sector, Textile sector, Textile, Management, Beauty and wellness, media and entertainment, Communication, IT, Sports, Life Science, Construction, Apparel, Tourism, Education, Electronics, Furniture, Paints, Gems and Jewellery, Aerospace, Handicraft, Mining, Retail, Automotive, Hydrocarbon sector etc.

Maximum number of youths from various parts of India was found interested in starting their own start up in the field of Agriculture (30%), followed by food Industry (17%), Psychology and Counselling (5%), Textile sector, Management Sector and Beauty and wellness Sector (4 % in Each Sector). Rest of the sectors were preferred by very less number of respondents. Telecom sector, Rubber sector, Logistic sector, Leather sector, Indian plumbing sector, Indian iron and steel sector, Hydrocarbon sector and automotive sector are the least attractive sector for start-up among youth.

V **Association of 'urge to initiate a start up' with related factors**

In this section, the level of education, place of residence, and parents' occupation was made with reference to urge to go for start-up. The data has been presented below-

Table – 3 Relationship of 'urge for start-up' with the place of residence of youth

N=223

Location of Residence	Urge to have own Start-up		Chi-square value	p-value
	Yes	No	0.508	0.476
Rural	64	23		
urban	94	42		

x^2=0.508** p=0.476

The results of the above table indicate that the p-value of chi-square test is not significant. It can be concluded from the above table that there is no relationship between the location of residence of Indian youth and their choice of startup.

Table – 4 Relationship of 'urge for start-up' to the education of youth

N=223

Degree of Education	Urge to have own Startup		Chi-square value	p-value
	yes	No		
Undergraduate	87	32	0.757	0.685
Post-graduate	56	27		
Doctorate	15	6		

x^2=0.757** p=0.685

Since the p-value is greater than the chosen significance level (a=0.05), we conclude that there is not enough evidence to suggest an association between degree/level of education and urge of youth to go for start-up. Based on result it can be stated that there is no significant relationship between urge for startup and academic degree (X^2>=0.757, p = 0.685).

Table – 5 Relationship between urge for start-up with the parents' occupation

N=223

Occupation of Parent	Urge to have own Startup		Chi- square test	p-value
	yes	No		
Private Job	45	27	5.979[a]	0.113
Business	32	15		
Agriculture	36	12		
Government employee	44	10		

x^2=5.979** p=0.113

Since the p-value is greater than the chosen significance level (a=0.05), we conclude that there is not enough evidence to suggest an association between parents' occupation and urge of youth to go for start-up. Based on result it can be stated that there is no significant relationship between urge for startup and parents' occupation (X^2>=5.979, p = 0.113).

CONCLUSION

Indian youth are the pillars' of "Atmnirbhar bharat". As an advantage of youth, India is getting fame as startup capital globally. As a cure for many problems like unemployment, rapid growth in rate of crime, constantly declining GDP etc., "youth in start-up" can be an effective solution. By this study it has been concluded that a large number of youths wants to move towards startup ventures. They require proper guidance, knowledge, skills, support, motivation and a right

direction to move ahead. This study also proved that there isn't any significant association of parent's occupation, place of residence and degree of individual with ones urge to do start-up. Agriculture and food sectors are preferred sectors for a startup. The students of Home/Community sciences can greatly benefit from this current trend of preference in establishing their own start-ups. Over the previous two decades, the Indian startup ecosystem has changed dramatically. More players have entered, offering various types of support to companies. As a result, the ecosystem has grown tremendously and is currently maturing. This is a crucial stage; our government and education institutes jointly need to share the responsibility to motivate the youth for startup and train them in a manner to ensure maximum success in their venture.

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DOMESTIC VIOLENCE AND MIGRANT WOMEN – PANDEMIC OF COVID-19

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ABSTRACT

Migration and migrants constitute a fundamental concept intertwined with economic development. However, the concern lies with women migrants, who are particularly susceptible to various forms of violence, particularly domestic violence. Domestic violence, also referred to as intimate partner violence, occurs within intimate relationships. It encompasses emotional, sexual, and physical abuse, as well as threats of abuse. Such violence can manifest in both heterosexual and same-sex relationships. Following the onset of the COVID-19 lockdown in India on March 25, reports of increased instances of domestic violence within households began to emerge. This study aims to uncover the domestic violence experienced by migrant women during the COVID-19 pandemic. The investigation was conducted in the Tiruppur district with a sample size of 100 participants. The findings reveal a significant prevalence of domestic violence among women, which subsequently affects their mental well-being, leading to heightened levels of depression. Empowering women migrants by educating them about government policies and programs related to women's protection could be a pivotal step in mitigating future instances of violence. This approach holds the potential to curtail the occurrence of such violence and ensure a safer environment for women.

Keywords: Covid-19, Domestic Violence, Mental Health, Migrant, Women, Pandemic Lockdown, Women Empowerment**.**

INTRODUCTION

Migration encompasses the movement of individuals within a country or across international borders, categorized into internal migration (within a nation's borders) and outward migration (crossing international boundaries). Internal migration refers to movement within a country, such as from one region to another. In 2017, global international migrants exceeded 258 million (UN DESA, 2017), with 59,037 migrants in 2019. Among these, 11,603 female workers were employed abroad in 2019, rising to 809,298 between 1991 and 2019. The connection between female empowerment and migration is intertwined, as studied by Hugo (2000). Similar to men, women's migration is influenced by pull and push factors. Education and employment often lead women to migrate from rural to urban areas, seeking improved prospects (Sony et al., 2020).

The "Place of Last Residence" data extracted from the 2011 Census unveiled a staggering count of 450 million internal migrants within India, accounting for 37.7% of the entire population (Registrar General of India, 2011). Projections indicate that by the year 2020, the number of internal migrants will soar to an estimated 600 million. Within this estimate, approximately 200 million individuals are expected to be interstate and inter-district migrants, a group that includes around 140 million migrant laborers (Gupta, 2020). Notably, over 62% of internal migration instances in India are characterized by short-distance intra-district movements. Conversely, only 12% are identified as long-distance interstate migrants, which is a relatively lower proportion compared to countries like China and Brazil. This migration pattern is attributed to factors such as the non-portability of social security benefits and constraints on employment opportunities at the destination (Kone et al., 2018).

In the Indian context, internal migration is primarily propelled by marriage or associational motivations, and notably, women outnumber men in this movement (Srivastava, 2011; Verick, 2017; Rajan and Sivakumar, 2018; Rajan and Sumeetha, 2019; Sony et al., 2020). Contrary to the common assumption that women primarily exit the labor force due to marriage, these women often maintain employment after migration. However, factors like patrilocality, caregiving responsibilities, and societal norms contribute to the under-recognition of female labor migrants (Mehrotra and Parida, 2017; Parida and Madheswaran, 2020).

The outbreak of the COVID-19 pandemic has heightened existing gender disparities. A stark example is that four out of every ten working women in India lost their jobs within a mere two months of lockdown initiation (Rukmini, 2020). The pandemic-induced reverse migration could potentially disrupt economic progress and exacerbate gender inequalities. Amidst these shifts, domestic violence has emerged as a pressing concern for women migrant workers, giving rise to a phenomenon often termed as the "shadow pandemic." It's noteworthy that intimate partners are frequently responsible for perpetrating violence against women, and since the onset of the COVID-19 crisis, incidents of domestic violence have surged worldwide. This crisis has accentuated the "Shadow Pandemic," warranting targeted measures to prevent violence against women (Nigam, 2020; UN Women, 2021; Piquero et al., 2021).

Given this intricate backdrop, the focal point of the study is to delve into the impact of domestic violence on migrant workers who are employed within India's garment industry.

OBJECTIVES

- To comprehend the social and demographic characteristics of respondents
- To identify respondents' family types
- To rank domestic violence experienced by women
- To suggest policies and recommendations for respondents

METHODOLOGY

This study employs a cross-sectional design to investigate the prevalence of domestic violence among migrant women during the COVID-19 pandemic in the Tiruppur district, India. Recognizing the intrinsic link between migration and economic development, the focus on women

migrants becomes imperative due to their heightened vulnerability to various forms of violence, particularly domestic violence. With reports of increased instances during the COVID-19 lockdown, this research aims to reveal the extent of domestic violence and its impact on the mental well-being of migrant women, specifically examining heightened levels of depression. Migrant women workers were selected using a purposive sampling technique, ensuring a representative sample from the Tiruppur district. Survey questionnaires are employed to collect quantitative data on domestic violence prevalence, covering demographic information, migration history, and experiences during the pandemic. Additionally, in-depth interviews are conducted with a subset of participants to gather qualitative insights into their experiences, coping mechanisms, and the impact on mental well-being. Variables include migration status, socio-economic factors, age, education, and marital status.

Ethical considerations prioritize informed consent, anonymity, and confidentiality. Data analysis involves descriptive and inferential statistics for quantitative data, while qualitative data are thematically analyzed. The study's outcomes are intended to inform policy recommendations, emphasizing the empowerment of women migrants through education about government policies and programs related to women's protection. Through a mixed-methods approach, this research aimed to contribute to a nuanced understanding of domestic violence among migrant women during the pandemic and facilitate targeted interventions for a safer environment. About 100 women migrant workers participated, and data collected from May to July 2022 was analyzed using SPSS version 22.0.

FINDINGS OF THE STUDY

The subsequent section discusses the study's findings. It analyzes the social and demographic characteristics of migrant women respondents, exploring aspects like age, religion, current residence, and origin to gain insight into their backgrounds.

1. Social and Demographic Characteristics of the respondents

Table No: 1: Social and Demographic Characteristics of the respondents

S. No	Character tics	Frequency	Percentage
1	**Age**		
	Below 20 years	12	12.0
	20-30 years	40	40.0
	31-40 years	31	31.0
	40-50 years	14	14.0
	Above 50 years	02	02.0
	Total	100	100.0
2	**Religion**		
	Hindu	67	67.0
	Christian	13	13.0
	Muslim	20	20.0
	Total	100	100.0
3	**Community**		
	BC	23	23.0
	MBC	28	28.0

	Others	49	49.0
	Total	100	100.0
4	**Type of migrant**		
	Intra district migrant	21	21.0
	Interstate migrant	30	30.0
	Inter district migrant	45	45.0
	Others	04	04.0
	Total	100	100.0

Source: Primary Data 2022

The aforementioned Table 1 provides an insight into the social and demographic characteristics of migrant women workers who have experienced domestic violence in their households. These characteristics shed light on their life histories and current living situations. Analyzing the data from Table 1 reveals the following patterns:

Age Distribution: The age-wise distribution of respondents indicates that 40% of them fell within the age group of 21-30 years. Moreover, 31% of respondents were aged between 31 and 40 years, while a smaller proportion belonged to the age group above 50 years.

Religion Classification: When categorizing respondents by religion, 67% identified as Hindu, 20% as Muslim, and 13% as Christian.

Community Classification: The community-wise breakdown of respondents revealed that 49% belonged to the Other community (SC/ST), 28% were from the MBC (Most Backward Classes) community, and 23% were from the BC (Backward Classes) community.

Place of Origin: The origin of respondents was classified into different categories: intra-district migrant, interstate migrant, inter-district migrant, and others. The study indicates that 45% of respondents were inter-district migrants, 30% were interstate migrants, 21% were intra-district migrants, and 4% fell into the other category. This distribution reaffirms the trend of women migrating in larger numbers, often due to marriage, as observed in this study.

Overall, the data from Table 1 underscores the significance of social and demographic characteristics in understanding the life trajectories and experiences of migrant women workers who have encountered domestic violence.

Table No: 2: Details on Family of the Respondents

S. No	Details	Percentage
1	**Type of family**	
	Nuclear	62.0
	Joint	38.0
	Total	100.0
2	**Size of family**	
	<3	28.0
	3-5	49.0
	>5	23.0
	Total	100.0

3	**Living with in-law's**	
	Yes	37.0
	No	63.0
	Total	100.0
4	**No. of earning members in the family**	
	1	33.0
	2-3	38.0
	More than 3	29.0
	Total	100.0

Source: Primary Data 2022

In the process of studying the domestic violence faced by the respondents, it was crucial to explore their family dynamics as well. Understanding their family conditions provided valuable context to their experiences. The outcomes of this exploration are presented in Table 2. The investigation delved into the type of family structure within which the respondents resided. The results revealed that 62% were living in nuclear family setups, while the remaining 38% were residing in joint family systems. Having identified the family structure, the study proceeded to ascertain the family sizes of the respondents. The findings indicated that 49% lived in households with family sizes ranging from 3 to 5 members. Additionally, 28% resided in households with less than 3 members, and 23% were part of larger families with more than 5 members. The research further examined whether the respondents cohabitated with in-laws, such as mother-in-law, sister-in-law, or father-in-law. It was found that 63% were living without in-laws, while the remaining 37% shared their living space with their in-laws.

Additionally, insights were gathered regarding the number of earning members in the households. Around 38% of the respondents reported having 2-3 earning members in their households, 33% identified themselves as the primary earners, and 29% indicated that more than 3 members in their households were contributing to the earnings. Collectively, the data presented in Table 2 underscores the significance of family dynamics in comprehending the conditions under which the respondents were experiencing domestic violence.

Table No: 3: Type of domestic violence faced by the respondents before and during pandemic

S.no	Types	Before pandemic	During pandemic
1	Physical	30	20.0
2	Psychological	37	47.0
3	Economical	33	33.0

Source: Primary Data, 2022

Domestic violence encompasses a range of harmful behaviors, including emotional, sexual, and physical abuse, as well as threats of abuse. These forms of violence can occur within both heterosexual and same-sex relationships. An essential element of abusive relationships is the presence of an unequal distribution of power and control, wherein the abuser employs manipulative and hurtful tactics to assert control over their partner. Drawing insights from the preceding table, a

notable pattern emerges. Prior to the COVID-19 pandemic, approximately 37% of women experienced psychological abuse, followed by 33% encountering economic abuse, and 30% enduring physical abuse. However, the impact of the pandemic has brought about variations in the experiences of domestic violence among the respondents. The data illustrates that nearly 47% of women now report psychological abuse as a result of the pandemic, while 33% still face economic abuse, and 20% have experienced physical abuse. This suggests that the pandemic has intensified instances of psychological abuse in the lives of women, thereby exacerbating their distressing circumstances.

Table No: 4: Problems faced due to domestic violence during pandemic

S.No	Problem	Rank
1	Mental stress	3
2	Depression	1
3	Lack of interest in living	4
4	Physical pain	7
5	Feeling insecure	2
6	Scared of everything	5
7	Dependent in taking decision	6

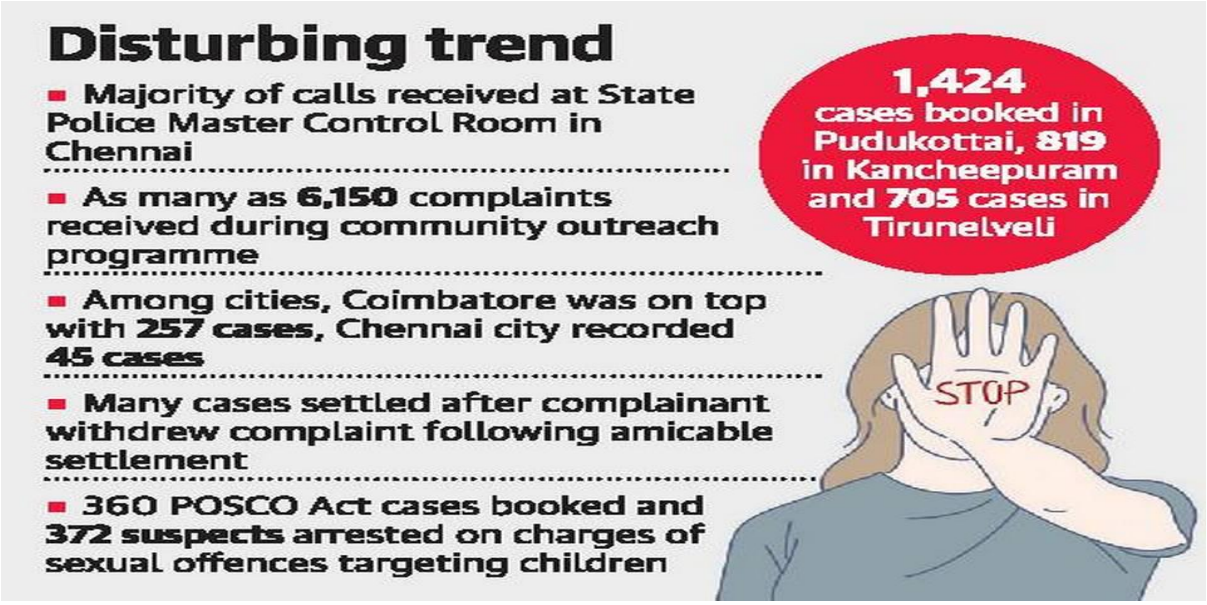
Source: Primary Data, 2022

The researchers utilized the Garrett Ranking method to assess the impact of domestic violence on the respondents. The findings unveiled significant consequences that domestic violence had on the lives of the respondents. The effects were ranked based on their severity and prevalence. The primary impact observed among the respondents was depression. This was largely attributed to the lack of accurate awareness about the virus and the proliferation of false information globally. The resulting confusion and misinformation contributed to the respondents' mental state, leading to a substantial increase in depression among them. The second-ranked impact was the sense of life insecurity. The pandemic disrupted communication between respondents and their families at their places of origin. Additionally, job losses resulting from the pandemic led to financial instability, amplifying the feeling of insecurity about their lives. Following closely in the rankings was the emergence of heightened mental stress among the respondents. The pandemic-induced circumstances elevated stress levels among the respondents, resulting in a significant impact on their mental well-being. In summary, the application of the Garrett Ranking technique revealed that domestic violence had far-reaching effects on the respondents. Depression emerged as a major consequence, stemming from the lack of accurate information and the prevalence of false messages. Furthermore, life insecurity and increased mental stress were identified as subsequent significant impacts of the pandemic on the respondents' lives.

COVID-19 AND DOMESTIC VIOLENCE

Throughout the initial four phases of the COVID-19-induced lockdown, there was a notable increase in domestic violence complaints filed by Indian women, surpassing the number recorded during a comparable period in the past decade. However, even this notable rise in

reported cases represents only a fraction of the actual occurrences, as a staggering 86% of women enduring domestic violence in India choose not to seek assistance or support. This statistic emphasizes that the reported figures only scratch the surface of the widespread issue of domestic violence faced by women in the country.



Source: The Hindu 2020

In the year 2020, specifically spanning from March 25 to May 31, a total of 1,477 complaints related to domestic violence were lodged by women. Strikingly, this span of 68 days saw a higher count of complaints than the cumulative number received for the same months over the course of the preceding decade. This data further underscores the exceptional surge in domestic violence incidents during this specific timeframe, likely influenced by the unique circumstances brought about by the COVID-19 pandemic.

Relationship between domestic violence and family details of the respondents

The utilization of Simple Linear Regression aimed to establish a connection between domestic violence and the family details of the respondents. The outcomes of this analysis are presented in the tables below. During this analysis, the null hypothesis (Ho) was stated as follows: There is no significant relationship between the independent variables and the dependent variable.

Table No: 5: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.781	.562	.498	.53180

Source: Estimated

The provided table displays significant statistical metrics: “the correlation coefficient (R) with a value of 0.781 and the coefficient of determination (R square) with a value of 0.562. The

coefficient of determination, commonly denoted as R square, represents the proportion of the variance in the dependent variable that can be elucidated by the independent variable". In this context, "the R square value of 0.562 indicates that around 56.2% of the variability in the dependent factor (likely the impact of domestic violence) can be accounted for by the independent factor (presumably the family details of the migrant women workers)". This statistical interpretation demonstrates the extent to which the fluctuations in the dependent factor can be attributed to the independent factor.

Table No: 6: ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	35.290	6	7.058	24.953	.000
Residual	54.865	194	.283		
Total	90.155	200			

Source: Estimated.

The ANOVA (Analysis of Variance) table indicates that the p-value is less than 0.05. This result indicates that the dependent variable is indeed significantly predicted by the independent variables with a confidence level of 95%. In other words, the statistical analysis confirms the significance of the regression model and underscores the meaningful relationship between the variables being examined.

Table No:7: Coefficients

Variables	Standardized Coefficients	T	Sig.
Type of family	.425	6.344	.000*
Size of family	.314	4.899	.002*
Living with inlaw`s	.733	6.718	.004*
No. of earning members in the family	.189	3.956	.012**

** Dependent Variable: Domestic violence*

The findings derived from the linear regression analysis that explored the association between domestic violence and the family details of the respondents unveiled a clear and substantial relationship. More specifically, the variables related to family dynamics, including family type, family size, cohabitation with in-laws, and the count of earning members within the family, exhibited statistical significance at either the 1 percent or 5 percent level of significance. This empirical evidence serves to emphasize the presence of a noteworthy and meaningful correlation between the instances of domestic violence experienced by the respondents and the array of family-related aspects that were investigated within the sample group.

CONCLUSION

The progress and advancement of a nation's economy are intrinsically linked with the development of its women. To ensure a robust national development, a paramount focus must be placed on empowering women. Particularly during unexpected crises like the COVID-19 pandemic, women often find themselves marginalized within their families, facing oppression from their partners or in-laws. Despite significant advancements in various spheres, the challenges faced by women and their predicaments continue to raise serious concerns. The current study underscores that female respondents are particularly vulnerable to heightened domestic violence during a pandemic, with psychological and economic abuse emerging as the primary forms. While women migrant workers found employment due to the pandemic's circumstances, the subsequent lockdowns disrupted their income, exacerbating their susceptibility to violence—especially with husbands being at home more often. The study underscores a robust correlation between the respondents' family details and the experienced domestic violence. Legislation focusing on domestic violence against women needs to be strengthened, and proactive measures should be taken to empower women in anticipation of future crises. Should another pandemic arise, women's empowerment must be a central theme, effectively communicated through media and the efforts of NGOs. Addressing these issues will contribute significantly to fostering a society where women can thrive and contribute to the overall growth and development of the nation.

SUGGESTIONS

- It's crucial to address the issue of underreporting when it comes to domestic violence cases. Policies and awareness campaigns should be designed to encourage women to break their silence and seek help for their problems.
- Widely publicize toll-free helpline numbers dedicated to women's safety. This should include spreading the information across all corners of the nation, including rural areas, so that women have easy access to assistance.
- Government initiatives are necessary to promote women's independence and empowerment. Quick and effective responses to women's issues should be prioritized, ensuring their safety and security.
- NGOs play a pivotal role in advocating for women's welfare. Their efforts should be made easily accessible to the general population, ensuring that the services they provide reach those who need them the most.

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ANALYZING CONSUMER BEHAVIOUR: FACTORS AFFECTING IMPULSE BUYING FOR SPECIFIC CONSUMER GOODS

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ABSTRACT

Impulsive behaviour is the apple of entrepreneurs' and marketers' eye. The average customer makes three accidental purchases per four out of ten store visits as revealed through several related researches. Consumer behaviour research has undergone substantial changes in recent years, primarily in the decision-making process and, as a result, in the influences on purchase intention. This paper is an attempt to investigate the factors which results in impulsive buying behaviour of consumers towards selected consumer goods. Present research was descriptive where the data was collected through a questionnaire from 125 consumers selected randomly from Vadodara city. To achieve this purpose, the study was guided by three categories of questions in the area of background information of the consumers, their state of impulse buying and the factors affecting their impulse buying. The study finds that 75% of the females indulged in impulsive buying. The findings further revealed that the respondents had the highest impulsive buying behaviour towards clothing and apparel (62%). It was also found that factors such as discount offers (31%), reviews and ratings on various products (28%) standard of living (24%), comments by reference group (22%), and products of latest trends (18%) were the factors that influenced the consumers to make impulsive buying. The study's most significant contribution will be for the retailers in monitoring strategies to coax consumers into buying impulsively. Consumer buying behaviour research is critical for consumer goods retailers' survival in this competitive period.

Keywords*:* Consumer, behaviour, impulse buying, influence, consumer goods.

INTRODUCTION

In the marketing literature, consumer behaviour is the most popular topic of study. There are several studies on the antecedents and predictors of consumer purchasing behaviour in the literature. From the consumer's perspective, impulse buying is a problem, but from the retailer's perspective, it is a necessary strategy for increasing sales volume (Xiao and Nicolson, 2011; Akram et al., 2018). For decades, researchers have studied impulsive purchase behaviour from various angles (Xiao and Nicholson, 2011).

Consumer buying behaviour is defined as the mental, emotional, and physical behaviours that people engage in when they select, purchase, use, and dispose of things and services to meet their

needs and preferences (Schifman & Kanuk, 2009). Consumer behaviour is the study of how people, groups, and organisations choose, purchase, use, and discard goods, services, ideas, and experiences to meet their needs and desires (Solomon, 2011; Kotler, Keller, Koshy, & Jha, 2012). Economic factors such as income expenditure patterns, product prices, price of complementary products, replacement goods, and demand elasticity influence consumer purchasing behaviour (Abraham, 1997; Kotler; Weng, Sanders & Armstrong, 2001). Buying behaviour marketing is the process of developing connections between market products and specific buying behaviour groups.

Because impulsive buying is a complex process that is congruent with classical economics' rational-choice theories, researchers' interest in the behaviour has not faded (Amos et al., 2014; Xiao and Nicholson, 2011). Furthermore, despite the fact that their disposable income has not increased, consumers' leisure spending has decreased while impulsive buying has increased (Gultekin and Ozer, 2012; Pradhan et al., 2018). Customer behaviour is influenced by shopping convenience, atmosphere, competitive price, promotion, and staff, according to Nguyen et al. (2015); consumer behaviour is also influenced by a well-known brand and an attractive informative package. Enhancing perceived physical proximity to a product, according to Hoch and Laewenstein, produces sentiments of partial ownership and potential loss if the object is not eventually purchased.

Consumer purchasing behaviour is also said to be inconsistent, varying from one product category to the next (Xiao and Nicholson, 2011). Price, features, quality, brand name, durability, and social aspects all influenced consumer purchasing decisions (Li & Li, 2010). Many people, for example, look for the cheapest options when looking for an affordable product like a pen, according to surveys. Consumers purchasing a higher-value goods, such as clothes, do not go out of their way to look for cheaper alternatives (Amos et al., 2014). For decades, researchers have studied impulsive purchase from various viewpoints, yet there are still contradictions in understanding of the idea. Advertising has the power to impact people's attitudes, lifestyles, and, in the long term, the culture of a country. Advertising has the power to influence customer brand preference (Latif & Abideen, 2011). Advertising is one of the most successful strategies of integrated marketing communication for emotionally motivating consumers to acquire things (Moore, 2004). When it comes to purchasing a brand of product, consumer behaviour can be predicted based on their mindset.

Digital technologies have had a noticeable impact and application on important business decisions such as product development, profitability, brand management, customer relationship management, purchasing and selling, and communication (Hudson, Roth & Madden, 2012). The success of contemporary media, according to Pearson (2013), is due to its social aspect. Consumers' information-gathering habits have been influenced by digital channels, particularly social media (Jonathan, 2012). More buyers are seeking information from a manufacturer's website, search engines, discussion forums, YouTube, and comparison websites, among other places, in the digital environment (Ioanas and Stoics, 2014). Customers' reviews on the internet are becoming increasingly important, as over 70% of customers consult online reviews before making a purchase decision (Ludwig et al., 2013). Customers not only read and believe other customers' reviews, but they also change their purchasing decisions based on them (Geamanco & Gregoire, 2012; Funde & Mehta, 2014). According to Hausman (2014), post-purchase social media actions include sharing product experiences, making recommendations to others based on positive experiences, and criticizing or denouncing brands in the case of a negative or dissatisfactory experience after purchase.

Retailers have been fast to build their own independently branded e-commerce stores in several parts of the world. Both offline and online, India's retail sector is flourishing. Individual purchasing behaviour has a significant impact on consumer behaviour in general and among youngsters in particular. Customers are attracted to retail establishments all over the world by using exterior and internal stimuli to generate differentiation and a value offer. Significant changes have occurred in the study of consumer behaviour, particularly in the decision-making process and, as a result, in the factors influencing purchase intention. The market places differ and are characterised by heightened competition, ongoing innovation in the goods and services on offer, and an increase in the number of businesses operating in the same market. Knowing the customer well is crucial in this situation. Innovation and meeting customer expectations are made feasible by analysing the variables that directly affect consumer behaviour. For marketers to be able to enhance their campaigns and more successfully engage their target audience, this study is crucial.

OBJECTIVE

i. To ascertain impulse buying behaviour related to selected consumer goods.
ii. To determine factors affecting impulse buying behaviour of consumers.

HYPOTHESIS OF THE STUDY

1. There exists relationship between impulse buying behaviour for selected consumer good and personal and family variables of the respondents.
2. There exists relationship between factors influencing impulse buying behaviour and personal and family variables of the respondents.

METHODOLOGY

The present study was conducted using descriptive research design. The data was collected from 125 consumers selected randomly from Vadodara city. The questionnaire method was used which was distributed online via Google form link. The questionnaire was enclosed with three section where section 1 contained questions related to background information of the consumers- age, gender, education, type of family, occupation and family monthly income. Section 2 elicited information related to their state of impulse buying, be it lowest, moderate or highest of the 17 selected list of consumer goods. Section 3 deals in the factors that affect the impulse buying behaviour of the respondents categorized on five groups- influence of emotions, influence of sales promotions techniques and window display, influence of advertising, visual merchandising and shopping companion, influence by income and festivals, influence of social media using the scale- strongly disagree, disagree, neutral, agree and strongly agree.

Steps Taken To Standardize The Tool

Step 1: Establishment of content validity

The scales prepared by the researcher was impulse buying behaviour related to selected consumer goods and factors affecting impulse buying behaviour of consumers. The response structure of the scale, impulse buying behaviour related to selected consumer goods was highest, moderate and lowest to which the score of 3,2,1 was assigned. Again, the response structure of the scale, factors affecting impulse buying behaviour of consumers was strongly disagree, disagree, neutral, agree

and strongly agree. To establish the content validity of the data collection tool, it was given to a panel of 5 judges from the related field. The judges were requested to judge whether the listed statements under each aspect were clear or ambiguous and relevant or irrelevant. Based on the valuable suggestions given by the experts, changes were made.

Step 2: Establishment of reliability

The reliability was established for the scales, impulse buying behavior related to selected consumer goods, and factors influencing impulse buying.

Pretesting: A pilot study was conducted to find out the key demographic factors, psychological factors such as emotions and mood, in-store marketing and advertising, influence of social factors including peer pressure and recommendations, promotional offers, discounts and sales events, cultural differences, trends, influence impulse buying behaviour of individuals. So, the developed scales was pretested on 30 respondents.

Reliability of the scales: The reliability of the scale was established through split-half method. For the split half method, the scale was divided in two using odd and even method. The coefficient of correlation was found between the two halves. The Cronbach's alpha test has been applied on random 30 samples.

The formula of Cronbach's alpha is as below:

$$a = \frac{N \cdot \bar{c}}{\bar{v} + (N - 1).\bar{c}}$$

Where, N is the number of items, $\bar{c}$ is the mean covariance between items and $\bar{v}$ is the mean item variance. The reliability value of the scales, impulse buying behaviour related to selected consumer goods and factors affecting impulse buying behaviour of consumers are 0.764 and 0.826 respectively.

MAJOR FINDINGS OF THE STUDY

The findings obtained on the basis of the responses gathered are discussed in details here.

1. **Background Information:** This section included information related to personal and family information of the respondents viz. age, gender, educational qualification, employment status, type of family, family monthly income.

AGE	**PERCENTAGE (%)**
Below 20 years	4
20-30 years	80.80
30-40 years	8.80
40 years and above	6.40
GENDER	
Male	24.80
Female	75.20
EDUCATION	
Illiterate	0
HSC (10th)	1.60

SSC (12th)	2.40
Graduation	30.40
Post Graduation	59.20
Diploma	1.60
Ph.D.	4
B.Ed.	0.80
TYPE OF FAMILY	
Joint	20
Nuclear	80
Occupation	
Unemployed	64
Employed	22.40
Self-Employed	13.60
FAMILY MONTHLY INCOME	
Below Rs. 50000/-	42.40
Rs. 50000 - Rs. 100000/-	28.80
Rs. 100000 - Rs. 500000/-	19.20
Above Rs. 500000/-	9.60

The data in the above table showed that majority of the respondents (80.8%) belonged to age group 20-30 years, being female (75.2%), with highest (59.2%) number of post graduates belonging to nuclear family (80%). Almost 64% of the respondents were unemployed and their family monthly income is below Rs.50000 for most of the respondents.

2. **Impulsive buying behaviour related to selected consumer goods:** This section comprises of list of consumer goods and their extent of behaviour towards the selected consumer goods.

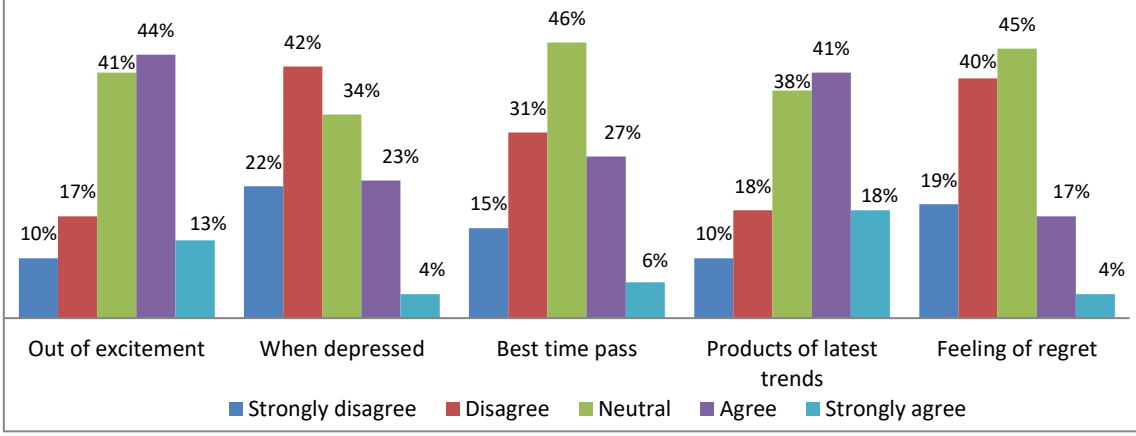
CONSUMER GOODS	**PERCENTAGE (%)**		
	LOWEST	**MODERATE**	**HIGHEST**
Convenience Food	26	76	23
Groceries	22	65	38
Cookware	38	76	7
Storage	39	68	17
Serveware	42	68	14
Linens	31	67	26
Furnishing	45	55	24
Clothing and Apparel	8	55	62
Shoes	20	60	44
Accessories	29	58	36
Home décor	34	57	33
Cosmetics	33	62	29
Jewellery	51	53	20
Toiletries	25	63	34
Stationery	26	58	41
Books	21	64	38
Gadgets and Devices	39	54	32

The data in the above table revealed that the impulse buying behaviour was highest on clothing and apparel (62%), moderate on convenience food (76%) and cookware(76%); and lowest on jewellery(51%).

3. Factors Affecting Impulse Buying

A. Influence of emotions: This section showed the extent of influence by emotional factors.

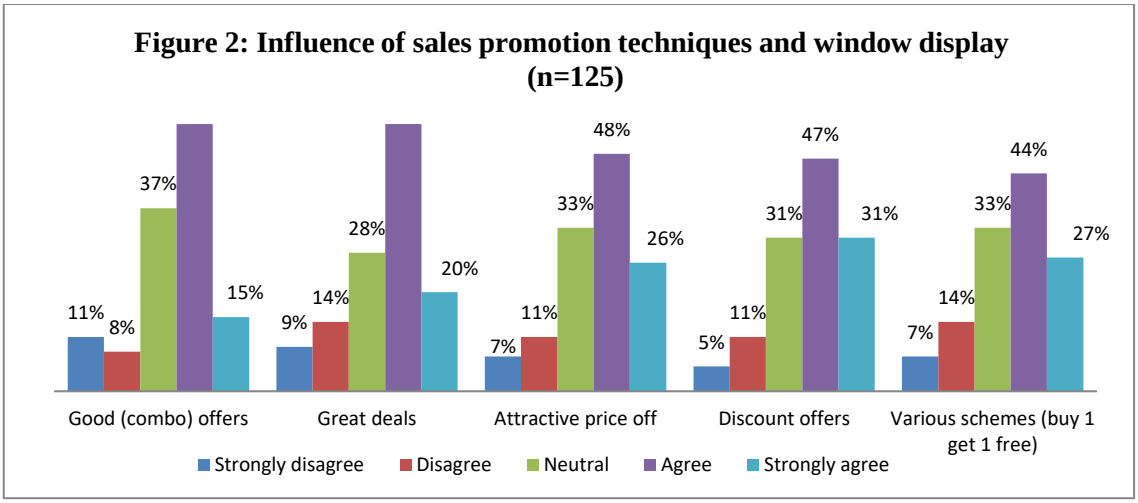
Figure 1: Influence of emotions (n=125)



The data in fig.1 indicated that the highest number of respondents strongly disagreed (22%) that they do impulsive buying when depressed, disagreed (42%) when depressed, are neutral(46%) being it the best time pass, agreed (44%) that they buy impulsively out of excitement; and strongly agreed (18%) that product of latest trends influence their impulse buying.

B. Influence of sales promotion techniques and window display: This section showed the extent of influence by sales promotion techniques and window display.

Figure 2: Influence of sales promotion techniques and window display (n=125)

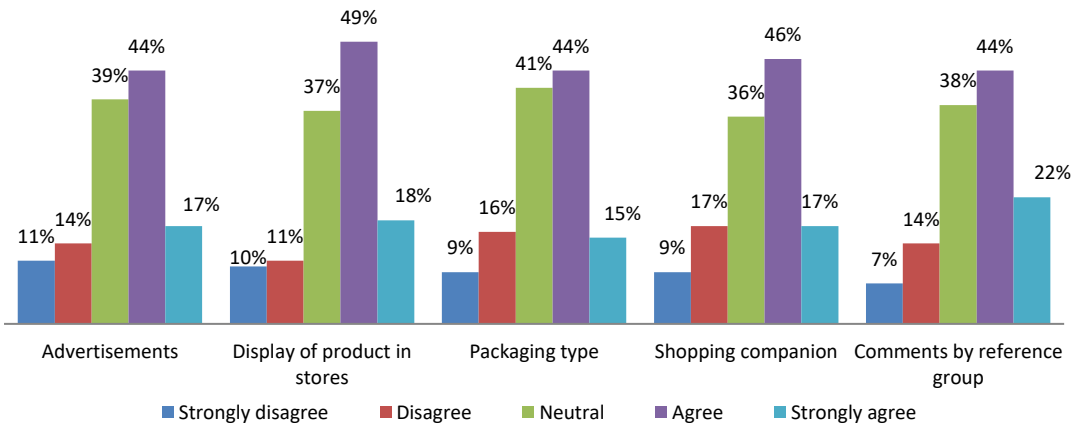


The data in fig.2 indicated that the highest number of respondents strongly disagreed (11%) the influence of good combo offers on impulse buying, disagreed (14%) the influence of various schemes (buy 1 get 1 free), were neutral(37%) towards good (combo) offers, agreed that both great deal (54%) and good (combo) offers (54%) influence impulse buying; and strongly agreed (31%) that discount offers influence impulse buying.

C. Influence of Advertising, Visual merchandising and shopping companion:

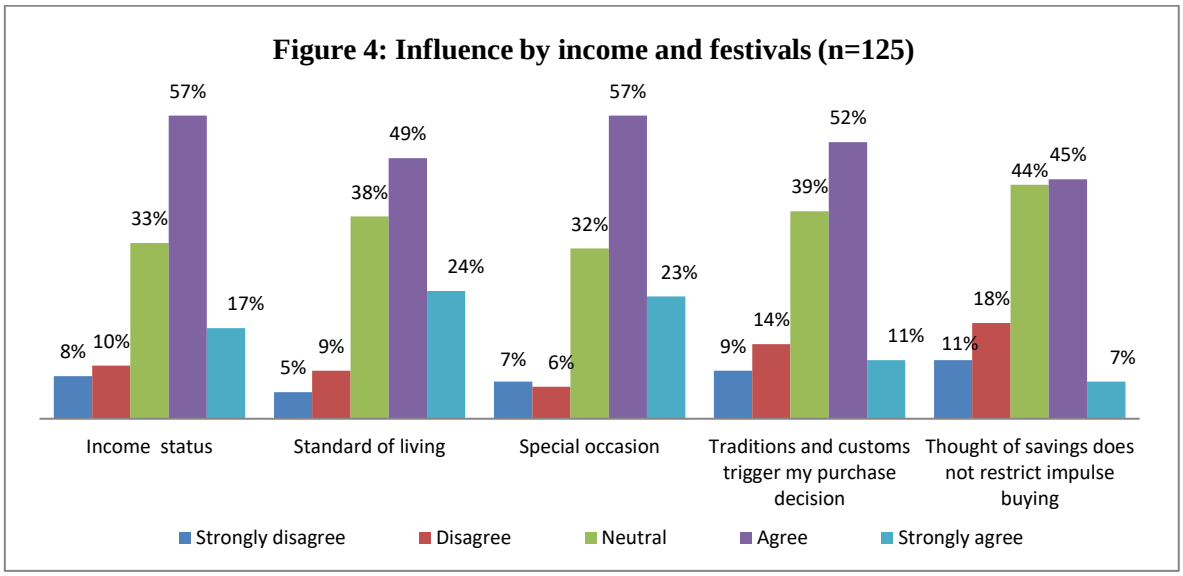
This section showed the extent of influence by advertising, visual merchandising and shopping companion.

Figure 3: Influence of advertising, visual merchandising and shopping companion (n=125)



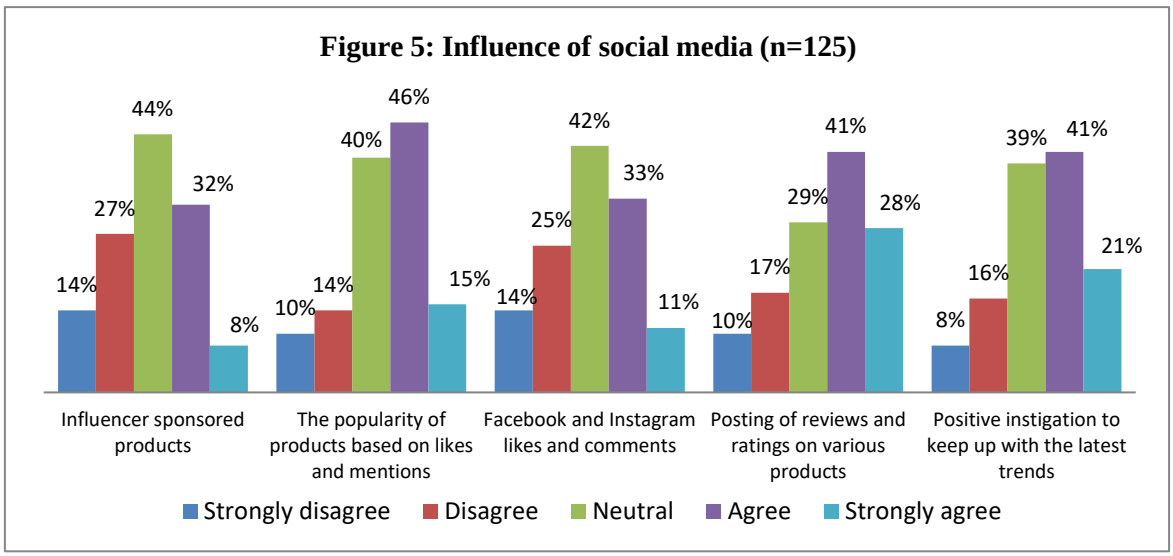
The data in fig.3 indicated that the highest number of respondents strongly disagreed (11%) the influence of advertisements on impulse buying, disagreed (17%) the influence of shopping companion, were neutral (41%) on influence of packaging type of the goods, agreed (49%) the influence of display of products in store; and strongly agreed (22%) comments by reference groups influence impulse buying.

D. Influence by income and festivals: This section showed the extent of influence by income and festivals.



The data in fig.4 indicated that the highest number of respondents strongly disagreed (11%), disagreed (18%) and were neutral (44%) that the thought of saving does not restrict impulse buying, agreed (57%) that impulse buying is influenced by income status and special occasions; and strongly agreed (24%) that standard of living influence impulse buying.

E. Influence of Social media: This section showed the extent of influence by social media.



The data in fig.5 indicated that the highest number of respondents strongly disagreed (14%) the influence of influencer sponsored products and facebook , instagram likes and comments on impulse buying, disagreed (27%) and were neutral (44%) on the influence of influencer sponsored products, agreed (46%) the influence of the popularity of products based on likes and mentions; and strongly agreed (28%) that posting of reviews and ratings on various products helps the respondents and in turns they make an impulsive purchase.

Correlation Co-efficient between selected Independent and Dependent variables

S. No.	Variables	Correlation Co-efficient 'r'				
		Consumer Goods				
		Clothing	Cosmetics	Jewellery	Stationery	Books
1.	Age				0.249**	0.254**
2.	Gender		0.185*	0.216*		
3.	Family Monthly Income	0.220*				

**Highly significant at 0.05 level *Significant at 0.01 level

Analysis of the above table proclaimed that there was existence of positive significant correlation between selected independent variables viz. age, gender, family monthly income; and dependent variables viz. consumer goods- clothing, cosmetics, jewellery, stationery and books. Increase in age was shown to be highly significant with the increase in people affinity to buy stationery and books as people try to discover methods to experiment in their creative areas and learn new things through reading a variety of literary works. Also, in later ages this helps them to find quality hours to spend their free time. Gender showed a significant level of increase in people buying cosmetics and jewelleries, primarily in case of women jewelleries and cosmetics always pick their eyes to carry them more eloquently in the society. Independent variable family income also showed a significant level of positive correlation with the clothing, as family income rises members are better able to opt for brands and increase in number of additional collections in their wardrobe.

Correlation Co-efficient between selected Independent and Dependent variables

S. No.	Variables	Correlation Co-efficient 'r'				
		Influence by income & festivals		Influence of social media	Influence of advertising	
		Standard of living	Thought of saving	Facebook & Instagram	Product display in store	Comments
1.	Age	0.302**				0.197*
2.	Occupation	0.191*	0.222*	0.207*		0.208*
3.	Family Monthly Income				0.187*	

**Highly significant at 0.05 level *Significant at 0.01 level

Analysis of the above table showed that there existed positive significant correlation between selected independent variables viz. age, occupation, family monthly income; and dependent variables viz. influence by income and festivals, social media and advertising. Age has been shown to play a highly significant role in raising living standards, which are influenced by income and festivals and Additionally, the influence of advertising is significantly positively correlated with user comments. Occupation also plays a significant role in increasing standard of living and thoughts on saving, as earning has a direct correlation with the amount one can spend and accordingly one has to save for overall development of one's family. Social media have also shown

a significant level of positive correlation with the occupation in doing impulsive buying. As social media greatly influence in bringing the product description handy with creative style of advertising it influences consumers greatly. Additionally, user comment has significant level of positive correlation with advertising and occupation. The influence of advertising in product display on the store has been significantly correlated with family monthly income. As family monthly income rises, people become more impulsive in their purchases of extra items rather than necessity.

CONCLUSION

The purpose of this study was to gain insight into consumers' impulsive shopping behaviour in supermarkets and the variables that influence or fuel those urges. There have been considerable changes in consumer behaviour, particularly in the decision-making process and, as a result, in the factors influencing purchase intention. It was important for merchants to comprehend the influence of consumers' impulsive buying behaviour and the possible financial benefits for those who can optimise this effect. Retailers or supermarket owners should therefore carefully consider these elements in order to profit from this phenomenon of impulsive buying behaviour and get customers to spend more money than they had originally meant. In today's competitive environment, new marketing models are successful in assisting and understanding consumer behaviour. In the last few decades, the elements that influence consumer behaviour have shifted dramatically. Consumers in the twenty-first century are extra cautious and aware. Consumer access to information has likewise become near-instantaneous. Consumers can get information for making decisions in a matter of seconds by using the internet.

IMPLEMENTATION

This paper advanced research into behaviour of consumers towards impulse buying. As understanding customer interests and preferences has become considerably easier than ever before in the era of big data and research, modern retail formats must ensure that they are modernised to meet the needs of their customers matching the customer's needs and the sales training tactics. Focus must be given on outstanding design concepts, innovative skills, work quality in order to affect behaviour of the consumers. To succeed in the future in the competitive economy, every marketer needs to grasp human psychology, especially that of the youth market.

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AN ASSESSMENT OF CONSUMERS' KNOWLEDGE ABOUT VARIOUS ASPECTS OF WEIGHTS AND MEASURES

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ABSTRACT

Every citizen regardless of the social standing, every man, woman and child, student, teacher and technician, worker, entrepreneur and manufacturer is a consumer in his own right. From birth, all people are consumers in one way or the other. No one can escape from being a consumer, everyone is consumer; may be of different types. This study was done with the objective to assess information empowerment of consumers on various aspects of weights and measures. The study was carried out on 100 consumers in six randomly selected nearby areas within Amreli district of Gujarat state. Based on the needs a ready educational package i.e. an audio-visual aid (CD) on various aspects of weights and measures was used. A sub-sample of 60 consumers was exposed to the film. It was observed that initial knowledge of majority of respondents was poor in all the aspects. But educational package proved effective in delivering information related to weights and measures.

KEYWORDS: Consumer, Information empowerment, Weights & measures.

INTRODUCTION

Consumers are the largest economic group of any country. But the very same consumers are the most voiceless in countries around the world. The seller's attitude towards the consumer is, "take it or leave it" (Singh & Garg, 1997). According to an estimate, consumers in India are cheated to the extent of INR 2000 crores. In recent days, an average consumer in India is poor, illiterate, unaware, irresponsive or just defeatist. What is in short supply are not commodities but justice, not laws but awareness (Bhattacharya, 1984). Past researches showed that people in the rural areas are suffering from various types of problems due to lack of knowledge, information and education on many aspects. (Sharma, 2016)

Presently, there is an utter lack of awareness of their rights and responsibilities. Because of utter lack of literacy and awareness among the masses, their preoccupation with the task of earning daily bread, the consumer is ineffective and virtually powerless. Consumer has neither the time nor the capacity and inclination to organize and boycott dealers who indulge in black marketing and selling the goods under the counter (Sinha, 2002).

It is a new concept to ensure People Participation at grass root level for their local development (Das, 2011). The goal of Development Communication is to mobilize people at grass root level and sensitize them so that they could become self-reliant and develop themselves by their own efforts (Sayulu, 1995).

OBJECTIVES

The objectives of the present study are as under:

1. To identify the educational needs of the urban consumers of Amreli district about various aspects of weights and measures.
2. To aware urban consumers of Amreli district about various aspects of weights and measures.

METHODOLOGY

The study was conducted in 3 phases:

1. Identification of educational needs:

- ***Location:*** The study was done in six randomly selected areas/ colonies of Amreli district, *viz.*, Rokadwadi, Bhojalpara, Railway colony, Narottam Nagar, Sai Nagar, Yamuna Park.
- ***Sample selection:*** A total of 100 consumers, 16 from 02 and 17 respondents from 04 colonies, were selected to identify the educational needs.
- ***Material used:*** Interview schedule consisting of two sections i.e. background information and knowledge test on weights and measures was used for data collection.
- ***Data Analysis:*** Data was analyzed using frequency, percentage and Mean Percent Scores (MPS).

Mean Percent Scores (MPS):

Scores obtained by the respondents were converted into MPS to have uniformity in the scoring of different provisions.

$$\text{Mean} = \frac{\text{Total obtained score}}{\text{Number of Respondents}}$$

$$\text{MPS} = \frac{\text{Mean}}{\text{Maximum obtainable score}} \times 100$$

2. Development of Educational Package:

- Based on the results of Phase I, i.e., after the assessment of needs of consumers, the educational package i.e. an audio-visual aid (CD) on different aspects of weights and measures was prepared and used.
- One Act Plays (pre-recorded) were used to impart knowledge through CD instead of stereo-type documentary style. It was confirmed by Sharma, 2021 that a medium or package of media is necessary to impart a sustainable awareness and information dissemination

3. Delivering the Educational Package: From the initial sample of 100 respondents a sub-sample of 60 consumers (10 from each colony), those interested and with low scores in pre-test were selected. They were exposed to the film. Post-test data were collected just after exposure to assess the impact of package in terms of gain in knowledge and after 15 days to assess the retention of knowledge.

RESULTS & DISCUSSION

The results obtained from the analysis of the data were as follows-

Background Information of the respondents:

Total 100 respondents were interviewed for their background information. 44 per cent of the respondents belonged to the younger age group of 25-40 years followed by 40 per cent in 41-55 years category. Only 17 per cent respondents were graduated, rest were with very low education level, i.e. only secondary or higher secondary passed on the contrary very less number of respondents were completed their graduation. More than half of the respondents (51%) were engaged in some kind of occupation, like housemaid, primary/secondary teacher, clerk and peon in Government or private organizations. Fifty three percent respondents belonged to joint families and rests were in the nuclear families. Fifty seven percent respondents were having more than 5 members. 57 per cent respondents were having very low family income, i.e. less than INR 10,000/- per month.

Table: 1- Background Information of the Respondents (n = 100)

S.No.	Variables	F/%
1.	***Age in Years***	
	25 – 40	44
	41 – 55	40
	56 – 70	16
2.	***Education***	
	Secondary	59
	Higher Secondary	24
	Graduation	17
3.	***Occupational Status***	
	Working	51
	Non-working/ Housewives	49
4.	***Family type***	
	Nuclear	47
	Joint	53
5.	***No. of Family members***	
	1-4	43
	5 and above	57
6.	***Family Income level***	

	Less than INR 10,000/- p.m	57
	INR 11,000- 50,000/- p.m.	35
	More than INR 51,000/- pm	08

Existing Knowledge of respondents on weights and measures:

The information collected was regarding various aspects of weights and measures such as correct beam scale of the weighing balance, standardization of weights and measures and time gap between re-verification of weighing and measuring equipment. Perusal of Table-2 reveals that only a few (8%) respondents knew that a correct balance should have a flat beam scale, followed by 42 per cent who said that it could have both flat beam scale and cylindrical beam scale while 50 per cent didn't know about the correctness of weighing scale. It was seen that none of the respondents were aware of the duration to verify the weighing and measuring equipment and only 6 per cent knew that the equipment has to be standardized by the Weights and Measures Department.

Majority of respondents were not aware of the facts that should be looked for the verification of standardization of weights and measures. They only looked for marking on the weights and had no idea about seal of Weights and Measures department. They were not aware of the fact that the seal bears the inspector's number and year of verification.

Rest of the information such as fraudulent practices prevalent in the market in terms of weights and measures were not known to the respondents except less weighing and poor measuring (61%), use of stone to weigh, weights and measures not being standardized as well as broken and tapered seal (each 10%) and balance with a cylindrical beam scale (8%). Use of stone instead of iron weights is a very common practice followed by fruit & vegetable vendors and consumers are so used to this practice that they don't pay any attention to it. They found it normal and didn't find anything wrong in this practice.

Such findings could be attributed to the reasons that the respondents cannot gain deep insight and understanding about such frauds just by experience. Further they might have not received such information in a systematic way either through training, education, mass media or extension personnel.

More than one third of the consumers (68%) were aware that marking of kilograms on weights could be seen for verification and check the weights and measure. While 11 per cent check ‘Arrow on edges of meter’. Only 2 per cent consumers check Seal of Department of Weights & Measures on a regular basis. 39 per cent respondents were observing all of the above options to verify. Majority of the respondents were knowing that weights and measured should be checked after a certain interval; however, they did not have any idea at what interval verification should be done.

Table-2: Existing Knowledge of respondents on Weights and Measures

n = 100

S.No.	Aspects Related to weight & Measures	(%)
1.	Correct balance should have	
	(a) flat bar (flat beam scale)	8
	(b) cylindrical beam scale	0
	(c) both of the above	42
	(d) don't know	50
2.	How one can be cheated in the market*	
	(a) use of stone instead of iron weights	16
	(b) weights & measures not being standardized	10
	(c) balance with a cylindrical beam scale	8
	(d) short Weighing and Measuring	61
	(e) broken and tampered seal	10
	(f) broken or bended weights & measures (meter & litre)	5
	(g) use of magnet	6
3.	How to check verification of Weights and Measures*	
	(a) Seal of Department of Weights & Measures.	2
	(b) Marking of kilograms on weights.	68
	(c) Arrow on edges of meter.	11
	(d) Inspector's number & year of verification	0
	(e) All of above	39
4.	Weights and Measures should be checked after certain interval	
	No	94
	Yes	6
5.	Verification should be done after how much time	
	(a) 1 month	0
	(b) 3 months	0
	(c) 6 months	0
	(d) 1 year	0

	(e) 5 years	0
	(f) Don't know	100

* Multiple options

Preparation and Use of Educational Package:

Based on gathered information following educational needs were identified in the component of Weights and Measures. According to the needs of consumers in various aspects of weights and measures, the educational package was prepared in the form of One Act Play (drama) and recorded and used which contained all the other related information in an extensive way. This drama was acted by the students for the fulfillment of the practical assessment of related course. The CD was shown at a common place inviting consumer at their common convenient time. Below is the information, which is included in the One Act Play's manuscript in the dramatic format for the purpose of imparting the knowledge among the consumers.

1. *Correct balance and other weighing & measuring equipment:* According to Indian Consumer Affairs Organization legal metrology methods should be used by the sellers, which tell about the units of measurement and weighment as well as the related instruments, which are technical and legal ensuring the public guarantee regarding security and accuracy of weights and measurements.
2. *Fraudulent practices related to weights & measures prevalent in the market:* Based on the correct balance or instruments and units of weights and measurements, traders or sellers try to breach the government rules and regulations and consumers who are not aware about the same, become the predators of the said frauds.
3. *Verification of weighing & measuring equipment:* To secure themselves consumers should have the proper knowledge and knowhow to verify the correctness of weights and measurements in the marketplace while purchasing the articles. Consumers should see properly and avoid the fraudulent conditions and also prefer to buy things from the seller who has correct weighing balance/ instrument.

Information Empowerment in terms of knowledge gain and retention on weights and measures:

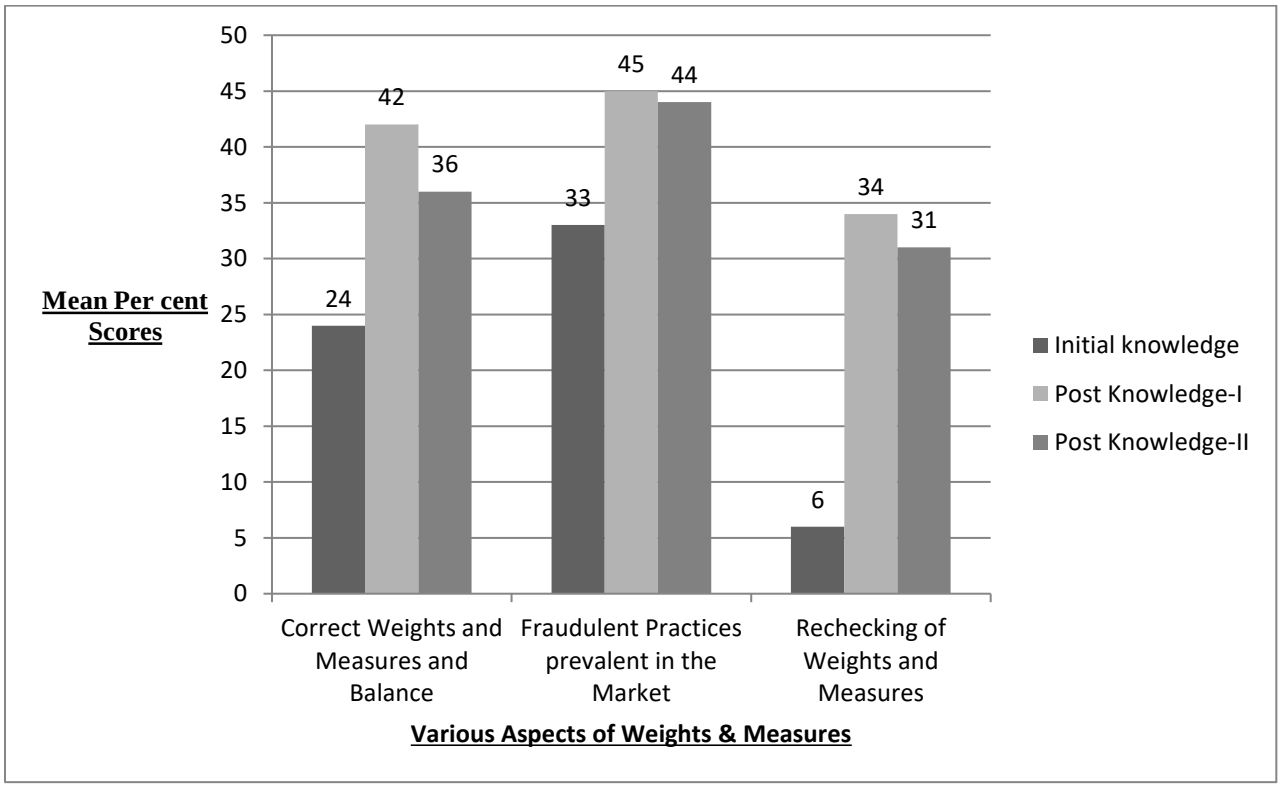
It is clearly depicted in Figure:1 that initial knowledge of majority of respondents was poor in all the aspects except fraudulent practices prevalent in the market where 43.33 per cent respondents were in average knowledge category followed by various aspects related to correct balance, weights and measures and re-verification of weights and measures (30 & 13.33%). It can be concluded that respondents had poor knowledge of weights and measures. The Mean Percent Scores of Initial knowledge in different aspects varied in range from 6.5 to 32.44 per cent. After exposure to educational package there was improvement in knowledge gain as majority of respondents now fell in average knowledge range in various aspects i.e. correct balance and weights and measures (86.67%), fraudulent practices prevalent in the market (80%) and re-verification of weights and measures (66.67%).

The effectiveness of the educational inputs is evident as Mean Percent Scores (MPS) obtained by respondents just after exposure to aid showed increase in all aspects of weights and measures from initial knowledge scores.

After 15 days of exposure to the educational package, retention in knowledge was assessed (Fig.1). Majority of respondents (60% and above) displayed average knowledge scores in different aspects of weights and measures. Knowledge loss was observed in all aspects as revealed from MPS in this phase. The minimum loss in knowledge as compared to other aspects was observed in the aspect of fraudulent practices prevalent in the market. Overall, it can be said that knowledge retention was in average range with time gap after exposure to educational package because respondents retained moderately in majority of aspects. The reasons may be that human beings have a tendency to forget information with passage of time.

Moreover, the subjects under study were consumers with low educational level and low economic status who considered this information secondary to their priority of earning their daily bread. They didn't practice intelligent buy Manship related to weights and measures as they thought it to be mere time wastage to fight for such things instead of earning their bread. So, they tend to forget important information on consumer issues. But with repeated exposure through mass-media they will become sensitized for getting full return of their hard-earned money by becoming informed consumer. It is interpreted that respondents understands the need of education. The findings of the present study were in line with those of Singh and Kushwaha (2009).

Figure: 1- Distribution of respondents according to knowledge gain and retention in different aspects of Weights & Measures



CONCLUSION

Results of the present investigation entail the situation of consumers, level of their knowledge and awareness regarding various aspects of weights and measures. Consumers who are into low income and low educational status can't think to be redressed or anything except earning daily bread for their survival. To spread awareness among consumers of their rights and responsibilities and other provisions by the government for their welfare alike educational packages will have a profound impact if it is in local language, local art, and interactive medium with less or without technical terms.

SUGGESTIONS FOR FUTURE RESEARCH

a) Same research can be done on rural consumers, as they are more prone to face the fraudulent practices/situations.
b) Comparative researches can also be done on basis of Gender, Income level / Occupation status as well as Educational status.
c) Consumer related government rules, regulations and laws should widely be publicized among the common people to aware them.
d) Consumer rights and responsibilities could also be taken into consideration for researches.

RECOMMENDATIONS

a) Advertisements to aware consumers regarding safe buying, different frauds in markets, could be run by the Govt. in between the daily soaps/serials people watch more on the basis on TRP. These could also be imparted via local news channels.
b) To create awareness or empower the consumers' knowledge rallies; street plays can be organized in the market as well as near the colonial areas.

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CONTRIBUTORS TO PSYCHOSOCIAL WELL-BEING OF WOMEN ACADEMICIANS AT HIGHER EDUCATIONAL INSTITUTIONS

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ABSTRACT

Women face several challenges every day to balance both their personal and professional life in this fast-paced and constantly changing world. Various research studies have indicated that stressful life situations, psychological aspects, medical & genetic conditions, hormonal fluctuations, changes in lifestyle and socioeconomic factors amongst others act as contributors to women's physical and mental health. In this context, psychosocial well-being of women is indispensable as it integrates the physical, psychological, socio-economic and cultural aspects of overall health. This research focuses on emotional disturbances that occur during the premenstrual phase and its impact on quality of life of women academicians at colleges. The ongoing stressors combined with hormonal fluctuations exacerbates the emotional symptoms during the premenstrual time. The study aimed to identify the psychosocial contributors of emotional discomfort during the premenstrual phase or the luteal phase of menstrual cycle. The sample size is 243 drawn out of finite universe, which comprised of 639 women faculties under the age-group of 26-49 years hailing from five private arts and science colleges in Coimbatore, Tamil Nadu through convenient sampling technique. The study adopted exploratory research design and survey method for data collection and interpretation. The findings of the study showed that various demographic, health and psychosocial factors such as age, weight, work experience, monthly income, diagnosed medical conditions, general mood problems, stressors, perception about being a woman, etc., act as predictors of emotional disturbances during the premenstrual phase, i.e., the luteal phase of the menstrual cycle. Thus, creating awareness and self-intervention techniques will provide women workforces to overcome their emotional discomfort during their premenstrual time and helps them to balance their 'Self'. This in turn will enable them to improve their personal and professional growth, engage in development of their family and society at large.

Keywords: Psychosocial Well-Being, Emotional Discomfort, Mental Health, Quality of Life, Life Satisfaction, Luteal Phase.

INTRODUCTION

Mental health is an essential part of personal well-being, which leads to thriving family relationships and societal contribution. The World Health Organization (WHO) says that mental health is fundamental to the development of societies and any nation. Based on this, psychosocial well-being of an individual involves both emotional and social skills, feeling optimistic about self and future, purposeful life and transcend beyond survival needs to higher forms of thinking, mental state and societal welfare health (American Psychosomatic Society & UNESCO Institute for Statistics). In the current scenario, women's socio-economic role has advanced substantially leading to challenges in handling both their work and life situations in a balanced way. In general, women undergo physical and emotional stress as part of their biological process during menstrual cycle. Though, this is an

element of nature's reproductive activity, the difficulty and pain one undergoes during this physical change combined with mood fluctuations, socio-cultural beliefs and one's own perception about self and ability to handle it makes this process exhaustive. Hofmeister and Bodden (2016) have mentioned that premenstrual symptoms (PMS), which occurs during the luteal phase of the menstrual cycle every month, i.e., the premenstrual phase, involves both physical and psychological symptoms that hinders the daily functioning of women including their work, personal activities, relationships and also adversely impacts quality of life. Also, research studies revealed that hormonal fluctuations play a significant role in the aetiology of these symptoms, and it arises when women are vulnerable and under stress. Studies reveal that there is a correlation between PMS stress, anxiety, depression and the role of femininity (Zendehdel & Elyasi, 2018) and also negative perceptions about health and stress also may intensify these symptoms in most of the women. (Matsumoto et al., 2019). The symptoms can also lead to a variety of physical consequences such as cardiologic, pulmonary, gastrointestinal, genitourinary and neurological disorders; psychological conditions including cognitive, mood and emotional disorders; behavioural changes such as fluctuations in sleep as well as eating patterns; and social complications like interpersonal relationships issues, social isolation, etc. (Siahbazi et al., 2018). These can remarkably impact quality of life of the affected women, especially during the premenstrual phase (Dennerstein et al., 2010 & Quick et al., 2019). A study by Somashekher in 2018 revealed that Indian women employees take their family commitments very seriously when compared to their professional responsibilities, which results in developing severe stress and work-family conflict. Also, severe premenstrual disorder results in economic burden for both women and the society (EL-Hamid et al., 2013). Moreover, a study conducted in India and Turkey showed that PMS was prevalent in 43–52.2% women of reproductive age (Erbil & Yücesoy, 2021; Dutta & Sharma, 2021). Hardy & Hunter (2021) mentioned that employees with moderate to severe PMS were found to perceive that their symptoms were preventing their ability to carry out the job requirements and was associated with difficulty concentrating at work, reduction in work productivity, increase in absenteeism and significant impact on quality of life.

Though emotions play an important role in one's life, its fluctuations during the premenstrual phase hampers work-life balance. Nowadays, college faculties are under a lot of stress due to family and social responsibilities, workplace stressors, wherein their employment status are placed under temporary, contractual or permanent category based on their work experience resulting in financial burden. Women in the academic sector are the pillars for seeding and infusing knowledge; therefore, they need to be more focused without physical or mental imbalances to impart education with quality and novelty to younger generations. Interestingly, research on premenstrual symptoms and its effect on quality of life among college faculties is still an unexplored avenue in a country like India, which comprises of nearly 50 percent female population. Hence, the present study intends to examine the recurrent emotional disturbances during the premenstrual phase and its impact on psychosocial well-being of women academicians.

OBJECTIVE

To identify the psychosocial contributors of emotional discomfort during the luteal phase of the menstrual cycle

HYPOTHESIS

H_0: There will not be any significant contributors associated with socio-demographic, health, premenstrual and psychosocial variables that impact emotional discomfort during the luteal phase.

H_A: There will be significant contributors associated with socio-demographic, health, premenstrual and psychosocial variables that impact emotional discomfort during the luteal phase.

METHODOLOGY

Sampling Procedure and Design

The study was conducted in five private arts & science colleges in the City of Coimbatore, Tamil Nadu upon receiving approval from the Institutional Human Ethics Committee of our University (AUW/IHEC/ws-20-21/XPD-03) and from the heads of the institutions of the respective colleges.

The sample has been drawn from a finite universe comprising of 639 women faculties, wherein the sample size (N) is 243. The study included only the women faculties falling under the age-group of 26 - 49 years. The faculties of age 50 years and above as well as who have undergone hysterectomy and subjected to early menopause were excluded. Based on the nature of the study, convenient sampling technique with exploratory research design and survey method was adopted.

The data was collected through online questionnaire and only the faculties who were interested participated in this research. The confidentiality statement and non-disclosure of the collected data were informed to the participants in the online link. The questionnaire consisted of independent variables: A) socio-demographic variables B) health variables and dependent variables: C) premenstrual variables and D) psychosocial variables. The thirteen variables/predictors that showed statistically significant results for the selected dependent variable (ED) are classified below.

Classification of Variables

The selected dependent variable ED is a premenstrual variable, which is severity of Emotional Discomfort during the premenstrual phase. This is a self-devised 5-point Likert-type scale with 15 items and each item is scored from 1 to 5 (1 = none, 2 = mild, 3 = moderate, 4 = severe, 5 = extremely severe).

The seven independent variables/predictors are as follows: A) Socio-Demographic Variables: i) A – Age (in years); ii) W - Weight (in Kg), iii) WE - Work Experience (in years); iv) MI - Monthly Income (in Rs.) and v) NC - No. of Children (indicates no. of male/female child or both); B) Health Variables: i) DMC - No. of other Diagnosed Medical Conditions (conditions like diabetes, hypertension, thyroid problems, etc.) and ii) GMP - General Mood Problems (like anxiety, mood swings, irritability, etc.).

The six dependent variables/predictors are as follows: C) Premenstrual Variables: i) BS - No. of Behavioural Symptoms during premenstrual phase and ii) PBES - Recurrent Physical, Behavioral & Emotional Symptoms during premenstrual phase; D) Psychosocial Variables: i) CFS - Causes for Stress, ii) ITFB - Increase in negative Thoughts, Feelings & Behaviour Patterns during premenstrual phase, iii) GDP - General Dream Patterns at night and iv) BW - Perception about Being a Woman.

The other constructed scales are Causes for stress (CFS), a 5-point Likert-type scale with 12 items and each item is scored from 1 to 5 (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always) and General Dream Patterns (GDP) that occur during the night, a 4-point scale with 3 items scored from 1 to 4 (1 = never, 2 = rarely, 3 = sometimes, 4 = often).

The questions pertaining to recurrent physical, behavioural & emotional symptoms during premenstrual phase (PBES) and increase in negative thoughts, feelings & behavior patterns during the premenstrual phase (ITFB) were given as Yes/No/Sometimes option, perception about being a woman (BW) is a set of both positive and negative multiple-choice responses and no. of behavioural symptoms during premenstrual phase (BS) is a multiple-choice response question.

Analysis

The data were coded and analyzed using SPSS 25.0. Reliability test performed for the constructed scales indicated that Cronbach's Alpha was >0.5: Emotional Discomfort (ED) = 0.939, Causes for Stress (CFS) = 0.849 and General Dream Patterns (GDP) = 0.804. Percentage analysis was done to identify the distribution of respondent's age and severity of their emotional discomfort during the premenstrual phase. In order to determine the statistically significantly predictors for the selected dependent variable (ED), a stepwise regression analysis was performed using the independent variables and other dependent variables.

RESULTS

The percentage distribution of respondents' age is given below in Fig. 1. It shows a maximum of 21% of the respondents are in the age group of 38-41 years followed by 18.5% and 17.3% in the age groups of 42-45 years and 34-37 years respectively. While there are 16.5% and 16% in the age groups of 30-33 years and 26-29 years, the least is 10.7% in the 46-49 years.

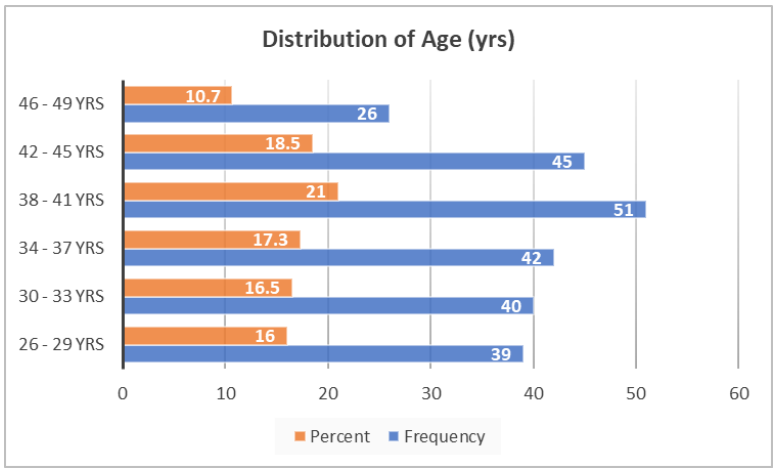

Fig.1: Age Distribution of Respondents (N = 243)

The severity of the respondents' emotional discomfort during the premenstrual phase was measured with a 15-item scale, which showed 41.2% of them have moderate discomfort, 33.3% have mild discomfort, 23% face difficult situation emotionally and 2.5% have high discomfort and are represented in Fig.2.

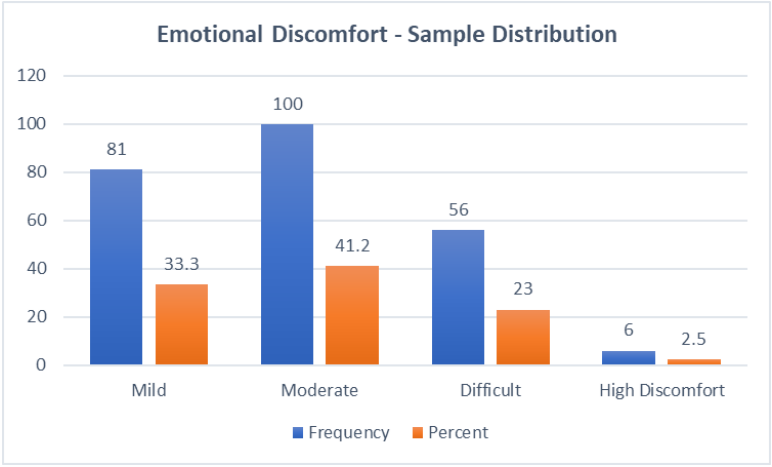

Fig.2: Distribution of Emotional Discomfort during Premenstrual Phase (N = 243)

The Table 1 shows the results of stepwise regression analysis using independent variables as predictors of Emotional Discomfort during the premenstrual phase.

Table 1: Regression on Emotional Discomfort using Independent Variables

Variable	R	R^2	β	F	P
GMP	0.433	0.187	0.433	55.455	0.000
GMP, MI	0.487	0.237	0.421 -0.224	37.294	0.000 0.000
GMP, MI, DMC	0.510	0.261	0.382 -0.230 0.158	28.064	0.000 0.000 0.006
GMP, MI, DMC, W	0.524	0.274	0.375 -0.245 0.165 0.119	22.502	0.000 0.000 0.004 0.034
GMP, MI, DMC, W, A	0.538	0.289	0.334 -0.189 0.172 0.126 -0.140	19.263	0.000 0.002 0.003 0.024 0.029
GMP, MI, DMC, W, A, NC	0.552	0.305	0.341 -0.203 0.170 0.119 -0.158 -0.129	17.226	0.000 0.001 0.003 0.031 0.013 0.022
GMP, MI, DMC, W, A, NC, WE	0.563	0.317	0.347 -0.242 0.159 0.111 -0.297	15.592	0.000 0.000 0.005 0.043 0.001

			-0.137 0.196		0.014 0.039

**P < 0.01, *P < 0.05 = level of significance
Dependent Variable: Emotional Discomfort (ED)
Predictors: (Constant), GMP, MI, DMC, W, A, NC, WE

The Table 1 shows that general mood problems (GMP) faced by the respondents is the most important predictor of emotional discomfort during the premenstrual phase with 18.7% variance. When other socio-demographic and health variables were added to the regression equation, such as monthly income and no. of other diagnosed medical conditions, it showed 23.7% and 26.1% variance respectively. This followed by weight and age showed corresponding variance of 27.4% and 28.9%. The last two predictors no. of children and work experience have contributed 30.5% and 31.7% variance respectively. The overall beta coefficients for general mood problems (β = 0.347), no. of other diagnosed medical conditions (β = 0.159), weight (β = 0.111) and work experience (β = 0.196) indicated positive contributions, while that of monthly income (β = -0.242), age (β = -0.297) and no. of children (β = -0.137) showed negative contributions.

The Table 2 represents the results of stepwise regression analysis using other dependent variables, which are the predictors of Emotional Discomfort during the premenstrual phase.

Table 2: Regression on Emotional Discomfort using other Dependent Variables

Variable	R	R^2	β	F	P
BS	0.428	0.183	0.428	53.911	0.000
BS, CFS	0.555	0.308	0.416 0.353	53.289	0.000 0.000
BS, CFS, PBES	0.630	0.397	0.372 0.307 0.306	52.397	0.000 0.000 0.000
BS, CFS, PBES, GDP	0.649	0.421	0.358 0.237 0.303 0.171	43.242	0.000 0.000 0.000 0.002
BS, CFS, PBES, GDP, BW	0.664	0.441	0.343 0.191 0.285 0.181 0.151	37.360	0.000 0.001 0.000 0.001 0.004
BS, CFS, PBES, GDP, BW, ITFB	0.674	0.454	0.318 0.166 0.252 0.169 0.164 0.126	32.655	0.000 0.004 0.000 0.002 0.002 0.019

**P < 0.01, *P < 0.05 = level of significance
Dependent Variable: Emotional Discomfort (ED)
Predictors: (Constant), BS, CFS, PBES, GDP, BW, ITFB

The Table 2 shows that no. of behavioural symptoms during the premenstrual phase (BS) is the most important predictor of emotional discomfort with 18.3% variance and beta coefficient β = 0.318. When other premenstrual and psychosocial variables were added to the regression equation such as the causes for stress; recurrent physical, behavioural & emotional symptoms during premenstrual phase; general dream patterns at night; perception about being a woman and increase in negative thoughts, feelings & behavior patterns during the premenstrual phase, it showed variance of 30.8%, 39.7%, 42.1%, 44.1% and 45.4% respectively with positive contributions of beta coefficients (β = 0.166, β = 0.252, β = 0.169, β = 0.164 & β = 0.126).

DISCUSSION

The present study shows that various demographic, social and psychological factors such as age, weight, child responsibility, income status, work experience, general mood problems due to life's stressors and other accompanying health conditions contribute to emotional discomfort during the premenstrual phase. This in turn increases the negative psychological processes, changes in behavioural patterns such as food habits and sleep disturbances, as well as recurrent premenstrual symptoms every cycle. The findings of the study also showed that perception of being a woman is one of the predictors of emotional discomfort. Our bodies respond to our inner thoughts, beliefs and emotions and other possible external factors that was developed since childhood like family and cultural expectations imposed on the girl child, women's role in the society, etc. The research studies conducted by Panahi & Faramarzi (2016) revealed that psychosocial factors predict the stress, and it is the most common trigger of premenstrual symptoms along with anxiety and depressive thoughts, which aggravates it. The study also mentioned that mindfulness-based cognitive therapy can be utilized to simply observe one's thoughts, feelings and experiences in order to detach from automatic and dysfunctional reactivity allowing to work with oneself and cultivate and more balanced relationships. Other studies mention that women's premenstrual distress is linked to feminine constructions based on culture, idealised femininity and other relational issues, where this distress is considered as dysfunctional pathologic conditions resulting in self-objectification. A shift in this positioning through facilitation of self-care, acknowledging bodily changes across the menstrual cycle and association of feelings about the 'self' can produce significant effect on women's experience of premenstrual distress (Ussher, 2008; Ussher & Perz, 2020; Ryan et al., 2022). Findings of the present study also shows that general dream patterns at night is associated with the premenstrual emotional disturbances. Research studies have also analysed the effect of menstrual cycle on dreams, mood and sleep quality, which is associated with hormonal variations. Moreover, dreams had highest levels of incongruity with positive emotions during the pre-ovulatory phase of the cycle and during the premenstrual phase dreams were longer and had negative emotions. (Natale, Albertazzi & Cangini, 2010). Women's dreams were characterized by emotions and dream reports contained statistical markers connected to dreamers' real-life experiences. (Fogli, Maria Aiello & Quercia, 2020). Other studies suggested that PMS is associated with alterations in emotion regulation both at explicit and implicit levels and should focus more on cognitive-emotional approach and its relation to biological changes (Eggert et al., 2016). Moreover, Abay & Kaplan (2019) mentioned that management of PMS is done by integrative approach based on the individual such as creating awareness, self-screening, lifestyle and diet modifications, stress coping strategies, pharmacological and other alternative therapies.

Based on the above findings, it is established that there are significant contributors associated with socio-demographic, health, premenstrual and psychosocial variables that impact emotional

discomfort during the luteal phase of the menstrual cycle. Hence, the null hypothesis H_0 is rejected and alternative hypothesis H_A has been accepted. Since well-being encompasses holistic health condition including physical, psychological, social and cultural dimensions, wherein the emotional aspects play a major role in managing thoughts and feelings, maintaining relationships and functioning effectively in the society. Hence, psychosocial well-being needs to be addressed conscientiously to improve self-efficacy, manage role conflict and reduce work-life imbalances.

SUMMARY, IMPLICATIONS & CONCLUSION

The findings of the study clearly imply that negative psychological patterns during the luteal phase of the menstrual cycle significantly impacts the quality of life of women academicians. The emotional disturbances have periodically affected work-life aspects to a larger extent in accordance with the premenstrual symptoms. Hence, this needs to be addressed conscientiously focusing on the psychosocial perspective for overall well-being of women. The limitation of this study is that it included samples only from arts and science colleges. Therefore, it is suggested that the future researchers shall include samples from various government and private academic institutions for a better understanding and comparison of results. Also, add few self-intervention techniques to support women workforces to become aware of their stressors and trigger events which are responsible for emotional disturbances especially during the luteal phase. Keeping in view the phenomenal contributions of academic women in shaping the future generations, the policy makers and other governmental and institutional bodies should include orientation and awareness programs and implementation of support groups emphasizing the importance of psychological well-being as their contribution is indispensable for societal development.

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21
A STUDY ON COLOUR SCHEME IN INTERIORS OF VARIOUS RESIDENTIAL SPACES

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ABSTRACT

This study on color scheme in interiors of various residential spaces has been conducted to find out the reason and factors considered in choosing colors for their interiors. It is also used to reveal the impact of colors in the moods of the respondents and the level of satisfaction in the color scheme of the interiors. The methodology of the study comprises of hundred samples who own their house were selected for the study using purposive sampling method. The details pertaining towards demographic profile, residential building, color used in interiors factors and reason for choosing colors, mood created by color in interior and the level of satisfaction of the respondents were obtained using structured questionnaire and the data collected were analyzed using frequency distribution. It is concluded from the study that the majority of the respondents were aware of the color schemes however they choose colors for their interiors based on their personal likes and dislikes and satisfied with the color schemes creating majority positive moods to the residents.

Keywords – Color Psychology, Color scheme, Moods of color.

INTRODUCTION

Color is one of the most important elements of an interior, and the way to inject one's own personality into their living space (Templer, 2009). Color in general have greater impact in home interiors. It reflects our personality, lifestyles, travels and interests. They set the scene for an atmosphere of relaxation or stimulation, for quiet contemplation or family get-together and parties (Cohen, 2007). Color is a powerful communication tool and can be used to signal action, influence mood, and even influence physiological reactions. Certain colors have been associated with physiological changes, including increased blood pressure, increased metabolism, and eyestrain (Cherry, 2024). We can able to create a mood, attract attention of the viewers, make energetic or cool down the people with the effective use of colors. The application of right color scheme to interiors, will create an ambiance of elegance, warmth or tranquility, or youthfulness. Color is a most powerful design element that affect an individual both mentally and physically if used effectively. Using colors consciously and harmoniously will help to create spectacular results. Recently, colors are being used in mental health wellness in the name of chromotherapy or color healing in which colors and their frequencies have a physical and psychological impact on the feelings and behavior of people exposed to it. For example, people are treated with cool colors to reduce their anger and heart rate whereas warm colors are used to increase the energy levels of depressed people. In this,

fast moving society people are not getting enough time to take care of themselves. This study on color schemes is done to strongly recommend the proper usage of colors in the interiors of both residence and work area which in turn will help the people work more efficiently with good sound health.

Hence the study – aims to know the important of colors used in various residential space and mood created by color and thus creating awareness on color schemes among the respondents.

OBJECTIVES OF THE STUDY

- To assess the knowledge of the respondents on various color scheme in interior space.
- To analyze the impact of color scheme on the mood and emotion of the respondents.
- To find out the level of satisfaction of the color scheme among selected respondents.

METHODOLOGY OF THE STUDY

Research Design

For the present study, Ex-post facto research design is used. "The main characteristic of this method is that the researcher has no control over the variables, he/she can only report what has happened or what is happening. It also includes attempts by researchers to discover causes even when they cannot control the variables" (Kothari, 2004). The present study reports the prevailing scenario of what knowledge the respondents already possess in choosing colors and its impact on them. There is no any control group in use of colors.

Sampling Design:

For the present study, purposive sampling method was adopted. "In this type of sampling, items for the sample are selected deliberately by the researcher, his/her choice concerning the items remains supreme. The researcher purposively choose the particular units of the universe for constituting a sample" (Kothari, 2004). People residing in own house of Chennai city alone were purposively selected for the study, as the color scheme will be chosen by them as they are going to be the prime users, which in turn helps to analyze their knowledge on colors. People residing in rental / lease home were excluded as the color decision is not made by them.

Sample Size:

Hundred residential building in Chennai city were chosen for this study and the details are obtained through the owners of the selected residential building. The data has been collected only after getting the willingness to participate in the survey. The respondents were also given orientation regarding the impact of color over their moods and wellness and how to use it effectively in each and every area of interiors.

Tools Used for the Study:

The structured questionnaire pertaining information regarding Demographic profile, Details of the resident, Selection factors of color, Details of colors used in various room like living room, bedroom, kitchen, and washroom, Reason for the selection of color, Moods created by colors in various rooms and Level of satisfaction of colors used in various room. The data has been collected through distribution of questionnaire in hardcopy. The respondents were requested to complete the entire questions without omitting anything. The questions were explained to the respondents in person to reduce the errors.

Analysis of Data:

The analysis of data is made using frequency distribution.

RESULTS AND DISCUSSION

Table 1 Details of Housing

Details of House		**Percentage (N=100)**
Type of House	Apartment/ Flat	41.0
	Individual Villa	59.0
Location of Area	Urban	72.0
	Sub-Urban	23.0
	Rural	5.0
No. of Rooms	1 RK	2.0
	1 BHK	23.0
	2 BHK	45.0
	3 BHK	23.0
	More than 3 BHK	7.0
Possess same Colors for all Rooms	Yes	37.0
	No	63.0
Aware of color Scheme	Yes	61.0
	No	39.0

It is clear from the above table that greater majority (59 percent) of the selected respondents were residing in Individual villa and (41 percent) were residing in Apartment/Flats. Greater majority (72 percent) for residences were located in Urban area with few residences from Sub-urban and Rural areas with (23 percent and 5 percent) respectively. Majority (45 percent) were 2 BHK houses. It is also noted from the study that majority (63 percent) do not possess same color for all the rooms and selected color schemes for each room as majority (61 percent) were aware of color schemes.

Table 2 Details on Factors considered in choosing colors for the Interiors of the selected respondents

Factors	Percentage (N=100) *
Personal likes	60
Cost	24
Theme	39
Family choice	54
Suggestion from color consultant	14

*Indicates data exceeds 100 because of multiple responses

It is noted from the results that majority (60 percent) of the respondents consider their personal likes and preferences as major criteria in choosing colors for the interiors, followed by majority (54 percent) consider family choice. About (39 percent) consider theme whereas about (24 percent) consider cost. Only (14 percent) consider suggestion from color consultants while choosing colors for their interiors.

TABLE 3 Reason for Selecting the Color*

Reason for Selecting the Color*	Living	Bedroom	Kitchen	Washroom	Total
Attractive	52	18	17	7	23.5
Elegance	25	32	20	11	22
Style of the room	15	30	19	8	18
Economical	16	13	16	11	14
Trend	11	20	17	6	13.5
Personal likes	34	40	36	23	33.25
Vastu reason	10	11	12	8	10.25
Builder’s choice	9	8	4	4	6.25
Availability	9	8	7	7	7.75

*Indicates data exceeds 100 because of multiple responses

It is clear from the table that majority (33.25 percent) of the respondents reported that their personal likes and dislike as the major reason for selecting colors in the interiors, followed by an at most equal majority (23.5 percent) and (22 percent) stated attractive and elegance as their reason respectively. It is also clear that the least majority (6.25 percent) of the respondents stated that the colors used in the interior was builder’s choice.

Table 4 Moods Created by Colors*

Moods*		Living	Bedroom	Kitchen	Washroom
Positive moods	Happy & cheerful	55	19	21	12
	Pleasant &peaceful	37	41	24	24
	Energetic	17	10	40	6
	Calm & Relaxed	16	32	18	26
	Romantic & Dreamy	9	34	9	4
Negative moods	Angry	3	9	5	-
	Discomfort	6	6	3	3
	Disturbing	2	7	6	2
	Sleepy	5	15	17	3
	Fear	5	4	6	3

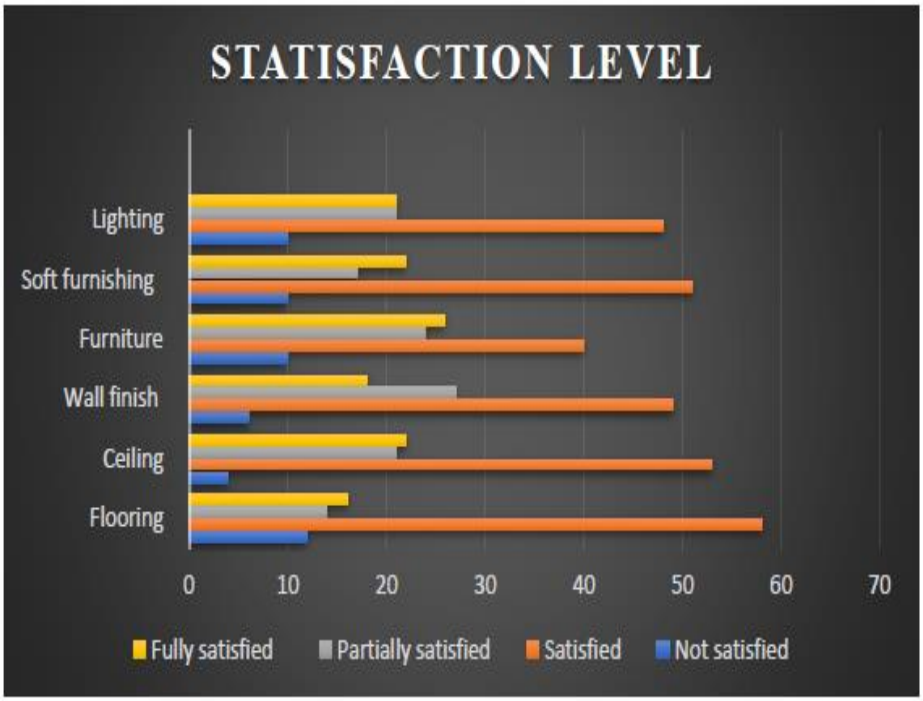
*Indicates data exceeds 100 because of multiple responses

It is evident from the table that the highest majority (55 percent) reported happy and cheerful in the Livingroom, followed by (41 percent) pleasant and peaceful in bedroom. About (40 percent) stated energetic in kitchen and (26 percent) stated calm and relaxed in their washroom as the mood created by colors of their interiors. It is also clear that only negligible percentage of respondents reported negative moods such as angry, discomfort, disturbing, sleepy and fear in their interiors.

TABLE 5 Level of Satisfaction of the Selected Respondents on the colors used in their Interiors

Areas in Interiors	Not Satisfied	Satisfied	Partially Satisfied	Fully Satisfied
Flooring	12.0	58.0	14.0	16.0
Ceiling	4.0	53.0	21.0	22.0
Wall finish	6.0	49.0	27.0	18.0
Furniture	10.0	40.0	24.0	26.0
Soft furnishing	10.0	51.0	17.0	22.0
Lighting	10.0	48.0	21.0	21.0
Total	8.6	49.8	20.6	20.8

It is clear from the table that the higher majority (49.8 percent) stated that the color used in the various area of their interiors such as flooring, ceiling, wall, furniture, furnishing and lighting were satisfied followed by an equal majority, (20.6 percent) and (20.8 percent) were partially and fully satisfied respectively. However, about (8.6 percent) reported that they were not satisfied with the colors used in their interiors.



SUMMARY & CONCLUSION

Majority of the respondents were aware of color schemes and they used different colors for various rooms in their interior, based on their personal likes and dislikes.

Regarding the colors used in various rooms, it is concluded that majority of the respondents preferred plain finishes with neutral color for their flooring, ceiling and wall finishes of the living room, bedroom, kitchen and washroom regarding furnishing material and lighting, it is noted that majority of the respondents preferred both plain and patterned finishes neutral color for the furniture upholstery, curtains, carpet and lighting.

It is also clear that majority of the respondents stated personal likes and dislikes as major response for choosing colours in their interior and also reported that they feel happy and cheerful in living room, pleasant and peaceful in bedroom, energetic in kitchen and calm and relaxed in washroom. It is noted that majority of the respondents were satisfied with the colour used in their interior.

The results should that majority of the respondents were aware of color schemes and its moods. However, respondents tend to prefer colors what they like most for their interiors. The prolonged exposure to particular color and its impact on physical and mental health has been explained to the respondents and suggested them to use colors based on the functionality of the area and personality of the users, which helps them to work more comfortably and efficiently.

In 2020 study conducted by (Janouskaite, et al,. 2020) that surveyed the emotional associations of 4,598 people from 30 different countries found that people commonly associate certain colors with specific emotions. According to the study results:

- Black: 51% of respondents associated black with sadness
- White: 43% of people associated white with relief
- Red: 68% associated red with love

- Blue: 35% linked blue to feelings of relief
- Green: 39% linked green to contentment
- Yellow: 52% felt that yellow means joy
- Purple: 25% reported they associated purple with pleasure
- Brown: 36% linked brown to disgust
- Orange: 44% associated orange with joy
- Pink: 50% linked pink with love

The study's researchers suggested that such results indicated that color-emotion associations appear to have universal qualities. These shared meanings may play an essential role in aiding communication.

FURTHER STUDY

It would be more helpful to study the comfort and work performance of people relating to the color scheme of interiors in work station.

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THE ROLE OF RHINOCEROS BEETLE LARVAE IN HANDLING OF KITCHEN ORGANIC WASTE

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HSAI-2022-TN-1187-LF [1], 93/T.5/LF[2]

ABSTRACT

Urbanization and public lifestyle changes are the leading cause of solid waste generation. Increasing solid waste generation and improper solid waste disposal practices affect environmental health as well as human health. In India, the fraction of organic waste, such as vegetable and fruit waste, is higher than a non-biodegradable fraction. As a result, finding a secure means of discarding organic waste is of paramount importance. The goal of the current study was to determine how rhinoceros beetle larvae affected the decomposition of organic waste. Two different treatments with three replications were carried out. The treatments were as follows: T1 – Rhinoceros beetle larvae, T2 – control. Physical and chemical parameters such as Moisture, pH, Electrical conductivity (EC), C:N ratio, Total organic carbon, and NPK were analyzed. From the obtained results, it was clear that the rate of decomposition process of T1 – Rhinoceros beetle larvae was fast compared to T2-control. T1-The sample treated with Rhinoceros beetle larvae attained the physical parameters such as volume reduction, earthy odour, brown colour, and reduction in particle size within two months. The study concluded that the best C/N ratio was in the T 1 - (Rhinoceros beetle larvae), which was 11:1. The Rhinoceros beetle larvae can be used as a volume and particle size reducer in composting organic waste. Before transforming into bees that assault coconut trees, these larvae can be used as poultry feed, and it does not require an extensive or costly composting system.

Keywords: Composting, Decomposition process, Kitchen organic waste, Rhinoceros beetle Larvae

INTRODUCTION

The environment, as well as the social and professional lives of city dwellers and urban planners, is negatively impacted by the rising rate of solid garbage. The first step to managing waste and preserving resources is to treat garbage as a resource. (Ara et al., 2021).

Due to the rising production of municipal solid waste (MSW), the difficulty of allocating and managing the higher cost for MSW within the municipal budget, the lack of scientific understanding of technicalities associated with different stages of managing MSW, and the level of

public support necessary to enable an environment conducive to solving MSW management issues, solid waste management in an urban context has become a significant challenge for local authorities in developing countries. (Saja et al., 2021).

Tot et al., (2012) opines composting as one method for handling municipal solid waste; it is a biological process in which the organic component of garbage is allowed to decay. The practice of composting lessens the likelihood of disposal and combustion of solid waste. Organic waste can make up anywhere between 20% and 80% of the overall municipal solid waste stream, depending on the level of development of the nation. As a result, composting is a useful biological process that can be utilized to reduce the amount and weight of organic waste while simultaneously transforming it into a useful product (compost) for soil improvement and crop growth.

There are several ways to compost, including in-vessel composting, vermicomposting, aerated windrow composting, and aerated static pile composting. There are numerous composting enhancers on the market, which speeds up the breakdown process. Rhinoceros beetle larvae (RBL) is one which was employed in this study to speed up the degrading procedure, much like vermicompost.

One of the principal insect pests of coconut and oil palm, rhinoceros beetles, are drawn to vermicomposting sites by the odor they create. The species' females are attracted to vermicomposting sites more than the males, and they lay their eggs there. According to Gopal et al. (2006), this indicates that the grubs prepare the decomposed organic waste upon hatching for use as nourishment for their development.

The study aimed to determine the effect of Rhinoceros beetle larvae in decomposing kitchen organic waste.

JUSTIFICATION

Estimates suggest that more than half of the municipal solid waste produced by the metropolitan areas of Indian cities might be converted into compost. We are in a position to identify the quickest volume or particle reduction facilitator since organic matter is produced every day. Composting should be accomplished using a cheap manner without the need for expensive machinery. In this study we have used rhinoceros beetle larvae to break down kitchen garbage, which is conveniently available in farmer's fields, in a process similar to vermicomposting.

OBJECTIVES

- To determine the effect of Rhinoceros beetle larvae in decomposing kitchen organic waste
- Comparing the obtained physical and chemical parameters of treatments with standard values recommended by FCO.

MATERIALS AND METHODS

Kitchen organic waste, which includes vegetable and fruit waste, was collected from the selected houses. Then the collected waste was mixed with brown waste, such as dried leaves, which helps to promote the decomposition process.36 kilograms of kitchen organic waste and 24 kilograms of brown waste made up the total amount of collected waste. The kitchen organic waste and brown waste were mixed in a ratio of 60:40. Then, the mixed waste was air dried under the shade net for ten days. During these days, water was sprinkled over the prepared waste and thoroughly mixed to maintain the moisture content. Plastic containers with holes beneath the container were used, and the container was covered with a green net to facilitate aeration. The aerobic composting method was followed. The mixed waste was weighed equally and transferred into plastic containers for two treatments. Each treatment with three replications was carried out to finalize the effect of Rhinoceros beetle larvae in the decomposition process. The treatments were followed as given below.

Treatment 1 – Rhinoceros beetle larvae

Treatment 2 – Control

Figure 1: Treatments with three replications and Rhinoceros beetle larvae

The larvae of rhinoceros beetle were used in T 1 while the other stages of the Rhinoceros, which are pupae and adults, were discarded. The larvae were collected from the composting yard of a farmer's field. Twenty-four larvae were collected and applied in Treatment 1. Treatment 2 - Control was conducted without adding any composting enhancers. Before adding the mixer to the containers, the raw materials C:N ratio and moisture content were analyzed. During the process, the material was remoistened to maintain 40 - 60 % moisture content in order to maintain ideal moisture content. The prepared material was turned on weekly once for aeration. Parameters such as C:N ratio, Ph, and EC were analyzed once every 15 days. Once when the compost reached its optimal range of C:N ratio, which confirms compost maturity level along with its physical parameters such as reduction in size, dark brown colour, earthy odour, and particle size, the sample of the compost was sent to the laboratory to find out other nutrient content. The research was conducted using randomized block design (RBD). Each treatment was done with three replications. Observation and parameters were carried out from April 2023 to May 2023. The collection of brown waste, Larvae and the place of the experiment was conducted at Pasumai Nursery, Kanuvai.

Coimbatore, Tamil Nadu. Sample tests were carried out at Tamil Nadu Agriculture University, Coimbatore.

RESULTS AND DISCUSSIONS

Table 1 represents the initial C:N ratio and moisture content of the mixed waste.

Table 1: Initial C:N ratio and moisture content of the samples

Samples	C:N ratio	Moisture content
Mixed waste	32:1	51.7%

The carbon-to-nitrogen ratio of the mixed waste obtained was 32:1. The initial carbon-to-nitrogen ratio of between 25 and 30 is recommended by Kumar et al. (2010) as the ideal range for composting. In a similar vein, the ideal C:N ratio for raw vegetable waste materials is between 25:1 and 30:1, while ratios between 20:1 and 40:1 are also acceptable (www.fao.org). However, the optimal range is closer to 25:1 than it is to 30:1. After a drying process which lasted for ten days, the sample's moisture content was found to be 46%, down from 51.7% when it was first received. Throughout the course of the trial, the amount of moisture was kept within the range specified by FCO guidelines (FCO, 2019), which was between 40 and 60 percent.

During the decomposition period, samples were analyzed every 15 days for pH, EC, and C:N ratio, as detailed in Tables 2 and 3.

Table 2: Analyses of particular chemical parameters during the process of decomposition (Values are the mean of three replications)

S.No	Treatments	15th day		30th day		45th day		60th day	
		pH	EC	pH	EC	pH	EC	pH	EC
1	T 1 – Rhinoceros beetle larvae	7.2	0.92	7.0	1.88	7.0	2.03	7.6	1.64
2	T 2 – control	8.5	1.24	7.0	1.81	7.1	1.80	7.4	1.83

According to the findings, both T1 and T2 had pH and EC values within the acceptable range of 6.5 to 7.5. This was the case for both samples. The initial pH of T2 was greater than what is considered acceptable by FCO. However, by the time we finished with the treatment, the pH of T2 had also reached the levels that were specified. The acceptable level of EC required in compost should be lower than 4.0 dsm-1. The obtained EC values of T1 and T2 were within the excellent range recommended by FCO.

The ratio of carbon to nitrogen that was determined to be present in each of the sample during the process of composting kitchen waste is presented in Table 3.

Table 3: C: N Ratio of the samples (Values are the means of three replications)

S.No	Treatments	15th day	30th day	45th day	60th day
1	T 1 – Rhinoceros beetle larvae	26:1	23:1	18:1	11:1
2	T 2 – control	30:1	27:1	30:1	29:1

The data that were obtained for the C:N ratio make it abundantly evident that the T1-RBL (45th day 18:1 and 60th day 11:1) was successful in reaching its optimal ranges as indicated by the FCO guidelines; however, the T2 –Control (60th – 29:1) did not succeed in reaching its optimal ranges even on the 60th day also. Jalalipour et al. (2020) agreed with the statement that the C/N ratio is mostly employed as a stability index, with a range for a final finished product of 15 to 20.

T1 – RBL achieved its physical characteristics, including colour, odour, volume reduction, and particle size, earlier than T2 – control, as indicated in Table 4. Following the measurement of the C:N ratio, the samples were sent for investigation of selected physical and chemical parameters; the findings of these analyses are presented in Tables 4 and 5, respectively.

Table 4: Selected physical parameters of the samples (Values are the means of three replications)

S.No	Test parameters	Requirements as per FCO standard	Treatments	
			T 1 – RBL	T 2 – control
1	Colour	Dark brown to Black	Brown to Black	Brown
2	Odour	Absence of foul odour	Absence of foul odour	Absence of foul odour
3	Particle size	Min 90% material should pass through 4.0mm IS Sieve	Complies	8.0mm
4	Volume reduction (kg)	-	3.620kg	1.950kg

As can be seen from Table 4, T1-RBL has achieved the optimal ranges of the selected physical parameters recommended by the FCO standard (which was discussed earlier). During the decomposition process, there was a total volume reduction of 3.620 kg in the T1–RBL group and 1.950 kg in the T2-Control group. A similar finding was made by Materechera and Mkhabela (2002), who concluded that rhinoceros larvae may play an essential role in modifying the aggregation of dung. Suppose if it is possible that the larvae could be employed to hasten the process of building up compost piles. After the larvae have been spread, the fertilizer will break down into smaller pieces that are more equally dispersed, which will make it simpler to apply the fertilizer to the plants. If the compost is combined with other components, such as soil or sand, it may become a wonderful garden planting medium.

Figure 2: The difference in volume reduction T 1 –RBL and T2 - Control

Table 5: Selected chemical parameters of the samples (Values are the means of three replications)

S.No	Test parameters	Requirements as per FCO standard	Treatments	
			T 1 – RBL	T 2 – control
1	Ph	6.5 -7.5	7.4	7.2
2	EC (dsm^{-1})	Not more than 4.0	1.54	1.88
3	C:N ratio	20 or less than 20	11:1	29:1
4	Total organic carbon (%)	16.0	13.0	7.0
5	Total Nitrogen as N (%)	Minimum 0.5	0.82	0.75
6	Total Phosphorus as P (%)	Minimum 0.5	0.32	0.30
7	Potassium as K (%)	Minimum 1.0	0.58	0.50

According to Table 5, the pH, EC, and C:N ratios of T1 – RBL were all within the required ranges. On the other hand, the total organic carbon (13.1%) was slightly below what the FCO recommends for its ranges. The three macronutrients that have the most significant influence on the development of plants are nitrogen (N), potassium (K), and phosphorus (P). Only two of the regimens, T1 RBL and T2 Control, achieved the optimal levels of total nitrogen indicated by the FCO. T1 RBL achieved 0.82 percent, and T2 Control achieved 0.75 percent. As can be seen in Table 5, the total phosphorus and potassium concentrations of either treatment did not reach the ideal limits for their respective values, and we could only find trace amounts of both elements.

CONCLUSION

Using Rhinoceros beetle larvae in composting operations encourages the breakdown of home organic waste through composting. These larvae will help to accelerate the process of decomposition by lowering the size of the particulate matter. After the decomposition process, it can be used as poultry feed. According to the research, rhinoceros beetle larvae have the potential to both accelerate the decomposition process and lower the size of particulate matter. It works very

quickly to reduce both the particle size and the volume. Composting facilities that are neither huge nor expensive are not required. In sample T 1 (Rhinoceros beetle larvae), the ideal carbon to nitrogen ratio was 11:1.

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EFFECT OF SICK BUILDING SYNDROME ON THE HEALTH OF UTTARKASHI DISTRICT RESIDENTS OF UTTARAKHAND

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ABSTRACT

The study investigates the effect of the built environment on the health of residents. In general, we are ignorant about the ill effects of the built environment on our health. If a building is not maintained in a certain way, then it is termed a "sick building" and its effect on the health of residents is called Sick Building Syndrome (SBS). A total of 120 families were selected from the study area which has a population of 627 in number. Again, to see the relationship between income and SBS total families were divided into three categories Low Income Group (LIG), Middle Income Group (MIG), and High-Income Group (HIG). There are many symptoms but sick building syndrome symptoms which were persistent among residents under the study, across all income groups, were itchy or watery eyes, blocked or stuffed nose, running nose, cold, lethargy or tiredness, dry, itchy or irritated skin, shortness of breath on mild exertion and humidifier fever. Chemical and biological contaminants, inadequate HVAC (Heating, Ventilation, and Air Conditioning) systems, outdated structures, inadequate and inappropriate lighting combined with lack of sunlight, psychological factors, and electromagnetic radiation are some of the factors that may contribute to sick building syndrome. It was found that children and elderly were more affected by the sick building syndrome symptoms.

Keywords— Sick building syndrome, Building related illness, HVAC system

INTRODUCTION

Have you ever been to a place where by entering you feel suffocated, gloomy, lethargic, and irritated? It didn't just happen. It happened because of the way the building was built and maintained. You felt the effect of sick building. Sick Building Syndrome (SBS) is the term for the health impacts that a building has on its occupants when they spend a considerable amount of time there. Sick building syndrome symptoms and indicators include headache, nausea, dizziness, dry cough, irritation of the eyes, nose, or throat, dry cough, dry or itchy skin, fatigue, sensitivity to smells, hoarse voice, allergies, cold, flu-like symptoms, increased incidence of asthma attacks, and personality changes. It increases absenteeism and lowers workplace productivity. Sick Building Syndrome is followed by Building Related Illness. Cough, chest pain, shortness of breath with

light effort, oedema, nosebleeds, cancer, pregnancy issues, and miscarriages are signs and symptoms of Building Related Illness (BRI). There are instances of extrinsic allergies, alveolitis, legionnaire's disease, humidifier fever, pneumonia, and occupational asthma. According to researchers, "Building Related Illness" is not the same as "Sick Building Syndrome". The distinction in BRI, according to the Environmental Protection Agency (1991), is when symptoms of a diagnosable illness have been found and can be directly linked to airborne building pollutants. One example of this would be legionnaire's disease.

LITERATURE REVIEW

Researchers **Colligan and Murphy (1982), Olkinuora (1984), and Boxer (1985)** found that environmental events such as an unpleasant odour can start contagion and convergence processes. Residents who are unable to pinpoint the exact cause of their symptoms frequently blame unseen agents like "mystery bugs" or visible environmental changes like installing a new carpet. In addition to headache, nausea, weakness, dizziness, sleepiness, hyperventilation, fainting, and vomiting, other symptoms of Multiple Psychogenic Illness (MPI) can include skin diseases and burning sensations in the eyes and throat.

William et al (1997) demonstrated links between dampness and asthma in his study. Patients aged 5 to 44 with diagnosed asthma and matched controls were recruited. A modified version of the Martin questionnaire was used; lung function and an asthma severity score calculated; and dampness assessed independently. The study demonstrated that asthmatic patients were two to three times more likely to live in a damp home and there were suggestions of a dose response relationship with asthma severity.

Yang et al (1998) said that 4164 children in rural Taiwan, China, showed that 12.2percent parents or guardians considered their dwelling to be damp, 30.1percent reported the instances of visible mould inside the housing, 43.4percent reported the appearance of standing water, water damage or leaks, and 60percent repeated at least one of the occurrences.

Jagannathan Mohan (2012) conducted research on the topic "impact of Indoor Environment Quality (IEQ) on sick Building Syndrome in LEED INDIA (***Leadership in Energy and Environmental Design***) Certified Buildings. Building occupants experienced Sick Building Syndrome symptoms that occurred "often" or "sometimes". The main symptoms prevailing was tiredness/lethargy (54.1percent, 48.8percent and31.7percent for silver, gold and platinum LEED certified buildings) and headaches (43.2percent, 48.9percent and 56.1percent for silver, gold and platinum LEED certified buildings) respectively. Secondly there was no gender bias for either the SBS score or the percentage of SBS symptoms.

JUSTIFICATION OF THE STUDY

One of India's most susceptible states is Uttarakhand. It is facing issues such as migration, unemployment, natural calamities (floods, landslides, earthquakes, etc.), human-animal conflict, and the collapse of hill's farming system. The hilly region of Uttarakhand mostly faces all these issues. Due to the collapse of the agricultural farming system and the lack of basic infrastructure and amenities available to the remote villages of the hilly region, there is rampant migration of people towards low-lying sub-areas or small towns for better facilities. This has resulted in the

problem of overcrowding of small towns such as Uttarkashi District, the study area of the present study. Overcrowding leads to the compromise of housing standards and building by-laws which has resulted in inadequate housing space and poor HVAC (Heating, Ventilation, and Air Conditioning) systems of buildings. As a result, Sick Building Syndrome develops.

OBJECTIVES

1. To study Demographic profile of households in Uttarkashi District of Uttarakhand.

2. To find out Prevalence of Sick Building Syndrome and impact on residents of different income.

LIMITATION

Only one district of Uttarakhand selected.

METHODOLOGY

Sample:

The study region for present investigation was selected using the purposeful sampling technique. Uttarkashi district of Uttarakhand has religious importance in Indian culture because the two shrines Gangotri and Yamunotri come under its jurisdiction. There were 120 families in the Bhatwari block altogether in the sample. These households were purposefully selected for convenience from three of the block's provinces: Joshiyara, Gyansu, and Barahaat. After the number of families in each town was determined, 5% of the total number of families in each research region were chosen at random using chits from the sample until the intended sample size of 120 was reached. Again, to see the relationship between income and sick building syndrome symptoms present in residents, the whole sample was divided into three different income groups; Low Income, Middle Income, and High-Income Group. 43 houses belonged to Low Income Group (LIG) and Middle-Income Group (MIG) each and the remaining 34 belonged to High Income Group (HIG). The total population of the sample was 627 people. 224 people belong to LIG, 207 belong to MIG and 196 belong to HIG income groups. Out of which 316 were children, 243 were adults, and 68 were elderly.

Materials used/Tools of the study:

An interview schedule was developed to know about the prevalence of sick building syndrome symptoms among residents across the all-income group. For assessing the face and content validity of the schedule, it was sent to 3 different professors from Family Resource Management department of College of Home Science, G.B. Pant University of Agriculture and Technology for their feedback.

Procedure:

Data was collected in two phases phase I and phase II. Phase I consisted of observation of the condition of the houses of the selected family members with the help of observation sheet. Phase II included face to face interview of the family members after developing a good rapport with people. Purpose of the study was thoroughly explained to the people so that they feel easiness to answering the questions.

RESULTS AND DISCUSSION

Demographic profile of the households

1. Household size

Household size was divided into four categories i.e. household with 3 members and below, 4 to 6 members, 7 to 9 members and more than 9 members. It was revealed that on the whole, majority of the respondents i.e. about 56 percent had family members 4 to 6 while only 10.83 percent respondents were having family members more than 9.

In Low Income Group, most of the respondents had family members with 4 to 6 and only about 12 percent respondents' families were having more than 9 members. Whereas in Middle Income Group maximum i.e. about 52 percent respondents had family members with 4 to 6 and only 2.5 percent respondents were having families more than 9 members. In High income group majority of the respondents i.e. about 53 percent had family members 4 to 6 while only 14.70 percent respondents were having families with more than 9 members. As a result, there were four to six family members in each group.

Table1. Demographic profile of households

S.N.	Characteristics	LIG n=43	MIG n=43	HIG n=34	TOTAL N=120
1.	**Houses hold size**				
	a. Up to 3 members	8(18.60)	11(25.58)	7(20.58)	26(21.66)
	b. 4-6 members	23(53.48)	22(51.16)	18(52.94)	63((52.5)
	c. 7-9 members	7(16.27)	7(16.27)	4(11.76)	18((15.0)
	d. More than 9 members	5(11.62)	3(2.5)	5(14.70)	13(10.83)
2.	**Composition of household**				
	a. Children (0-20 years)	103 (45.98)	108(52.17)	95(48.46)	316(50.39)
	b. Adult (21-55 years)	95(42.41)	80(38.64)	78(39.79)	243(38.75)
	c. Old age (above 55 years)	26(11.60)	19(9.17)	23(11.73)	68(10.84)
	d. Total	**224(35.72)**	**207(33.01)**	**196(31.25)**	**627**
3.	**Sources of household income**				
	a. Agriculture				
	b. Domesticating animals	6(13.95)	4(9.30)	2(5.88)	12(10.0)
	c. Poultry	3(6.97)	2(4.65)	-	5(4.16)
	d. Daily Wages	-	-	-	-
	e. Private	16(37.20)	5(11.62)	3(8.82)	24(20.0)

	f. Government Services	2(4.65)	12(27.90)	10(29.41)	24(24.0)
	g. Combination of above	5(11.62)	16(37.20)	15(44.11)	36(30.0)
		11(25.58)	4(9.30)	4(11.760	19(15.83)

*Figures in parentheses represent percentage

2. Composition of famiy

Composition of family was categorized into three categories i.e. Children (0-20 years), adult (21-55 years), old age (above 55). Data in **Table 1** revealed that total population of all families was 627 out of which maximum i.e. about 51 percent population were children, 38.75 percent were adult and only 10.84 percent were old age.

From the **table 1** this can be analysed that all different income groups followed same trend with maximum population of children and minimum population of old age. Hence all different income groups comprised maximum population of children.

3. Sources of family income

Sources of family income were divided into seven categories i.e. agriculture, domesticating animals, poultry, daily wages, private services, government services and combination of more than one services. Data in **Table 1** revealed that on the whole, most of the respondents i.e. 30 percent possessed private services whereas only about 4 percent possessed domesticating animal as their source of income.

Among all income groups, maximum i.e. about 38 percent possessed daily wages among Low Income Group, while large number of the respondents i.e. 37.20 percent possessed government in Middle Income Group. In High Income Group most of the respondent's i.e. about 45 percent respondents were engaged in government services. Data revealed that majority of the respondents of Low-Income Group possessed daily wages but in Middle Income Group and High-Income Group it was government job.

Prevalence of Sick Building Syndrome symptoms among all residents

The data on sick building syndrome symptoms revealed that overall, most persistent symptoms among people under study were itchy or watery eyes, blocked/ stuff nose, running nose, cold, lethargy or tiredness, dry, itchy or irritated skin, shortness of breath on mild exertion and humidifier fever. Results showed that overall maximum i.e. about 16 percent population was suffering from difficulty in concentration. **(Fig. 1 a)** These were those people who were having their houses close to national high highway and in congested locality. After that most of the residents i.e. about 15 percent reported fatigue, again 15 percent watery or itchy eyes while minimum about percent population one percent population reported dizziness. In the year of **2004, David Straus** also conducted a 22-month in-depth study of 48 schools that had reported concerns about health and indoor air quality to the quality of indoor air of the company with which the university researchers are affiliated. The researchers disseminated a questionnaire to the staff of the school and found that about 30 percent of all staff reported symptoms or complaints, most commonly nasal drainage, congestion, and itchy, watery eyes. This was reported due to poor indoor quality while in present study sick building symptoms persisted due to poor designing and faulty construction **(example shown with picture 3a. & 3b.),** poor decision about site selection **(example shown with picture 3c. & 3d.)** and zero or nil involvement of construction expertise in housing construction.

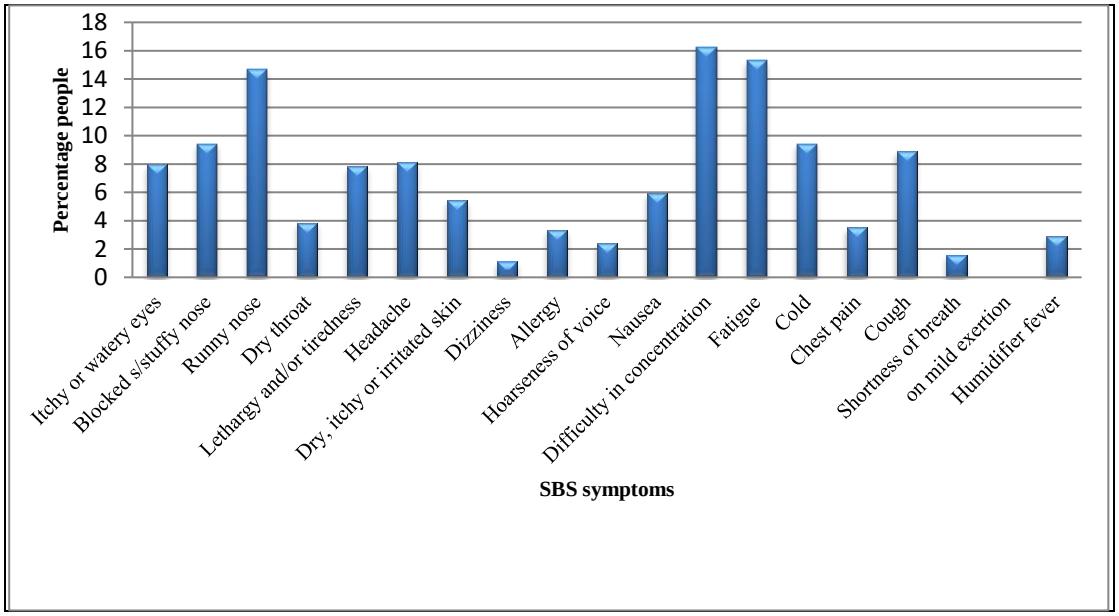

Fig. 1.a Sick building symptoms among total residents

3a. House with too low ceiling

3b. House with triangular configuration

3c. Houses near landslide prone area

3d. Houses near river catchment in study area

Prevalence of Sick Building Syndrome symptoms among residents of Low-Income Group:

Out of total Low-Income Group population maximum about 26 percent residents were suffering from sick building symptoms cold followed by 25 percent population from running nose, approximately 18 percent population from inability to focus and minimum 2.23 percent population from breathing difficulties with light effort. It was noted from **Fig. 1.b** that maximum sufferer were children among all age group. Low-income group reported more sick building symptoms unlike all other group due their less concern about housing infrastructure, poor maintenances which indeed results in sick houses. **Lugalla** in the year of 2003 conducted a study in Tanzania which showed a strong linkage between income and health. He reported that group with high income grouper incomes recorded less mortality rate while group with low income recorded high mortality rate.

Maximum observational data showed that about 35 percent children suffered from cold, 33 percent children population from running nose, 24.27 children from blocked/stuffy nose whereas maximum about 16 percent adult population had headache, 14.75 percent adult population from itchy or watery eyes while about 14 percent adult population were suffering from cold. Elderly's 58 percent population were suffering from lethargy and/or tiredness followed by 34.61 percent old age by running nose and dryness, itchy or irritated skin with minimum about 8 percent by chest pain. One particular house reported a humidifier fever diagnosis among its children due to severe dampness in the house, shown in **picture 1e.**

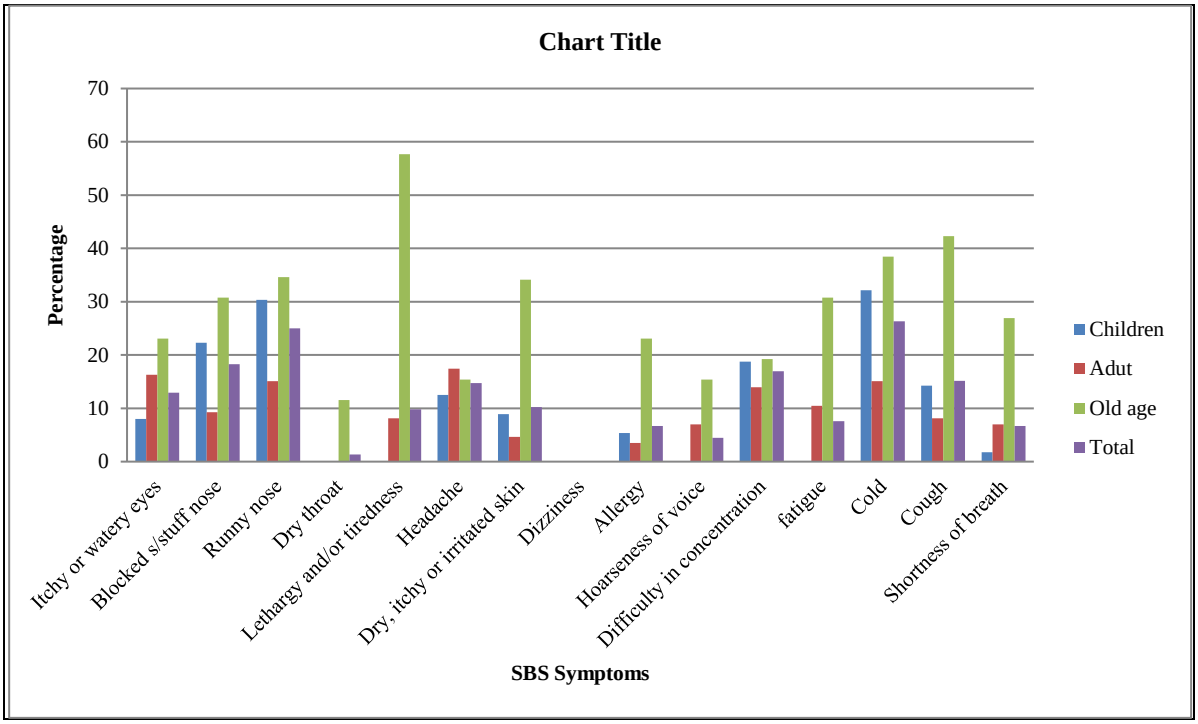

Fig. 1.b Sick building symptoms among Low Income Group

3e. Damped roof of the house

Prevalence of sick building Symptoms among residents of Middle-Income Group:

It was found that compared to Low Income Group, out of total population of Middle-Income Group, maximum i.e. about 22.7 percent population were suffering from sick building symptom, difficulty in concentration followed by 14.97 percent population from cold, 13.52 percent population from running nose and cold each, 10.14 percent population from itchy or watery eyes and minimum about 1 percent population by chest pain shown in **Fig. 1. c**

Again data revealed that as compared to Low Income Group, about 24 percent children population of Middle Income Group were suffering from difficulty in concentration followed by 19.44 percent children from running nose, 14.81 percent children population from cold whereas largest number of residents i.e. about 22 percent adult population were suffering from difficulty in concentration followed by 16.25 percent adult population were from fatigue and lethargy each with smallest number about 3 percent from allergy. And maximum i.e. about 48 percent old age populations were suffering from symptom lethargy and/or tiredness belonged to Low Income Group. While very few i.e. about 5 percent old age population were suffering from headache.

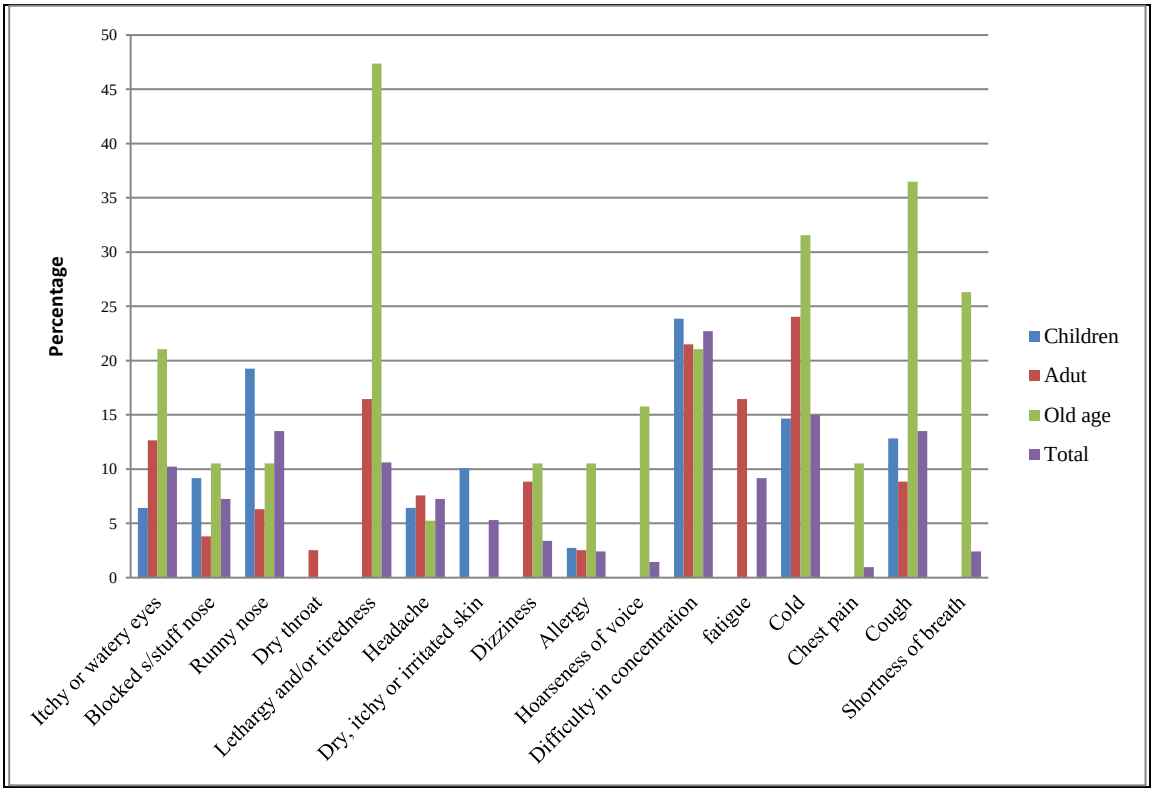

Fig. 1.c Sick building symptoms among Middle Income Group

Prevalence of Sick Building Syndrome symptoms among residents of High-Income Group

Data showed that out of total population maximum i.e. about 23 percent population of High-income group Income Group were suffering from sick building symptom i.e. difficulty in concentration followed by 10.36 percent population from lethargy and / or tiredness, 9.14 percent population were from fatigue and cold each while minimum about 1 percent population were suffering from hoarseness of voice **(Fig. 1.d).**

Result showed that maximum about 33 percent children population of High-income group were suffering from sick building symptom, difficulty in concentration followed by 10.97 percent children population from cough, 13.72 percent were from cold and minimum about 9 percent children were suffering from itchy or watery eyes. Whereas 17.97 percent adult population were suffering from difficulty in concentration followed by 11.23 percent adult population from lethargy and/ or tiredness, 10.11 percent from cough while minimum about 3 percent adult population from blocked/ stuffy nose. And maximum about 33 percent old age population were suffering from fatigue followed by 25 percent old age population from cold, 20.83 percent population from headache whereas minimum 4.16 percent old age population were suffering from hoarseness of voice.

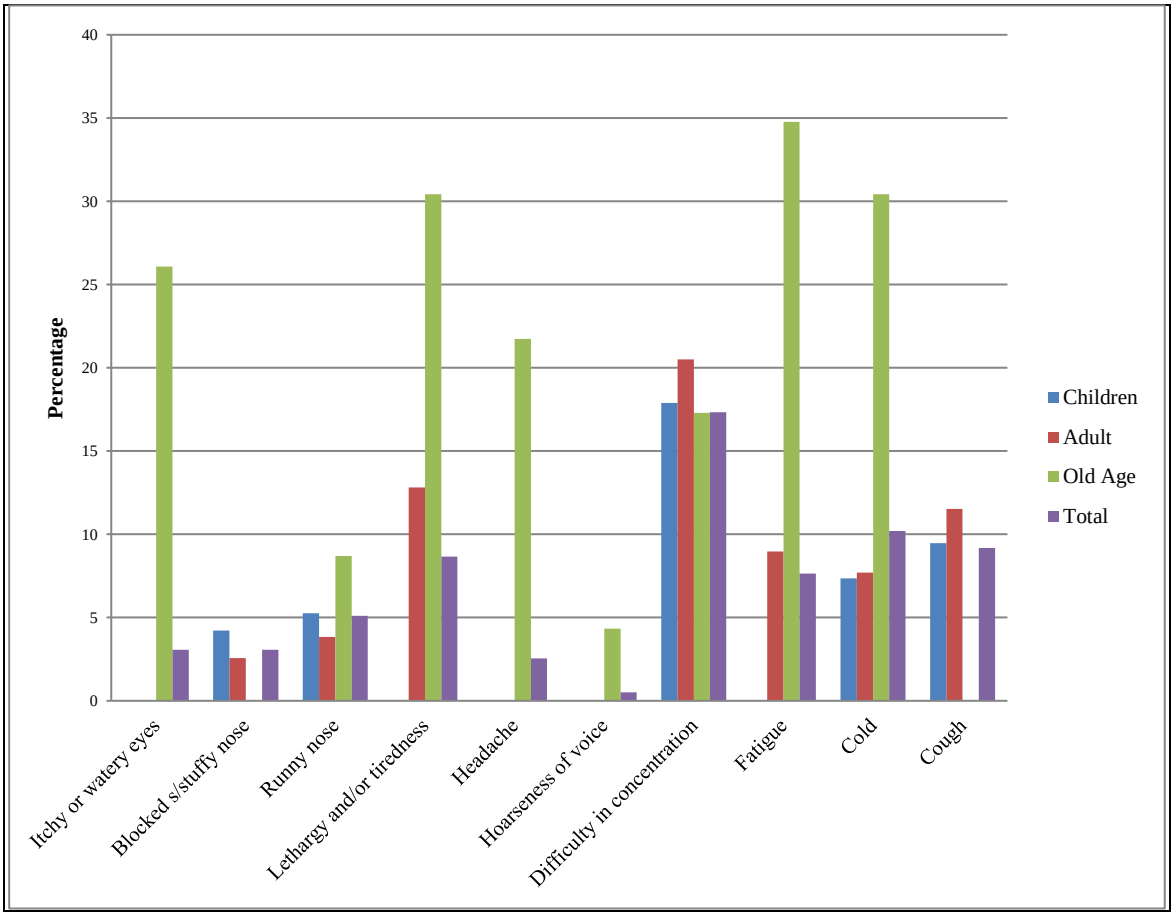

Fig. 1.d Sick building symptoms among High Income Group

Indoor Air Quality (IAQ) of the houses

Indoor Air Quality (IAQ) refers to the air quality within and around buildings and structures, especially as it relates to the health and comfort of building occupants. On the whole it was observed from the **Fig 1 e** that about 38 percent respondent reported air temperature too cold in their house, 25 percent reported air temperature too warm, 41.66 percent perceived too little air circulation due to congestion or overcrowding of houses, only 17.50 percent reported air too stale due to insufficient ventilation and uncared or rubbish surroundings, 44.16 percent reported distracting ambient noise and 31.66 percent houses were observed with dusty air due to being situated near to national highway. None of the respondents reported humidity in their houses.

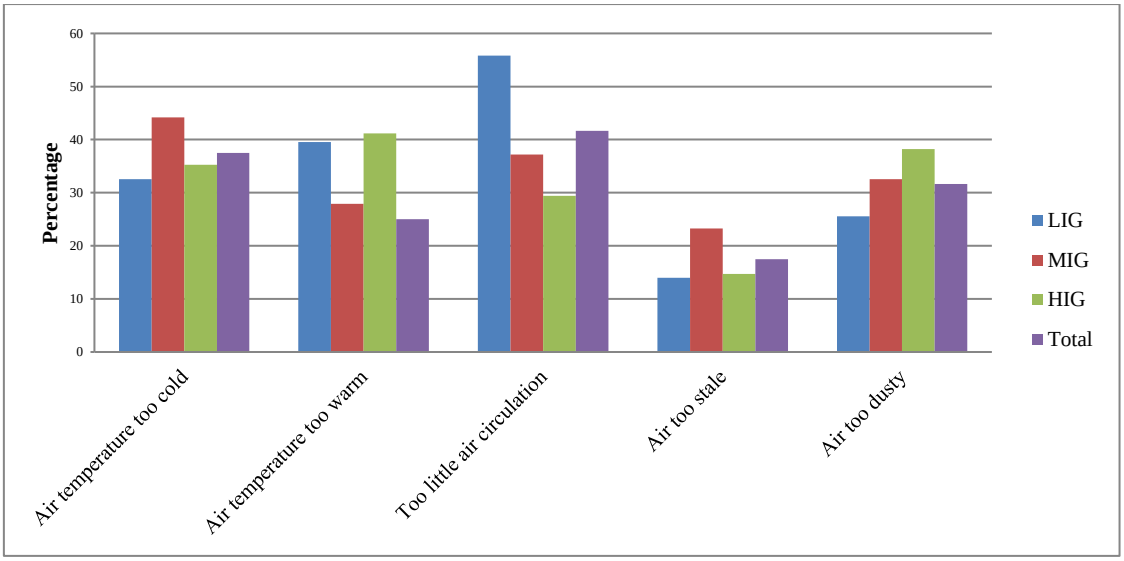

Fig. 1.e Indoor Air Quality of the houses

On the comparison among all income groups, majority of the respondents i.e. 55.81 percent perceived too little air circulation while only 13.95 percent respondent reported air too stale in Low Income Group. 44.18 percent respondents reported air temperature too cold while only 23.25 percent houses reported air too stale in Middle Income Group. In High income group Income Group, 41.17 percent houses reported air temperature too warm.

CONCLUSION

As India's hills are extremely fragile and environmentally sensitive, housing for hills is one of the country's top issues. Housing in the hills has been paralysed by a number of issues, including the unsuitability of homes for the various reasons such as landslides, earthquakes, large families necessitating an insufficient number of rooms, a lack of construction materials and land for building homes, and the migration of people from high altitude to low altitude. This is creating a problem of overcrowding and congestion. Children made up the majority of the population, and the majority of families claimed government services as their main source of income. Itchy or watery eyes, blocked or stuffy noses, running noses, colds, fatigue, or lethargy, dry, itchy, or irritated skin, shortness of breath with light exercise, and humidifier fever were the symptoms of SBS that residents of particular homes reported as being the most persistent. Children population was suffering more in all income groups. Most of the population i.e. children of Low-Income Group were suffering from cold and running nose and in Middle Income and High-Income Group they were suffering from difficulty in concentration, because the houses were constructed on the both sides of the national highway and near to market.

IMPLICATION OF THE STUDY

1. **To the Residents:** the findings of this investigation may be helpful to users in a way that it guides them to be careful in site selection by avoiding risky locations such as steep slope, river catchment area and landslide prone area besides this it also sensitizes them about selecting a contractor for their house construction who have all basic knowledge about construction as well as about housing standards and building by-laws. The findings may also help them to consider elements of art i.e. use of bright colors, designs, vertical lines, lighting etc and

principles of design which leads to aesthetically sound houses and help them to make their housing happy and enjoyable.

2. **For contractors:** The contractors may use the information regarding concerns about site, orientation of house and placement of doors and windows, housing standards and building by-laws and while furnishing the houses they may use knowledge on colour schemes of the house and principles of design to make the house functionally and aesthetically sound. This will enhance their job value in market.

SUGGESTIONS FOR FUTURE RESEARCH

There are many things that need to be done in this area. A survey can be conducted during different seasons to see the variation in prevalence of sick building syndrome symptoms among residents. Clinical-based studies on sick building syndrome symptoms will validate the concept of sick building syndrome. Researchers from different regions of the nation must likewise pursue the aforementioned field of study.

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EFFICACY OF ECO-FRIENDLY MATERIALS ON THE SHELF-LIFE OF THE SELECTED FOOD GRAIN FLOURS

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ABSTRACT

Flour is the major ingredient in the preparation of numerous varieties of food items and is a staple in most countries' menu. Food grain flour is a fundamental ingredient in diets worldwide, providing essential nutrients and energy. It also has a cultural significance. Its versatility, affordability and contributions to nutrition and food security make it a cornerstone of our food systems. India has been grappling with significant post-harvest losses in its food grain production. The Food Corporation of India (FCI) estimated that the post-harvest loss for major crops like rice and wheat was around 10 percent of the total production. Food grain flour has poor shelf-life due to its high fat content as well as lipase activity which causes rapid development of rancidity and bitterness. The current study aims to assess the utilization of botanicals and associated byproducts for the storage of food grain flour, building upon the aforementioned basic information. In this study, four types of flours were selected, namely rice flour, wheat flour, bengal gram flour and maida. These flours were chosen due to their widespread usage in Indian families as food grain flours. The botanicals chosen for this study were *neem*, *nochi* and pumgamaya mold in pack 1 and sweet flag, pepper, cloves, garlic skin and bay leaf mold in pack 2. The findings of the study indicate that the use of pack 1 is more effective in managing insect and worm infestations in stored food grain flour, as compared to pack 2, which possesses distinct features.

Keywords: botanicals, eco-friendly, food grain flour, post-harvest losses, shelf-life

INTRODUCTION

Agriculture sustainability is the key to ensure food security and hunger eradication for the ever-growing population. Global food production must be increased by 60 per cent to feed 9–10 billion of the population by 2050 (Sharma etal., 2022). The Food and Agriculture Organisation (FAO), in a 2019 report, mention that for each kilogram of food lost in the supply chain in Central and South Asian areas, around 2.2 kilogram carbon-di-oxide equivalent is released, increasing the issue of sustainability which is a greater hazard to the agricultural productivity throughout the globe (FAO, 2019).

It is required to change from the latest paradigm of improved agricultural cultivation to agricultural sustainability (Suryawanshi etal., 2023). Due to unprecedented human population growth and technological development, the survival of our own species is at stake and in the short

term, the states face increased expenses with healthcare systems and food security, food grains and flour storage with the mitigation of environmental damage such as pollution, soil degradation and other such effects (Dasgupta 2021).

Different forms and bi-products of flours are consumed by the majority of the population worldwide (Bello et.al, 2014). The monetary and political problem of the countries is affected by the accessibility and required supply of food grain flour (Aritonang et al., 2019). The properties of food items express the multiple linkage among the components, molecular confirmation of the structure and physiochemical qualities of these items (Ojoetal., 2017). These properties involve in the preparation and usage of food constituents for various foods and also manage the storage as well as processing of such varieties (Puthuegoetal., 2014). Therefore, in the upcoming era, a controlled method for developing and storing food grain flour, plant-based products should be added to address the challenges and their associated results for food preservation and storage.

NEED FOR THE STUDY

Numerous investigations have been conducted by multiple researchers pertaining to the preservation of food grains (Nabububya et al., 2017; Mu et al., 2017; TEEB, 2018; Chavas et al., 2020; Kryszak et al., 2023). There are several significant gaps in the existing research on the storage of food grain and flour storage at the household level employing botanicals. These factors encompass the necessity to examine a broader array of easily accessible and socially accepted botanical substances, scrutinize the effectiveness of botanicals in various domestic environmental circumstances, ascertain the most suitable dosages and methods of application, evaluate the enduring impacts on the quality and safety of food and assess health-related considerations. Furthermore, it is imperative that research endeavors encompass an investigation into the compatibility of packing materials, the potential microbiological consequences, the level of consumer acceptance, the cost-effectiveness, the behavioral and cultural aspects that influence the adoption of sustainable household-level storage practices, as well as the implementation of community-based ways to promote such practices. By addressing these gaps, it is possible to provide practical and culturally suitable solutions that can effectively boost food security, mitigate food waste and encourage sustainable methods for storing food inside families. The present study is being conducted to investigate the utilization of botanicals and associated by-products for the storage of food grain flour, building upon the aforementioned basic information.

OBJECTIVES OF THE STUDY

This study aims to: -

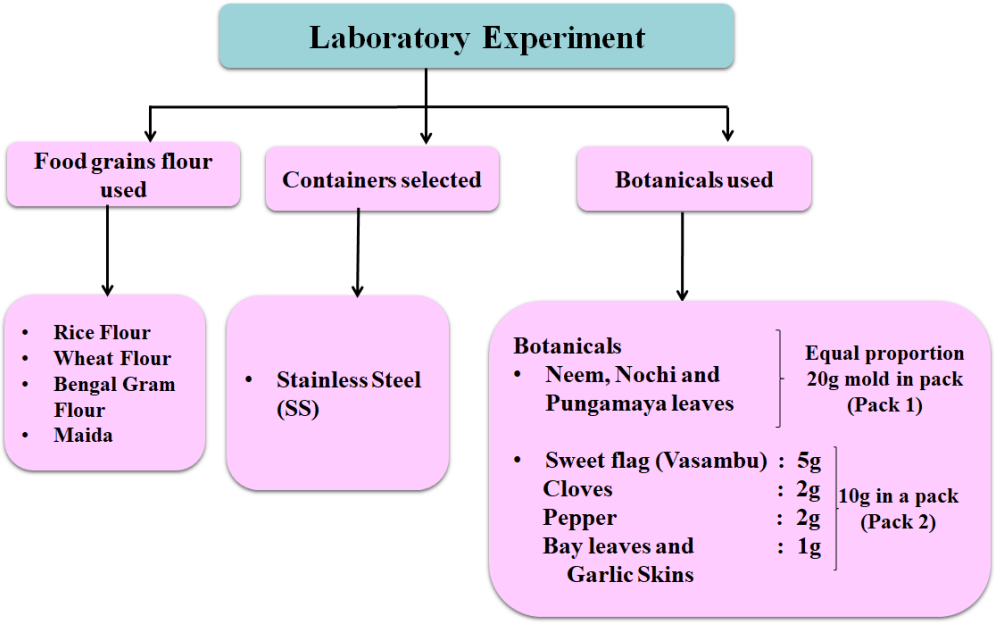
- Examine the physical parameters associated with the storage of food grain flour
- Identify botanical substances that possess significant insecticidal and pesticidal properties
- Prepare two different botanical packs using different combinations of selected botanicals
- Assess the effectiveness of these two different botanical packs in controlling the food grain flour losses during storage through laboratory experiment.
- Assess the efficacy of two different botanicals in controlling food grain flour losses by using stainless steel container.

HYPOTHESIS

- There is no significant difference between two packs- I and II in controlling the food grain flour losses during storage in stainless steel container

METHODOLOGY

The methodology adopted for this study is given in the following steps:



- **Selection of flour:** For conducting the experimental study four different flours each one kilogram- namely rice flour, wheat flour, bengal gram flour and maida were selected as these were the most used and stored in the household level.
- **Selection container:** Among various types of containers used in Indian households, stainless-steel was considered to be more eco-friendly, affordable, durable and budget friendly. Hence stainless-steel container was chosen for conducting the experiment.
- **Selection of botanicals:** The botanicals that are easily available and had good insects and worms controlling qualities were selected for the experiment.
    - *Neem*, *nochi* and pungamaya were powdered, equal quantities were added and made into mould each weighing 20 gms were kept in pack 1.
    - Sweet flag (5gms), pepper (2 gms), cloves (2 gms) and garlic peelings and bay leaves (1g) mold were kept in pack 2

      The quantity of botanicals in pack 1 and pack 2 varies according to their insect and worm repellent properties. *Neem*, *nochi* and pungamaya mold in Pack 1 were used in larger quantity, whereas botanicals in Pack 2 were used in lesser quantity as per the latest household practices and the related studies.

- **Preparation of botanicals:**

  Pack 1 Equal quantities of *Neem, Nochi* and Pungamaya leaves were gathered, dried and pulverized. The resulting powder was then compressed into cylindrical shapes weighing 20 grams each, utilizing a press specifically designed by the researcher. The mold was stored in a compact cloth cover. The investigator ensured its freshness and confirmed its quality by storing it for a month.

  Pack 2: A total of 10 grams of dried botanicals, including 5 grams of Sweet flag, 2 grams of Pepper, 2 grams of Cloves and 1 gram of Garlic peelings and Bay leaves were stored in pack 2. These products were selected based on their utilization in prior relevant research and their suitability in terms of texture and accessibility.

  Preparation of flour: Sieving and cleaning was done for the selected flours(1kg) namely, rice flour, wheat flour, bengal gram flour and maida. Moisture level of flour was brought within the recommended level of below 13% (FSSAI Standard). Physical parameters of flour such as pleasant aroma, absence of clumps and insects were ensured for its freshness.

  Preparation of storage room: The room was subjected to a controlled environment through the implementation of dusting, sweeping and mopping. The temperature and humidity levels were assessed and documented. A platform was also organized for the storage of containers, food grain flour, weighing balance and other supplies necessary for the experiment.

- **Conduct of the experiment:** In order to carry out the experiment, cleaned stainless-steel containers were utilized to contain the selected flours. Three containers for pack 1, pack 2 and for control group were prepared for 1 kg of selectedflours. These containers were labeled as pack 1, pack 2 and the control group (without any pack). All of the chosen flours were uniformly stored for experimentation purposes and the duration of the trial spanned a period of six months.

- **Analysing the qualities of stored food grain flours:** The assessment of physical characteristics including the presence of insects and worms, clumps, change in aroma was observed on completion of every month. Five women were selected to carry out this assessment and the results were recorded.

- **Statistical analysis carried out:**To find out the efficacy of botanicals with flours and containers chi-square test and ‘t’test were carried out.

RESULTS AND DISCUSSION

The findings comprised of the examination of physical parameters including the presence of insects and worms, the formation of clumps and the flavor of flour while stored using different botanicals. Additionally, the study explored the relationship between the physical parameters of various flours stored in a stainless-steel container**.**

Flour can be stored in its existing packaging or in an airtight container on a shelf or in a cabinet in a cool area in the kitchen, according to a study conducted by Fab flour in 2018. Fresh

flour should be never mixed with old flour. Whole grain flour has a shorter shelf-life than white flour due to the rancidity of the germ and bran lipids. White flour has a shelf-life of six to nine months, whereas whole grain can be stored for a period of three months. If moisture is permitted to enter the flour, it could become clumpy. Flour can sometimes attract Psocids. Psocids is known as flour weevils, which are brown or black insects that inhabit dried foods.

Occurrence of insects and worms in the flour

The findings regarding the number of insects and worms formed in stainless steel storage containers are presented in Table 1. The experiment was conducted under controlled conditions for the selected flour using the botanical molds Pack 1 and Pack 2 for a period of six months.

Table 1: Number of Insects and Worms in Stainless Steel Container (in 100g)

Flour	Experiment	No. of insects and worms (in 100g)					
		After 1 month	After 2 months	After 3 months	After 4 months	After 5 months	After 6 months
Rice flour (Worms)	Pack 1	-	-	-	-	1	2
	Pack 2	-	-	-	1	3	2
	Control Group	-	-	1	3	4	2
Wheat flour (Worms)	Pack 1	-	-	-	-	-	-
	Pack 2	-	-	-	-	-	-
	Control Group	-	-	-	-	2	2
Bengal gram flour (Insects)	Pack 1	-	-	-	-	1	-
	Pack 2	-		-	-	1	2
	Control Group	-	1	3	4	7	12
Maida (Worms)	Pack 1	-	-	-	6	8	4
	Pack 2	-	-	1	4	14	16
	Control Group	-	-	2	7	16	19

*Indicate number of pests

The investigator was able to observe worm formation after 5 months of using rice flour with pack 1, after 4 months of using pack 2 and after 3 months in the control group, as shown in Table 1. By using pack 1 and pack 2, worm formation in wheat flour was not detected until 6 months, whereas it was detected after 5 months in the control group. In bengal gram flour, the formation of the insect was observed after 5 months of using pack 1 and pack 2, while it was observed after 2 months of storage in the control group. Worm formation in maida flour was observed after four months of using pack 1, three months of using pack 2 and in the control group. The findings were similar to those of a study conducted by Sirohi in 2021, in which it was determined that storing food grains in stainless steel containers is effective.

Formation of clumps in the selected flour

Flour that is fresh has a uniform, dry texture and a neutral aroma. Its color and odor alter during storage and can indicate the formation of clusters as its moisture content rises.

The formation of clusters in stainless steel containers containing the study's flour was analyzed and the results are given in Table 2.

Table 2: Number of Clumps in Stainless Steel Container (100gm)

Flour	Experiment	Number of clumps (in 100g)					
		After 1 month	After 2 months	After 3 months	After 4 months	After 5 months	After 6 months
Rice	Pack 1	-	-	-	-	2	3
	Pack 2	-	-	-	1	2	3
	Control Group	-	-	-	2	4	7
Wheat flour	Pack 1	-	-	-	2	3	5
	Pack 2	-	-	1	4	5	7
	Control Group	-	-	2	5	9	10
Bengal gram flour	Pack 1	-	2	6	9	30	40
	Pack 2	2	7	13	24	34	43
	Control Group	3	8	14	18	36	49
Maida flour	Pack 1	-	-	1	2	4	5
	Pack 2	-	-	1	4	6	7
	Control Group	-	-	2	6	8	15

After five months of storage in a stainless-steel container, approximately two clumps were noticed in rice flour stored using the pack 1, whereas after four months of storage, lump formation was evident in the flours stored in controlled groups and pack 2. After using pack 1 for four months, pack 2 for three months and in a control group during the control period, in the wheat flour, worm was observed to develop. Bengal gram developed lumps after being exposed to pack 1 for two months, pack 2 for one month and a control group for one month. After five months, the formation of lumps in maida was recorded in the flour stored using pack 1, pack 2 and control groups. The study was similar to the findings made by Neme et al., 2021, which indicates about the clump's formation in food grain flour. The study was in par with the results.

Aroma of the flour

From the first month of the investigation to the sixth month, the flavor of the flour was evaluated each month. For this study, the odor of flour stored in stainless steel containers was evaluated on a five-point Likert scale: E-Excellent; VG-Very Good; G-Good; F-Fair; P-Poor. The results are presented in Table 3.

Table 3: Aroma of the Flour

Flour	Experiment	Aroma of the flour					
		After 1 month	After 2 months	After 3 months	After 4 months	After 5 months	After 6 months
Rice flour	Pack 1	5	5	4	4	4	3
	Pack 2	5	4	3	2	2	2
	Control Group	5	5	4	4	2	2
Wheat	Pack 1	5	5	4	3	3	2
	Pack 2	5	4	4	3	2	2
	Control Group	5	4	4	3	2	2
Bengal gram	Pack 1	5	5	4	4	3	3
	Pack 2	4	3	3	2	2	2
	Control Group	5	5	3	3	2	2
Maida	Pack 1	5	5	5	4	3	3
	Pack 2	4	3	3	2	2	2
	Control Group	5	4	3	3	2	2

5-Excellent; 4-Very Good; 3-Good; 2-Fair; 1-Poor

After 6 months of storage in a stainless-steel container, rice flour with pack 1 had a pleasant odor, whereas rice flour with pack 2 had a pleasant odor only for the first 3 months of storage and a fair odor after 6 months. For the control group, rice flour had a fair odor after 6 months of storage in a stainless-steel container. After 6 months of storage, wheat flour with pack 1 smelled fair, wheat flour with pack 2 smelled fair, control group wheat flour smelled fair and maida flour with pack 2 smelled fair even after 6 months of storage. The use of pack 1 was effective in preventing the flour from smelling and preserving its freshness.

Association between flours and container

The association between the selected flours and stainless- steel container usage was studied using Chi-square and the result is been given in the following table 4.

As majority of the households use stainless steel container for food grain and flour, the same was selected.

Table 4: Association between selected flours and stainless-steel container

Flour	Experiment	Chi –square value	Sig value
Rice flour	Pack 1	58.792	0.000*
	Pack 2	1.576	0.455
	Control Group	4.873	0.087
Wheat	Pack 1	52.147	0.000*
	Pack 2	4.968	0.083
	Control Group	5.870	0.053
Bengal gram flour	Pack 1	35.971	0.000*
	Pack 2	71.425	0.042

	Control Group	35.182	0.175
Maida	Pack 1	37.482	0.000*
	Pack 2	67.133	0.034
	Control Group	48.262	0.123

Source: Estimated

At the 1% significance level, the above chi-square analysis revealed that the use of pack 1 was significantly associated with the flavors of flours such as rice flour (p=0.000), wheat (p=0.000), bengal gram flour (p=0.000) and maida (0.000). In contrast, the use of pack 2 and the control group was not associated with maintaining the flours' odor effectively.

The following Table 5 brings out the flour flavour using pack 1 and pack 2 in the stainless-steel container using 5 pointscale rating.

Relationship between Aroma of the Flour and Botanicals

A paired-sample test was conducted in order to find the relationship between the selected flours and smell of the flour using botanicals Pack 1 and Pack 2. The findings are presented in Table 5.

Table 5: Relationship between Aroma of the Flour and Botanicals (T-Test)

Constructs		Mean±SD	T-value	sig
Rice	Pack 1	2.95±0.93	12.071	0.000
	Pack 2	1.45±0.98		
Wheat	Pack 1	2.95±0.82	9.121	0.002
	Pack 2	1.02±0.642		
Bengal gram	Pack 1	2.64±0.61	6.635	0.003
	Pack 2	1.85±0.99		
Maida	Pack 1	2.08±0.81	10.461	0.000
	Pack 2	1.89±0.97		

Source: Estimated

The study examined the outcomes of a paired sample t-test conducted on the properties of the chosen flours, utilizing both pack 1 and pack 2. The preservation of the aroma of flour can be achieved by utilizing pack 1 and pack 2. When comparing the mean value of pack 1 to pack 2, it was observed that the mean value for pack 1 was higher.

CONCLUSION

Stored grain pests can cause considerable harm to food grains and flours. Numerous chemical pesticides are already employed; nevertheless, their utilization is accompanied with detrimental implications for human health, the environment, prolonged persistence as residues and even infiltration into the food chain. Hence, there is an urgent need for the development of safer, environmentally acceptable and eco-friendly alternatives to replace these toxic substances. The majority of the botanicals employed in this context are indigenous in nature, prioritizing the utilization of locally available materials, particularly at the household level. Furthermore, aside from their eco-friendly nature and cost-effectiveness, these approaches also offer the advantage of

utilizing locally accessible resources, while ensuring the preservation of food grains and posing minimal health hazards. The present study involves the development of pack 1 and pack 2 for the purpose of preserving food grains at the home level. The findings of the study indicate that the botanicals mold kept in Pack 1 which contains *neem*, *nochi* and pungamaya was more effective in the persistence of food grain flour in terms of clumps, insects, worms and maintaining the aroma of the flour for a longer duration. Hence the utilization of botanicals effectively inhibits the growth of insects and worms, as well as regulates the aroma emanating from stored flour in comparison to other methods of involving botanicals.

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LIVING CONDITIONS OF URBAN SLUM DWELLERS IN VISHAKHAPATNAM

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ABSTRACT

Slums are not a new phenomenon as they have been a part of almost all cities, particularly during a time of urbanization and industrialization. Slums are generally the only type of settlement affordable and accessible to the poor in cities, where competition for land and profits is intense. Urban sustainability depends on the design, planning, construction, and maintenance of urban infrastructures, which are largely impacted by public initiatives in India. The current study aims to assess the living condition of the slum dwellers in Vishakhapatnam. According to information on the living circumstances of the slum dwellers in Vishakhapatnam slum beneficiaries who were chosen, 67% of them resided in semi-pucca homes, while 52% had two rooms with no flooring. Although 87 percent of families reported not having a separate restroom and 60 percent of households said their floor was made of mud, all the houses had access to enough electricity, and 40 percent of households used kerosene for cooking. The income of the respondents plays a key part in providing the basic necessity and facilities needed for them. When respondents' incomes are high, they are more likely to use basic services, and the opposite is also true.

Keywords: Urbanization, Slum, living condition, housing facility, slum dwellers, Vishakhapatnam slum

INTRODUCTION

Slums are not a new phenomenon as they have been a part of almost all cities, particularly during a time of urbanization and industrialization. Slums are generally the only type of settlement affordable and accessible to the poor in cities, where competition for land and profits is intense.

Slums sprout and continue for a combination of demographic, social, economic, and political reasons. Many people move to urban areas primarily because cities promise more jobs, better schools for poor's children, and diverse income opportunities than subsistence farming in rural areas.

A slum, in the eyes of UN Habitat, is defined as a place that is deficient in at least one of the following: a reliable housing structure, access to clean water, acceptable sanitation, enough living space, and tenure security [UN-Habitat 2018]. Each slum might have a unique main concern,

such as a lack of access to necessities like toilets and water in Nairobi, Kenya, or a lack of tenancy security in India [Lucci 2015].

Deplorable living conditions, poor land use planning, a lack of social services, high rates of communicable diseases, exposure to fire outbreaks, inadequate infrastructure, and vulnerability to risk including natural disaster, environmental hazard, and health risk are all characteristics of urban slums. Slums primarily offer an unregulated, low-wage, unstable labor market with erratic hours of work. About all new arrivals to the city work in the unorganized sector. Additionally, they are residing in homes without adequate ventilation, drinking water, electricity, or sewerage, which leads to the development of new issues like underemployment, high crime rates, the expansion of shanty towns, poor quality housing, poor transportation, and issues with service delivery. As noted by the World Bank (2023),

> "Poverty is not only a problem of low incomes; rather, it is a multi-dimensional problem that includes low access to opportunities for developing human capital and to education which may relate to some key that may help to turn out the whole scenario."

Slum development programs have often been "action-oriented packages" that have increased donor assistance and a focus on eradicating poverty rather than the sustainability of the urban environment. Yet, by the middle of the 1970s, many governments in developing nations had acknowledged their incapacity to provide their populations, particularly the low-income groups, with housing through government public housing programs. While certain government agencies and non-governmental organizations have been trying for years to raise slum inhabitants' standards of living, overall progress has been slow. (UN-HABITAT, 2006; Sarkar and colleagues, 2020).

> “Rapid urbanization frequently results in the loss of important ecosystems and lands in order to meet urban demand. Serious environmental, social, and economic problems are foreseen if present and future metropolitan regions continue to consume the same resource” (Shaban et.al, 2020, Chand 2018 and Ramani 2016)

Slums form, especially in emerging nations, as a result of the fast urban population increase and inadequate funding for necessities like housing and healthcare [Ooi et.al, 2007 and Mahabir et.al, 2016]. Slum dwellers struggle with major public health issues brought on by unfavourable environmental factors such as overcrowding and tainted water [Ezeh et.al, 2017 and WHO 2011].

In order to meet their needs, slum dwellers must build a private well and a water storage tank, purchase water from public faucets, water vendors, and water shops, or install a private well and a water storage tank [Sarkar 2020 and Majuru et al, 2016]. Slum residents, even those who have access to piped water, often rely on a variety of water sources due to the erratic water supply and poor water quality [Biswas et. al., 2021 and Adane et.al, 2017]. According to Haque et al. 2019 and Tutu et al. 2016, a slum is also defined as any human settlement that lacks any one of the following indicators: access to water and sanitation, adequate living space, housing made of durable materials, a non-hazardous location, and tenure security. Additionally, slum dwellers consume less water than the 50 litres per capita per day (LPCD) WHO requirement because of the deficiencies [Subbaraman et al., 2015 and Ssemugabo et al., 2020].

As the world rapidly urbanizes, we must encourage cities to become more sustainable if we are to solve the environmental problem. Urban sustainability depends on the design, planning, construction, and maintenance of urban infrastructures, which are largely impacted by public initiatives in India. The current study aims to assess the living condition of the slum dwellers in Vishakhapatnam. Living conditions refer to the quality of life experienced by individuals or communities, encompassing various aspects of their physical, social, economic, and environmental well-being. In the context of slum dwellers, living conditions may include parameters such as housing quality, access to basic amenities (such as water, sanitation, and electricity), healthcare services, education opportunities, employment prospects, safety and security, social cohesion, and overall quality of the built environment. In the context of the current study assessing the living conditions of slum dwellers in Vishakhapatnam would involve examining various aspects of their living conditions to gain insights into the overall quality of life and well-being of the people residing in slum areas.

OBJECTIVES

The study titled **"Living Conditions of Urban Slum Dwellers in Vishakhapatnam"** was carried out with the following objectives-

- To study the socio-demographic characteristics of the selected samples
- To examine the living condition of the sample group
- To find out the relationship between the income of the respondents and their basic household facilities availability.

METHODOLOGY

The research work was carried out utilizing the primary data approach. The investigator visited specific slum areas, namely R.P Peta and Gandhi Nagar of Vishakhapatnam, to collect the necessary information. The selection of these areas was justified based on their significant representation of slum populations within the city and their accessibility for data collection purposes. For the research, approximately one hundred households were chosen using a random sampling technique. The sample size of 100 was determined based on practical considerations such as time constraints, resources available for data collection, and the need to obtain a representative sample of the slum population. The random sampling technique used, ensuring each household in the selected areas had an equal chance of inclusion, minimizing bias and enhancing the generalizability of the findings. A well-structured interview schedule was developed by the researcher to comprehensively investigate the living conditions of the subjects. This schedule was meticulously crafted following an extensive review of relevant literature, consultation with experts in the field, and consideration of key factors influencing living conditions in slum areas. It included questions covering various aspects such as housing conditions, access to basic amenities, socio-economic status, health indicators, and other relevant factors impacting the quality of life of slum residents. The information gathered through the interviews was then entered into statistical software for coding and analysis. This allowed for systematic examination of the data to identify patterns, trends, and associations, facilitating a deeper understanding of the living conditions of the subjects and providing valuable insights for potential interventions or policy recommendations.

FINDINGS OF THE STUDY

The socio-demographic background of the respondents which includes gender, age, and type of family, marital status, education, occupation, and income details were presented and tabulated in the following table (1).

Table – 1- Socio-Demographic Details

Particulars	Variables	Percentage
Gender	Male	54
	Female	46
Age (In Years)	25 – 30	17
	31 – 35	34
	36 – 40	30
	41 – 50	17
	Above 50	2
Type of Family	Nuclear	74
	Joint	26
Marital Status	Married	60
	Unmarried	29
	Widow/Widower	6
	Separated/ Divorce	5
Education	Illiterate	45
	Schooling	32
	Graduation	11
	Others	12
Occupation	Agriculture	9
	Daily Wages	16
	Construction Works	12
	Self-Employed	24
	Salaried Job	4
	Housewife / unemployed	35
Income (In Rs.)	Less than 4000	12
	4001 – 6000	18
	6001 – 8000	15
	8001 – 10000	36
	Above 10000	19

According to the gender distribution of the sample surveyed, nearly half of them were male (54 percent), while just 46 percent of the respondents were female. According to the data on the age distribution of the sample, nearly 34 percent of the population was between the ages of 31 and 35. This was followed by 30 percent of people who were between the ages of 36 and 40, 25 percent of them were between the ages of 41 and 50, and were above the age of 50.

According to information on the family structure of the chosen group, nearly 74 percent of people lived in nuclear families, followed by 26 percent of people in joint families. The

respondents' marital status revealed that roughly 60 percent were married, followed by 29 percent of those who were single, and 11 percent of the sample were not married. In terms of education, the sample's distribution showed that around 45 percent of the population was illiterate, with schooling level accounting for 32 percent of the sample's total education.

The respondents' occupation information revealed that the majority of them (35 percent) were either housewives or unemployed, followed by 24 percent of self-employed people, 16 percent of those earning a daily wage, and others working in agriculture and salaried jobs.

According to the samples' income distribution, 36 percent of respondents of family income was between Rs. 8001 and Rs. 10,000 annually, followed by 19 percent of them earn more than Rs. 10,000 and others who made less than Rs. 10,000.

Fifty four percent of the respondents came from the male gender, according to the respondents' social and demographic background. Of the respondents' age range, 34 percent were between 31 and 35 years old, and most of them lived in nuclear families (74 percent), while 60 percent of the respondents were married sample households. Of the respondents' educational backgrounds, 45 percent were illiterate, which led to around 35 percent of them being unemployed or housewives and others earning around less than Rs.10,000

Since the primary goal of the study was to understand the respondents' living conditions, the investigator gathered data on this topic, including information on the type of house, number of rooms, type of flooring, separate kitchen and bathroom, electric supply, and cooking fuel used. The information gathered is presented in table (2).

Table – 2 - Living Condition

Particulars	Variables	Percentage
Type of house	Kutcha	9
	Pucca	24
	Semi-Pucca	67
Number of rooms	One	24
	Two	52
	More than two	24
Type of flooring	Mud	60
	Cement	26
	Tile	14
Separate Kitchen	Yes	48
	No	52
Separate Bathroom	Yes	13
	No	87
Electricity Supply	Yes	84
	No	16
Fuel used for cooking	Kerosene	40
	LPG	38
	Wood	22

According to information on the different types of housing, the majority of people (67percent) lived in semi-pucca, while 24 percent lived in pucca and only 9percent in kutcha houses. According to the information on the number of rooms, about 52 percent of people lived in homes with two rooms, followed by 24 percent of people who lived in one room and 24 percent who lived in homes with more than two rooms. The type of flooring of the respondent's houses showed that 60 percent were living in mud flooring houses followed by 26 percent having cement flooring and 14 percent having tile flooring. According to the data on separate kitchens, only 48percent of households had separate kitchens, while about 52 percent did not. Almost 87 percent of the households did not have a separate bathroom, and only 13 percent had a bathroom, according to data on separate bathrooms. Regarding the household electricity supply, it was evident that every household had access to the electricity that the state government had allocated. The case of fuel used for cooking showed that about 40 percent were using kerosene for cooking followed by 38 percent having LPG facility and 22 percent were found to be using wood for their cooking needs.

Thus, the details on the living condition of the slum showed that about 67percent were living in semi-pucca houses whereas 52 percent had two rooms in their house and in case of flooring 60 percent mentioned that their floor was made with mud and 52 percent did not have separate kitchen whereas 87 percent reported that they do not have a separate bathroom but all the households were having adequate electric supply and 40 percent were using kerosene as fuel for their cooking.

Figure-1: Prevailing slum conditions

After studying the living conditions of the respondents their household supporting facilities were examined and the findings were received as multiple responses. The result has been given in table (3).

Table – 3 Household Supporting Facilities

Particulars	Good	Average	Bad
	In (percent)		
Educational facility	16	42	32
Drainage facility	23	39	12
Medical facility	35	46	21
Transport facility	45	49	19
Water facility	36	42	29
Electricity facility	38	51	28
Garbage facility	37	48	19
Security	12	39	45
Building Maintenance/ amenities	29	34	21
Community Facilities	32	45	18
Sanitation and Hygiene	38	42	26
Basic necessities and services	47	56	23

*Multiple Responses

The household supporting facilities of the respondents were examined under three categories namely good, average, and bad. The educational facility available near the provinces showed that 16 percent felt good which meant that there is the availability of schools or colleges for the education of the family member's respondents. The drainage facility in the residence showed 23 percent felt it to be good followed by 35 percent feeling their medical facility was good and the transport facility was good for 45 percent of the sample. About 36 percent of the felt that water facility was good whereas the garbage facility showed that 37 percent feeling it to be good. The security facility respondents were bad 45 percent of the building maintenance and amenities were found to be good for 34 percent whereas, in the case of community facilities 45 percent were having the good facility, in case of sanitation and hygiene 42 percent feeling it to be good and the necessities and services feeling to be good for 56 percent.

This showed that the income of the respondents plays a vital role in providing the basic necessity and facilities needed for them. When the income of the respondents is high their preference for availing of basic facilities in their households in their households is high and vice versa.

Further, the investigator tried to examine the relationship between the respondent's income and its effect on taking up the basic facilities in their households needed for their life through regression analysis. The result of the same is been discussed as follows.

Relationship between respondent's Income and basic facilities in their households

Multiple regression analysis was used to examine the relationship between respondent's income and the presence of basic facilities in their households. The basic facilities available for the respondents in their housing was examined with 3-point ranking scale "Good", "Average" and "Bad". The facilities namely Educational facility, Drainage facility, Medical facility, Transport facility, Water facility, Electricity facility, Garbage facility, Security, Building Maintenance/amenities, Community Facilities, Sanitation and Hygiene, Basic necessities and services was considered for the study.

H_o: there is no relationship between Income and basic facilities in their households in their households

H_a: there is a relationship between Income and basic facilities in their households in their households

Linear regression analysis was done to find the relationship between respondents' incomes with their basic facilities in their households.

Table – 4 - Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.809	.689	.632	.64855

According to the table, the correlation is denoted by the letter R, and its value is 0.809. The degree of determination is denoted by the letter R square, and its value is 0.689. The degree of determination indicates to which extent of the selected slum dwellers income affect the basic facilities in their households. In this situation, the independent factor is responsible for 68.9 percent of the dependent factor's determination.

Table – 5 – Coefficients of basic facilities in their households

Variables	Standardized Co-efficient	T	Sig.
Educational facility	.402	4.189	.009*
Drainage facility	.409	4.019	.013*
Medical facility	.465	4.698	.008*
Transport facility	.548	5.648	.000**
Water facility	.512	5.365	.002**

Electricity facility	.679	5.845	.000**
Garbage facility	.478	4.725	.006*
Security	.425	4.321	.007*
Building Maintenance/ amenities	.412	4.122	.012*
Community Facilities	.412	5.986	.002**
Sanitation and Hygiene	.489	4.989	.004**

* Dependent Variable: Income

** - Significant at 1percent level, * - Significant at 5percent level

From the table 5, it can be identified the chosen dependent variable is the income of the respondents and the independent variables are the basic facilities in their households of the sample group which is been gathered for about 12 variables from the above table it is understood the selected facilities like educational, drainage, medical, transport, water, electricity, garbage, security, building maintenance/ amenities, community and sanitation and hygiene are statistically significant at 1 percent and 5 percent level of significance indicating that the selected variables are related with the dependent variable income as educational facilities (p=0.009), drainage facility (p=0.013), medical facility (p=008), transport facility (p=0.000), water facility (p=0.002), electricity facility (p=000), garbage facility (p=0.006), security (p=0.007), building and maintenance facility/amenities (p=0.12), community facilities (p=0.002), sanitation and hygiene facility (p=0.004) and basic necessity and service (p=000).

From the analysis presented in Table 5, it is evident that the income of the respondents serves as the dependent variable, while the basic facilities in their households act as independent variables. The results reveal that several facilities, including educational, drainage, water, electricity, garbage, security, building maintenance/amenities, community, sanitation and hygiene, and basic necessities and services, demonstrate statistical significance at either the 1 percent or 5 percent level. This indicates a significant relationship between these facilities and respondents' income levels. Notably, the provision and quality of these facilities play a crucial role in determining the well-being and living standards of individuals and communities. Overall, these findings underscore the importance of addressing infrastructure and service deficiencies to enhance the overall quality of life and socio-economic conditions among slum dwellers in the study area.

CONCLUSION

Urban slum upgrading is a procedure and a collection of results that have the potential to improve a number of health-related factors and maybe lessen health disparities suffered by the urban poor. The current study has been undertaken to observe the living situations of the selected slum dwellers in Vishakhapatnam. The social and demographic background of the respondents showed that about 54 percent were male gender the age-wise classification showed that 34 percent were between the age of 31 to 35 years residing mostly 74 percent were in the nuclear family whereas about 60 percent were married sample households and their educational qualification showed that 45 percent were illiterate due to which around 35 percent were unemployed or housewife and others were According to information on the living circumstances of the slum

dwellers who were chosen, 67% of them resided in semi-pucca homes, while 52% had two rooms with no flooring. Although 87 percent of families reported not having a separate restroom and 60 percent of households said their floor was made of mud, all the houses had access to enough electricity, and 40 percent of households used kerosene for cooking. The income of the respondents plays a key part in providing the basic necessity and facilities needed for them. When respondents' incomes are high, they are more likely to use basic facilities in their households, and the opposite is also true. Hence, for the sample slum dwellers, there is a relationship between income and basic facilities in their households.

IMPLICATION OF THE STUDY

The study observed the living situations of selected slum dwellers in Vishakhapatnam, providing insights into their social and demographic backgrounds, including gender distribution, age demographics, family structures, marital status, and educational qualifications. Findings revealed substandard living conditions, such as inadequate housing with no flooring and limited access to basic amenities like separate restrooms. These underscored the urgent need for urban slum upgrading initiatives to improve housing infrastructure and sanitation facilities, thereby reducing health disparities and enhancing the well-being of the urban poor. The study also highlighted the crucial role of income in determining access to basic necessities and facilities among slum dwellers, emphasizing the importance of addressing economic inequalities and providing opportunities for income generation. Overall, the study's findings have significant implications for policy formulation and urban development strategies, calling for holistic approaches to promote inclusive growth and improve the quality of life for urban slum dwellers.

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CARBON FOOT PRINT MANAGEMENT FOR SUSTAINABILITY

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ABSTRACT

Global population growth has led to increasing pressure on worldwide natural resources. Man has becoming a victim of his own behavior. Environmental conservation is an integral part of the socio-economic development. The growing populations, high degree of urbanization and steep use in energy use have affected the sustainability of the environment. Today climate change is the big issue. In the present scenario **Carbon Foot Print** is the buzz word. One of the reasons for climate change is global warming due to greenhouse effect. Human beings need to reduce their carbon footprint to save the planet. In order to do so one need to first understand what carbon foot print is? There is a need for the people to adopt ecofriendly best practices by using improved sustainable development methods to reduce carbon emissions which in turn improves the quality of life on earth. Hence the present study was undertaken with one of the objectives of gaining insight into the influence of the term carbon foot print in Environment Management and Conservation. 100 respondents who were working in Bangalore city were selected for the study. Analysis of the data revealed the awareness level of the term carbon foot print and their major role in protecting the planet. The findings of this paper indicate that 82% could not understand the concept of greenhouse gases and its effect on environment. They lack knowledge and awareness about calculating carbon emissions in Indian standards. This can open research avenues in developing an Indian carbon foot print calculator for calculating primary and secondary carbon foot print emissions.

Key Words: Carbon foot print, global warming and sustainability.

INTRODUCTION

Earth pain is becoming humanity's pain. Human beings have consistently ignored the dark side of development and they continue to do so. Earth is our home, and home to all living creatures, has been used ruthlessly and mercilessly and unsustainably. Global population growth has led to increasing pressure on worldwide natural recourses. Man has becoming a victim of his own behavior. Environmental conservation is an integral part of the socio-economic development. The growing populations, high degree of urbanization and steep use in energy use have affected the sustainability of the environment. Today climate change is the big issue. In the present scenario Carbon Foot Print is the buzz word. One of the reasons for climate change is global warming due to greenhouse effect. Human beings need to reduce their carbon footprint to save the planet. In order to do so one need to first understand what carbon foot print is?

'Carbon Foot Print' has become a widely used term and concept in the public debate on responsibility and abatement action against the threat of global climate change. It had a tremendous increase in public appearance over the last few months and years and is now a buzzword widely

used across the media, the government and in the business world. But what exactly is a 'Carbon Foot Print'?

According to Carbon Trust (2007)-"The Carbon Foot Print is the measure of the impact human activities have on the environment in terms of the amount of Greenhouse gases produced measured in tonnes of carbon dioxide.

Shrivastava (2010) debates that the appropriate use of Carbon Foot Prints spread through society like rings in water. The idea put forward is that a carbon footprint is what has been left behind as a result of an organization's activities.

Despite its ubiquitous appearance there seems to be no clear definition of this term and there is still some confusion what it actually means and measures and what unit is to be used. While the term itself is rooted in the language of Ecological Foot printing (Wackernagel 1996), the common baseline is that the carbon footprint stands for a certain amount of gaseous emissions that are relevant to climate change and associated with human production or consumption activities. But this is almost where the commonality ends. There is no consensus on how to measure or quantify a carbon footprint. The spectrum of definitions ranges from direct CO2 emissions to full Life-cycle greenhouse gas emissions and not even the units of measurement are clear.

In a landmark paper published this year titled "A Definition of 'Carbon Foot Print'," Thomas Wiedmann and Jan Minx state that while the term 'Carbon Foot Print' originates in the language of 'Ecological Foot Print', it is a measure of the exclusive total amount of carbon dioxide emission that is directly and indirectly caused by an activity or is accumulated over the life stages of a product. The data which calculates the carbon footprint needs to be relevant, complete, consistent, transparent, and accurate.

On the basis of the level of control which an organization has over the emissions, the greenhouse gas (GHG) emissions can be classified into three main types, namely, the Direct or Scope I emissions (combustion of fuels; most common, also known as the primary carbon footprint), the Electricity or Scope II emissions (not directly controlled; contributes to 17 per cent of the global GHG emissions), and the Indirect emissions from products and services purchased or Scope III emissions (also known as secondary carbon footprint). Scope I and Scope II emissions must be reported while Scope III emission is optional. Also, while making a corporate-wide inventory, small emission-causing activities were discovered. Hence, producing a full carbon footprint covering all the three types of emissions can be quite a complex task.

A Carbon Foot Print is ways to measure the impact of your personal activities have on the environment. Things like driving, electricity use, the food you choose to eat and the products you buy can all have an impact on your Carbon Foot Print. Any activity that burns fossil fuels and/or emits greenhouse gases will contribute to your carbon footprint.

Many of these questions have been discussed in the disciplines of ecological economics and lifecycle assessment for many years and therefore some answers are at hand. So far, however, they have not been applied to the term carbon footprint and thus a clear definition is currently missing. This report addresses the questions above and attempts a clarification. In literature overview,

propose a working definition of the term 'carbon footprint' and discuss methodological implications is a need of the day.

A good practice to use, whether you calculate your carbon footprint or not, is to be more questions that need to be asked are: Should the carbon footprint include just carbon dioxide (CO2) emissions or other greenhouse gas emissions as well, e.g. methane? Should it be restricted to carbon-based gases or can it include substances that don't have carbon in their molecule, e.g. N2O, another powerful greenhouse gas? One could even go as far as asking whether the carbon footprint should be restricted to substances with greenhouse warming potential at all. After all, there are gaseous emissions such as carbon monoxide (CO) that is based on carbon and relevant to the environment and health. What's more, CO can be converted into CO2 through chemical processes in the atmosphere. Also, should the measures include all sources of emissions, including those that do not stem from fossil fuels, e.g. CO2 emissions from soils?

A very central question is whether the carbon footprint needs to include indirect emissions embodied in upstream production processes or whether it is sufficient to look at just the direct, onsite emissions of the product, process or person under consideration. In other words, should the Carbon Foot Print reflect all life-cycle impacts of goods and services used? If yes, where should the boundary be drawn and how can these impacts be quantified? Finally, the term 'Foot Print' seems to suggest a measurement (expression) in area-based units. After all, a linguistically close relative, the 'Ecological Foot Print' is expressed (measured) in hectares or 'global hectares'. This question, however, has even more far-reaching Implications as it goes down to the very decision whether the carbon footprint should be a mere 'pressure' indicator expressing (just) the amount of carbon emissions (measured e.g. in tonnes) or whether it should indicate a (mid-point) impact, quantified in tonnes of CO2 equivalents (t CO2-eq.) if the impact is global warming potential, or in an area-Based unit if the impact is 'land appropriation'.

Keeping this Background an attempt was made to study the awareness of the term Carbon foot print and their role in planet protection through carbon foot print management. A Study was conducted to find out the awareness level on the term Carbon Footprint and the individual contribution in protecting the environment by reducing the carbon emissions. 100 respondents who were working in various professions in Bangalore City were selected with purposive sampling method.

AIM OF THE STUDY

To study the awareness of Carbon Foot Print and individual role in planet protection through Carbon Foot Print management.

OBJECTIVES

To study the awareness of Carbon Foot Print.

To find out the role of individual in planet protection through Carbon Foot Print management.

METHODOLOGY

Variables:

Dependent variable considered being awareness of Carbon Foot Print, recycling of waste.

Independent variables selected were age, gender and education.

Further the association is measured between age, gender and education level of the respondents on awareness of Carbon Foot Print

Development of Tools and Data Collection:

Background information on age, type of family, family size, education and income of the respondents were gathered. Carbon Foot Print Awareness and Knowledge level were recorded. Structural schedule was prepared respondents. Information was also sought and recorded on their contribution in preserving environment. The questionnaires were administered and their data was collected, tabulated, analyzed and interpreted using chi-square tests.

Limitation of the study:

The sample size is restricted to 100 respondents who were working in Bangalore city in various professions.

RESULTS AND DISCUSSIONS

Table-1. Classification of Respondents by Age, Sex and Education

Characteristics	Category	Percentage of Respondents (n=100)
Age (Years)	21-30	28.0
	31-40	22.0
	41-50	28.0
	51-60	22.0
Gender	Male	47.0
	Female	53.0
Education	Degree	52.0
	PG	21.0
	Ph.D.	27.0
Total		100

Table-1 depicts the classification of the respondents by age, gender and education. The results indicate that 28% of the respondents belonged to the age group of 21-30 years and 41-50 years, and 22% belonged to 31-40 and 51-60 years respectively. With regard to Gender perspective about 53% were females and the rest 47% of them were males.

It is evident from the table that most of the respondents (53%) were graduates, 21% were post graduates and 27% were doctorates.

Table-2 Awareness of the Respondents about Carbon Foot Print

Characteristics	**Percentage of Respondents (n=100)**
Aware of the term Carbon Foot Print	60
Interested to know about Carbon Foot Print	100
Aware of ways to reduce Carbon Foot Print	57
Not aware of the concept of Green House Gases	82

Table -2 depicts the classification of various aspects on awareness of carbon foot print .it is evident from the table that the 60 % of the respondents were aware of the term carbon foot print through newspapers, television, internet and journals and 40% of the respondents were not aware of the term carbon foot print.

The 60% of the respondents who were aware of the tern carbon footprint through various media also expressed lack of scientific knowledge in depth the respondents were not able to manage carbon emissions and cent percent of the respondents indicated they would like to know about carbon footprint.

57% of the respondents, they were environment conscious and were using energy saving devices and adopted fuel efficiency. However, the results indicate that 82% could not understand the concept of greenhouse gases and its effect on environment.

Table-3 Awareness of Respondents about Carbon Foot Print

Characteristics	**Category**	**Percentage of Respondents(n=100)**
Carbon a significant contributor to Global warming	Yes	100
Major role in Protecting the Planet	Yes	83
Total		100

Table-3 shows the classification of aspects with regard to awareness of Carbon Foot Print. Carbon being a significant contributor to Global Warming, it is observed from the results that cent percent of the respondents were aware of carbon is the significant contributor to Global Warming. With regard to response on major role in protecting the planet the results indicate that majority of the

respondents (83%) gave positive response in taking care of the Mother Earth, which is very interesting to note.

Table-4 Association between Age Group and Response on Awareness of Carbon Foot Print

Age Group	Response on Awareness of Term Carbon Foot Print					Chi-Square Value
	Yes		No		Total	
	No	%	No	%		
21-40	28	59.6	19	40.4	100	0.01^{NS}
41-60	32	60.4	21	39.6	100	
Combined	60	60.0	40	40	100	

NS: Non-Significant X2 (0.05 1df) =3.841

From Table-4 it is evident that most of the respondents belonging to the age group of 41-60 years and 21-40 years were aware of the term carbon foot print (60.4%) and (59.6%) respectively.39.6% and 40.4% of the respondents belonging to the age group stated that they were not aware of the term Carbon foot print. It is interesting to note that 60% of the respondents who were aware of and the remaining 40% who were not aware of carbon foot print expressed that they lack knowledge about carbon foot print management. However, the result indicated in the statistical Chi-Square test found to be non-significant (0.01^{NS}). Therefore, the association between age groups and the awareness of carbon foot print found to be Non-significant

Table-5 Association between Gender and Response on Awareness of Carbon Foot Print

Gender	Response on Awareness of Term Carbon Foot Print					Chi-Square
	Yes		No		Total	
	No	%	No	%		
Male	29	55.8	23	44.2	100	1.67^{NS}
Female	12	57.1	9	42.9	100	
Combined	60	60.0	40	40	100	

NS: Non-Significant X2 (0.05 1df) =3.841

From Table-5 it is evident from the table that 57.1% of female respondents and 55.8% of male respondents indicated they were aware of the term Carbon foot print and 44.2% of male

respondents and 42.9% of female respondents indicated they were not aware of the term carbon foot print. However, the statistical Chi-Square test result found to be non-significant (0.01^{NS}). Therefore, the association between gender and the awareness of carbon foot print found to be Non-significant.

Table-6 Association between Education Level and Response on Awareness of Carbon Foot Print

Education Level	Response on Awareness of Term Carbon Foot Print					Chi-Square
	Yes		No		Total	
	No	%	No	%		
Degree	29	55.8	23	44.2	100	1.67^{NS}
PG	12	57.1	9	42.9	100	
Ph.D.	19	70.4	8	29.6	100	
Combined	60	60.0	40	40.0	100	

NS: Non-Significant X2 (0.05 2df) =5.991

It is revealed from table-6 that 55.8% of the graduates 57.1% of the post graduates and 70.4% of the doctorates revealed that they were aware of the term Carbon foot print and 44.2% graduates and 42.9% of post graduates and29.6%doctorate respondents indicated that they were not aware of the term carbon foot print. However, the statistical Chi-Square test result found to be non-significant (1.67^{NS}). Therefore, the association between education level and the awareness of carbon foot print found to be Non-significant.

Table-7 Classification of respondents by Recycle of Waste

Characteristics	Category	Respondents	
		No	%
Rubbish Collects at home	1Kg	49	49.0
	2Kgs	40	40.0
	3+Kgs	11	11.0
Segregates Bio and non-biodegradable waste	Yes	36	36.0
	No	64	64.0
Recycling daily wastes at home	Yes	31	31.0
	No	69	69.0
Total		100	100.0

From Table-7 the results revealed that 49%, 40% and 11% of the respondents stated that their daily rubbish will be collected about 1Kg, 2Kgs and 3+Kgs respectively. With regard to Segregation of

Bio and non-biodegradable waste most of the respondents (64%) indicated that they do not segregate the waste and 36% of the respondents segregate the waste. Most of the respondents (69%) stated that they did not recycle, whereas, 31% of the respondents do recycling of waste at home.

Table-8 Association between Education Level and Recycle of Wastes at Home

Educational Level	Recycling Daily Wastes at Home						X2 value
	Yes		No		Total		
	No	%	No	%	No	%	
Degree	17	32.7	35	67.6	52	100.0	0.45^{NS}
PG	7	33.3	14	66.7	21	100.0	
PhD	7	25.9	20	74.1	27	100.0	
Combined	31	31.0	69	69.0	100	100.0	

NS: Non-Significant X2 (0.05 2df) =5.991

From table-8 it is observed that the 37.7% of the graduates, 33.3% of Post Graduates and 25.9%of Doctorates were recycled their daily wastes, whereas, 67.6% of graduates 66.7% of Post graduates and74.1%of doctorates did not recycled wastes at home due to lack of knowledge to do it. The respondent's association between education level and recycle of wastes at home found to be non-significant.

CONCLUSION

The respondents are confronted the spread of Carbon Foot Print knowledge dissemination, this will help them more in practicing environmental best practices for sustaining the environment. The respondents need to make aware of Carbon emissions for each activity with standardized tool. For creating awareness about Carbon foot print and its management for protecting the environment simpler and effective education modules, tools and strategies to be developed. This awareness will definitely help people to become more conscious about activities that affect the environment. Thereby it reduces the burden on mother earth and preserves environment for today and also for future generation. The findings of this paper indicate lack of knowledge and awareness about calculating carbon emissions in Indian standards.

IMPLICATIONS

This can open research avenues in developing an Indian Carbon Foot Print calculator for calculating primary and secondary Carbon Foot Print emissions.

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MUSCULOSKELETAL DISCOMFORTS EXPERIENCED BY THE ROSE FARM WORKERS OF VADODARA DISTRICT

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ABSTRACT

In comparison to other flowering plants, rose cultivation has grown its importance due to its high demand to gain a good profit. The rose farm workers perform abundant labour-intensive jobs and repetitive tasks; therefore, workers experience musculoskeletal discomfort which has an impact on their health and productivity. Therefore, to assess musculoskeletal discomforts experienced by the rose farm workers, the present study was undertaken. Descriptive research design was adopted and 60 Rose farm workers were chosen as a sample using purposive sampling technique. The data were collected by pre-tested and pre-validated structure Interview Schedule and observation sheet. Study concluded that, the respondents experienced more discomfort in upper body parts (upper back, lower back, mid-back, neck, right wrist, right palm, left shoulder and right shoulder) in comparison to lower body parts (right foot, left foot and buttock). This could be due to the adopted standing and forward bending posture for plucking, gathering and heaping of the rose crops. Whereas, severity of body discomfort in the right wrist and right palm might be due to plucking of the rose with the right hand and discomfort in the neck and shoulder might be due to carrying the rose collecting bag.

Keywords: rose farm, workers, musculoskeletal disorders, coping strategy

INTRODUCTION

Flowers and ornamental plants have always been an important part of the social fabric of human life since prehistoric times. Flowers and plants are grown for a variety of purposes, including home decoration, fragrance, perfumes, and medicine. As a result, floriculture can be described as a primitive farm activity with enormous potential for generating remunerative self-employment among small and marginal farmers. Although India has a long tradition of floriculture, the social and economic aspects of flower growing were only recently recognised. Roses are among the flowers that are propagated as both ornamental and commercial plants. In comparison to other flowering plants, rose cultivation has grown its importance in the modern era. As a result, farm workers are eager to invest in rose cultivation due to its high demand to gain a good amount of profit.

The Rose farm workers of floriculture Industry performs abundant labour-intensive jobs such as land preparation, removing of stalks and stubbles, levelling, compartment, preparation of channels for irrigation, digging of Rose crop into land, manuring, weeding of Rose crop, pruning and budding,

spraying pesticides on Rose crop and lastly, harvesting the Rose in which Rose farm workers are involving in the task of plucking, gathering, heaping of the Rose crop. Due to physical strain and repetitive tasks, workers experience musculoskeletal discomfort, which has an impact on their health and productivity. Plucking, heaping, and gathering Rose flowers is thought to be the most arduous task in a rose farm. Workers must maintain a bent posture with their backs to the ground while performing this task, which can cause severe pain in their backbone, leg, thigh, and feet.

During the review of literature, it was found that various studies are done focusing on research areas such as "Production Technology of Rose in Greenhouse" (Kumari and Choudhary,2014), "Assessment of Drudgery in Rose Cultivation among Farmers of Rajsamand District" (Sharma, 2016),"Assessment of Musculoskeletal Disorder and Occupational Hazard carried out by flower plucking women engaged in Floriculture in Faizabad District of Uttar Pradesh" (Mishra and Singh,2017), etc. However, a dearth was found in researches done on musculoskeletal discomforts experienced by the Rose farm workers of the floriculture industry of Gujarat. Vadodara being the second major district involved in cultivation of Rose, the present research study aims to assess the Musculoskeletal Discomforts experienced by the Rose farm workers of Vadodara district in Gujarat.

Statement of problem

To assess the musculoskeletal discomforts experienced by rose farm workers of Vadodara district during the rose harvesting process.

OBJECTIVES

1. To collect demographic information of the rose farm workers engaged in rose harvesting of selected rose farms of Vadodara district.
2. To assess musculoskeletal discomforts experienced by the rose farm workers during the rose harvesting process.
3. To assess the cause and suggest the coping strategies to overcome musculoskeletal discomforts experienced by the rose farm workers.

Delimitation of the study

1. The present study was limited to the selected Kashmiri rose farms of Vadodara districts having a minimum of ten farm workers engaged in rose harvesting process.
2. The present study was limited to those rose farm workers who were above 18 years of age, physically and mentally normal and were willing to participate in the research study.

METHODOLOGY

For the present study, descriptive research design was adopted. The study was conducted among the 60 male and female rose farm workers of Vadodara district, who are engaged in the rose harvesting process including plucking, gathering and heaping and had minimum two years of experience with the same crop. For the present study, purposive sampling technique was used for the selection of

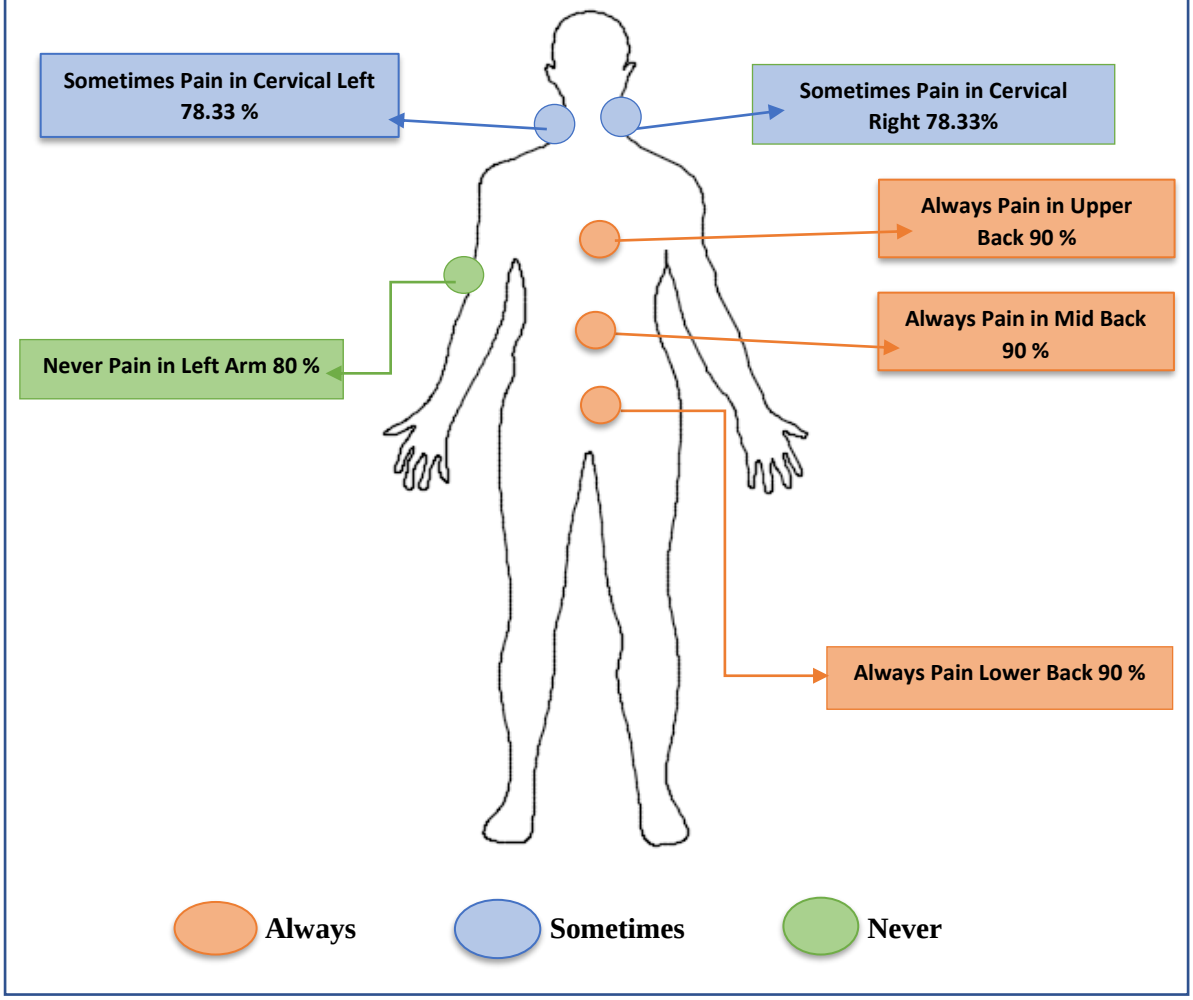
rose farm and rose farm workers. Out of the five major rose-growing districts in Gujarat, Vadodara was selected for the first stage of the process because it has the largest numbers of Kashmiri rose farms. The second stage involved selecting Kashmiri rose farms in the Vadodara district that had at least ten farm workers engaged in the rose harvesting process and at least 70 kg of rose crop production per day. Only workers over the age of 18, with at least two years of experience with the same crop, who were physically and mentally, and especially females who were not in the pregnancy stage, were chosen to participate in the research study. The information was gathered using pre-tested and pre-validated structured interview schedule and observation sheet. The Extent of Frequency and Severity of Body Pain was measured through Psychophysical Corlett and Bishop's Body Part Discomfort Standardized Scale (1976). Collected data were analysed by applying descriptive statistics viz. frequency, percentage, mean and standard deviation.

FINDINGS AND DISCUSSION

The present study revealed that, more than three-fourth (76.67%) of the respondents were males with their mean age of 39 years. 80% of the respondents were from a nuclear family. 91.67% of the respondents had 2- 6 years of work experience in the field of Rose harvesting and their mean family monthly income was ₹9500. None of the respondents had medical-related health problem like Diabetes, Hypertension, Joint Pain, Back Pain, Respiratory Problem, Arthritis, Tendencies, and women are also not pregnant. The sizes of the Rose farm ranged between 1.2 to 1.6 Acres (land area). Less than one- half (46.67%) of the respondents worked in Rose farms having production of Rose crops approximately up to 101-131 kgs. per day.

- **Musculoskeletal discomfort experienced by the respondents in upper body and lower body parts during rose harvesting process (plucking, gathering and heaping).**
  After the study, it was observed that, majority of the respondents always experienced pain in the upper back (90%), mid-back (90%), lower back (90%), neck (78.33%) and right wrist (78.33%). While, more than half i.e; 68.33% and 66.67% of the respondents always experienced pain in right palm and both the shoulders respectively. Whereas, the majority of the respondents experienced pain sometimes in clavicle left and clavicle right, slightly more than half of the respondent reported about pain in right forearm (55%). However, majority of the responded revealed no pain in left arm (80%), left forearm (75.00%), left elbow (71.67%), left wrist (71.67%) and left palm (71.67%). Therefore, it could be concluded that out of 18 upper body parts, almost (90%) all the respondents always experienced pain in the upper back and lower back **(figure 1).**

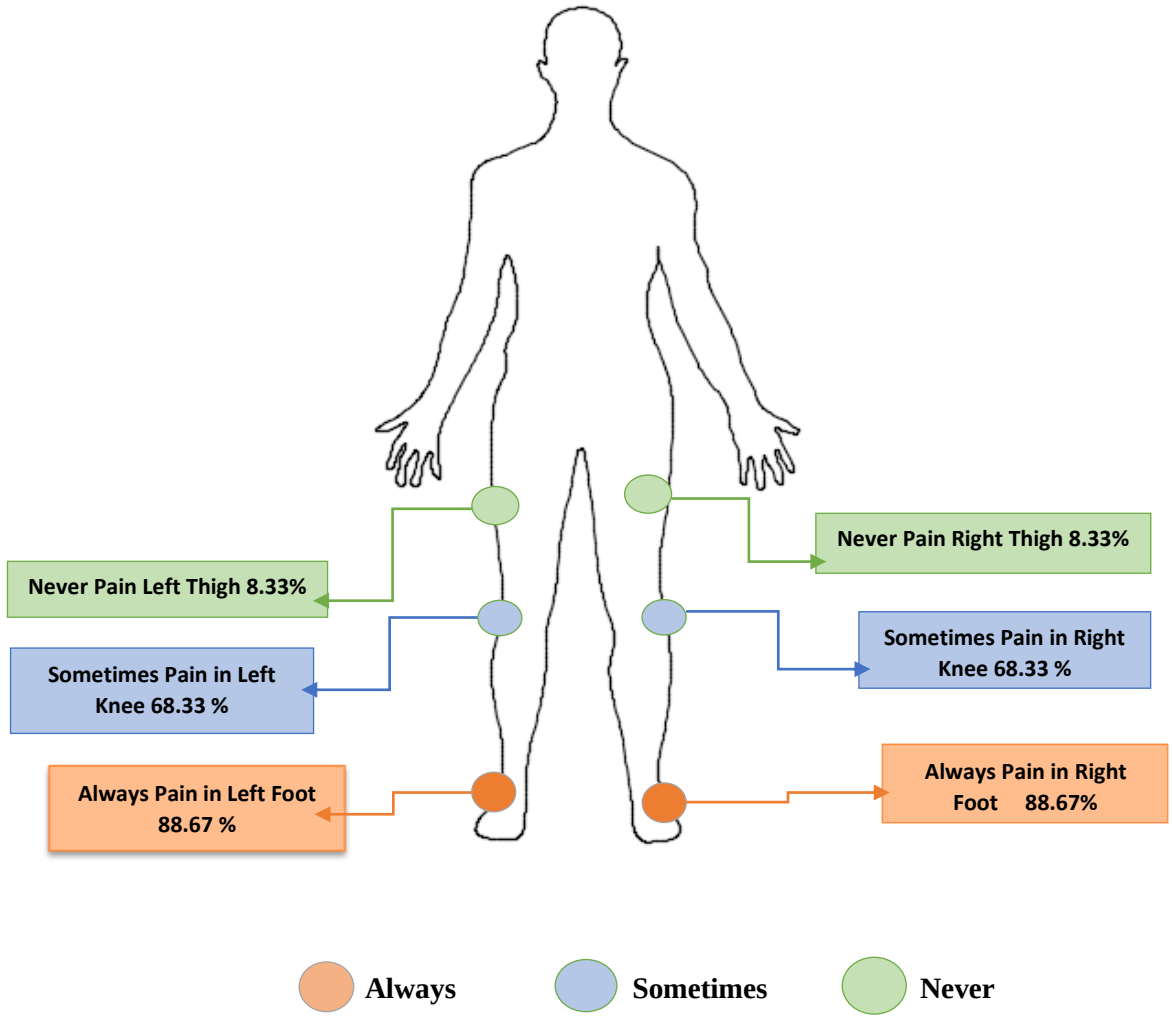
Fig 1: frequency of body discomforts experienced by the rose farm workers in upper body parts during rose harvesting process.



The results revealed that more than one half (63.33%) of the respondents always experienced discomfort in the upper body parts, little less than one third (28.33%) of the respondents sometimes experienced discomfort in the upper body parts and little less than the tenth (8.33 %) of the respondents never experienced discomfort in the upper body parts.

Again, **figure 2** depicts that, majority of the respondents always experienced pain in left foot (88.67%), right foot (88.67%) and buttock (85%). Whereas, more than half of the respondents experienced pain sometimes in left knee (68.33%), right knee (68.33%), left leg (66.67%), right leg (66.67%) and little less than two-thirds (61.67%) respondents in the left thigh and right thigh. However, 8.33 per cent of the respondents had never experienced pain in right and left thigh.
It revealed that half (50%) of the respondents sometimes experienced discomfort in lower body parts and slightly less than half (41.67%) of the respondents had always experienced discomfort in lower body parts. Whereas, very few (8.33%) respondents never experienced discomfort in lower body parts.

Fig 2: Frequency of body discomforts experienced by the rose farm workers in lower body parts during rose harvesting process (plucking, gathering and heaping).



- **The extent of body discomfort (based on the severity of pain) experienced by the respondents in upper and lower body parts during rose harvesting process**

Figure 3 shows that, more than two-fifth of the respondents had very severe pain in the upper back (43.33 %), mid-back (43.33 %), lower back (43.33 %), neck (41.67%) and right wrist (41.67%). Whereas, more than one-half of the respondents had severe pain in the upper back (53.33%), mid-back (53.33%), lower back (53.33%) neck (53.33%) and more than two-fifth of the respondents in the right wrist (48.33%), cervical left (45 %), cervical right (45%) left shoulder (43.33%) and right shoulder(43.33%) respectively.

Again, more than one-half of the respondents had moderate pain in the right forearm (56.67%), cervical left (53.33%), cervical right (53.33%), less than one-half of the respondents in right arm (46.67%) and right elbow (43.33%). However, ten per cent of respondents had mild pain in the right forearm, and the majority of the respondents reported that they had no pain in the left arm (96.67%), left forearm (93.33%), left elbow (91.67%), left wrist (91.67%) and left palm (91.67%).

Fig 3: Extent of body pain (measured through the severity of pain) experienced by the respondents in upper body parts during rose harvesting process

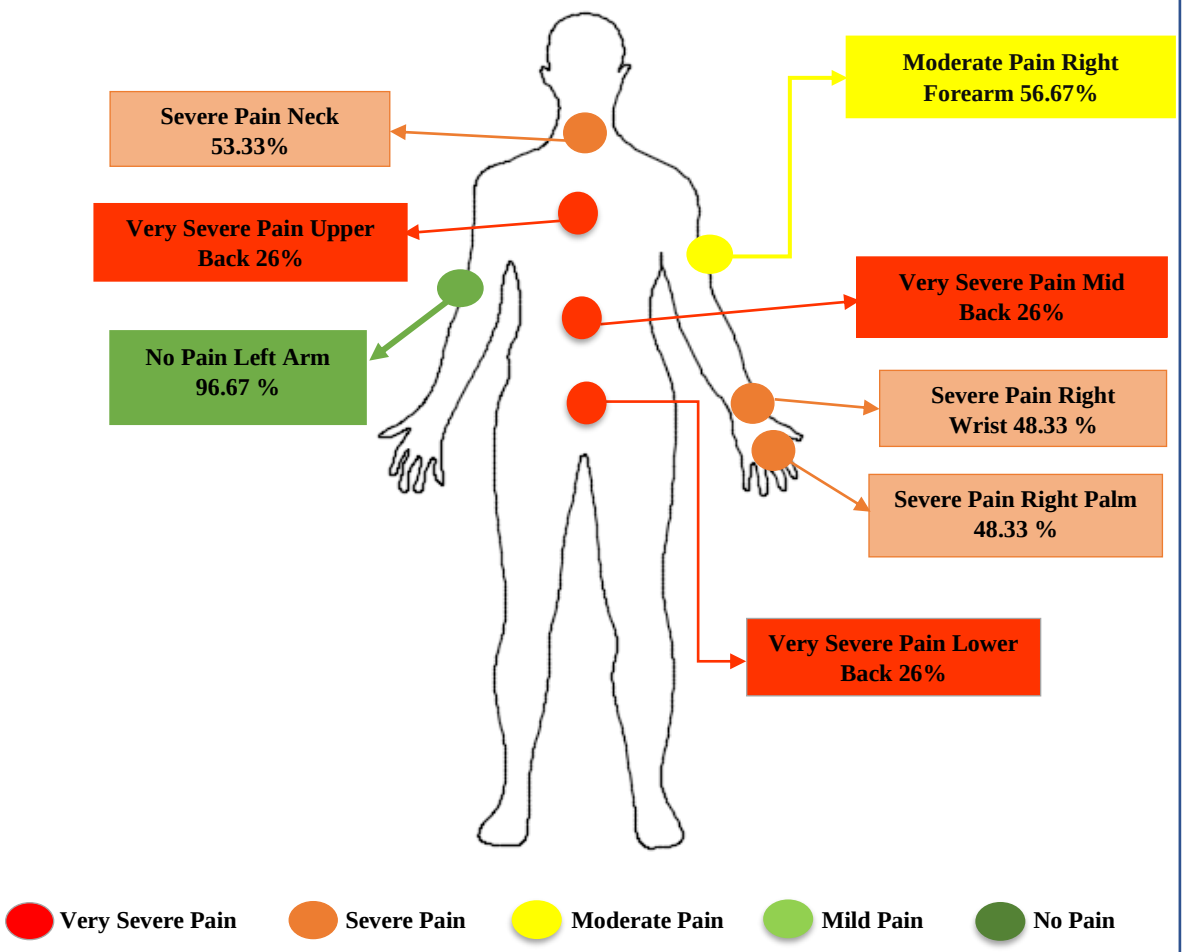


Table 1: Overall distribution of the respondents according to the extent of body discomfort experienced in upper body parts

Sr. No	The extent of body discomfort scale	Range of score	Respondents (n=60)	
			f	%
1	Discomfort to Great Extent	76-90	13	21.67
2	Discomfort to High Extent	61-75	24	40.00
3	Discomfort to Moderate Extent	48-60	16	26.67
4	Discomfort to Low Extent	33-47	2	3.33
5	Discomfort to No Extent	18-32	5	8.33

According to **table 1**, it can be said that, less than half (40.00%) of the respondents experienced high extent of discomfort in upper body parts during rose harvesting process.

- **The extent of body discomfort (measured through the severity of pain) experienced by respondents in lower body parts during rose harvesting process**

As shown in **figure 4**, respondents experienced very severe pain in left foot (53.33%), right foot (53.33%), buttock (51.67%). Whereas, more than one-half of the respondents experienced severe pain in left leg (56.67%), right leg (56.67%), left knee (53.33%), right knee (53.33%) and less than one half (46.67%) of the respondents in the left foot and right foot. However, majority has experienced moderate pain in the left thigh (75%) and right thigh (73.33%).

Fig 4: Extent of body pain experienced by the respondents in lower body parts

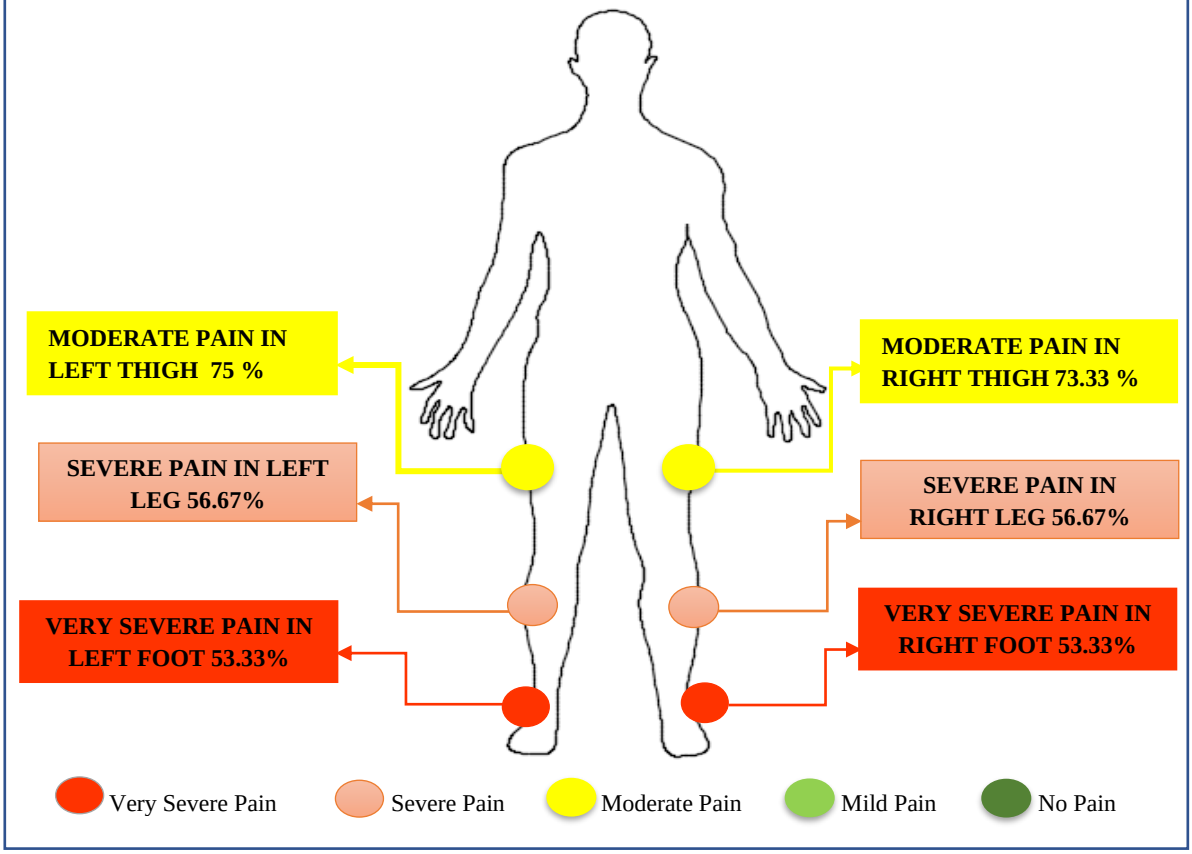


Table 2: Overall distribution of the respondents according to extent of body discomfort experienced by them in lower body parts

Sr. No	The extent of body discomfort scale	Range score	Respondents (n=60)	
			f	%
1	Discomfort to Great Extent	34 - 45	19	31.67
2	Discomfort to High Extent	30 - 37	25	41.67
3	Discomfort to Moderate Extent	25 - 29	16	26.67
4	Discomfort to Low Extent	17 - 24	2	3.33
5	Discomfort to No Extent	9 - 16	5	8.33

Table 2, it revealed that less than half (41.67%) of the respondents experienced discomfort in lower body parts at the higher extent.

Table 3: Overall extent of frequency and severity of body discomfort experienced by the rose farm workers during rose harvesting process according to the weighted mean score

Body parts	Frequency index weighted mean score (3-1)	Severity index weighted mean score (5-1)
Upper body Parts		
1. Upper Back	2.9	4.4
2. Lower Back	2.9	4.4
3. Mid Back	2.88	4.4
4. Neck	2.78	4.36
5. Right Wrist	2.76	4.31
6. Right Palm	2.66	4.23
7. Left Shoulder	2.66	4.23
8. Right Shoulder	2.66	4.23
9. Right Arm	2.6	3.73
10. Right Elbow	2.61	3.73
11. Right Forearm	2.41	3.66
12. Clavicle Left	2.21	3.43
13. Clavicle Right	2.21	3.43
14. Left Palm	1.28	1.16
15. Left Wrist	1.28	1.16
16. Left Elbow	1.28	1.16
17. Left Forearm	1.25	1.13
18. Left Arm	1.2	1.06
Lower body Parts		
19. Left Foot	2.88	4.5
20. Right Foot	2.88	4.5
21. Buttock	2.85	4.48
22. Left leg	2.33	3.75
23. Right Leg	2.33	3.75
24. Left knee	2.31	3.66
25. Right Knee	2.31	3.66

26. Left Thigh	2.21	3.25
27. Right Thigh	2.21	3.25

The **table 3**, represent the frequency and severity of body discomfort experienced by the respondents in their upper and lower body parts during Rose harvesting process. It can be observed that amongst the upper body parts, the frequency of body discomfort was highest in the upper and mid-back with weighted mean score 2.9 respectively and in the lower back with weighted mean 2.88. The second-highest frequency of pain was experienced in the neck with weighted mean 2.78 and in right wrist with weighted mean 2.76 followed with right palm, left and right shoulder with weighted mean 2.66. Similarly, amongst the lower body parts the frequency of body discomfort was high in Right and left foot with weighted mean 2.88 respectively and in the buttock with weighted mean 2.85.

Subsequently, about the severity of pain experienced by the respondents in their upper and lower body parts during Rose harvesting process, it can be observed that amongst the upper body parts the severity of body discomfort was highest in the upper back, mid-back and lower back with weighted mean 4.4. The second highest severity of body pain was observed in the neck with weighted mean 4.36 and right wrist with the weighted mean 4.31 followed with severe pain in the right palm, left and right shoulder with weighted mean 4.23 respectively. Similarly, amongst the lower body parts, the frequency of body discomfort was seen high in right and left foot with weighted mean 4.5 respectively and in the buttock with weighted mean 4.48.

- **Suggested coping strategies**

Need-based coping strategies were suggested based on frequency and severity of musculoskeletal discomfort experienced by the rose farm workers during rose harvesting process in various upper and lower body parts due to time spent on the rose harvesting process, distance travelled during the rose harvesting process, the quantity of rose harvested, frequency of repetitive task (plucking, gathering and heaping).

1. It was observed that majority of the respondents experienced high frequency and severity of musculoskeletal discomfort in the right wrist, and right palm which may due to the continuous repetition of plucking, gathering and heaping of the rose crops by adopting standing and forward bending posture with no rest-pause. Therefore, it is suggested that farmers should adopt the 2 feet long rose pruner available in the market to reduce pain in right wrist and right palm while rose harvesting. Additionally, the rose pruner will help the farmers to reduce upper back pain, mid-

back pain and lower back pain because the farmer will not have to bend forward for plucking rose while using rose pruner during rose harvesting process.

Plate 1: Rose pruner to reduce pain in wrist and palm while rose harvesting

Regarding frequency and severity of musculoskeletal discomfort in neck, right and left shoulder, right wrist and palm. It was observed that during rose harvesting process the farmers hang rose gathering bag on their neck for long duration and also bend forward for plucking the rose. Therefore, it is suggested that farmers should adopt rose collecting trolley to reduce the neck and shoulder pain during rose harvesting. The rose collecting trolley would also help the farmers to reduce their walking distance as more quantity of roses can be harvested in a trip as compared to rose collecting bag which as a result will prevent the farmers to walk for heaping of roses. Consequently, it will benefit the farmers in increasing productivity as they will be able to collect more roses at the same working hours.

Plate 2: Use of flower collecting trolley

2. It was observed that majority of the respondents had on musculoskeletal discomfort in lower body parts viz; foot and legs due to the time duration taken, and distance covered during each trip. Therefore, it is suggested that farmers should adopt farming boots to reduce foot and leg pain during the rose harvesting process

Plate 3: Use of farming boots to reduce Foot and leg pain during the Rose harvesting process

CONCLUSION

The study can be concluded that, out of 18 upper body parts, 90% of the respondents always experienced pain in the upper back and lower back with the weighted mean score 2.9 respectively. Subsequently, almost all the respondent always experienced pain in the mid-back with the weighted mean score of 2.88 and majority of the respondents always experienced pain in the neck with 2.78 weighted mean score and right wrist with 2.76 weighted mean scores.

Thus, it can be said that, respondents experienced more discomfort in upper body parts (upper back, lower back, mid-back, neck, right wrist, right palm, left shoulder and right shoulder) in comparison to lower body parts (viz; right foot, left foot and buttock). This could be due to the adopted standing and forward bending posture for plucking, gathering and heaping of the Rose crops. Whereas, the frequency and severity of body discomfort in the right wrist and right palm might be due to plucking of the Rose with the right hand and the frequency and severity of body discomfort in the neck and left and right shoulder might be due to carrying the Rose collecting bag on their neck.

To reduce musculoskeletal discomfort in the right wrist and right palm which may due to the continuous repetition of plucking, gathering and heaping of the rose crops, it is suggested that farmers should adopt 2-feet long rose pruner; to minimize discomfort in neck, shoulder, right wrist and palm, it is suggested that farmers should adopt rose collecting trolley; again, to reduce discomfort in foot and legs due to standing for long run, it is suggested that farmers should adopt farming boots.

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AWARENESS PROGRAMME ON ENVIRONMENTAL HYGIENE AMONG SELECTED RURAL WOMEN

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ABSTRACT

As most of India lives in a state of poverty concentrated in rural areas, environmental hygiene, and safety are of utmost importance and urgency to ensure that there is a reduction in the prevalence of NCDs (non-communicable diseases). However, research regarding the awareness of environmental hygiene in rural India is highly limited, due to which the present study seeks to bridge this gap and create awareness among the rural population. A lack of studies also reports on the effects of environmental hygiene interventions on the knowledge, attitudes, and practices of women residing in rural Tamil Nadu. Therefore, the present study aims to assess the environmental hygiene in the Eazhu Nagar Kudiiruppu, Kandanchavadi, and to create awareness of the environmental hygiene programme among the rural women in the selected area. For this study, a total of 500 women were selected through purposive sampling. The interview-cum-observation method was selected as a tool. A five-day intensive environmental hygiene awareness programme was conducted with selected women. The study deals with analyzing the relationship between socio-demographic profile and prevailing environmental practices and assessing the comparison and relationship of knowledge, attitude, and practice of selected women on environmental hygiene before and after the awareness programme. The study finds that the level of awareness is the most influential factor and has a significant positive relationship with environmental hygiene. Thus, the awareness programme and related education services towards proper and good sanitation practices are a pressing need to promote a hygienic environment.

Keywords: Awareness Programme, Environment, Households, Health, Hygiene, Sanitation

INTRODUCTION

Homes are built to shelter individuals from physical, biological, and chemical hazards. However, in less developed nations, housing situations may be compromised due to poverty, a lack of resources, and harsh living conditions. Housing sanitation refers to the security and sanitation of the shelters where individuals live. Many individuals in rural areas continue to live in huts or houses made of materials lacking stability, water, electricity, or sanitation. Consecutively, they are exposed to an unhealthy environment, external dangers, and harsh weather conditions. As

individuals spend most of their time at home, housing sanitation is a primary concern for public health initiatives. It is essential for multiple dimensions of well-being and healthy living. In rural areas, the number of household members negatively influences usage and accessibility to latrines, depending on the household head's education, age, and gender. Water access and supply also determine the access to latrines (De, 2018)

Waste management is crucial to environmental hygiene maintenance as it produces renewable energy and compost following the pre-treatment of organic and combustible waste products. Waste output is also lessened through segregation and recycling. Landfilling of waste should be discouraged because of the large amounts of organic waste it yields, further accounting for possible environmental emissions (Singh et al., 2018). In most rural areas of India, there is an improper method of hygienically collecting and transporting solid waste. Considering that most live in a state of poverty, the Indian government is making initiatives to directly target the issue of solid waste management (Parmar and Pamnani, 2018). This highlights the need for continuous monitoring of rural areas and health studies to facilitate an understanding of alleviating the negative impacts of ambient air pollution on the rural population (Karambelas et al., 2018). However, outdoor air pollution has also been reported to be the same in non-urban and urban areas of India (Fangget et al., 2020).

Children and pregnant women are at greater risk of health problems due to pollution. In society, women are strongly associated with being the primary caretakers of their household in terms of the health of their family, household chores, and cooking. With this fundamental role in the household comes the need for awareness regarding environmental health, sanitation, and hygiene to ensure that the daily practices of women are not compromising the health of their families. (Bungau et al., 2019) In addition, the environmental health knowledge, awareness, and practices of women are inclined to be passed down to their children through teachings, enabling a coming generation of children equipped with a strong understanding of healthy sanitation and hygiene practices. However, in rural areas, limited primary care facilities account for poor awareness among women regarding environmentally caused diseases (Selvam et al., 2019). Also, women and girl children experience menstruation, which, if not given the medical and sanitary attention it needs, may be handled in an unhygienic manner that increases the chances of infection.

Most studies suggest the need for environmental hygiene awareness among the rural population to bring about the necessary changes. Rural women have a relatively low level of awareness due to a lack of exposure and education regarding the same. This awareness can be brought about through environmental hygiene awareness, consisting of camps, education programmes, and informational sessions conducted by health workers. Conducting environmental health awareness campaigns will ensure that the rural population of women will become aware of how to access different healthcare facilities, proper sanitary practices, the importance of clean water, and its essence in reducing the risk of NCDs and improving nutrition status. Therefore, the present study on the **Awareness Programme on Environmental Hygiene among Selected Rural Women"** has been undertaken to create awareness among rural women, which in turn will educate the entire community and lead to improved national development.

OBJECTIVES OF THE STUDY

- To assess the awareness of selected women on the concept of environmental hygiene
- To formulate course content and conduct an environmental hygiene awareness programme
- To evaluate the effectiveness of the environmental hygiene awareness programme conducted

HYPOTHESIS OF THE STUDY

- There is no significant relationship between the demographic profile and the prevailing environmental hygiene practices.
- There is no significant difference in knowledge, attitude, and practices among women on environmental hygiene before and after the awareness programme.

METHODOLOGY

The study was conducted in Eazhu Nagar Kudiirupu, Kandanchavadi. In the selected area, there were 1822 residences on 20 streets, but only 10 streets were selected through the purposive sampling method based on the environmental situation and the need to create awareness. Among the selected 10 streets, 50 households in each street were selected, which constituted a total of 500 households. Women are considered effective change agents for better houses, better environments, and a better economy for the nation; hence, women were the respondents for this study. A total of 500 women were divided into 10 groups; in each group, there were 50 women. The selection of women for the awareness programme was based on their willingness to participate, their interest in preserving nature, and their ability to communicate to the other members in their places what they had learned during the training programme.

The awareness programme was conducted for five days in each group, 3 hours per session, which comes to 60 sessions, for a total period of one year. Various methods and aids were used, and practical exposure was also given with the help of the Panchayat president, subject experts, doctors, and health workers. A structured questionnaire and inventor scale were framed with valid statements on environmental hygiene concepts, which were approved by the subject experts in this field. The approved questionnaire and inventor scale were used to assess the knowledge, attitude, and practices towards environmental hygiene before and after the awareness programme and were statistically assessed through paired t-tests. The schematic representation of the research design is given in Figure 1.

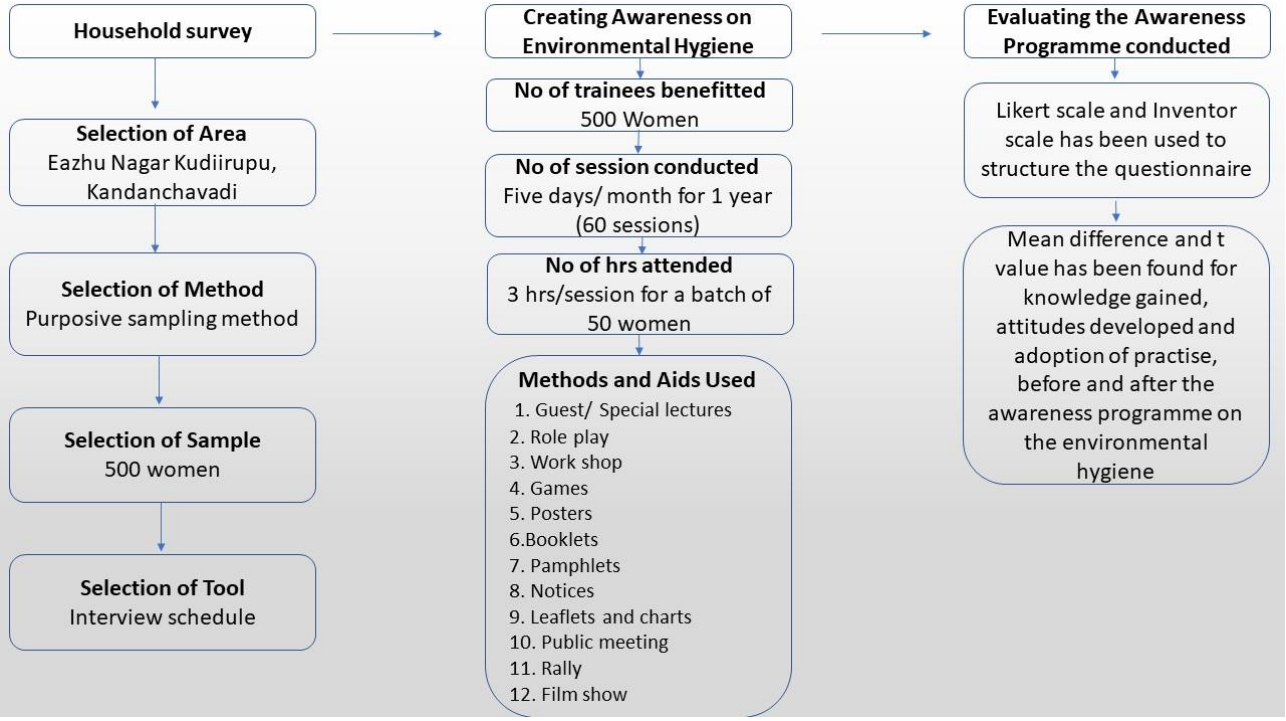

Figure-1 Schematic Representation of the Research Design

FINDINGS AND DISCUSSION

The major findings include: Socio-demographic profiles**,** Prevailing environmental hygiene practices, Relationship between socio-demographic profiles and prevailing environmental hygiene practices and the Comparison of knowledge, attitudes, and practices on environmental hygiene among women before and after the awareness programme

I. Socio demographic profile of the selected women

The details of the socio demographic profile on age, educational qualification, occupational status and monthly income of the selected women are given in Table 1.

Table 1: Socio -demographic profile of the selected women

N=500

Category	Classification	Frequency	%
Age (in years)	21-25	4	1
	26-30	67	13
	31 and above	429	86
Education	Illiterate	189	38
	Primary	30	6
	Secondary	181	36
	High secondary	23	5

	Graduate	40	8
	Post graduate	31	6
	Diploma	6	1
Occupational Status	Agriculture	49	10
	Daily laborer	344	69
	Maid /Cook	32	6
	Self-employed	75	15
Family Income	Rs. ≤ 5,000	103	21
	Rs. 5,001-10,000	283	57
	Rs. 10,001 – Rs.15,000	56	11
	Rs. 15,001 – Rs. 20,000	27	5
	Rs. > 20,001	31	6

Among the selected women, the majority (86 percent) belong to the age group of 31 years and above. Educational backgrounds have an impact on an individual's economic status and lifestyle. Lifestyle changes have effects on health (Mirowsky, 2017). The analysis of the educational status of the women shows that 38 percent of women were illiterate, which shows that women's education status is poor in rural areas, and 36 percent have completed their secondary education. It was clearly stated that 8 and 6 percent were graduates and postgraduates, respectively. Regarding occupation, the majority (69 percent) of the women were working as daily labourers, and it is interesting to note that 15 percent of the respondents were self-employed in areas such as basket making, pottery, fodder collection, retail shops, tailoring, and floriculture. It shows women's empowerment and entrepreneurship.

II Prevailing environmental hygiene practices by the selected women.

The prevailing environmental hygienic practices as expressed by the selected women are given in Table 2.

Table 2: Environmental Hygienic Practices by the Selected Women

N= 500

Prevailing Environmental Hygiene practices	Never		Sometimes		Most of the times		All the time	
	N	%	N	%	N	%	N	%
Burn waste in an open area.	108	22	140	28	82	16	170	34
Dispose of the waste in an open area.	215	43	170	34	75	15	40	8
Dispose of the waste in a community dustbin.	180	36	100	20	100	20	120	24
Separates waste into recyclable and non-recyclable products.	320	64	80	16	60	12	40	8
Difficulties in procuring clean water access	120	24	80	16	135	27	165	33

Prevailing Environmental Hygiene practices	Never		Sometimes		Most of the times		All the time	
Access to clean drinking water	160	32	120	24	100	20	120	24
Access to a toilet at home	80	16	40	8	160	32	220	44
Access to water in the public toilets	190	38	100	20	160	32	50	10
Defecate or urinate in public spaces.	80	16	40	8	160	32	220	44

Out of 500 selected women, 34 percent of the women stated burned the waste all the time in an open area, and 8 percent of them disposed of the waste in an open area. Interestingly, 24 percent of the selected women disposed of the waste only in a community dustbin. Even after many government programmes and training, 64 percent of the women never separated waste from recyclable and non-recyclable products, 33 percent of the selected women faced difficulties procuring clean water, and 24 percent of women were not getting clean drinking water.

Regarding access to toilets at home, 44 percent have the facility, and only 10 percent of the women keep the toilet clean and neat. Defecation or urination in public spaces all the time was reported by 44 percent of the women.

III Relationship between Socio demographic profile and prevailing environmental hygiene practices

The relationship between age, education, occupation and monthly income of the women and environmental hygiene practices are presented in Table 3.

Table 3: Relationship between socio demographic profile and prevailing environmental hygiene practices.

N=500

Socio-demographic Parameters	Age	Education	Occupation	Monthly Income	Prevailing environmental Hygiene Practices
	r and p value				
Age	1	.010 (.626)	.012 (.548)	.015 (.461)	.003 (.899)
Education		1	.309** (.000)	.265** (.000)	.266** (.000)
Occupation			1	.428** (.000)	.008 (.684)
Monthly Income				1	.015 (.461)

Prevailing environmental condition					1

** Significance @ 0.01 level

- **Hypothesis framed:** There is no significant relationship between the socio demographic profile and the prevailing environmental hygiene practices.

Among various socio demographic profiles, only education has been found to have a positive and significant relationship with prevailing environmental hygiene practices ($r = .266$, $p < 0.05$). This indicates that environmental hygiene practices mainly depend on education. Hence, the null hypothesis is rejected. Regarding age, occupation, and monthly income, there is no significant difference; hence, the hypothesis framed is accepted.

It concluded that education is the best tool to practice and safeguard the environment and health of human beings.

IV Comparison of knowledge, attitudes, and practices on environmental hygiene among women before and after the awareness programme.

Knowledge makes it easy to solve the problem, and it helps enhance the ability to think diversely. Attitude is a mental position about a fact or state. Attitude is the basis for everything and determines how we react to adversity, grow and learn, overcome challenges, and create bonds with others. Hence, an inventory scale on knowledge, attitudes, and practices of environmental hygiene was framed, and the respondent's knowledge was analysed before and after the awareness. The comparative analysis of women's knowledge, attitudes, and practices before and after awareness is presented in Table 4.

Table 4: Comparison of knowledge, attitudes and practices on environmental hygiene among women before and after the awareness programme.

N=500

Variable	Before/After	Mean	SD	t value	p value
Knowledge of environmental hygiene	**Before**	4.57	1.602	27.69	0.000**
	After	10.23	4.422		
Attitudes on environmental hygiene	**Before**	30.15	3.663	9.303	0.000**
	After	32.85	5.964		
Practices of environmental hygiene	**Before**	14.26	2.653	20.27	0.000**
	After	23.31	9.976		

** $p<0.01$ level

- **Hypothesis Framed** : There is no significant difference in knowledge, attitude, and practices among women on environmental hygiene before and after the awareness programme.

The result showed a significant difference after the awareness programme (27.96) due to the involvement and keenness of the women to learn and change their environmental practices and also manage environmental hygiene for future generations. These findings are in line with the findings of the study conducted by Sanders et al. (2021).

The findings suggest that enhancing hygienic attitudes may be important in promoting hygienic behaviour among the selected women. A hygienic awareness programme in connection with preventive health examinations might also contribute to activating hygienic-promoting behaviour. Hence, in the aspect of attitude towards hygiene, there was a significant difference (9.303) found after awareness. These findings are in parallel with the study conducted by Gebreeyessus and Adem (2018) in Ethiopia.

In the aspect of practices on environmental hygiene before and after the awareness, there is a significant difference (20.27) since the women realized the importance and role of safeguarding the interior and exterior environment to promote individual, family, community, and overall well-being of the society.Veerapu et al., (2016) also concluded that education awareness is needed to bring about or sustain positive change.

Therefore, the null hypothesis framed is rejected, and there is a significant difference in knowledge, attitude, and practice among women on environmental hygiene before and after the awareness programme

SUMMARY

The study focused on the effectiveness of an awareness programme on environmental hygiene among selected rural women. Out of 500 participants, the majority (86 percent) were aged 31 years and older. Regarding educational status, 38 percent of the women were illiterate, and in terms of occupation, 69 percent were daily laborers. Concerning environmental practices, 34 percent of respondents admitted to burning waste in open areas consistently. Access to toilets at home was reported by 44 percent of participants. Additionally, 53 percent reported crowded living conditions due to infrastructure deficiencies, and 37 percent noted increased disease prevalence due to unclean environments. The analysis revealed that education had a positive and significant relationship with prevailing environmental hygiene practices ($r = 0.266$, $p < 0.05$). Following the awareness programme, there was a significant improvement in attitudes towards hygiene (9.303) and practices related to health and sanitation (20.27). This improvement was attributed to the women's involvement and eagerness to learn and change their environmental practices, thus contributing to individuals

CONCLUSION

The present study concluded that environmental hygiene is a fundamental aspect of ensuring sustainable and healthy living. Emphasizing public awareness and education empowers individuals to make informed choices and contribute to a cleaner environment. Hence, the collective work of government, non-government, institutions, communities, families, and individuals towards creating

awareness of environmental hygiene will pave the way for a brighter, healthier future for the forthcoming generation.

SUGGESTION

- Integrate environmental education into school curriculums to raise awareness among the younger generation and foster environmentally conscious behavior from an early age.
- Educate individuals about maintaining clean and hygienic living spaces, including regular cleaning and disinfection of surfaces and proper waste disposal.
- Establish efficient waste collection and disposal systems to collect garbage regularly from residential areas.
- Government will allocate sufficient funding for environmental clean-up initiatives, conservation efforts, and research on sustainable practices.

FUTURE RESEARCH

- An assessment of personal hygiene among men and children in rural areas
- A study on personal hygiene and sanitary practices among 15–20-year-old adolescent girls
- Effects of Introducing Hygiene Practices in the School Curriculum
- Role of women in enhancing environmental hygiene in rural and urban areas.

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LIFESTYLE RISK FACTORS AND ASSOCIATED DISEASES AMONG SCHOOL TEACHERS OF NORTH-EAST DELHI: A CROSS SECTIONAL STUDY

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ABSTRACT

The burden of diseases such as diabetes, hypertension and cardiovascular conditions is increasing in countries like ours. The main culprit behind this remains lifestyle risk factors, which originate from the wrong choices of living such as dietary pattern, physical activity levels, sleep pattern and alcohol and tobacco consumption. This behaviour is found to be common among teachers as well. Since teachers are the role models for their students and thus may affect the food choices and other lifestyle factors of their students. This is a cross-sectional study to assess the lifestyle risk factors and associated diseases among school teachers. Four schools (2 government and 2 non-government) were purposively selected by convenient sampling. A total of 105 teachers with a mean age of 38.8±9.6 years participated in the study. Their information on socio-demography, history of diabetes and hypertension, anthropometric data such as weight, height, and WC, dietary habits, and physical activity level were collected. Data was statistically analysed using Excel and SPSS version 24. The majority of teachers were females (87.6%). Almost half (48.6%) of the teachers were found to be in the category of obesity stage 1 with a mean of Body Mass Index (BMI)=27.4±5.5 Kg/m^2. About 6.6% of teachers were diabetic and 13.3% were hypertensive. BMI ($p=0.02$) and WC ($p=0.01$) were significantly associated with hypertension. Factors such as weight ($r=0.215$, $p=0.03$); age ($r=0.306$, $p<0.01$), and skipping meals ($r=0.202$, $p=0.04$) were positively associated with the blood pressure of teachers. Dietary inadequacy was evident except for fats and sugar. Higher levels of physical inactivity were seen among female teachers than male teachers ($p<0.01$). Correction of lifestyle risk factors is of prime importance to reduce the burden of diseases and to build a healthy nation. Therefore, awareness and behaviour modification programs focusing on healthy lifestyle habits should be planned to prevent and manage lifestyle diseases among teachers.

Keywords: Lifestyle, Lifestyle risk factors; Metabolic diseases; Teachers

INTRODUCTION

Teachers constitute a significant and indispensable workforce, shaping the development of any society (Toropova et al., 2021). They play a pivotal role in nurturing young minds, and creativity, and fostering academic excellence (Soh et al., 2014). Besides academics, they also influence the values, ethics, and lifestyle choices adopted by their students. Teachers' lifestyle habits play a profound role in students also adopting similar habits, leading to positive lifelong outcomes (Abirami et al., 2018; Pulimeno et al., 2020). Therefore, lifestyle habits and overall health play an important role as it is not only associated with them but also for improved quality of education and stability in schools and teaching effectiveness and student achievement (Child Trends 2018).

However, a shift in lifestyle habits marked by unhealthy dietary habits, reduced physical activity, and alcohol and tobacco consumption greatly affect holistic health. (Selvam et al., 2017; Vio et al., 2016; Pobee 2013). Along with a hampered lifestyle, prolonged standing, intensive verbal communication, and workload, teachers are exposed to stress (Fahmy et al., 2022; Delfino et al., 2020). Occupational stress has been strongly linked to diseases like hypertension and other chronic diseases (Quick et al., 2016). The predisposition to lifestyle diseases like obesity, diabetes, and hypertension has been coming up as an important health concern among teachers (Joshi et al., 2021; Monica et al., 2017; Manjula et al., 2016).

As teachers have unique responsibilities and professional commitments from other professions, they have unique lifestyle patterns and face different challenges. However, research on this area remains unexplored. The lack of research on lifestyle habits and lifestyle-related diseases among school teachers contributes to a limited understanding of these issues. It is crucial to examine the impact of lifestyle risk factors on their health and well-being, and their potential association with specific diseases.

METHODOLOGY

Objectives

The study hypothesized that lifestyle diseases could be associated with lifestyle related risk factors such as dietary habits, and physical activity level. Therefore, this cross-sectional study aimed to assess lifestyle diseases and associated risk factors, including diet and physical activity among teachers of North East Delhi. Additionally, this study evaluated the nutritional status, knowledge, and eating habits of the school teachers.

Sample

Considering the prevalence of diabetes among residents of East Delhi in 2016 as 18.3% (Madhu et al. 2018). The sample size came out as 230 using the formula given in equation 1, with Z representing the Z static for a 95% confidence level (1.96), P denoting the prevalence of diabetes, and d indicating the desired level of precision (0.05) (Pourhoseingholi et al., 2013). Accounting for a 10% sample loss, the final sample came out as 250. However, being a preliminary study with limited resources, a total of 100 to 110 teachers were contacted for consent.

$$n = Z^2_{1-\frac{\alpha}{2}} \frac{P(1-P)}{d} \qquad (eq\ 1)$$

Data Collection

A total of 105 teachers (25 to 55 years old) were enrolled from total four (2 government and 2 nongovernment) schools of northeast Delhi using a purposive sampling technique. The schools for the survey were selected after considering easy accessibility, willingness of school authority to participate and availability of samples. School principals were contacted to seek permission to conduct the cross-sectional survey. While enrolling the participants, it was ensured to account for diversity in school settings and demographics. Ethical approval was obtained from the Institutional Ethics Committee to ensure that the study complies with ethical guidelines for human research. Participants were provided with participants information sheets along with verbal detailing of the study objective, benefits, and risks. Informed consent was sought from all participants, ensuring their voluntary participation and confidentiality of their responses.

Tools and techniques

Lifestyle can be defined as one's way of living, influenced by various factors such as geographical, economic, political, cultural and religious beliefs (Farhud et al. 2015). A structured questionnaire was administered to assess the lifestyle habits and presence of associated risk factors and diseases. The questionnaire comprised three sections: demographics, health cards, and lifestyle habits. The health card recorded the presence of diagnosed metabolic diseases such as diabetes and hypertension. A self-administered questionnaire was used to assess dietary habits including meal patterns, meal skipping and nibbling habits, and eating-out behaviour. Detailed dietary analysis was done using 24-hour recall for 2 days and a food frequency questionnaire (FFQ). The Global Physical Activity Questionnaire (GPAQ) was used to assess physical activity (Armstrong et al., 2006). Participants were classified based on their total physical activity score (Ptotal). Ptotal score <600 indicates below recommended activity levels, while Ptotal ≥600 signifies meeting the recommendations.

The anthropometric assessment included weight and height, measured using standard procedure. Waist circumference (WC) was determined using a non-stretchable SECA tape, and blood pressure (BP) was measured with a digital sphygmomanometer. For known diabetic patients, self-reported fasting glucose was noted.

Statistical Analysis

The content validity of tools was ensured by seeking input from five experts (professor, dietician, school principal, and teacher). Further, pretesting was conducted to enhance tool quality. The clean and coded data were analysed using SPSS software (Statistical Package for the Social Science) version 24.0. Descriptive statistics were used to summarise the prevalence of lifestyle risk factors and associated diseases among teachers. Statistical tests like the independent t-test and Karl Pearson's correlational test for finding associations between different parameters were used to compute continuous variables. DIETCAL software version 10.0 was used for analysing the diet-related data of the participants.

RESULTS

Sociodemographic characteristics of the participants

A total of 105 teachers participated in the study, with 53 teachers from government and 52 from non-government schools. The study population was predominantly female (87.6%), with a mean age of 38.8±9.6 years (Table 1). There was an almost equal proportion of teachers living in joint and nuclear families. The majority of teachers held post-graduate degrees and had received education in nutrition, providing them with basic knowledge about its importance. Additionally, more than half of the teachers belonged to the upper-class income group. The included teachers had a mean teaching experience of 12.3 years, with an average of 6.4 hours of work/day.

Table 1: Sociodemographic characteristics of the participants (N=105)

Characteristics	Mean ± SD / Frequency (%)
Age (years)	38.8±9.6
25-35	42 (40)
35-45	32 (30.4)
45-55	31 (29.5)
Gender	
Male	13 (12.4)
Female	92 (87.6)
Marital status	
Married	83 (77)
Unmarried	22 (21)
Education	
Doctorates	5 (4.8)
Postgraduates	84 (80)
Graduates	16 (15.2)
Socioeconomic Status	
Upper class	40 (38)
Upper middle	65 (62)
Teaching experience	12±9.6 years

Anthropometric and metabolic characteristics of the participants

Table 2 presents the anthropometric and metabolic characteristics of the participants. The mean weight was 67.3±10.5 kg, with similar distribution among both males and females. However, a significant difference in BMI was observed between the two groups, with female teachers having a higher BMI (27.09±5.6kg/m^2) compared to males (24.7±4.4 kg/m^2) (p=0.043).

When comparing the teachers' BMI to the South Asian standards (Misra et al., 2015), it was evident that more than 80% of the teachers were in the overweight or obese category, with approximately 45% in obesity stage 1. Furthermore, there wasn’t a significant difference in

WC between male and female teachers, However, the majority of female teachers (80.4%) had higher WC while male teachers over 60% had a normal WC (<90cm).

Table 2: Anthropometric and metabolic parameters of school teachers (N=105)

Variables		**Mean ± SD/ Frequency (Percentage)**
BMI Category	Underweight	4 (3.8)
	Normal	15 (14.3)
	Overweight	16 (15.2)
	Obese stage 1	48 (45.7)
	Obese stage 2	15 (14.3)
	Extreme obesity	7 (6.7)
Waist circumference (cm)	**Males**	87.63±11.1
	Normal	8 (61.5)
	Increased risk for cardiovascular diseases (>90)	3 (23.1)
	Substantially Increased Risk for Cardiovascular Diseases (>102)	2 (15.4)
	Females	87.1±3.3
	Normal	18 (19.6)
	Increased risk for cardiovascular diseases (>80)	37 (40.2)
	Substantially Increased Risk for Cardiovascular Diseases (>88)	37 (40.2)
Self-reported Diabetes		7 (6.6)
Self-reported Hypertension		14 (13.3)
Blood pressure (mm Hg)	Systolic Blood Pressure	116.4±18.94
	Diastolic Blood Pressure	80.15±9.44
Blood glucose levels (mg/dl)	Fasting Blood Glucose	127±12.5
	Post Prandial Glucose	168±18.3

Table 3 briefs the key lifestyle-related habits such as dietary habits, physical activity pattern, and alcohol and tobacco consumption. Breakfast was found to be most skipped meal among all. Nibbling in between meals was seen in almost half of the participants. Various factors associated with nibbling in between meals included long and extended working hours, long commute hours, cravings and responsibilities.

Table 3: Lifestyle habits of school teachers (N=105)

Lifestyle habits	Frequency (%)
Meal skipping behaviour	
Breakfast	36 (34.3)
Lunch	2 (1.9)
Dinner	26 (24.8)
Eating out habits with family	13 (12.4)
More than once a week	8(8%)
Once a week	16(15%)
Once a fortnight	16(15%)
Once a month	40(38%)
Rarely	25(24%)
Nibbling in between meals	
Yes	47(44.7)
No	24 (22.8)
Sometimes	34(32.4)
Ptotal Score (Global Physical activity Questionnaire)	535±630
Alcohol Consumption	4 (3.8)
Tobacco Consumption	2 (1.9)

Dietary habits of the participants

Table 4 provides a detailed analysis of the dietary intake. It is evident that dietary consumption mainly consists of carbohydrate and fat-rich meals. The table highlights that both carbohydrate and fat intake significantly exceed the Recommended Dietary Allowance (RDA) for Indian Adults 2020 (ICMR-NIN 2020). While, the consumption of other nutrients, especially B vitamins, protein, and essential minerals such as iron and calcium, was generally inadequate among both male and female teachers.

Table 4: Nutritional analysis of dietary intake of school teachers (N=105)

Nutrients	Male (n=13)			Female (n=92)		
	RDA (ICMR, 2020)	Mean Intake ±SD	Dietary adequacy (%)	RDA (ICMR, 2020)	Mean Intake ±SD	Dietary adequacy (%)
Energy (Kcal/d)	2110	1875±349	88.8	1660	1527±360.1	91.9
Protein (g/d)	65	59.2±13.7	91.07	55	45.2±11.0	82.1
Carbohydrate (g/d)	130	250.3±59.2	192.3	130	196.3±43.6	150.7
Fat (g/d)	25	67.9 16.6	271.6	20	60.2±21.2	301
Iron (mg/d)	19	15±4.2	78.9	29	11.6±3.4	40
Calcium (mg/d)	1000	863.7±240.5	86.3	1000	684.2±215	68.4
Potassium (mg/d)	3500	2803.1±566.2	80	3500	2432.0±675.2	69.5
Thiamine (mg/d)	1.4	1.3±0.26	92.8	1.4	0.91±0.25	65
Riboflavin (mg/d)	2.0	0.96±0.26	48	1.9	0.61±0.22	32.1
Niacin (mg/d)	14	7.96±1.75	56.8	11	6.4±1.8	58.1
Pyridoxine (B6) (mg/d)	1.9	1.29±0.29	67.8	1.9	0.99±0.27	52.1
Folate (mg/d)	300	307.6±81.8	102.3	220	250.5±95.0	113
Vitamin C (mg/d)	80	111.9±42.6	139.8	65	130±76.3	200

Physical activity pattern of the participants

Different domains of physical activity such as work-related, travel related and leisure time activities were assessed using the GPAQ. The mean minutes spent in work-related physical activity was 45 minutes, however, only among physical health educators. The mean time spent in travel and recreational activities was 11.9 and 27.3 minutes respectively. The P_{total} calculated by combining all the domains was significantly higher in male teachers compared to female teachers [1307±143.7 (males) vs 416.9±443.3 (females), $p<0.01$]. Further, participants were categorized into 2 groups based on their total physical activity scores when compared to the WHO recommendations (Table 5). Higher levels of physical inactivity were seen among female teachers, with Ptotal scores below 600, whereas only 28.2% were found to be physically active.

Table:5 Physical activity levels among school teachers (N=105)

Physical activity level	Male	Female	p-value
Do not meet WHO recommendations (Ptotal<600)	4(30.7%)	66(71.7%)	
Meets WHO recommendation (Ptotal>=600)	9(69.2%)	26(28.2%)	
Mean Ptotal	1370.7±143.7	416.9±443.3	**0.01***
***p value significant at <0.05**			

Self-reported data indicated that 6.6% of teachers had diabetes. The mean fasting and postprandial blood glucose was 127±12.5 mg/dl and 168±18.3 mg/dl, respectively. The presence of diabetes showed a positive correlation with a family history of diabetes (r=0.363, p=0.00).

It was found that 13.3% of the teachers were hypertensive, with a mean BMI of 30.8 kg/m2 and a significantly higher mean WC of 94.7 cm (p=0.01). Higher BMI and WC were significantly more prevalent among teachers with high BP compared to non-hypertensive teachers. The mean systolic BP and diastolic BP were found to be 116.4±18.94 and 80.15±9.44 mmHg, respectively. BP showed significant association age (r=0.306, p<0.01), teaching experience (r=0.282, p<0.01), weight (r=0.216, p=0.03), and meal skipping behaviour (r=0.202, p=0.04).

DISCUSSION

There has been a gradual shift in lifestyle habits, particularly dietary habits, reduced physical activity, increased sedentariness, and alcohol consumption, among others (Andersen et al., 2021). This transformation can be observed across all professions. However, considering the influential role teachers play in shaping the choices of their students and thus for future generations this study aimed to investigate the lifestyle-related habits and associated diseases such as obesity, diabetes, and hypertension prevalent among them.

This study reported that 15.2% of teachers were overweight, while 45.7% fell into obese stage 1. A study in Tamil Nadu also found 43.2% with Grade I obesity, 20.4% with Grade II obesity, and 6.6% (Monica et al., 2018). Factors contributing to the higher obesity prevalence among females include physiological changes like pregnancy, lactation, and menopause, along with lifestyle habits like little physical activity. Furthermore, the prevalence of known diabetes was reported as 6.6%. This was in line with a study from Nagpur which reported 6.47% known cases of diabetes (Lone et al., 2014). The prevalence of diabetes in northeast Delhi households was reported to be about 10.8%. In another study conducted among college teachers in Chhattisgarh, a total of 11.35% of teachers had diabetes (Nishad et al., 2017). This variation can be due to the consideration of only known cases of diabetes in this study. As, due to ethical and financial concerns, only self-reported cases of diabetes were noted, there might be chances that cases with undiagnosed diabetes may have resulted in

underreporting. Another metabolic disease that is greatly affected by lifestyle habits is hypertension. The cases of self-reported hypertension were recorded to be 13.3%. The presence of high BP was also assessed by recording the random BP levels of the participants according to which almost 60% belong to the normal category followed by 19% in the elevated stage 1 blood pressure. A study conducted among government school teachers of Rajasthan reported that 23% of teachers have high BP (>140/90mmHg) (Joshi et al., 2021).

The lifestyle habits including unhealthy dietary habits and low physical activity has been associated with obesity and associated diseases across literature. This study also highlighted the meal skipping behavior (especially breakfast) as a prevalent dietary habit among almost 45% teachers, aligning with prior studies reporting breakfast as most frequently skipped meals (Almoraie et al., 2023). Skipping meals has been significantly associated with raised BP levels and higher risk of metabolic diseases across studies (Cahil et al., 2013). Furthermore, this study also characterized teacher's diet as carbohydrate and fat-rich food which coincided with previous literature reporting high consumption of added sugars and sodium-rich foods, along with low consumption of fruits and vegetables (Parker et al., 2020). Higher physical inactivity was seen among female teachers. Although the difference was significant, the number of male teachers was much less than females, therefore cannot be compared. Higher physical activity among men can be attributed to engagement in more recreational and outdoor activities like dedicated physical activity in parks and playing outdoor games. On the other hand, females are usually more engaged in household chores along with their professional roles, thus leaving less time and energy for recreational activities and dedicated activities (Delfino et al., 2020; Bergier et al., 2016).

It was observed that there was no statistically significant difference in lifestyle habits among teachers across schools. This may be attributed to small samples enrolled from each school, however, future studies with large sample can be conducted to assess various correlates such as work load, work-life balance, stress, environmental and infrastructural factors which can affect the lifestyle habits as well as overall health across different type of schools. This may be helpful in recommending reforms to improve the lifestyle and overall health.

The rising prevalence of obesity is a dual concern, impacting both health and the role of teachers as student role models. Teachers profoundly influence lifelong habits, emphasizing the need to raise awareness about obesity's health and productivity consequences. This study provides a foundation for future research into teachers' lifestyle behavior and associated health issues. Implementing a behaviour change communication model is crucial for promoting a healthy lifestyle to prevent obesity and related diseases. Increasing awareness among teachers can improve their health and productivity while reducing non-communicable disease burdens. Moreover, it can positively influence students, making teachers key agents of change in curbing the rising disease rates.

There are a few limitations to this study. Firstly, it was conducted with a relatively small sample size, and future research should aim for a larger sample. Additionally, the identification of diabetes among participants relied on self-reported data and previous blood glucose levels, which may be subject to recall bias and is less accurate. Future studies can

conduct blood assessments to evaluate metabolic parameters like glucose levels and lipid profiles for a more comprehensive assessment of metabolic disease risk. Lastly, dietary intake was assessed using a two-day 24-hour recall, which may not fully represent long-term dietary habits.

FUTURE DIRECTIONS

As this was a small study, future studies should be conducted on a larger population with robust methodology and holistic evaluation (biochemical parameters and comprehensive lifestyle factors including detailed dietary habits and stress levels). Moreover, future studies should also focus on the inclusion of appropriate interventions to create awareness and improve overall lifestyle habits, not only among school teachers but also among professionals engaged in sedentary occupations.

CONCLUSION

This study showed that the majority of the teachers were obese and some of them had associated co-morbidities like diabetes and hypertension. Lifestyle habits like inadequate consumption of fruits and vegetables, higher intake of fat, salt, and sugar, nibbling in between and skipping meals, and physical inactivity were common among teachers. It is imperative to create awareness about the importance of healthy lifestyle habits, along with the development and implementation of comprehensive programs aimed at fostering healthier lifestyle choices within the school environment targeting both teachers and students, creating a health-conscious atmosphere that promotes well-being.

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AN EXPLORATION OF THE NUTRITIONAL, PHYTOCHEMICAL AND *IN VITRO* ANTIOXIDANT PROFILE OF *CUCURBITA PEPO* L. (PUMPKIN) SEEDS

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ABSTRACT

The quest to discover the functional and health benefits of the underutilized seeds has exponentially increased in recent times. Although extensive research has been done on the fruits of *Cucurbita pepo* L., there is a dearth of data available on the nutritional, phytochemical and antioxidant profile of their seeds. Hence the current study was carried out with these objectives. The study revealed that *C. pepo* seeds have high calorific value, high protein and fat content proving it to be a rich source of energy. On the contrary, the carbohydrate content of the sample was not on par with its calorific value. The sample presented a low moisture content indicating the storage advantage of the seeds. There was an intriguing and notable mineral content whereas vitamins were found to be present in a fair amount. Quantitative phytochemical analyses were performed for quantifying the total phenolics, total flavonoids and total alkaloid contents in the sample which were found to be 32.7 ± 0.89 mg/100g GAE, 16.8 ± 0.63 mg/100g QE and 8.3± 1.12 mg/100g AE respectively. The current study is probably the first to have reported the total alkaloid content of *C. pepo* seed aqueous extract. The sample was found to be effective in inhibiting DPPH radicals almost comparable to that of reference standard, ascorbic acid. The presence of an assortment of potent secondary metabolites either alone or in combination, may be accountable for the observed antioxidant activity.

Keywords: Antioxidant profile, *Cucurbita pepo* L., Nutritional profile, Phytochemicals, Secondary metabolites

INTRODUCTION

Vegetable seeds are handy foods and most of them are edible. Protein, fiber, vitamins, minerals and phytochemicals contained in seeds are considered to be nutraceutical chemicals. They endorse general wellbeing and also boost immunity (Adeola and Anofi, 2021). Antioxidant supplements are the effective approaches to fight against the detrimental effects of reactive oxygen species (ROS) induced oxidative stress (Kasote *et al*., 2015). A diet enriched with plant foods will confer a milieu of phytochemicals which are non-nutritive compounds that possess health promoting properties. Vegetables are high in phenolic compounds, terpenoids, pigments, and other natural antioxidants that have been linked to disease prevention and therapy (Bloch and Thomson, 1995).

Pumpkin (*Cucurbita pepo*) is one of the widely cultivated and popular vegetable crops of high economical value. It is an annual plant bearing round shaped, deep yellow to orange coloured fruits with smooth, slightly ridged skin. The thick shell encloses the pulp and flat and dark green coloured seeds (Schieber *et al*., 2001). Its edible seeds are generally regarded as agro-waste and habitually discarded. The functional health benefits of *Cucurbita pepo* seeds need to be well explored in order to advocate their adequate consumption by the population and for the formulation of novel drugs for therapeutic purposes (Ayyildiz *et al*., 2019).

OBJECTIVES

- Determine the nutritional profile of *Cucurbita pepo* L. seeds
- Quantitatively estimate the phytochemical content in *Cucurbita pepo* L. seeds
- Analyze the antioxidant profile of *Cucurbita pepo* L. seeds *in vitro*

METHODOLOGY

Sample Collection and Preparation

Cucurbita pepo L. seeds were collected directly from the farmers at Tudiyalur, a locality in Coimbatore. The seeds were identified and authenticated (voucher specimen number BSI/SRC/5/23/2021/Tech/282) at Botanical Survey of India, Southern Regional Centre, Tamilnadu Agricultural University, Coimbatore.

Determination of Nutritional Composition

The seeds were washed and cleaned to remove any debris, dehulled and shade dried before powdering. Seeds were weighed and milled into fine flour and sieved. The *C. pepo* seeds were analyzed for its proximate composition and vitamins and mineral contents using standards procedures of Association of Official Analytical Chemists (AOAC, 2005) with slight modifications. The carbohydrate content was calculated by the following expression:

Carbohydrate content (%) = 100 - (moisture + fat + protein + ash + fiber) %

The energy value of the sample was calculated as (protein × 4) + (carbohydrate × 4) + (fat × 9) in kilo calories (kcal).

Quantitative Determination of Phytochemicals

10g seed powder was measured and dissolved in 100 ml deionized water and kept in a mechanical shaker overnight at 50ºC for 75-100 rpm. The solution was filtered using Whatman filter paper and the extract was collected and refrigerated until analyses.

a. Total Phenolics

3 mg of Gallic acid was dissolved in 3 ml of distilled water. Dilutions of this solution with distilled water were prepared to give the concentration of 25, 50, 75, 100, 200 and 250 µg/ml. Stock solutions of sample were prepared by dissolving 10 mg of seed extract in 10 ml of distilled water to give concentration of 1mg/ml. The 100µl of this solution was taken in to 25ml volumetric flask, to which 10 ml of water and 1.5 ml of Folin-Ciocalteau reagent were added. The mixture was

then kept for 5 min and to it 4ml of 20% w/v sodium carbonate solution was added. The volume was made up to 25 ml with distilled water. The mixture was kept for 30 minutes until blue colour developed and then observed at 765 nm. The standard curve of gallic acid was plotted between absorbance versus concentrations, and the unknown sample concentration was calculated in terms of mg GAE/100g (Bhalodia *et al*., 2011).

b. Total Flavonoids

10 mg of quercetin was dissolved in methanol and then diluted to 25, 50, 80, and 100 µg/ml. A calibration curve was made by measuring the absorbance of the dilutions at 415 nm with a Shimadzu UV - 1800 spectrophotometer. 0.5ml of each extract stock solution, 1.5 ml methanol, 0.1 ml aluminium chloride, 0.1 ml potassium acetate solution and 2.8 ml distilled water were added and mixed well. Sample blank was prepared in similar way by replacing aluminium chloride with distilled water. Sample and sample blank of extracts were prepared and their absorbance was measured at 415 nm. A linear calibration curve of quercetin was used to calculate the concentration of flavonoid content and expressed as milligrams of quercetin equivalent (mg QE/100 g) (Pallab *et al*., 2013).

c. Total alkaloids

Atropine standard solution was prepared by dissolving 1 mg of pure Atropine (AR-grade procured from Sigma Company) in 10 ml distilled water. Aliquots of Atropine standard solution (0.4, 0.6, 0.8, 1 and 1.2 ml) were accurately measured and transferred to different separatory funnels. 5 ml of phosphate buffer (pH 4.7) and 5 ml of Bromocresol Green (BCG) solution were taken and the mixture was shaken with extract with 1, 2, 3, and 4 ml of chloroform. The extracts were then collected into a 10 ml volumetric flask and diluted to adjust the solution with chloroform. The absorbance of the complex in chloroform was measured using UV-Spectrophotometer (470 nm) against the blank prepared as above but without Atropine (Ajanal *et al*., 2012).

Antioxidant Activity

DPPH scavenging assay

The DPPH solution was prepared in ethanol (control) and subsequently added to various concentrations of the sample extract (10, 20, 40, 60, 80 and 100 µg/ml). Ascorbic acid was taken as standard. Absorbance variations were read at 517 nm wavelength using a spectrophotometer. The percentage scavenging activities were plotted against varied concentrations of sample extract and represented in µg/ml to create the linear regression curve (Sadiq *et al*., 2015). Percentage inhibition was estimated by using the equation as follows.

Percentage inhibition = (AC-AS)/AC×100

Where, AC is the absorbance of control and AS is the absorbance of sample

The IC_{50} values were calculated using linear regression analysis and used to indicate scavenging activity of the sample extract.

Statistical Analysis

Data were analyzed using Microsoft EXCEL and IBM SPSS software version 21.0 and expressed as mean ± standard deviation (SD) of triplicate readings.

RESULTS AND DISCUSSION

The health benefits of *Cucurbita pepo* (Pumpkin) seeds are represented in **Fig. 1**.

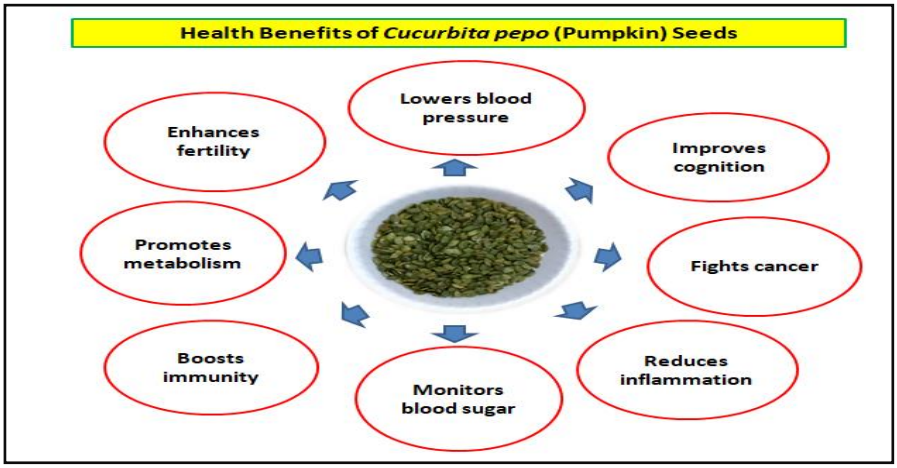

Fig.1: Health Benefits of *Cucurbita pepo* L. Seeds

Proximate Composition of *Cucurbita pepo* L. Seeds

In this study, the proximate composition of the *Cucurbita pepo* L. seeds was assessed and used as a criterion in determining the nutritional quality of the seeds. The proximate composition determined is furnished as a pie chart (**Fig. 2**) for a better understanding.

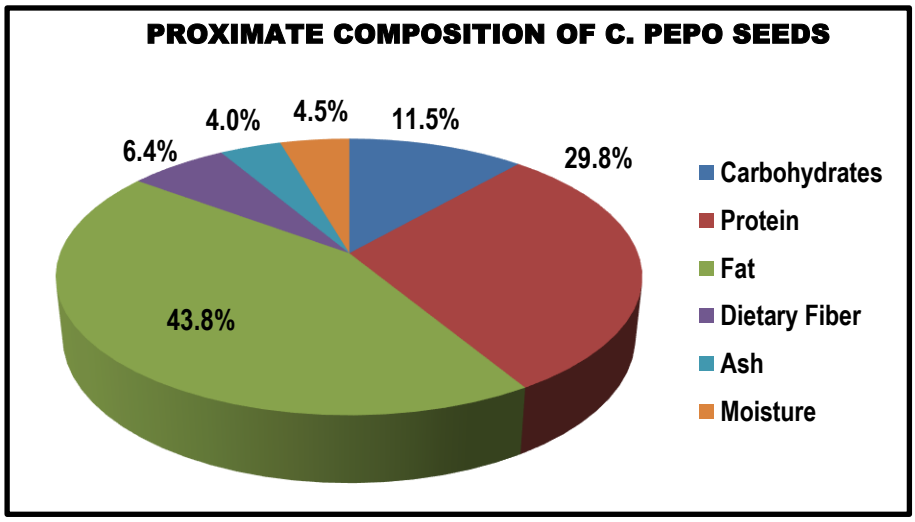

Fig. 2: Proximate composition of *Cucurbita pepo* L. seeds

The present study revealed that the *C. Pepo* seeds have moisture content which is lower than that of the vegetable seed like amaranth seeds (10.6± 0.2) and pomegranate seeds (*Punica granatum*) (6.84 ± 0.03) as reported by Zhana *et al*., (2019) and Abiola *et al*., (2018) respectively. The low moisture content indicated the storage benefit of the *C. pepo* seeds. The ash content of the seed was found to be closer to the ash content of chia seeds (4.45%) (Kibui *et al*., 2019). The ash content is a reflection of the quantity of minerals present in a food material (Gemede *et al*., 2016). The *C. pepo* seeds were found to be of high calorific value (559.4 kcal/100 gram). Lipids are essential for our body to sustain as they provide maximum energy, provide fat soluble vitamins and

act as insulation. The lipid content of the sample indicated how pumpkin seeds could be regarded as oilseeds like sunflower, soybean, mustard etc. The lipid content was closer to the value reported by Badu *et al*., (2020). Chigwe and Saka (1991) indicated that pumpkins supply calcium, iron, vitamin A, fat (25 – 55%), and protein (25 – 35%). This is in accordance with the studies conducted by Achu *et al*., (2005) and Loukou *et al*., (2007) which revealed similar results on the analysis of *C. pepo* seeds. For example, their studies revealed oil and protein content within the ranges of 28 – 40.49% and 61 to 73.59% respectively, while this study revealed 43.8±0.098 and 29.8±0.103. Furthermore, the nutritional value of the *C. pepo* seed is species dependent and is also influenced by climate and geographic difference.

Most bodily tissues rely on dietary protein for their natural production and upkeep. The protein content of the seed showed that *C. pepo* seeds are a good source of protein. The available carbohydrate content of the seed was found to be poor and was not in agreement with the findings of Ghaffar *et al*., (2018) may be due to the difference in geographic location. These results conclusively confirmed the dependency of nutritional content of these seeds to regional climates. It was inferred that major contributors to calorific value of *C. pepo* seeds are fat and protein contents in comparison to carbohydrate. The fiber content of the seeds proved the *C. pepo* seeds are a good source of dietary fiber. Hence *C. pepo* seeds could be recommended for relieving constipation, protection from certain cancers in addition to lowering blood cholesterol level.

Vitamin and Mineral Content of *Cucurbita pepo* L. Seeds

Sample was screened for quantifying vitamin A and vitamin C contents. Further ash content was analyzed for quantifying certain macro and micro minerals (as shown in **Table 1**) present in the sample.

Table 1. Vitamins and minerals content of *Cucurbita pepo* L. seeds/100 gram

SL. No.	Element	Concentration
1.	Vitamin A (mcg)	92.4 ±0.23
2.	Vitamin C (mg)	2.6 ±0.05
3.	Calcium (mg)	48 ±1.19
4.	Iron (mg)	7.5 ±0.07
5.	Phosphorous (mg)	900±0.60
6.	Potassium (mg)	450 ± 0.12
7.	Magnesium (mg)	520 ±0.02
8.	Zinc (mg)	8.2± 0.10
9.	Sodium (mg)	24.2±0.05
10.	Copper (mg)	1.67±0.90

Note: The data are mean value ± standard deviation of triplicate results

Potassium and phosphorous content were found to be abundant in the sample. Potassium is required for fluid balance, nerve transmission, iron absorption and to control hypertension whereas

phosphorous maintains acid-base balance and is essential for healthy bones and teeth. Thus, *C. pepo* seeds could be regarded as a rich source of potassium and phosphorous.

The sample presented a fairly high value for Zinc. Zinc is a part of many enzymes and is needed for genetic makeup, wound healing, growth and development and sexual maturation (Supasai *et al*., 2017). Dietary intake of iron is crucial for binding and transport of oxygen (Abbaspour *et al*., 2014). The sample was found to have a fair amount of iron present in it. *C. pepo* seeds had approximately 5 mg of magnesium for every 100 g of sample which imply that it is an excellent source. Magnesium is a constituent of bone and teeth and is directly associated with calcium and phosphorus absorption (Glasdam *et al*., 2016).

The concentration of sodium in the sample was found to be good as sodium is required to regulate blood pressure and blood volume and fluid balance. Study indicated that *C. pepo* seeds are a good source of calcium. Calcium ions are necessary for the normal functioning of nerves and muscles (Payne, *et al*., 1990). Copper acts as antioxidant and help in the prevention of free radical damage in living organisms (Blockhuys and Wittung-Stafshede, 2017). This study revealed that the sample under study is a good source of copper. Vitamin A in the present sample was found to be 92.4 mcg. Vitamin A is of high significance since it has a key role in vision, immunity and reproduction. Vitamin C content was found to be 2.6±0.05 mg/100 gram. Vitamin C or ascorbic acid is an indispensable factor required for growth and development, immunity, wound healing and iron absorption.

Quantitative Determination of Phytochemicals in *Cucurbita pepo* L. seeds

Qualitative phytochemical analysis of the aqueous extract revealed that *C. pepo* seeds had appreciable levels of alkaloids and tannins, moderate levels of carbohydrates and steroids and other compounds such as protein, flavonoids, saponins, terpenoids, quinones in trace levels (Nair and Raajeswari, 2023). Hence quantitative analyses were performed and the concentrations of total phenols, flavonoids and alkaloids of *C. pepo* seed extract are as furnished as in **Table 2**.

Table 2. Quantitative analyses of phytochemicals in *Cucurbita pepo* L. seeds

SL. No	Phytochemicals	Concentration	Regression coefficient (R^2)
1.	Total Phenolics (mg/100g GAE)	32.7± 0.89	0.964
2.	Total Flavonoids (mg/100g QE)	16.8 ± 0.63	0.976
3.	Total Alkaloids (mg/100 AE)	8.3 ±1.12	0.958

Note: GAE-Gallic Acid Equivalent, QE-Quercetin Equivalent, AE-Atropine Equivalent

The result revealed that the *C. pepo* seeds had a high concentration of total phenols (32.7± 0.89 mg/100g GAE) in it. Xanthopoulou *et al*., (2009) reported that pumpkin seed water extract was the richest in phenolic constituents (85–92% of total extractable phenolics) in comparison with other extracts. Sahin *et al*., (2014) revealed that the water extract of *Prunella grandiflora* has the highest total phenolic content (24.63 ± 0.55 mg GAE/g extract) when compared to alcoholic

extracts. The high concentration of phenolics in the extract could be attributed to the presence of proteins and other water-soluble compounds containing phenolic rings.

Flavonoids are considered as the most imperative natural phenols. They have a wide spectrum of biological and chemical activities including radical scavenging properties. Total flavonoid content results revealed lower values than those obtained for the analysis of phenols. This is within expected, being that flavonoids are nothing but a subgroup of the phenolic compounds. Alkaloids are naturally occurring chemical compounds having a significant impact on plant medicine because of their vast application (Shamsa *et al*., 2008). The sample was found to have a high alkaloid content of 8.3 ±1.12 mg/100 AE. The current study is probably the first to have reported the total alkaloid content of *C. pepo* aqueous extract.

Quantitative phytochemical analysis of aqueous extract of *C. pepo* seeds exhibited that it has remarkable amount of total phenolics, flavonoids, and alkaloids. Polyphenols and flavonoids isolated from the plants are generally considered as potent antioxidants because of their ability to absorb and neutralize free radicals as well as quench reactive oxygen species. Therefore, *C. pepo* seeds could be recommended as excellent natural source of antioxidant agents.

Antioxidant activity of *Cucurbita pepo* L. seeds

DPPH scavenging activity

DPPH free radical scavenging activity is defined as the amount of antioxidant necessary to decrease the initial DPPH radical concentration by 50% (IC_{50}). The highest antioxidant capacity is indicated by the lowest IC50 values (Stanković *et al*., 2010). **Fig. 3** indicates the increase of radical scavenging activity of extract which was deduced from the increase of percent inhibition as the extract concentration increases.

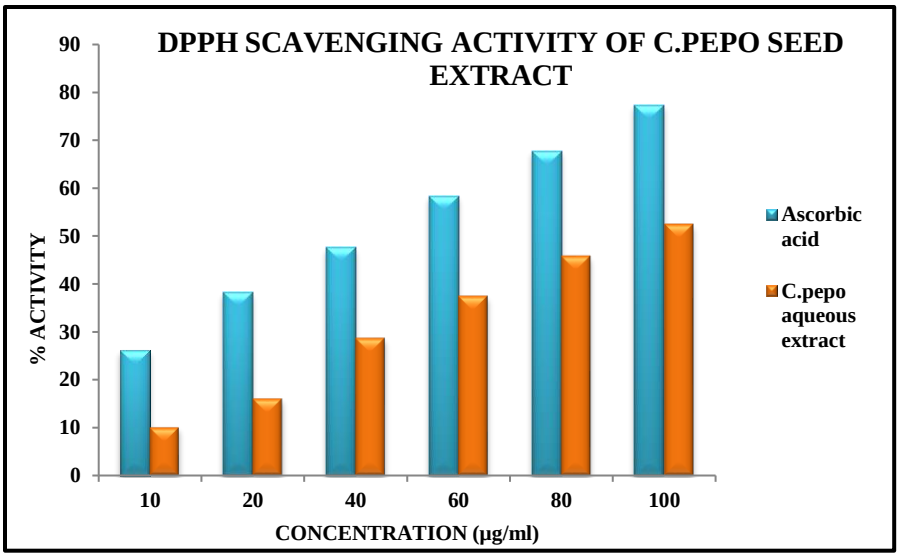

Fig. 3: DPPH scavenging activity of *Cucurbita pepo* L. Seed Extract

In the present study, the half-maximal inhibitory concentration (IC_{50}) of the *C. pepo* seed extract and the ascorbic acid (standard) were found to be 90.35µg/ml and 46.94µg/ml respectively. The *C. pepo* seed extract exhibited a high antioxidant activity with a lower IC_{50} value. From the investigation, it was evident that the *C. pepo* seed extract had a considerable DPPH radical scavenging activity almost similar to that of the standard. The inhibition of DPPH radical

scavenging by the sample extract was found to be strictly proportional to the concentration of total phenolics. These results reflected that the aqueous extract had high scavenging activity which could be attributed to the presence of various bioactive compounds such as phenolics, flavonoids and alkaloids as found in quantitative phytochemical screening. Hence the study strongly implies a high correlation between the antioxidant activity and phenolic content of the *C. pepo* seeds under investigation.

Valenzuela *et al*., 2014 reported that in all varieties of seed Cucurbita spp studied, the highest antiradical activity was detected in the aqueous fractions. A study carried out by Rakass *et al*., (2018) also disclosed that among all extracts, water extract of *C. pepo* exhibited the highest antioxidant activity followed by ethanol, methanol and acetone extract. Numerous studies have proven that antioxidant activity of plant extracts is mainly associated to the total phenolic content in the plants. In this study, a strong correlation between total phenolic, total flavonoid and total alkaloid contents and radical scavenging activity of *C. pepo* seed extract were observed.

CONCLUSION

The present findings strongly recommend the daily intake of *Cucurbita pepo* L. seeds in the diet for numerous reasons i.e. it is a widely cultivated, cheap and cost-effective vegetable crop which is a nutrient dense pack and of high calorific value. Importantly, these results strongly suggest that the *C. pepo* seeds if consumed in sufficient quantities would immensely improve human nutritional status. Therefore, this alone can make a significant contribution to family food security and nutritional needs, enhancing normal growth and active protection against diseases and malnutrition in the most vulnerable members of society. The quantitative analyses of *C. pepo* seed extract indicated the high quantity of bioactive compounds such as total phenolics, total flavonoids and total alkaloids. The presence of various bioactive compounds in the *C. pepo* seeds make it a promising source of natural antioxidants which could be therapeutically utilized for the prevention and treatment of a diverse range of diseases and disorders.

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DEVELOPMENT OF GLUTEN FREE BURFI FROM MALTED OAT: TRADITIONAL INDIAN SWEETS

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ABSTRACT

Oats can be considered a valuable component of a gluten-free diet and gives gluten-intolerant individuals more options for their meals. The present investigation was conducted to develop the gluten-free burfi using the combinations of malted oat flour and besan and assessing it for sensory, nutritional and physical parameters. Roasted besan and malted oat flour were blended in various proportions, 100:0, 75:25, 50:50, 25:75 & 0:100 (Type I, II, III, IV and V; respectively) for the preparation of burfi. The burfi with 75% oat, which had a nice balance of the flavours of malted oats, besan, and sugar sweetness was arbitrated best with an overall acceptability score of 8.69. Sensory quality and nutritional properties of burfi improved after addition of malted oat. Moisture, crude fat, crude fibre and energy content were high in burfi with malted oat as compared to control (Type I) sample. Antioxidant activity improved after addition of malted oat. Addition of malted oat made burfi softer therefore reducing its hardness. Malted oat can be successfully incorporated with besan to produce a nutritious and highly acceptable product.

Key words: Burfi, Celiac, Malted oat, Nutritive value, Sensory quality

INTRODUCTION

Consuming gluten, a protein present in wheat, rye, and barley, can cause celiac disease in genetically predisposed individuals. This autoimmune inflammatory illness of the small intestine damages the finger-like projections known as villi (Salehi and Sardarodiyan, 2016). The first three years of life are when it commonly manifests, but it can also arise later in life, even in adults. Currently, this disorder affects one in every 100 persons worldwide, or 1 to 2 percent of the general population in industrialized and developing countries. Recently, both children and adults have been shown to have significantly greater cases of celiac disease in India (Tanwar and Dhillon, 2017). Intestinal damage can be repaired with a gluten-free diet, which also improves nutritional deficiency symptoms and lowers the risk of many major long-term problems linked to untreated celiac disease (Jnawali et al., 2016). Patients who strictly adhere to a gluten-free diet frequently experience various nutritional deficiencies. Additionally, compared to healthy individuals, adults with celiac disease who follow a gluten-free diet also weigh much less, have a lower body mass index, and have more lean body mass (Churruca et al., 2015).

Oat stands at fifth place in the world as an economically important cereal with production of 25 million tonnes (Singh et al., 2019). The only grain that contains avenalins, a protein that resembles legumes and serves as the primary storage protein (80%), oats include significant levels of unsaturated fatty acids, soluble and insoluble dietary fibres, protein, and starch (Kaur et al., 2012). β-glucan is the main component of the soluble fiber in oats. Micronutrients such as zinc, selenium, iron, copper, manganese, folates, choline, carotenoids, lignins, vitamin E, phytic acid and alkyl resorcinols are present in oats (Smulders et al., 2018). Oat has unique ability to synthesize many powerful bioactive phytochemicals such as coumarins, saponins, flavonoids, tocols, antioxidants namely avenathramides that helps in preventing free radical damage, avenacosylates, phenolics and ligans are converted to enterolactone in our intestines that protects against heart problems (Rasane et al., 2015). Additionally, it has a significant proportion of lipids, notably unsaturated fatty acids (Peterson, 1998), which are utilized to assess the quality of oat products and customer preferences.

Malting, the controlled germination of grains increases nutrient bioavailability along with the addition of new flavours to the product (Farooqui et al., 2018). Germination leads to an increase in phytase activity that causes degradation of phytates and increases availability of micronutrients especially minerals along with lysine and tryptophan content but a slight decrease in prolamine content, offers a method for improving the nutritional value of oats. Malting enhances sensory attributes of oat products, but the use of oat malt is currently very limited (Farzaneh et al., 2017). Malted oat can be used in functional food products such as sweets, porridge, oatmeal, breakfast cereals, flakes, muesli, granola, bread, biscuits, cookies, burfi, infant foods, oat milk and oat based probiotic drink and can be incorporated besan. Oats can be counted as a valuable ingredient in a gluten free diet and offers a wider choice in the diets of celiac people (Hoffmanova et al., 2019).

Therefore, these characteristics of oats are appealing for the development of novel techniques and food products. In light of these facts, the current study was conducted to examine the usage of malted oat flour in the development of gluten-free burfi for a variety of consumers, with a special focus on celiac disease patients.

JUSTIFICATION

The development of gluten-free burfi from malted oat addresses a significant dietary need for individuals with gluten intolerance, celiac disease, or those seeking gluten-free options. Burfi, a traditional Indian sweet, is typically made from gluten-containing ingredients such as wheat flour or semolina, limiting its consumption by individuals with gluten-related disorders. By utilizing malted oat, a gluten-free grain, this study aims to create a safe and nutritious alternative for such individuals, providing them with a traditional sweet option that meets their dietary requirements. Additionally, exploring the nutritional and sensory attributes of the malted oat burfi contributes to the broader understanding of utilizing alternative grains in traditional food preparation, potentially opening avenues for innovation in the gluten-free food industry.

OBJECTIVES OF THE STUDY

The present study was planned with the following objectives:

- To develop gluten free burfi using malted oat.
- To assess the sensory attributes of the developed gluten free burfi.

- To assess the developed gluten free burfi for nutrient composition.

METHODOLOGY

Research design

The malted oat grains and Bengal gram grain were grounded into flour and roasted. The roasted flours were combined in various proportions and mixed with sugar syrup to form burfi. The mixture was spreaded in trays to set, and the burfi were cut into desired shapes and packaged. The process for developing gluten free burfi from malted oat is illustrated in Figure 1. Sensory evaluation was carried out for all the developed gluten-free burfi combinations. The combination with the highest overall aacceptability score was assessed for nutritional analysis, the antioxidant activity and hardness. Statistical analysis was done to compare the mean values of the result.

Procurement of material

Bengal gram (HC-1) and Oats (OS-6) were obtained from the Department of Genetics & Plant Breeding, Chaudhary Charan Singh Haryana Agricultural University, Hisar. Milk (Amul full cream), desi ghee (Vita), sugar and other ingredients were procured from the local market.

Malting of oat grains

All the lighter foreign matter from the grains was removed by winnowing, sieving and remaining extraneous matter such as weeds and stones were handpicked. Cleaned oat grains were treated with 2% sodium hypochlorite solution for 10-15 min, thoroughly washed with distilled water and steeped for 24 hrs. Steeped grains were drained and spread evenly on trays. Hydrated grains were kept in the dark at 15°C for 72 hrs to reach more than 90% germination. Germinated oats were dried in a tray dryer at 60°C for 10-14 hr and kilned at 80°C for 3-4 hr to stop the enzyme activity. The moisture content of kilned grains was reduced to 4.2%. The kilned grains were cooled, lightly scrubbed by hand and screened to remove the rootlets and stored for further use in an airtight container.

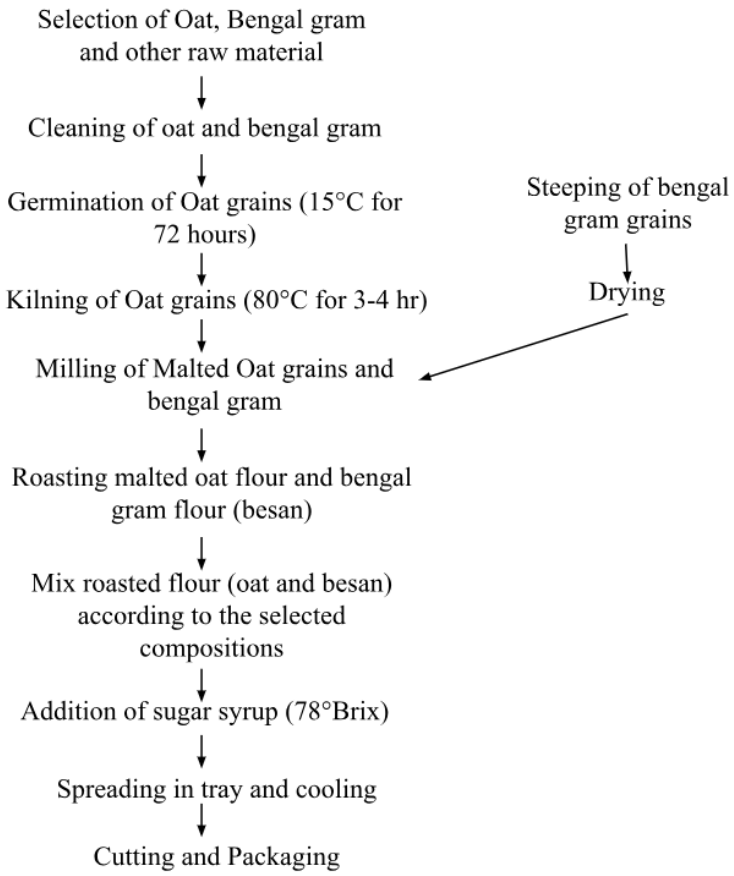

Figure 1: Flow diagram for preparation of gluten free malted oat burfi

Milling

The stored malted oat grains were milled with a lab scale grain mill (Parnami Super). Bengal gram was steeped, dried, dehulled and milled with a lab scale grain mill (Parnami Super) to obtain besan. Besan and malted oat flour were passed through 425 μm and 250 μm sieve for the preparation of gluten free malted oat burfi.

Preparation of burfi

Roasted besan and malted oat flour were used in various proportions, 100:0, 75:25, 50:50, 25:75 & 0:100 for the preparation of burfi with 60g sugar per 100g. Besan and malted oat flour were roasted with desi ghee (15g) on low flame and mixed thoroughly with hot sugar syrup (78°Brix), sheeted in a greased tray, cooled overnight and cut to desired shape.

Sensory evaluation of burfi

Burfi samples were subjected to sensory evaluation to assess various sensory aspects such as color & appearance, taste, flavour, aroma, texture and overall acceptability by a panel of 10 trained/semi-trained panelists using 9-point Hedonic Scale. The overall rating was obtained by averaging the scores given by the panelists.

Nutritional evaluation of burfi

The proximate composition comprising moisture, crude protein, crude fibre, crude fat and ash was calculated using the standard method of analysis (AOAC, 2005). The total carbohydrates were calculated using the given equation:

Total carbohydrates (%) = 100 – (Crude protein+crude fat+crude fibre+ash).

Energy was calculated by multiplying the protein, carbohydrate and fat present in the sample by factor 4, 4 and 9, respectively using the following equation:

Energy (Kcal/100g) = 4.0 x crude protein (%) + 4.0 x carbohydrate (%) + 9.0 x crude fat (%)

Antioxidant activity

Antioxidant activity was measured using 2, 2-diphenyl-1-picrylhydrazyl (DPPH) dye, as per the procedure described by Shimada et al., (1992).

Texture

Texture of Burfi was studied using the TMS-Pro Texture Analyser of Food Technology Corporation (FTC), Sterling, Virginia, U.S.A fitted with a 5kg load cell. The instrument was calibrated to place it at zero position. The base plate was secured on the heavy-duty platform. The Burfi samples were kept on the platform and the force was applied. The texture of Burfi was assessed using 2mm candy needle probe with 30 mm/min speed and 10mm displacement.

Statistical analysis

The data obtained in the present investigation was subjected to analysis of variance (ANOVA) technique. For physico-chemical analysis of burfi, t-test and standard deviation (SD) was calculated to compare the means.

RESULT AND DISCUSSION

Formulation of besan:oat burfi was done with roasted besan and malted oat flour blended as, 100:0, 75:25, 50:50, 25:75 & 0:100. The sensory scores on the 9-point Hedonic scale of burfi are depicted in Table 1.

Table 1 Effect of incorporation of malted oat on sensory scores of burfi

Sensory attributes	Burfi					CD at 5%
	Type I	Type II	Type III	Type IV	Type V	
Colour & appearance	8.85±0.62	8.30±0.25	7.80±0.35	8.62±0.24	8.60±0.45	0.21
Taste	8.00±0.47	7.90±0.43	7.60±0.53	8.75±0.35	8.20±0.39	0.19
Flavour	7.62±0.62	8.00±0.67	7.80±0.48	8.70±0.55	8.20±0.52	0.49
Texture	8.72±0.42	8.00±0.49	7.75±0.35	8.70±0.26	8.35±0.41	0.34
Overall acceptability	8.29±0.37	8.05±0.26	7.74±0.34	8.69±0.14	8.34±0.25	0.34

Values in the table are mean ± SD of ten panellist

Type I- 100:0 (Besan:Oat), Type II- 75:25 (Besan:Oat), Type III- 50:50 (Besan:Oat), Type IV- 25:75 (Besan:Oat), Type V- 0:100 (Besan:Oat)

When compared to all other variants, Type I burfi had a high score for colour and appearance (8.85), while Type I and Type IV burfi received the highest scores (8.72 and 8.70) for texture. The soft texture of the burfi appears to be the result of the oats' inclusion. Taste (8.75) and flavour (8.70) score of Type IV burfi were highest among all. During roasting, the Maillard reaction plays an important role in developing the distinctive colour and flavour (Ziegleder, 1991). The panelists felt that the addition of oats provided the burfi a wonderful and distinct flavour, with 75% of the burfi's oat content being considered the finest among all. Children may also enjoy this burfi because of its flavour and colour. The best type of burfi, with an overall acceptability score of 8.69, was Type IV, which had a nice balance of the flavours of malted oats, besan flour, and sugar sweetness. The recent investigation concluded that the burfi's attractive dark chocolate colour was a result of grain roasting and kilning. Burfi's overall acceptance score was found to increase with the inclusion of malted oat flour (upto 75%). Figure 2 shows the best selected burfi (Type IV) and the control samples (Type V and Type I).

a **b** **c**

Figure 2: Variants of developed gluten free burfi

(a – Type I burfi [100:0 (Besan:Oat)], b – Type IV burfi [25:75 (Besan:Oat)], c – Type V burfi [0:100 (Besan:Oat)])

Proximate analysis of the control samples (Type V and Type I) and best selected (Type IV) burfi are presented in Table 2. Moisture content of Type V, Type IV and Type I burfi was 14.31, 13.29 and 12.22%. Type V had the highest moisture content and Type I had the lowest. Moisture content varied significantly due to the different composition of flour. Low moisture content in burfi makes it hard, dry, difficult to chew and unacceptable (Chaudhary et al., 2019). The results for proximate composition of burfi are in agreement with those reported earlier in pineapple burfi (Kamble et al., 2010), millet burfi (Bhisht and Sivastava, 2013) and herbs burfi (Prasad et al., 2017). Increasing the concentration of malted flour in burfi the proximate composition increases and a similar trend was observed in the corn flour burfi (Dua et al., 2018).

Crude protein 12.52% was highest in Type I and (11.48%) lowest in Type V burfi whereas Type IV was not significantly different from Type I and Type V burfi. 16.50% crude fat was observed in Type V burfi which was higher from Type IV (14.57%) followed by 12.53% in Type I burfi. Fat content was high for burfi's prepared from 100% oat; this might be due to the high fat content in oat (Kourimska et al., 2018). Fat acts as a barrier for moisture therefore helps in increasing the shelf life

of the product (Tiwari et al., 2014). The fat content of burfi was significantly ($P < 0.05$) influenced by the addition of malted oat flour. As the oat level increases the fat content of burfi increases significantly. Earlier it was reported that as the concentration of almonds in burfi increases, the fat content in burfi also increases (Hajare et al., 2016).

Highest crude fibre was observed in Type I burfi followed by Type IV and Type V *burfi* i.e., 4.16, 2.98 and 2.08%, respectively. There was no significant difference observed in the ash and carbohydrate content of the burfi's and ranged from 2.38-2.61% and 65.48-70.26%. In the current study ash and fibre content increased with increase in the oat percentage and the similar results for ash and fibre content were reported in millet-based burfi (Bisht and Srivastava, 2013), finger millet burfi (Mohod et al., 2020) and pineapple burfi (Kamble et al., 2010). Energy was highest in Type V due to the highest fat and carbohydrate content followed by Type IV and Type I burfi i.e., 464.66, 450.99 and 435.57 Kcal, respectively.

Table 2 Proximate analysis of burfi

Parameters	**Burfi**			**CD at 5%**
	Type I	**Type IV**	**Type V**	
Moisture (%)	12.22±0.12	13.29±0.14	14.31±0.26	0.42
Crude protein (%)	12.52±0.29	12.08±0.31	11.48±0.19	0.63
Crude Fat (%)	12.53±0.41	14.57±0.27	16.50±0.37	0.78
Crude fibre (%)	2.08±0.07	2.98±0.25	4.16±0.11	0.37
Ash (%)	2.61±0.14	2.49±0.13	2.38±0.23	NS
Carbohydrates (%)	70.26±0.17	67.87±0.13	65.48±0.36	NS
Energy (Kcal)	443.86±2.29	450.99±0.91	456.34±2.46	4.49

Values in the table are mean ± SD of three replicates, NS= Non-significant
Type I- 100:0 (Besan:Oat), Type IV- 25:75 (Besan:Oat), Type V- 0:100 (Besan:Oat)

Antioxidant activity of Type V burfi was the highest followed by Type IV and Type I burfi i.e., 63.44%, 61.79% and 59.72%, respectively as shown in Table 3. Kilci and Gocmen (2014) reported that tarhana samples that were supplemented with oat flour showed high antioxidant activity. Oat contains compounds that possess antioxidant activity and therefore, helps in maintaining the stability of processed oat products (Peterson, 2001). Ryan et al., (2011) reported that antioxidants present in oat can contribute significantly to the diet.

Texture of burfi was measured in terms of the hardness and the results are described in Table 3. Type I burfi (17.87N) had maximum hardness followed by Type IV (16.59N) and Type V burfi (15.82N). As the percentage of oats increased, the hardness decreased significantly ($P < 0.05$). Addition of oats made burfi softer. The results for texture of burfi are in agreement with those reported by Prasad et al., (2017), Arora et al., (2010), Chawla et al., (2014) and Wasnik et al., (2015).

Table 3 Antioxidant activity and Texture of the control samples and best selected burfi

Treatment	Burfi			CD at 5%
	Type I	Type IV	Type V	
Antioxidant Activity* (%)	59.72±0.32	61.79±0.14	63.44±0.09	0.44
Hardness (N)	17.87±0.11	16.59±0.07	15.82±0.16	0.29

Values are mean ± SD of three replicates *% DPPH Scavenging activity
Type I- 100:0 (Besan:Oat), Type IV- 25:75 (Besan:Oat), Type V- 0:100 (Besan:Oat)

CONCLUSION

It can be concluded from the present study that malted oat can be successfully incorporated with besan to produce a nutritious and highly acceptable gluten free burfi. The malted oat burfi prepared by using 75 percent oat flour and 25 percent besan was the most acceptable among all the combinations with the highest overall acceptability score (8.69). Incorporation of malted oat increased the antioxidant activity (61.79%) and improved the textural quality (16.59 N) of the burfi as compared to the 100% besan burfi (59.72% and 17.87 N). The addition of malted oat to burfi resulted in an increase in protein, fiber, and ash content compared to burfi made from 100% besan. These findings suggest that malted oat can be a viable alternative to gluten-containing grains in the production of traditional Indian sweets.

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ANTHROPOMETRIC AND PHYSICAL PERFORMANCE OF WOMEN ATHLETES (18-21 YEARS)

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ABSTRACT

Women athletes from India are from Economically Weaker Sections of society. They lack adequate nutrition and training. These factors impact their stature and performance. The present study was conducted to assess the socio economic status, nutritional anthropometry and physical performance of women athletes in selected areas of Tamil Nadu. One hundred and twenty women athletes from St. John's College, Rani Anna Government College for women in Tirunelveli participated in the study. Anthropometric measurements namely, body height, weight, waist circumference, hip circumference and skin fold measurements were measured using standard protocols. The total energy expenditure (TEE) was calculated based on multiplication of Basal Metabolic Rate (BMR) to Physical Activity Level (PAL) (TEE = BMR X PAL). Physical performance of the athletes such as sit-ups, standing balance and long jump were assessed through standard procedures. Female Athlete Triad was assessed based on the presence of eating disorders, osteoporosis and menstrual problems. All anthropometric parameters and indices were significantly ($p<0.01$) less than the respective standards. The mean energy expenditure of athletes was 2172.63 kcal/day with an excess energy expenditure of 13.76 percent against the actual intake of 2172.63 kcal/day. All the athletes were in the below average range in terms of sit ups test and standing balance test. Disordered eating was observed among 1.67% of athletes, 5% had menstrual dysfunction though none of the athletes had low Bone Mineral Density. The female athletes in the present study were thus smaller and shorter than their reference counterparts and were in negative energy balance. Their physical performance was subnormal. In addition they showed anorexia and amenorrhoea. However none of them exhibited low Bone Mineral Density.

Keywords: Anthropometric Measurements, Body Mass Index, Energy expenditure, Female Athlete Triad, Physical Performance, Skinfold Measurement

INTRODUCTION

One of the world's most demanding and competitive occupations is now sports. Sports involve national sentiments and pride. In compared with other countries, sports performancein India is not optimum. The lack of essential nutrition is one of the several reasons. Dietary deficiencies that affects an individual's health likely to have an impact on that person's capacity for physical performance (Anbumalar and Kokila *et al.*, 2019). The anthropometric characteristics of athletes have a significant impact on the physical and physiological characteristics (Milanese *et al.*, 2012). Anthropometric measurements are used for nutritional evaluation and are reliable tools to assess in nutritional status changes for an individual

(Delvarianzadeh *et al*., 2016). Assessment of anthropometric measurements in athletes helps to ascertain the nutritional status which is important for sports performance (Santos *et al*., 2014). Energy is required to maintain and promote physical performance and protect against injury. It is needed for a healthy and complete diet for female athletes. A low-quality diet exposes young female athletes to the risk of consuming insufficient amounts of energy and carbohydrates (Alaunyte *et al*., 2015).

In India, active women and elite female athletes face different energy and dietary challenges than their male counterparts. The most common nutritional concerns revolve on getting enough energy to meet the demands of daily activities, sport and reproduction also choosing the right foods to get the nutrients needed to support intense physical activity, overall health and maintenance and repair of bone and muscle (Andari *et al*., 2021). Female athletes are more affected by nutrition related health issues than their male counterparts in terms of eating disorders, nutrient deficiencies, body health issues and weight management problems (Shriver *et al*., 2013). The International Olympic Committee coined the term Relative Energy Deficiency in Sport (RED-S) in 2014 to refers the possible effects of insufficient energy for sport on one's health and ability to perform (Elliott *et al*., 2018).

The participantion of female athletes in all sports is only 50%. It is necessary to optimise the diet for female physiology-specific health and performance (Holtzman and Ackerman *et al*., 2021). According to studies, female athletes are often insufficient in meeting energy needs and nutritional both micro- and macronutrients leading to health, medical related issues, low energy availability and poor performance (Gastrich *et al*., 2020). According to the definition of the Female Athlete Triad (Triad), it is the combination of disordered eating and irregular menstrual cycles that eventually leads to a decrease in endogenous estrogen and other hormones, resulting in low bone mineral density'(Mountjoy *et al*., 2014). Hence the present study undertaken with the following objectives:

OBJECTIVES

- To assess the socioeconomic background and anthropometric parameters of selected women athletes
- To assess the total energy expenditure and incidence of female athlete triad among the athletes
- To study the physical performance of the women athletes.

HYPOTHESIS

In the present study, the authors stipulate that there will be no significant relationship between body weight and physical performance, and that there will be no significant relationship between physical performance and anthropometric parameters as the null hypothesis.

METHODOLOGY

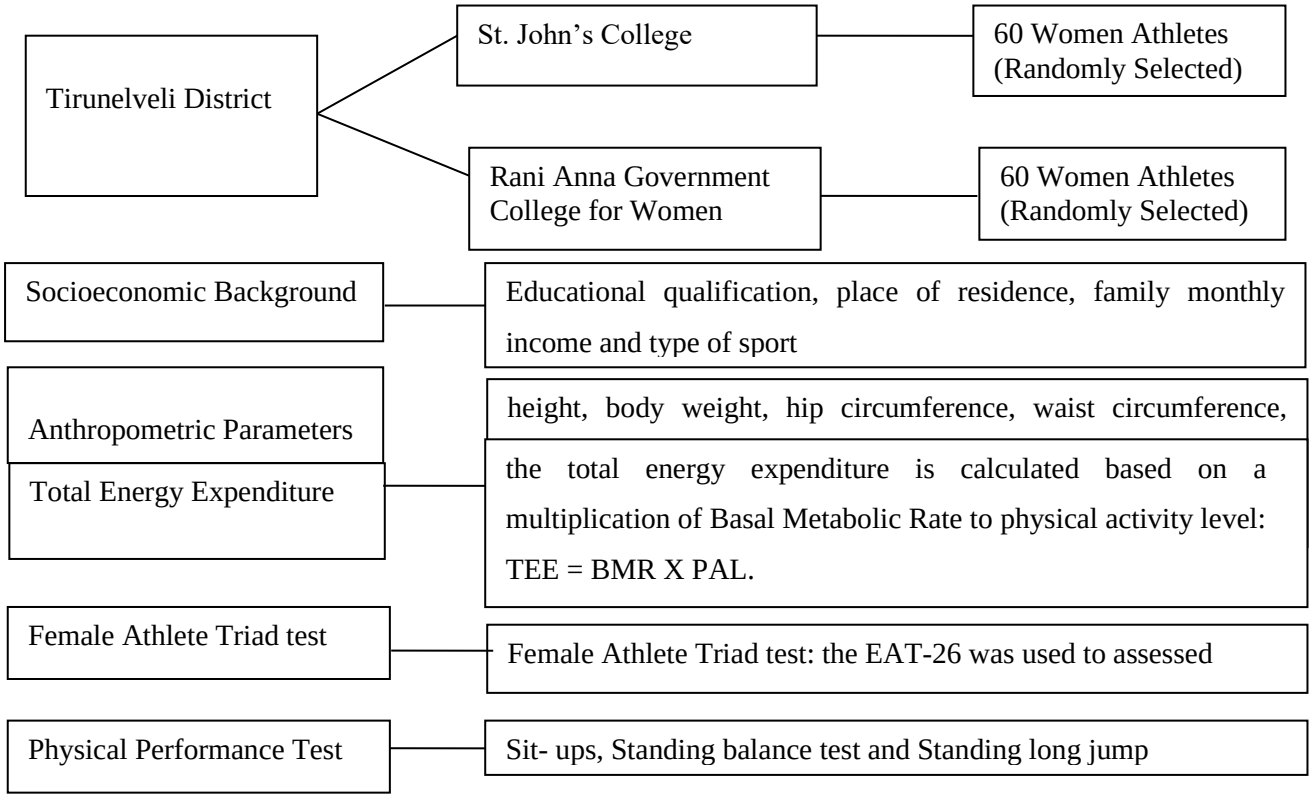
Research Design

The research investigation using a descriptive research approach was carried out.

Area of the research

A questionnaire was used to gather data on the socio economic status and demographic details of 120 women athletes selected from St. John's College, Rani Anna Government College for Women, Tirunelveli, with their consent.

Selection of the sample



COLLECTION OF DATA

Anthropometric measurements namely, body height, weight, hip circumference, waist circumference, forearm length, upper arm length, thigh girth and skinfold measurement were measured using standard protocols. Waist hip ratio and body mass index were calculated.

Height is measured by stadiometer. Weight is measured with properly calibrated scale. Body Mass Index (BMI), which is calculated by dividing weight in kilograms by height in meter squared although of limited usefulness with competitive athletes The procedure for measuring fatfold thickness is to grasp a fold of skin and subcutaneous fat firmly with the thumb and forefinger, pulling it away from the underlying muscular tissue following the natural contour of the fatfold. Adequate energy intake in relation to energy expenditure is important for good physiologic functioning: athletes who are in an energy deficit may experience

performance and negative health outcomes. To avoid lasting harm through worsening symptoms and other health or performance related impairements, it is to identify inadequate energy intake. The Basal Metabolic Rate was determined using the Harris-Benedict equation formula (1918) used was: Basal Metabolic Rate=655.5+9.56×weight in kg+1.85×height in cm - 4.68×age in years (Srilakshmi *et al*., 2017). The total energy requirement or the total energy expenditure is calculated based on a multiplication of Basal Metabolic Rate to physical activity level: TEE = BMR X PAL. Physical activity level (PAL) (ICMR, 2020). Physical performance of the athletes was tested using standard protocols for Sit- ups, Standing balance test and Standing long jump, (Ray *et al*., 2011). Physical performance parameters namely sit- ups test, standing balance test and long jump test were conducted. Participants were engaged in physical-activity regularly for one to three hours daily. All students reported their regular physical-activity behavior. Female athlete triad test: the EAT-26 was used to assessed disordered eating. The EAT-26 is a condensed version of the original EAT-40 scale that was published by Garner and Garfinkel and colleagues in 1979 as an economic and objective way to assess anorexia nervosa symptoms. The 26 items on the scale consists of three eating disorders: dieting; bulimia and food preoccupation; and oral control.

Using the IBM (SPSS) Statistics 21 software (SPSS/IBM), statistical analyses of all data were performed. Descriptive statistics ranges for means, standard deviations, one way ANOVA, one sample t test, and multiple regression tests was used for the parameters of physical performance and anthropometric characteristics.

FINDINGS AND DISCUSSION

A. Demographic Details of the Women Athletes

Table 1 presents the demographic details of the women athletes.

Table 1: Demographic Details of the Women Athletes

Details	Number N=120	Percentage (%)
Educational Qualification		
Under graduate	89	74
Post graduate	31	26
Place of Residence		
Urban	62	52
Rural	58	48
Family Income (Rs)*		
6,214-10,356	40	33
10,357-15,535	35	29
15,536-20,714	45	38
Sport		
Basketball	36	30
Throwball	32	27
Volleyball	29	24
Football	23	19

*Housing Urban Development Corporation (HUDCO) (2017)

Seventy four percent of women athletes were under graduates and 26 percent were post graduates. Fifty two percent of women athletes were from urban while 48 percent were from rural background. According to HUDCO (2017), 38 percent of the women athletes had monthly income ranging from Rs. 6,214-10356, 29 percent had income between Rs. 10,357-15,535 and thirty three percent had income between Rs. 15,536-20,714. Thirty percent of the athletes were basketball players, 27 percent were throwball players, 24 percent were volleyball players and 19 percent of the athletes played football.

B. Anthropometry of Women Athletes

The details on anthropometry of women athletes is given in Table 2.

Table 2: Anthropometry of Women Athletes

Parameters	**Number N=120**	**(%)**	**Standard/ Reference**	**Mean ± S.D**	**T- test**
Height (cm) #					
149-159	66	55	162	155.68±2.69	4.527**
160-172	54	45		163.17±3.08	
Weight (Kg)a					
41-46	32	27		43.09±1.71	21.535**
47-57	60	50	65.0	51.86±3.12	
58-68	28	23		60.75±2.70	
Waist Circumference (cm)*					
60-70	108	90	80.0	64.50±1.98	18.308**
71-80	12	10		75.57±2.06	
Hip circumference (cm)@					
74-84	57	48	102.4	80.84±2.71	38.273**
85-100	63	52		88.41±3.77	
Waist Hip Ratio (cm) &					
0.68-0.75	57	48	0.80	0.75±0.01	17.413**
0.76-0.80	63	52		0.77±0.01	
Body Mass Index (kg/m^2) $					
≤ 18.5	35	29	20.70	17.27±0.96	3.035**
18.5-22.9	85	71		21.32±1.63	
Upper arm length (cm)!					
21-25	101	84	27.49±1.91	23.98±1.11	7.529**
26-29	19	16		28.16±1.09	
Fore arm length (cm)!					
19-22	39	32	24.98±1.77	21.02±1.08	11.180**
23-29	81	68		24.13±1.08	
Thigh girth (cm)!					
33-40	41	34	46.61±3.01	37.12±1.66	13.046**
41-48	79	66		46.75±1.35	

Skinfold Measurement (mm)!					
Biceps	13	28	8.59±0.92	6.72±0.45	6.465**
6-7	107	72		8.52±0.50	
8-9					
Triceps					
9-10	40	33	11.39±1.26	9.47±0.50	5.325**
11-13	80	67		12.23±0.86	
Subscapular					
10-12	54	45	14.12±1.40	11.05±0.91	9.795**
13-15	66	55		13.89±0.89	
Supra iliac					
11-13	31	26	17.89±2.10	12.19±0.94	24.822**
14-16	89	74		15.22±0.65	

#,^- ICMR (2020); [a]ILSI,SAI,NIN (2007); *, &- WHO (2010); $- WHO (2000), @-Molarius *et al*., (1999),!- Anel and Subapriya (2018); ** - Significant at 1% level.

Fifty five percent of the women athletes were in the height range of 149-159cm with a mean height of 155.68cm. The remaining 45 percent were in the height range of 160-172cm with a mean height of 163.17cm. Twenty seven percent of the women athletes were in the range of weight of 41-46kg with a mean weight of 43.09kg; fifty percent of the women athletes were in the range of weight 47-57kg with a mean weight of 51.86kg. The remaining 23 percent were of the women athletes were in the weight range of 58-68kg with a mean weight of 60.75kg. Ninety percent of the women athletes were in the waist circumference range of 60-70cm with a mean waist circumference of 64.50cm. The remaining 10 percent were in the waist circumference of 71-80cm with a mean waist circumference of 75.57cm. Forty eight percent of the women athletes were in the hip circumference range of 74-84cm with a mean hip circumference of 80.84cm. The remaining 52 percent were in the hip circumference range of 85-100cm with a mean hip circumference of 88.41cm. Twenty nine percent of the women athletes were in the body mass index range of ≤18.5kg/m^2 with a mean body mass index of 17.27kg/m^2. The remaining 71 percent were in the range of body mass index 18.5-22.9 kg/m^2 with a mean body mass index of 21.32 kg/m^2.

Eighty four percent of the women athletes had upper arm length range of 21-25cm with a mean upper arm length of 23.98cm. The remaining 16 percent were in the upper arm length range of 26-29cm with a mean upper arm length of 28.16cm. Thirty two percent of the women athletes were in the fore arm length range of 19-22cm with a mean fore arm of 21.02cm. The remaining 68 percent were in the fore arm range of 23-29cm with a mean fore arm of 23-29cm. Thirty four percent of the women athletes were in the thigh girth range of 33-40cm with a mean thigh girth of 37.12cm. The remaining 66 percent were in the thigh girth range of 41-48cm with a mean thigh girth of 46.75cm.

Twenty eight percent of the women athletes were in the biceps range of 6-7mm with a mean biceps range of 6.72mm. The remaining 72 percent were in the biceps range of 8-9mm with a mean biceps of 8.52mm. Thirty three percent of the women athletes were in the triceps range of 9-10mm with a mean triceps range of 9.47mm. The remaining 67 percent were in the triceps range of 11-13mm with a mean triceps of 12.23mm. Forty five percent of the women athletes

were in the subscapular range of 10-12mm with a mean subscapular range of 11.05mm. The remaining 55 percent were in the subscapular range of 13-15mm with a mean subscapular range of 13.89mm. Twenty six percent of the women athletes were in the supra iliac range of 11-13mm with a mean supra iliac of 12.19mm. The remaining 74 percent were in the supra iliac range of 14-16mm with a mean supra iliac of 15.22mm.

C. Energy Intake and Expenditure of Women Athletes

Table 3 presents the mean energy intake and expenditure of women athletes.

Table 3: Mean Daily Energy Intake and Expenditure of Women Athletes (N=120)

Group	Energy intake (kcal)	Energy expenditure (kcal)	Excess/deficit (%)
Athletes	2172.63±114.31	2471.25±126.64	-13.76

The mean energy expenditure of athletes was 2471.3 kcal/day with an excess energy expenditure of 13.76 percent against the actual intake of 2172.6 kcal/day. All the athletes were in negative energy balance. The athletes had low energy intake which could be due to lack of nutrition awareness, harmful food choices, a lack of the components of a well-balanced diet. Training time was 3-4 hours daily, practice time were in the morning and evening.

D. Age and Physical Activity of Women Athletes

Table 4 presents the association between age and physical activity of women athletes.

Table 4: Details of Age and Physical Activity of Women Athletes (N=120)

Variable		Mean	SD	SE	F-value	Sig
Age	**Walking**	2.69	0.82	0.04	16.125	.000**
	Yoga	1.12	0.85	0.03		
	Cycling	1.96	0.79	0.05		

**-Significant at 1% level

The above table reveals the output of One – way ANOVA analysis between Age and normal physical activities done by the respondents like walking, yoga and cycling, the significance p- value is 0.000, there is statistically significant difference (at 1% level) between the means of the Age and normal Physical Activity. The result shows that the respondents in all age groups are involved in doing normal physical activities.

E. Average Physical Performance of Women Athletes

Table 5 presents the physical performance of women athletes.

Parameters	Number	(%)	Mean ± S.D	Grade	Score (s) *	Performance
Sit-ups test (counts) 25-28 29-32	78 42	65 35	28.06 ± 2.00	Good Average Below Average	37-41 29-32 25-28	Below Average
Standing balance (seconds) 9-10 11-12	35 85	29 71	10.86 ± 1.02	Below Average Above Average	13.1	Below Average
Standing long jump (meters) 1.60-1.70 1.71.1.77	44 76	37 63	1.75 ± 0.07	Below Average Average Above Average Excellent	1.50-1.62 1.63-1.77 1.78-1.91 >1.91	Average

Table 5: **Average Physical Performance of Women Athletes (N=120)**

*Ray *et al* (2011)

Sixty five percent of the women athletes could complete 25-28 sit ups test in one minute and thirty five percent of women athletes could complete 29-32 sit- ups test in one minute. The mean number of sit- ups that could be performed by the women athletes was 28.06 which was in the below average range. Twenty nine percent of the women athletes could perform standing balance test for 9-10 seconds and seventy one percent could perform between 11-12 seconds. The mean duration of 10.86 seconds showed standing balance test below average performance. Thirty seven percent could complete 1.60-1.70 meters standing long jump and sixty three percent completed 1.71-1.77 meters. The mean standing long jump distance of 1.75 m fell in the average performance category.

F. Association between Body Weight and Physical Performance of Women Athletes

Table 6 presents relationship between Body weight and Physical performance.

Table 6: **Association between Body Weight and Physical Performance of Women Athletes (N=120)**

Variable		Mean	SD	SE	T-value	Sig
Weight	**Sit-Ups (counts)**	2.14	1.12	0.05	9.145	.000**
	Standing Balance (s)	3.27	1.66	0.09		
	Long Jump (m)	2.52	1.21	0.04		

**- Significant at 1% level

One – way ANOVA analysis between Weight and major physical activities like Sit-Ups, Standing Balance and Long Jump, shows that there is a statistically significant (at 1% level) the difference between means of Weight and Physical Activities of the respondents. Respondents with greater body weight and obesity have trouble in doing physical activity.

Table 7 presents regression analysis was anthropometric parameters and sit-ups.

Regression analysis was used relationship between to find out sit-ups and the anthropometric parameters. Below is a model summary table:

Table No: 7 Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.649	.435	.411	.224585

The correlation R value is 0.649 and R square value is 0.435 degree determination. The degree of determination reveals the extent to the physical performance sit-ups correlate positively with the various parameters like upper arm length, fore arm length, thigh girth, biceps, triceps, subscapular and supra iliac.

G. Association Between Sit-Ups and Anthropometric Parameters

Table 8 presents the result of the regression analyses was used find out the relationship in sit-up and anthropometric parameters.

Table 8: Association Between Sit-Ups and Anthropometric Parameters (N=120)

Model	Sum of Squares	difference	Mean Square	F	Sig
Regression	12.752	7	2 .452	21.547	.000**
Residual	17.112	112	.228		
Total	29.864	119			

**- Significant at 1% level

The ANOVA table shows that the significance is less than 0.05, which means dependent variable is participation in decision making by independent variables is significantly predicted at 95% of confidence level. The regression model for Sit-Up indicates.

H. Relationship Between Physical Performance and Anthropometric Parameters

Table 9 presents the relationship between physical performance and anthropometric parameters of women athletes.

Table 9: Relationship Between Physical Performance and Anthropometric Parameters

Variables	Standardized Coefficients	T	Sig.
Upper Arm Length	0.160	-2.257	.025*
Fore Arm Length	0.211	3.922	.001**

Thigh Girth	0.273	3.924	.000**
Skinfold Measurement (mm) Biceps	0.383	4.903	.000**
Triceps	0.289	2.782	.012*
Subscapular	0.328	3.789	.009*
Supra Iliac	0.412	2.789	.000**

* Dependent variable: sit-ups; ($p<0.05$)

The regression results for parameters in doing physical activity predicted by upper arm length, fore arm length, thigh girth, biceps, triceps, subscapular and supra iliac. In the brief, all the parameters were statistically significant at 1% level for fore arm length, thigh girth, biceps and supra iliac and at 5% level for upper arm length, triceps, and subscapular. So the null hypothesis is rejected.

I. Female Athlete Triad Each Component

Figure 1 presents the Female Athlete Triad of each component.

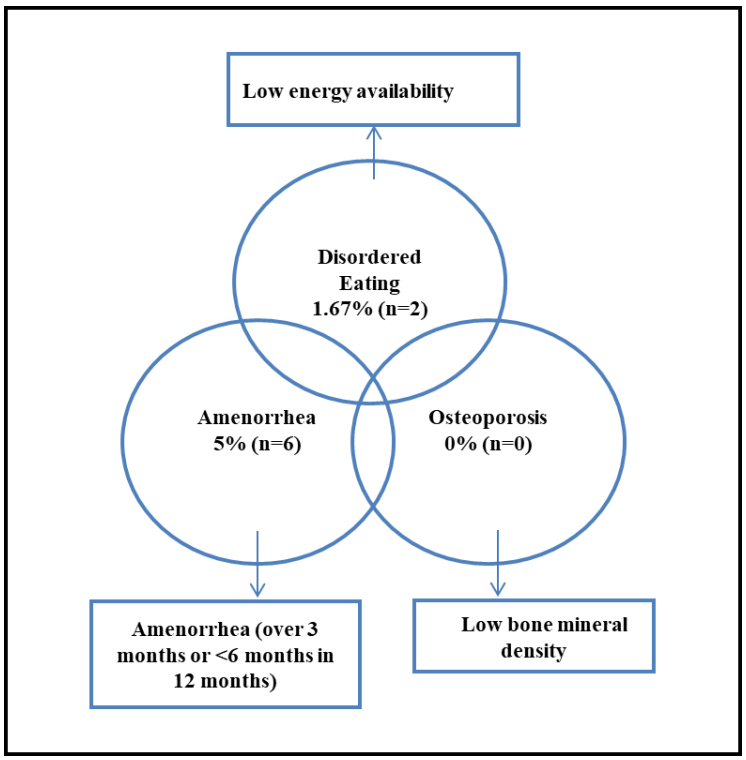


Figure 1: Number of the Female Athlete Triad each component (N=120)

(Edama *et al.*, 2021)

Disordered eating was observed among 1.67% of athletes, 5% had menstrual dysfunction and none of them had low bone mineral density.

SUMMARY AND CONCLUSION

The food and nutrient intakes of Indian women athletes are reportedly subnormal. This is reflected in their anthropometry and physical performance. It was observed that the anthropometric measurements and indices of the women athletes fell short of all the respective anthropometric standards. The athletes had low energy intake and showed gross energy deficits. This was reflected in the presence of female athlete triad among 6.67% of the women athletes. Physical performance parameters were either average or below average. This indicates the need for dietary modification and nutrition counseling to enhance the nutritional status and physical performance among the women athletes. Hence there is an urgent need to provide nutritional supplements and nutrition education to the women athletes which will enhance their physical performance. Nutrition education is needed to bring changes in dietary practices and improve nutrition knowledge.

SUGGESTIONS FOR FUTURE RESEARCH

- Design nutrition education modules and provide nutrition education and counseling to women athletes groups and assess the effect on the Knowledge, Attitude and Practice.
- Formulate need-based easy-to-prepare food supplements from inexpensive and indigeneous ingredients and assess their impact on nutritional status and physical performance of women athletes.

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PROBIOTIC PROPERTIES AND SAFETY ASSESSMENT OF *LACTOBACILLUS REUTERI* IN A BEVERAGE CONTAINING *ULVA sp.*

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ABSTRACT

The use of functional food ingredients like lactic acid bacteria (LAB) as potential probiotic candidates in food systems has gained momentum. In this study, the isolated LAB strains from the beverage containing *Ulva lactuca* were assessed for *in-vitro* probiotic activity and safety. Selected LAB's were presumptively identified as *Limosilactobacilli* and *Lactobacilli* based on physiological, biochemical, and morphological traits. The findings of the study suggested that *L. reuteri* isolate OP389067 exhibited significant tolerance to pH, simulated gastric juice (98.25-99.4% survival rate), pancreatin (25.33%), and bile (10.63%). The *in-vitro* safety of the isolate was established and considerable antibiotic resistance towards Amoxicillin, Penicillin, and Amoxiclav. The information presented by the study is pertinent to the probiotic's ability to deliver its intended health benefits while ensuring its safety for consumption.

Keywords: *Ulva lactuca*. *Limosilactobacilli. L. reuteri* isolate OP389067. cell surface hydrophobicity. auto-aggregation potential. antibacterial activity.

INTRODUCTION

The use of microbial cultures in food to confer health benefits is attributed to their functional role (SE Evive *et al*., 2017). The quintessential characteristics of prospective probiotics are acid resistance, bile tolerance, are non-pathogenic, according to studies by Prabhurajeshwar *et al.*, 2017, Plaza-Diaz *et al.*, 2019 and T K Das *et al.*, 2022. Rigorous evaluation of probiotics was done to be designated as Generally Recognized as Safe (GRAS) for human consumption. They should demonstrate considerable potential to ensure applications within the food matrix. The probiotic foods must have at least 106 CFU/g, which is considered an adequate number of live bacteria to determine its functionality in conferring health benefits (Isa *et al*., 2021).

Numerous studies have demonstrated edible seaweeds as a super food and a potential substrate for probiotics and prebiotics thus favourably influencing the gut microbiome (Vamanu *et al*., 2020). The current study was executed to investigate the probiotic properties and safety assessment of *L. reuteri* from a beverage containing *Ulva lactuca.*

OBJECTIVES

The objectives of the study are enlisted as follows:

1. To assess the *in-vitro* potential of the lactic acid bacteria strains from the probiotic beverage containing *Ulva lactuca* by assessing their tolerance to pH, and tolerance to gastrointestinal juices.

2. To determine the *in-vitro* safety by evaluating antibacterial susceptibility tests and haemolytic activity.

HYPOTHESES

1. The isolated strains will demonstrate the probiotic properties and hence have resistance to high pH, have tolerance to gastric, bile, and pancreatic juices during the *in-vitro* study.

2. The isolated strains will demonstrate significant antimicrobial activity towards targeted pathogens and do not show haemolytic activity.

MATERIALS AND METHODS

Isolation and Purification of LAB Strains from a Beverage Containing *Ulva lactuca.*

The probiotic beverage containing *U. lactuca* was aseptically prepared and the sample was collected in a container that was pre-sterilized in the laboratory. According to the conventional procedure gleaned from Liu *et al*., 2019, serial dilution of the sample was done at the power of 10^{-3} times, and 0.1 ml of the strain isolate was pour-plated into MRS agar and incubated at 37 ℃ for 24h under anaerobiosis. After acquiring distinct colonies of organisms, pure cultures were acquired by sub-cultivation onto MRS agar plates. (Zhou *et al*., 2021).

Morphological and Biochemical and Phenotypic Characterisation of LAB

Colony morphology, characteristics of the isolated culture, and microscopic observations were carried out as a part of the preliminary identification protocol. Biochemical screening assays were conducted on the isolates from the differential media and the results were systematically obtained. These include testing for urease, the Vogues-Proskauer test, the H_2S generation test, the indole production, citrate utilization, and arginine hydrolysis testing. As per the protocol suggested by Kunchala *et al*., 2017, Thakur *et al*., 2017, and Obasi *et al*., 2019, evaluations for starch hydrolysis, carbohydrate fermentation, oxidase, and Voges-Proskauer were also conducted.

As per the process elucidated by Angelescu *et al.,* 2019, the extraction of the DNA isolate was carried out and its characteristics were determined. As per the protocol, the 'universal primers' 27F (5′AGAGTTTGATCMTGGCTCAG-3′) and 1492R (5′TACGGYTACCTTGTTACGACTT-3′), were utilized and bacterial 16S ribosomal RNA-based polymerase chain reaction was meticulously executed. (Plessas *et al.,* 2017). A comparative study approach was used to analyse the 16S rRNA gene sequence homologies. A BLAST search was used to match the obtained sequences to those in the NCBI repository. The gene sequences were

examined, and a tree portraying the evolutionary relationship was structured using MEGA 6.0 software (Mulaw *et al.,* 2019).

In-vitro Probiotic Analysis of the Isolate

Tolerance to pH

To determine resistance to acids of an isolate, there is a need for choosing a beneficial probiotic strain for which, an in-vitro analysis was carried out. The pH endurance test was conducted during the three hours that it takes for food to be fully absorbed in the stomach (Angmo *et al.,* 2016). The tolerance of the isolate to pH was assessed using 0.5 ml of inoculum. The pH levels of a 20-hour culture medium were adjusted to 3 and 7.2 by 1N HCl before adding 5 ml of phosphate-buffered saline (PBS). Subsequently, the mixture was subjected to aerobic incubation for an additional duration of three hours at a temperature of 37℃. To evaluate the viability and growth kinetics, optical density measurements were performed at 600 nm at predefined time intervals. (Giri *et al.,* 2018, Nath *et al*., 2020).

Simulated Gastric Juice Tolerance

The methodology proposed by Koh *et al.,* 2019 and Wu *et al.,* 2021 was adopted with minor modifications to assess the simulated gastric juice tolerance of the LAB isolate. The strain was centrifugally agitated at 5,000 revolutions per minute for 15 minutes at 5 ℃ after being cultivated in an MRS medium with 0.1% ascorbic acid for a 48-hour period at 37 ℃. To conduct the test, gastric juice with a pH of 3.0, comprising 125 millimolar NaCl, 45 millimolar NaHCO3, 7 millimolar KCl, and 3 g/L pepsin was made. For the control, 1 M of HCl and sodium hydroxide were added to make the solution pH 7 (Archer *et al*., 2015). For both the assay and control groups, the bacterial pellet was initially resuspended in 10 ml of phosphate-buffered saline (PBS) at pH 7.4, followed by incubation in simulated gastric juice. The viability of the bacterial strain was subsequently assessed by enumerating colony formation over a period ranging from 0 to 3 hours.

$$\text{Bacterial viability (\%)} = \frac{CFU_{assay} \times 100}{CFU_{control}}$$

Bile Juice Tolerance

The procedure outlined by Nakkarach *et al*., 2018 was followed for conducting the bile tolerance test. 100 µL of bacterial culture that had been cultivated overnight was centrifuged and resuspended in PBS solution with 0.3% bile, adjusted to pH 8.0. Additionally, as a control, the test strain isolate was inoculated in MRS broth solution without bile. Resistance was measured for both test tubes by counting live colony counts after incubation at 37 ℃. To establish bile salt tolerance, the absorption value of MRS broth at 600 nm was determined. This was done because the usual duration for meal assimilation in the small intestine is between 0 and 4 hours. By outspreading a hundred microliters of the isolate on top of the MRS agar plate after the organism had been incubated for four hours, the survivability of the same in 0.3% bile was measured as well.

Pancreatin Tolerance

0.1 ml of bacterial isolate from the 24-hour culture was extricated by centrifuging at 10,000×g for 5 min at 4 ℃. They were briefly suspended in PBS (pH 7.2) and resuspended in the

same solution of pH 8.0 containing 0.5% pancreatin. The control group received no treatment. For 48 hours at 37 °C, inoculated test tubes containing the bacterial isolate were incubated in a shaker incubator. By taking measurements of the absorbance at 600 nm at intervals of 24h for two days starting from 0h, pancreatin tolerance was ascertained. After 48 hours of incubation, the cell viability of the test and control specimen in MRS agar plates was also calculated as per the protocol suggested by Khagwal *et al.,* 2019 and Gebre *et al.,* 2023.

In-Vitro Safety Assessment of the LAB Strain

Determination of Antibiotic Susceptibility of *L. Reuteri* on Common Enteropathogens

With a few minimal alterations, the disc agar diffusion suggested by Cui *et al.,* 2018 and Wang *et al.,* 2021, was applied to determine susceptibility to antibiotics. On an MRS agar plate, 100µL of LAB cells (107 CFU mL^{-1}) were plated. The plates containing discs that had been infused with antibiotics were left to incubate at a temperature of 37°C for 24-48 hours. Amikacin – AK30mcg, Gatifloxacin – GAT 5mcg, Moxifloxacin –MO 5mcg, Amoxicillin sulbactam- AMS 30/15 mcg, Penicillin – P 10mcg, Amoxiclav– AMC 10mcg and Chloramphenicol – C 30 mcg, Vancomycin – VA 30mcg, Methicillin – MET 5mcg, procured from 'hi-media' were used.

Haemolytic Activity

Determining the pathogenicity of isolates of bacteria is a crucial factor for prophylactic microorganisms in general. On the contrary, the absence of the action shows that non-virulent strains are present. The bacterial culture was scattered onto sheep blood agar plates that contained 5% sheep blood and incubated thereafter at ambient temperature for 48 hours (Romero-Luna *et al.,* 2020 Mousanejadi *et al.,* 2023). A prominent, colourless zone encircling the colonies, showing complete RBC lysis, indicated the possibility of beta (β) haemolysis and served as a visual representation of its presence. A small section of the media when discoloured from green to brown signifies alpha (α) haemolysis, due to the reduction of haemoglobin to met-haemoglobin. No change in the medium is indicated by gamma (γ) haemolysis (Vaithilingam *et al.,* 2016).

Statistical Analysis

The findings of each experiment were communicated as the mean and standard deviation of triplicates. SPSS version 23.0 (IBM, USA), and the data generated was reviewed using Microsoft Excel 2021. At a P value < 0.05 and < 0.01, the statistical significance was computed. Independent sample T-test and ANOVA were used to illustrate the outcomes.

RESULTS AND DISCUSSION

Morphological, Biochemical, and Phenotypic Characterisation of the Strain

The current study reports the presence of non-pigmented, small, and clustered creamy white and shining colonies of bacteria that were rod-shaped, gram-positive, with a mucilaginous appearance on the superficial plane of the agar medium. A distinctive sequence of growth was seen between the 25 and 40 °C temperature range. As depicted in Table 1, the isolates exhibited negative outcomes for the tests' indole, Voges-Proskauer, methyl-red, endospore production,

oxidase, catalase, and citrate utilization. According to the findings, the isolate(s) was/were capable of fermenting glucose, lactose, sucrose, fructose, maltose, galactose, and ribose.

Morphological characteristics		Biochemical characteristics	
MRS Broth	**Mild to moderate turbidity**	**Indole**	-
MRS agar	**Irregular colonies**	**Voges–Proskauer test**	-
Appearance and colour	**White, creamy, and shiny colonies**	**Methyl red test**	-
Type of colony	**Small, clustered**	**Oxidase test**	-
Ambient Growth temperature	**25-40°C**	**Catalase test**	-
Endospore test	**Negative**	**Citrate utilization test**	-
Gram reaction	**Positive**	**Carbohydrate fermentation**	
Shape	**Elongated, rod shaped, arranged in chains**	**D-Glucose**	+
		D-Fructose	-
		D-Lactose	+
		D-Sucrose	+
		D-Xylose	-
		D-Maltose	+

Table 1: Morphological and Biochemical characterization of the lactobacillus strain.

The generated BLAST results demonstrated that the 16S rDNA sequence of the isolated strain KYK demonstrates a high degree of similarity with species of *Lactobacillus* indexed in the GenBank and archived the accession number OP389067. The isolates showed the highest homology of 99% similarity index regarding species bacterial genera *Lactobacillus reuteri and Limosilactobacillus reuteri.* The phylogenetic tree in Figure 1 represents the lineage analysis of the isolate with database sequences.

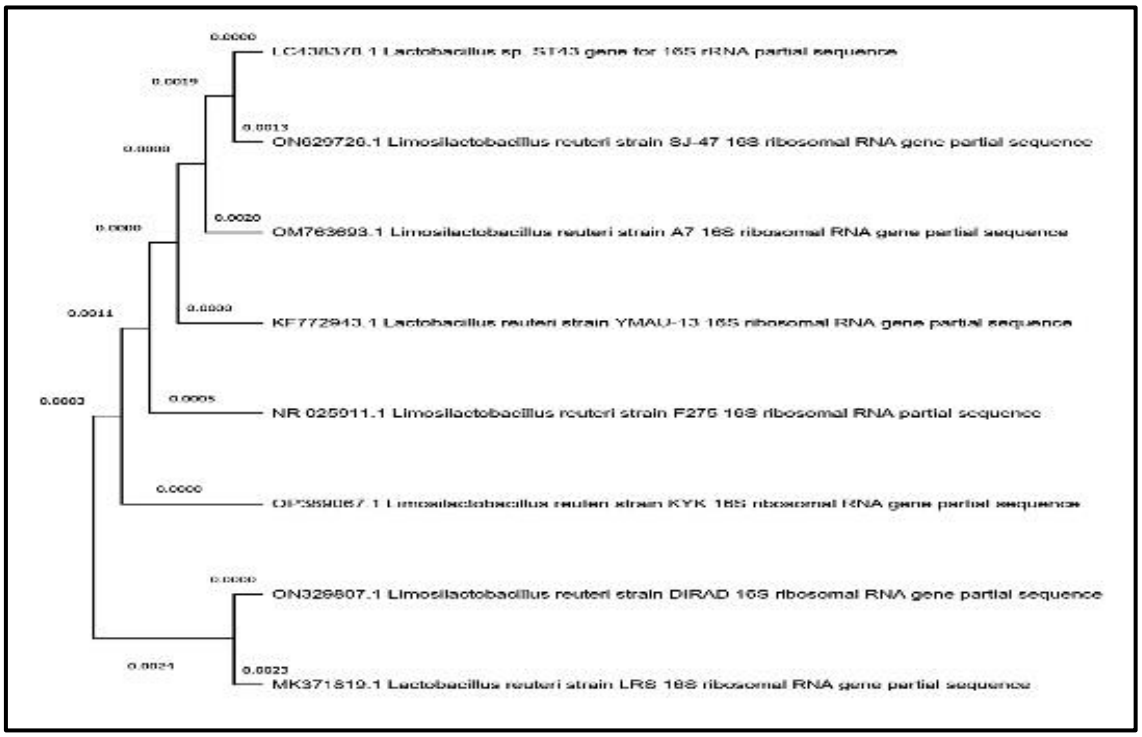


Figure 1: Phylogenetic tree of isolate OP389067, depicting the lineage analysis of the strain with the database sequence.

In-Vitro Analysis of Probiotic Characteristics of the Isolate

pH Tolerance

Probiotic microorganisms must demonstrate a surviving potential for an average time of 3h at pH ≤ 3 in the GI system. From Table 2, it was evident that there is a statistical association between the variables *L. reuteri* at pH 3.0 and pH 7±0.2 as the significance is 0.000, which is statistically significant (at 1% level). From the mean value, it is noted that sample Assay demonstrated more pH tolerance (41.70%) when compared to control samples. Figure 2 depicts the analogous growth of *L. reuteri* at pH 3.0 when collated with pH 7.20.

Simulated Gastric Juice Tolerance

The viability of probiotic isolate is directly proportional to the tolerance against the gastric juice at pH 3. Figure 3 shows that there is maintained growth (CFU/ml) of the *L. reuteri* isolate OP389067 at 3 pH when compared to the analogous increase in the growth of the organism at neutral pH. *L. reuteri* isolate OP389067 showed a survival rate of 99.4% after first-hour incubation. The viability decreased to 98.76% in the second hour and a marginal decrease was observed in the third hour, which is 98.25%. To find the association between sample Assay and Control (without gastric juice), Independent sample t-tests were used, and the results were presented in Table 2. There is a statistical association established between the variables as the significance (p-value) value is 0.000, it is statistically significant (at a 1% level). From the mean value it is noted that *L. reuteri* isolate OP389067 at 3 pH demonstrated significant Simulated Gastric Juice Tolerance when compared to control at pH 7.2 without Gastric juice.

Bile Juice Tolerance

The bile tolerance potential of the *L. reuteri* isolate OP389067 at 0.3% bile and its absence, determines the ability of the organism to break down lipids and fatty acids due to which viability of the bacteria diminishes (Somashekaraiah *et al.,* 2019). In Table 2, the statistical association between *L. reuteri* (3pH) and *L. reuteri* (7.2pH) presented that there is a significant association between the variables at the 5% level, as the significance (p-value) value is 0.019. From the mean value, it is noted that *L. reuteri* with 0.3% Bile at pH 8 had more Bile Tolerance when compared to *L. reuteri* control. The *L. reuteri* isolate OP389067 showed a survival rate of 10.15% during 0-4h and with relation to absorbance, the isolate demonstrated a survival rate of 10.63% at 3 h, and there was considerable growth after 4h incubation time.

Pancreatin Tolerance

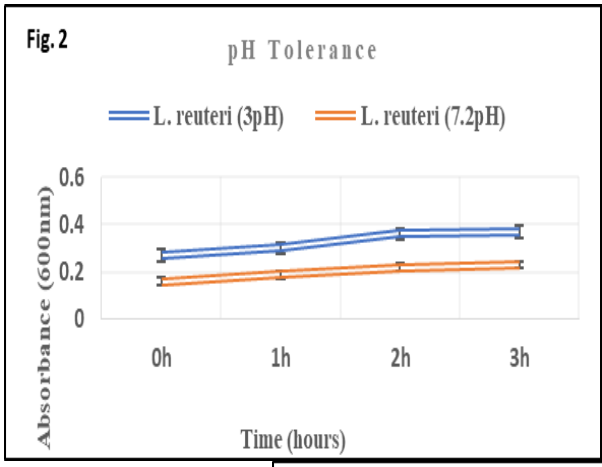
The pancreatin tolerance of the *L. reuteri* isolate OP389067 for 0.5% Pancreatin concentration is determined by its ability to digest macronutrients with the help of the secreted enzymes from the pancreas. In Table 2, the statistical association between *L. reuteri* isolate OP389067 at 0.5% bile concentration and the control illustrated a 5% significance as the significance (p-value) value is 0.015. From the mean value it is concluded that *L. reuteri* isolate OP389067 in 0.5% pancreatin had more Pancreatin Tolerance Absorbance at 600nm when compared to control. Fig.6 shows that there is remarkable growth in the isolate at 24h in the presence of 0.5 percent pancreatin and the viability index of *L. reuteri* isolate OP389067 is calculated to be 25.33% at 24 h and 10.22% after 48 h incubation. Similar results were shown in

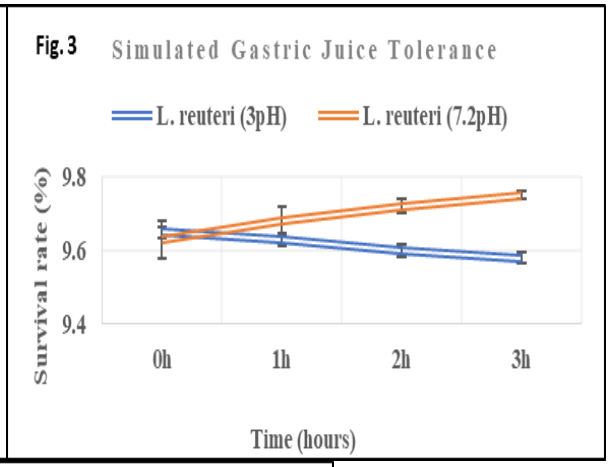
the study by Chelliah *et al.*, 2016 and Marinova *et al.*, 2019 that increasing the incubation time resulted in diminished viability of bacteria.

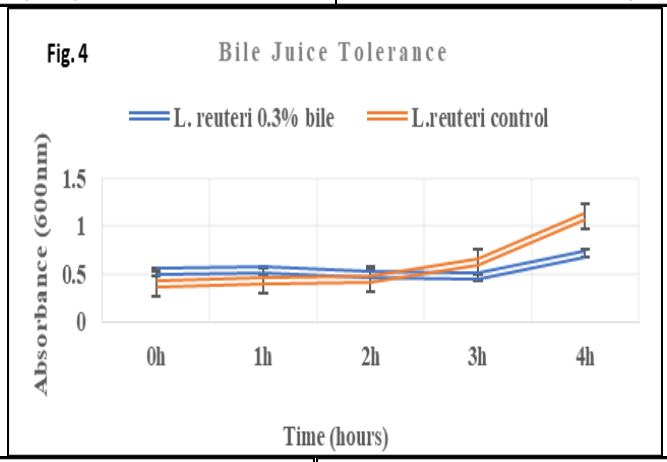
Table 2: Independent sample t-test depicting the statistical significance between *L. reuteri* isolate OP389067 and *L. reuteri* control.

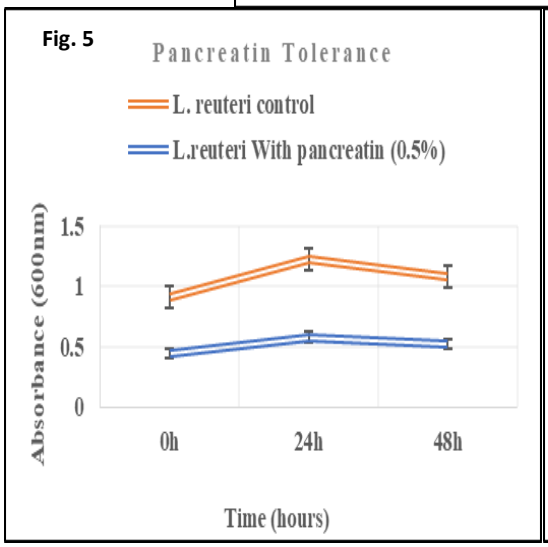
Type of test	Variables	Mean±SD	T - Value	Significance
pH Tolerance	***L. reuteri* (3pH)**	0.34±0.05	8.586	.000*
	***L. reuteri* (7.2pH)**	0.20±0.03		
Simulated Gastric Juice Tolerance	***L. reuteri* (3pH)**	9.63	5.359	.000*
	***L. reuteri* (7pH)**	9.64		
Bile Tolerance (log 10 cfu/ml)	***L. reuteri* 0.3% Bile at pH 8**	8.70	3.130	.019**
	***L. reuteri* control**	9.40		
Pancreatin Tolerance Test (log 10 cfu/ml)	**Assay (3pH)**	13.19	.463	.015**
	Control (7.2pH)	13.87		

***= Significant at 1% level** **=Significant at 5% level**









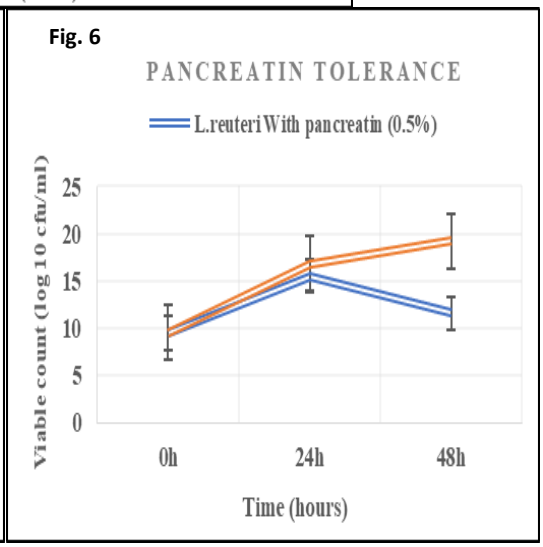


Figure 2: Growth of *L. reuteri* isolate OP389067 in pH 7.2 and pH 3.
Figure 3: Survival rate of *L. reuteri* isolate OP389067 in pH 7.2 and pH 3.
Figure 4: Survival rate of *L. reuteri* isolate OP389067 in 0.3% bile and in the control system.
Figures 5 and 6: Survival rate of *L. reuteri* isolate OP389067 in 0.5% pancreatin and in the control system.

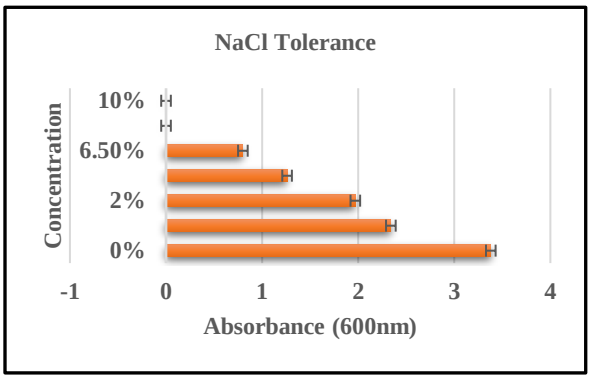


Figure 7: Viability Index of *L. reuteri* isolate OP389067 in NaCl at different concentrations.

In-Vitro Safety Assessment of *L. Reuteri* Isolate OP389067

Antibiotic Susceptibility

L. reuteri isolate OP389067 was found sensitive to Amoxicillin sulbactam- AMS 30/15 mcg, Penicillin – P 10mcg, Amoxiclav– AMC 10mcg, and Chloramphenicol – C 30 mcg. Intermediate sensitivity was observed towards Gatifloxacin – GAT 5mcg and Moxifloxacin –MO 5mcg. However, *L. reuteri* isolate OP389067 was found to be resistant to Methicillin – MET 5mcg and Ceftazidime – Cz 30mcg (Table 3). The association between the isolate and the susceptibility towards antibiotics was analyzed through One-Way ANOVA and the statistical association between the variables as the significance (p- value) value is 0.000, is established at a 1% level.

Table 3: Antibiotic Susceptibility of *L. reuteri* isolate OP389067 against antibiotics at varied concentrations.

AK 30mcg	GAT 5mcg	MO 5mcg	AMS 30/15 mcg	MET 5mcg	P 10mcg	AMC 10mcg	C 30 mcg	Cz 30mcg
0.25±0.01	0.17±0.01	0.12±0.01	4.78±0.03	>250	5.2±0.1	6.8	5.96±0.05	>250
IS*	**IS***	**IS***	**S****	**R*****	**S****	**S****	**S****	**R*****

*IS – Intermediate Sensitive; **S – Sensitive; ***R – Resistant

Haemolytic Activity

L. reuteri isolate OP389067 showed γ-haemolysis or no haemolysis, which is a desirable characteristic of beneficial probiotic bacteria aiding in gut health.

SUMMARY AND CONCLUSION

Outcomes of the current research divulge that *L. reuteri* isolate OP389067 from the probiotic beverage containing *U. lactuca* could be adjudged as a potential probiotic strain, due to its broad-

spectrum resilience towards conditioned simulations of the Gastro-intestinal tract, absence of haemolysis and notable antibiotic resistivity.

IMPLICATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The study asseverates that the consumption of the beverage aids in improving gut health and confers additional health benefits adverting to the probiotic potential. However, there is a wide scope for extensive research to elucidate practical applications of probiotic potential and safety applications in foods, for diverse benefits pertinent to human health.

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NUTRITIONAL AND PSYCHOLOGICAL HEALTH OF WORKING AND NON-WORKING WOMEN

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ABSTRACT

In present times, women are playing multiple roles, as a homemaker and in various professional fields. Women are the backbone of family and society, supporting their families financially, physically and emotionally. In this exhausting process, they often overlook their health. Thus, the present study is an attempt to assess nutritional status and psychological health of working and non-working women. Nutritional health in terms of BMI (body Mass Index), WHR (Waist Hip Circumference Ratio), eating pattern and dietary habits was studied. To assess psychological health, anxiety levels and stress levels were seen. The results showed that working status affected women's health differently as compared to home makers. The working women reflected poorer psychological health and the non-working women showed poorer nutritional health. The eating habits, lifestyle and dual responsibility of home as well as professional lives were the probable determinants influencing the health of women. It is recommended that for a better health status psychological counseling should be imparted to working women and nutritional counseling to non-working women.

Keywords: Non-working women, Nutritional health, Psychological health, Working women.

INTRODUCTION

With an increase in economy, educational attainment, opportunities and need, women are participating in workforce. However, the rate of participation of women is still low in India. There are 355 million working age women in India, of which133 million are working and 222 million are non-working. Out of 133 million working women, 80 million are working as main workers and 53 million as marginal workers (Anand et al., 2022). Furthermore, a grim reality published in The Telegraph states a decline in Labour Force Participation Rate for women from 42.7 percent in 2004- 05 to 25 percent in 2021 (The Telegraph, 2022). The drop is probably attributed to improve in economic status of family, increase in household burden pertaining to marriage and taking care of kids, inconducive work environment, and the poor quality of education received by women not at par with the requirement of professional demand. The lack of work-life balance, familial matters and family financial status has reduced the participation of women in the work (Kapsos et al., 2014). In many cases, employment has doubled the burden of women as they have taken up the dual responsibility of managing work with home. The double burden may adversely affect their nutritional and psychological health. Thus, there is a need to discern the health status of working women and non-working women so as to understand the issues underlying the low rate of female

participation in labour force in India compared to the global average. The present study is a descriptive study to assess the nutritional status and stress levels of women across their working status with the following objectives:

OBJECTIVES OF THE STUDY

1) To assess and compare nutritional status of working and non-working women.
2) To understand the dietary habits of working and non-working women.
3) To assess the psychological health of working and non-working women.

Hypothesis

Ho: Nutritional status and psychological health do not differ between working and non-working women.

H1: Nutritional status and psychological health differ between working and non-working women.

METHODOLOGY

The present study was descriptive in nature. Thirty working and thirty non-working rural women aged (21-55 years) from Haldwani block, district Nainital, Uttarakhand were randomly selected as the respondents for the study. A self-structured questionnaire was deployed to study the socio-economic details of the respondents. The subjects were interviewed and their responses were recorded.

Nutritional status was assessed using anthropometric measurements viz. weight, standing height, waist circumference and hip circumference. The weight was measured using digital weighing balance, where the subjects were asked to stand straight with minimum clothing. Standing height, hip circumference and waist circumference were measured using non stretchable measuring tape. While measuring the height, the subjects were asked to stand straight against the wall, with the heels touching the wall. For assessing the nutritional status, BMI was computed as weight (kg)/ height^2 (m^2) and compared with the WHO Asian BMI classification. Waist hip circumference ratio (WHR) was calculated to understand the health risks. WHR was calculated as waist circumference (cm)/ hip circumference (cm). A WHR greater than 0.8 in women is indicative of android obesity. Food frequency questionnaire was deployed to assess the dietary habits of women.

To discern the psychological health, self-reported anxiety and stress levels were measured. Perceived stress scale by Cohen & Others (1983) was used to assess the stress level of women. The data was analyzed and chi-square test was applied to make the comparison between working and non-working women.

RESULTS AND DISCUSSION

The socio-economic details showed that 83.3% of working women and 100% of non-working women were married. The age of the women ranged from 21 to 55 years, with a mean age of 32.9 years for working women and 36.7 years for non-working. A higher percentage (60%) of non-working women lived in joint family compared to working women (46.66%). Educational attainment was seen to be higher for working women. It was seen that 66.66% of working women were graduate compared to 36.6% of non-working women. The employment status showed that

46.66% of working women were self-employed and run shops, boutique, beauty parlours and coaching classes, 66% were in government jobs, 3.33% in semi-government jobs and 43.33% in private jobs (Table 1).

Table 1. Socio-economic status of working and non-working women

Parameters		Working Women		Non-working Women	
		N	%	N	%
Marital Status	Married	25	83.33	30	100
	Unmarried	5	16.66	0	0
Type of Family	Joint	14	46.66	18	60
	Nuclear	16	53.33	12	40
Educational Status	Illiterate	1	3.33	2	6.66
	Primary	1	3.33	8	26.66
	Secondary	8	26.66	9	30
	Graduate	20	66.66	11	36.66
Monthly Family Income	10-20 thousand	18	60	13	43.33
	21-30 thousand	5	16.66	8	26.66
	31-40 thousand	5	16.66	9	30
	Above 40 thousand	2	6.66	0	0

Nutritional status of working and non-working women

Nutritional status of women was assessed using BMI (Table 2, Fig. 1). It was seen that 13.33 % of working women and 10% non-working women were underweight, 43.3% working women and 46.6% non-working women were in normal category. A high percentage of working women (16.66%) were overweight as compared to non-working woman (3.33%), however obesity was seen to be higher among non-working women (40%) compared to working women (26.6%) but the nutritional status was not significantly pronounced. Anand and Sharma (2017) reported that 66% of working women were overweight as compared to 58% of non-working women. Contrarily, Bhoyar (2014**)** concluded that a higher percentage of working women were underweight compared to non-working women.

In the present study, the average BMI for working women was seen to be 22.66 kg/m^2 and for non-working women 23.31 kg/m^2, indicating that non-working women were overweight. Tiwari & Tripathi (2018) found that BMI of working women (22.21kg/m^2) was significantly higher than non-working women (21.65kg/m^2)**.**

Waist Hip circumference Ratio (WHR) gives the distribution of fat in the human body and a value higher than 0.8 indicates android obesity and risk of atherosclerosis in females. It was seen that the WHR >0.8 cm was significantly higher for non-working women compared to working women (Table 2, Fig. 2). Pallavi et. al. (2020) found in their study that 76% of working women were at risk in terms of WHR.

Table 2. BMI, BMI classification and WHR for working and non-working women

Variables	Working Women			Non-working women		Chi-square value	P-Value
Average BMI (kg/m^2)	22.66			23.31		-	-
BMI (kg/m^2)		F	%	F	%	3.8466	0.427
	Underweight	4	13.33	3	10		
	Normal	13	43.33	14	46.66		
	Overweight	5	16.66	1	3.33		
	Obese I	6	20	10	33.33		
	Obese II	2	6.66	2	6.66		
WHR	<0.8cm	15	50	5	16.66	7.5	0.006
	>0.8 cm	15	50	25	83.33		

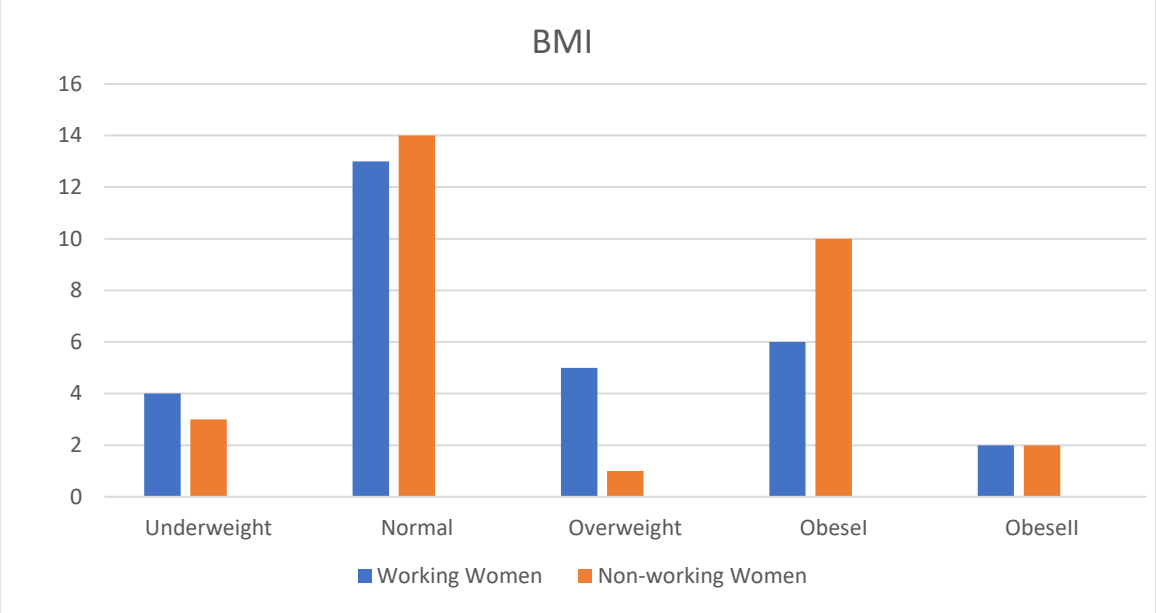

Fig. 1 BMI classification of working and non-working women

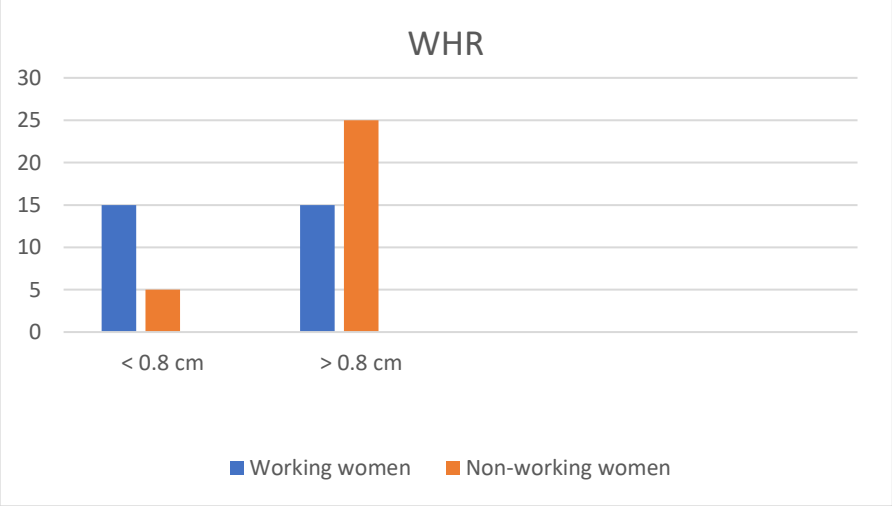

Fig. 2 WHR of working and non-working women

To further understand the nutritional status of working and non-working women their dietary habits using food intake frequency was studied and it was seen that both working and non-working women included cereal, pulses and vegetables daily in their meal. A high percentage of working women (83.33%) took milk daily and 16.66% never took milk, on the other hand 73.33% of non-working women took milk daily, 13.33% took weekly and 13.33 % never took milk. Half of the working women were vegetarian, 40 % women were non-vegetarian, 10% women were ovo-vegetarian. Correspondingly, 53.33% non-working women were vegetarian, 33.33% women were non- vegetarian, 13.33% women were ovo-vegetarian. Majority of working and non-working women took 3 meals a day. Habit of fasting (once a week) was same among working and non-working women, however, 13.33% of working women had never observed fasting as compared to 3.33% of non-working women. A high percentage of working and non-working women reported of

consuming fruits daily. Daily consumption of tea was seen in 80% of working women and 86% of non-working women. Daily sugar consumption was less in working women (83.33%) as compared to non-working women (96.99%). Daily nut consumption was higher among working women (53.33%) as compared to non-working women. Priyadarshini (2016) found in the study that daily consumption of fruits, milk and sugar was high among working women compared to non-working women, however, pulses, green leafy vegetables and roots and tubers consumption was high among non-working women**.** Tiwari and Tripathi (2018) concluded in their study that working women took more nut/oil, sugar and other vegetables than non-working women, however, milk and fruit consumption was higher among non-working women.

Lifestyle pattern was studied and it was seen that none of women reported smoking and alcohol consumption. Physical activity showed that 70% of working women and 73.33% of non-working women had a habit of walking twice a day. Yoga was practiced by 50% working women and 33.33% of non-working women. Physical activity is seen to be highly beneficial for improving physical and mental health. It was inferred that a change in lifestyle and performing moderate physical activity daily can help to maintain body mass and improve health (Dabrowska et al., 2015). Physical activity can reduce the symptoms of stress, anxiety and depression (Singh et al., 2023). Vitamin and minerals supplements tablets were consumed by few working and non-working women. Majority of working women (73.33%) opted for home delivery of marketed food as compared to 10% of non-working women. Home-made food was more preferred by non-working women.

Table 3. Dietary habits of working and non-working women

	Variable	Working Women		Non-Working women	
		N	%	N	%
Food Type	Vegetarian	15	50	16	53.33
	Non-vegetarian	12	40	10	33.33
	Ovo-vegetarian	3	10	4	13.33
Number of Meal	1 time	0	0	0	0
	2 time	2	6.66	1	3.33
	3 time	28	93.33	29	96.66
Fasting Frequency Per Week	1 days	5	16.66	5	16.66
	2 days	2	6.66	0	0
	Sometimes	19	63.33	24	80
	Never	4	13.33	1	3.33
Fruit Consumption	Daily	28	93.33	30	100
	Weekly	1	3.33	0	0
	Never	1	3.33	0	0
Milk Consumption	Daily	25	83.33	22	73.33
	Weekly	0	0	4	13.33

	Never	5	16	4	13.33
Tea Consumption	Daily	24	80	26	86.66
	Weekly	0	0	2	6.66
	Never	6	20	2	6.66
Sugar Consumption	Daily	25	83.33	29	96.66
	Weekly	4	13.33	0	0
	Never	1	3.33	1	3.33
Breakfast	Chapattis	29	96.66	30	100
	Fruit	1	3.33	0	0
Food Items	Cereals	30	100	30	100
	Pulses	30	100	30	100
	Spices	30	100	30	100
	Fat/oil	30	100	30	100
	Vegetables	30	100	30	100
Nuts Consumption	Daily	16	53.33	14	46.66
	Weekly	13	43.33	16	53.33
	Never	1	3.33	0	0
Home Food Delivery	Yes	22	73.33	3	10
	No	8	26.66	27	90
Morning-evening Walk	Yes	21	70	22	73.33
	No	9	30	8	26.66
Habit of Yoga	Yes	15	50	10	33.33
	No	15	50	20	66.66
Supplement Tablets	Yes	7	23.33	6	20
	No	23	76.66	24	80

Health status of working and non-working women

Ailments and stress level were reported by respondents. It was found that 16.66% of working women were suffering from various diseases like blood pressure, back pain, joint pain and anemia. On the other hand, 30% of non-working women suffered from various ailments viz. back pain, acidity, etc. A higher percentage of working women (36.66%) reported experience of anxiety compared to non-working women (20%). This could be probably because of excessive work load

and dual responsibilities of work and home. Chand (2020) observed similar results in working mothers compared to non-working mothers.

Levels of stress experienced by working and non-working women are showed in Table 4, Fig. 3. Experience of stress was also high among working women. Moderate stress was high among working women (66.66%) compared to non-working women (33.33%). None of the respondents except one in non-working women category exhibited high stress level and this was because of her family related issues. The study is in agreement with earlier study done by Kour et al. (2020) which concluded that working women suffered from greater stress compared to non-working women, probably because of overload of work and less time for family compared to their non-working counterparts (Akila, 2021). It was reported that housewives had better mental health compared to working women (Khodidas, 2013). However, Khunttey & Sahu (2021) found no difference in mental health of working and non-working women.

Table 4. Stress levels of working and non-working women

	Working Women		Non-working Women		Chi-Square value	P-value
Level of stress	Frequency	Percentage	Frequency	Percentage		
Low stress	10	33.33	19	63.33		
Moderate stress	20	66.66	10	33.33	7.1264	0.0283
High stress	0	0	1	3.33		

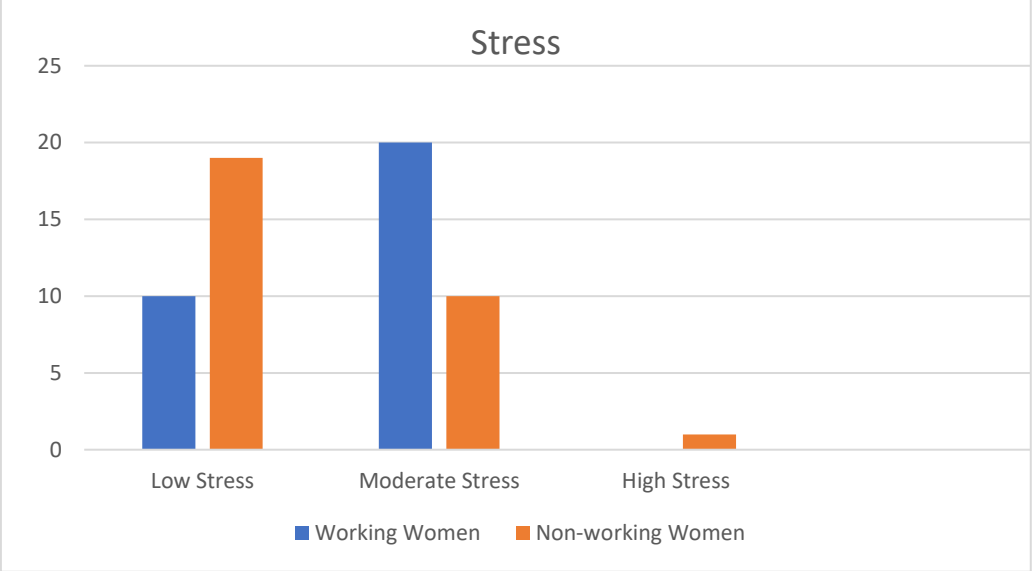

Fig. 3 Levels of stress among working and non- working women

CONCLUSION

The nutritional and health status of working and non-working women was studied and it was seen that average BMI was higher for non-working women compared to working women. The non-working women were seen to be overweight. Also, the WHR showed that non-working women were at higher risk. Dietary habits were almost similar among working and non-working women. The daily consumption of milk and nuts were slightly high in working women whereas daily consumption of fruits, tea and sugar was slightly high in non-working women. A higher percentage of working women practiced yoga daily. The high BMI for non-working women and higher percentage of non-working women with WHR > 0.8 cm could be probably due to their life style and dietary habits of consuming more sugar.

Anxiety was experienced more by working women compared to non-working women. A high percentage of working women exhibited moderate stress compared to non-working women. This may be because of inefficient coping with dual responsibility of home and work.

Thus, there is a need to improve the health of both working and non-working women. The working women need to improve their psychological health and non- working women need to take care of their nutritional health. Both the working and non-working women need to be made aware of their health status. Modification in eating habits, increase in daily physical activity and practicing stress buster activities may be effective in attaining good health among working as well as non-working women. It is recommended that for a better health status, working women need psychological counseling and non-working women nutritional counseling.

Suggestions for future research

Irrespective of the working status, maintaining the good health is of prime importance for all women. It has been seen that nutritional status and psychological health of women need attention and hence creating awareness among women through counseling can be done. Further, the impact of nutritional and psychological counseling on the health of women can be studied.

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EVALUATION OF QUALITY OF LIFE USING WHO-BREF QUESTIONNAIRE AMONG DIABETIC NEPHROPATHY PATIENTS

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ABSTRACT

Diabetic nephropathy is a common complication of diabetes that significantly impacts the quality of life. With the impact of diabetes on physical, social, psychological components of individual's life, a holistic view in terms of Quality of Life (QoL) is being increasingly recognized as an essential element of diabetes care, its complications and management. The objective of this study was to assess and evaluate the QoL in Diabetic Nephropathy (DN) patients. It was a cross-sectional study where 100 adult Diabetic Nephropathy patients were enrolled. The QoL of patients was accessed by the validated WHO-QoL BREF questionnaire. The data was analysed with the calculations as guided by the WHO-QoL 100 scoring guide. Out of 100 DN Patients, 54 were male and 46 were female with a mean age (±SD) 57.75 ± 8.767 years and 59.52 ± 8.586 years respectively. Almost half of the male patients (46.2%) rated their QoL as good, while 26% females rated as general and 26% as good. Males had significantly healthier scores for the physical health domain. Lowermost mean scores were obtained in social relationship domain in both males and females i.e 9.055 ± 2.66 and 7.434 ± 2.68 respectively. There was a strong correlation found between psychological domain of QoL and duration of diabetes among males and females (r=0.84 and 0.85) respectively. Data revealed that as the duration of diabetes increases, the psychological scores decreases**.** Majority of the male DN patients reported good QoL, better employment level. There is urgent need for increased health alertness and Nutrition education among DN female patients undergoing treatment in the hospital.

Keywords: Diabetic Nephropathy, Quality of Life, Tertiary care teaching learning Hospital

INTRODUCTION

Universally, Type 2 diabetes (T2DM) is one of the most recurrent enduring diseases. T2DM is a growing cause of disability and premature death, primarily through cardiovascular diseases and other chronic difficulties.

Cardiovascular diseases (CVD) account for most NCD deaths, or 17.9 million people annually, followed by cancers (9.0 million), respiratory diseases (3.9million), and diabetes mellitus (1.6 million). These 4 groups of diseases account for over 80% of all premature NCD deaths. Among these NCDs, Diabetes has become a major challenge to healthcare delivery in the 21st century.

Various studies indicate that diabetic patients are more likely to develop micro as well as macro vascular complications. Diabetic nephropathy (DN) is one of the major micro vascular complications of diabetes which can result in end stage renal disease (ESRD). (Raghuvansh et al (2016)).

Nearly 44 % of new cases are of kidney failure which is most common cause of Diabetes (Kosamiya et al, (2020)). According to Jitraknatee et al, (2020) the overall incidence of CKD in T2DM patients to be 24.4% in Thailand.

One cross sectional study was carried out at the out-patient department (OPD) of endocrinology in (2017-18), at Hakeem Abdul Hameed Centenary Hospital, Jamia Hamdard, New Delhi, India by Hussain et al 2019, out of 365 patients, 34.4% prevalence was found of Diabetic Kidney Disease. (DKD).

According to Prasad N & Murlidhar (2019), of patients with type 2 diabetes, approximately 10%-20% will eventually develop Diabetic Nephropathy.

The worldwide difference of prevalence and risk factors studied by Gheith et al, (2016) in Egypt revealed that Diabetic kidney disease (DKD) is more frequent in African Americans, Asian-Americans, and Native Americans. Hyperglycaemia is well known hazard factor for in addition to other risk factors like male sex, obesity, hypertension, chronic inflammation, resistance to insulin, hypovitaminosis D, and dyslipidaemia.

Among CKD patients, HRQOL i.e health related quality of life gradually decays as the disease develops with the nastiest scores reported by those with advanced renal disease. When CKD coexists with diabetes, a marked decline in QOL is expected.

QoL is enormously important for patients suffering from diabetes and its problems and their healthcare providers for numerous reasons, as many people who suffer from diabetes with poor QoL, rarely pay attention to their self-care and disease management (www.icsi.org/guidelines).

Quality of life is a condition where a person can feel satisfactions in all daily activities in carrying out physical activities, control mentally and feel satisfied in everyday social roles (WHO, 2016).

QoL of chronic kidney failure patients decreases due to emotional instability and has begun to surrender to the disease, which also affects the physical domain and social interactions in everyday life. (Wyld et al, (2016)).

OBJECTIVE

To assess and evaluate the QoL in DN patients from tertiary care teaching learning hospital.

HYPOTHESIS

There was no significant difference seen in the Quality-of-life scores assessed using WHO BREF questionnaire among the patients suffering from Diabetic Nephropathy.

MATERIAL AND METHODS

A hospital based cross sectional study was carried out on the patients attending a Nephrology and Medicine OPD clinic from one tertiary care teaching learning hospital of rural Vadodara. The study was permitted by institutional ethics committee and was performed in accordance with the code of Good Clinical Practices. An informed written consent in vernacular language was provided to each patient and for some patients who were unlettered full description about the study prior to registration was given assuring them confidentiality.

Data collection: 100 patients were screened, and data was collected with face-to-face conversion according to the inclusion criteria.

Study tool: Validated WHO-QoL BREF (World Health Organization) survey form was used to assess the quality-of-life of patients. It comprises of 26 items in 4 domains; Physical health (Assesses seven items in areas such as the presence of pain and discomfort; dependence on medical treatments; energy and fatigue; mobility; sleep and rest; activities of daily living; perceived working capacity) Psychological (Assesses six items in areas such as enjoyment of life; feeling of life to be meaningful; being able to concentrate; body image and appearance; self-esteem and negative affect) Social relationships (Assesses three items in areas such as personal relationships, social support; sexual activity)and environment; (Assesses eight items in areas such as physical safety and security; physical environment e.g. pollution, noise, traffic, climate; financial resources; Prospects for receiving new information and skills; contribution in and occasions for recreation/leisure activities; home environment; health and social care: approachability and quality; transportation)and two items on overall QoL and over-all health.

The respondents rated all items on a 5-point Likert scale inquiring 'how much', 'how satisfied' or 'how completely' the respondents felt in relation to the domain being investigated. The 4 domain scores denote an individual perception of the QoLs in each domain. The domain scores were scaled in a positive direction (higher scores denote higher QOL while lower scores denote lower QoL). The scores of items within each domain were used to calculate domain scores according to WHO Manual of scoring.

Research design: Purposive study population who consisted of patients diagnosed with Diabetic Nephropathy.

Inclusion Criteria

1. Stable diabetic patient (35 years)
2. Serum Creatinine levels >1.4 mg/dl.
3. Persistence microalbuminuria (>300mg/d or >200µg/min)/urine (1+ or >300) dipstick (>1+).
4. Both Genders (Male and Female)
5. Patients giving consent for study.

Exclusion Criteria

1. Patients with acute infection (URTI,LRTI,GI,UTI,Current illness, Dengue, Malaria)
2. Patients with cardiac failure with E.F <30%) /Advanced chronic liver disease-decompensated CLD.
3. Patients suffering from type 1 DM
4. All patients of CKD without DM.
5. Women with pregnancy.

STATISTICAL ANALYSIS

The analysis of study was carried out using Excel 2019. Categorical variables were presented as frequencies and percentages. Pearsons's correlation was applied between duration of disease and domains of QoL. Descriptive statistics including mean (reported as mean ± SD) was computed for continuous and categorical variables.

RESULTS AND DISCUSSION

In this cross-sectional study, 100 patients were registered and amongst them, 54 were male and 46 were female with a mean Age (±SD) 57.75 ± 8.767 and 59.52 ± 8.586 respectively (Table.1) The socio demographic profile is represented in Table. 2. Half of the male patients i.e 55% were from Madhya Pradesh and with respect to females, i.e 54% were from Gujarat. 46% Males were self-employed in some form of work, 40% were professionals, 11% were retired from work and on other hand, 0% females were found to be unemployed.37% males and 22% females had completed their graduation, 29% males and 26% females had completed primary schooling, no male patients were found to be illiterate, but amongst females, 8.6% were illiterate.40%, 39% & 20% male patients were staying in Nuclear, Joint, and extended family. Majority (47%) of the female patients were staying in Joint family. With regards to duration of diabetes, majority of the male & female patients 42% & 43% had diabetes for 5-10 years. 26% males had early onset of diabetes (<5 years), In females it was 6%. A study by (Homady et al, 2020) found 46% patients diabetes duration of < 5 years.

Table 1. Mean Age of Diabetic Nephropathy Patients (N=100)

Variable	Male (N=54)	Female (N=46)	Total(N=100)
Age (Years) Mean± SD	57.75 ± 8.767	59.52 ± 8.586	58.57 ± 8.685

Table 2. Frequency distribution of Socio-demographic and onset of disease profile of DN patients (N=100)

Variables	Category	Male N=54	Female N=46	Total & %
Age (Year)	35-45	8(14.8)	3(6.52)	11
	46-55	16(29.6)	13(28.2)	29
	56-65	14(25.9)	12(26)	26
	66-75	16(29.6)	18(39.4)	34
Residential State (India)	Gujarat	23 (42.5)	25(54.3)	48
	Madhya Pradesh	30(55.5)	19 (41.3)	49
	Rajasthan	0	2 (4.3)	2
	Other	1(1.8)	0	1
Occupation	Unemployed	0	0	0
	Unskilled Labourer	1(1.8)	0	1
	Home maker	0	39(84.7)	39
	Retired	6 (11.11)	0	6
	Professional	22 (40)	7(15.2)	29
	Self employed	25 (46.2)	0	25
Educational Level	Illiterate	0	4 (8.6)	4
	Primary School	16 (29.6)	12 (26)	28
	Secondary School	8 (14.8)	7(15.2)	15
	Higher Secondary	5 (9.2)	9(19.5)	14
	Graduate	20 (37)	10 (21.7)	30
	Post Graduate	6 (11.11)	4 (8.6)	10

Type of Family	Nuclear	22 (40)	17(36.9)	39
	Joint	21 (38.8)	22 (47.8)	43
	Extended	11 (20.3)	7(15.2)	18
Onset of Diabetes	<5 years	14 (25.9)	3(6.52)	17
	5-10 years	23 (42.5)	20 (43.4)	43
	10-15 years	8 (14.8)	13(28.2)	21
	> 15 years	9 (16.6)	10 (21.7)	19

Note: Figures in parenthesis denotes the percentage of the DN patients.

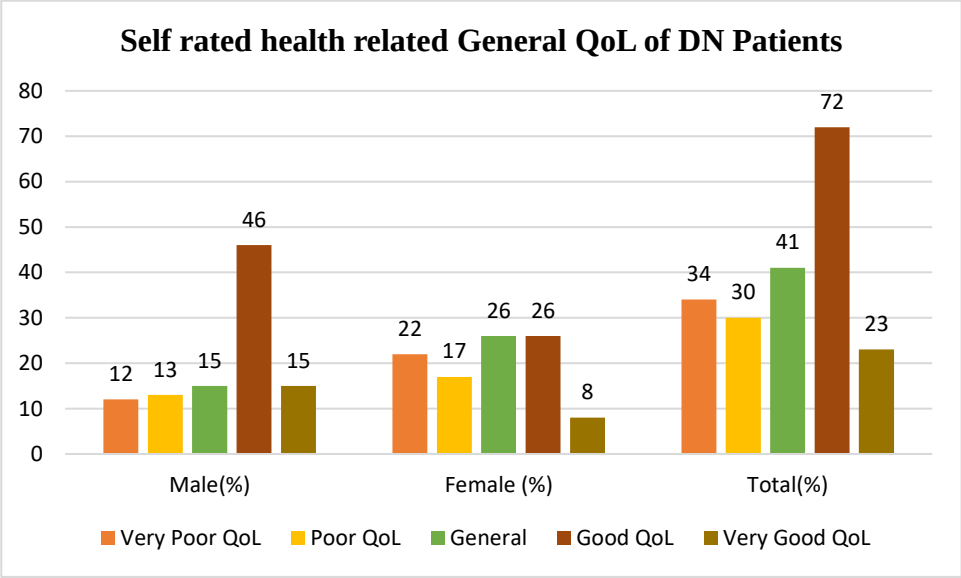


Fig:1(a) Self-rated Health related QoL of DN Patients

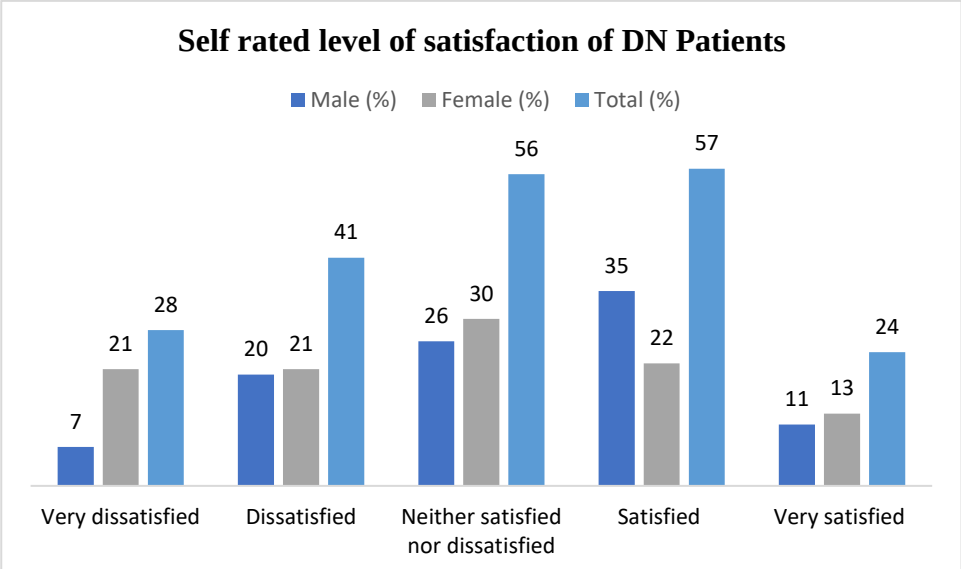


Fig1(b) Self-rated level of satisfaction by the DN Patients.

Many studies indicate that diabetes with some or other complications influences quality of life. Almost half of the male patients (46.2%) rated their QoL as good, while females rated 26% as general QoL and 26% as good.

Regarding the general health of male and female patients, 35% and 21% were satisfied, 25% and 30% were neither satisfied, nor dissatisfied, 20% and 21% were dissatisfied, 11% and 13% were very satisfied and 8% and 21% were very dissatisfied. (Fig 1(a) & (b)).

Table 3. Frequency responses of Male DN patients for different domains and facets of QoL questionnaire (WHO BREF) N(%), where N= 54

1. Physical health Domain					
Scale points/Domains and Facets	**5 Not at all**	**4 Little**	**3 A moderate amount**	**2 Very much**	**1 An extreme amount**
Pain and discomfort	8 (14.8)	18 (33.3)	13 (24)	11 (20.3)	4 (7.4)
Dependence on medication	2 (3.7)	19 (35.1)	18 (33.3)	13 (24)	2 (3.7)
	1 Not at all	**2 Little**	**3 A moderate amount**	**4 Very much**	**5 An extreme amount**
Energy and fatigue	6 (11.11)	11 (20.3)	17 (31.4)	16 (29.6)	4 (7.4)
Mobility	6 (11.11)	9 (16.6)	19 (35.1)	16 (29.6)	4 (7.4)
Sleep and rest	4 (7.4)	13 (24)	10 (18.5)	21 (38.8)	6 (11.11)
Activities of daily living	6 (11.11)	11 (20.3)	15 (27.7)	16 (29.6)	6 (11.11)
Working capacity	6 (11.11)	11 (20.3)	15 (27.7)	20 (37)	2 (3.7)
2 Psychological Domain					
	5 Not at all	**4 Little**	**3 A moderate amount**	**2 Very much**	**1 An extreme amount**
Positive feelings	4 (7.4)	12 (22.2)	17 (31.4)	13 (24)	8 (14.8)
Personal belief	4 (7.4)	6 (11.11)	21 (38.8)	13 (24)	10 (18.5)
Thinking, learning, memory, and concentration	6 (11.11)	11 (20.3)	10 (18.5)	17 (31.4)	10 (18.5)
	1 Not at all	**2 Little**	**3 A moderate amount**	**4 Very much**	**5 An extreme amount**
Body image	4 (7.4)	13 (24)	19 (35.1)	12 (22.2)	6 (11.11)
Self esteem	4 (7.4)	5 (9.2)	21 (38.8)	18 (33.3)	6 (11.11)
	5 Never	**4 Seldom**	**3 Quite often**	**2 very often**	**1 Always**

Negative Feelings	15 (27.7)	14 (25.9)	8 (14.8)	11 (20.3)	6 (11.11)
3. Social relationship Domain					
	1 Not at all	**2 Little**	**3 A moderate amount**	**4 Very much**	**5 An extreme amount**
Personal relationships	5 (9.2)	4 (7.4)	25 (46.2)	18 (33.3)	2 (3.7)
Sex	5 (9.2)	12 (22.2)	27 (50)	10 (18.5)	0
Practical social support	4 (7.4)	7 (12.9)	23 (42.5)	18 (33.3)	2 (3.7)
4. Environment Domain					
	5 Not at all	**4 Little**	**3 A moderate amount**	**2 Very much**	**1 An extreme amount**
Physical safety and security	2 (3.7)	3 (5.5)	20 (37)	17 (31.4)	12 (22.2)
Physical environment	0	3 (5.5)	24 (44.4)	13 (24)	14 (25.9)
	1 Not at all	**2 Little**	**3 A moderate amount**	**4 Very much**	**5 An extreme amount**
Financial resources	4 (7.4)	9 (16.6)	22 (40)	17 (31.4)	2 (3.7)
Information and skills	2 (3.7)	7 (12.9)	20 (37)	21 (38.8)	4 (7.4)
Recreation and leisure	6 (11.11)	9 (16.6)	25 (46.2)	12 (22.2)	2 (3.7)
Home environment	4 (7.4)	7 (12.9)	23 (42.5)	18 (33.3)	2 (3.7)
Access to health and social care	4 (7.4)	5 (9.2)	23 (42.5)	18 (33.3)	4 (7.4)
Transport	4 (7.4)	9 (16.6)	25 (46.2)	14 (25.9)	2 (3.7)

Note: Figures in parenthesis denotes the percentage of the DN patients.

Frequency responses of male and female DN patients for different domains and facets of QoL questionnaire is given in Table 3 & 4 in detail. The trend followed steep rise in QoL in a positive manner (i.e from very poor to very good).

Table 4. Frequency responses of Female DN patients for different domains and facets of QoL questionnaire (WHO BREF) N(%), where N= 54

1. Physical health Domain					
Scale points/Domains and Facets	**5 Not at all**	**4 Little**	**3 A moderate amount**	**2 Very much**	**1 An extreme amount**
Pain and discomfort	0	16 (34.7)	14 (30.4)	10 (21.7)	6 (13)
Dependence on medication	0	12 (26)	20 (43.4)	8 (17.3)	6 (13)
	1 Not at all	**2 Little**	**3 A moderate amount**	**4 Very much**	**5 An extreme amount**
Energy and fatigue	8 (17.3)	14 (30.4)	18 (39.4)	6 (13)	0
Mobility	10 (21.7)	14 (30.4)	8 (17.3)	14 (30.4)	0
Sleep and rest	10 (21.7)	14 (30.4)	14 (30.4)	8 (17.3)	0
Activities of daily living	10 (21.7)	14 (30.4)	12 (26)	10 (21.7)	0
Working capacity	10 (21.7)	14 (30.4)	16 (34.7)	6 (13)	0
2 Psychological Domain					
	5 Not at all	**4 Little**	**3 A moderate amount**	**2 Very much**	**1 An extreme amount**
Positive feelings	8 (17.3)	16 (34.7)	4 (8.6)	16 (34.7)	2 (4.3)
Personal belief	6 (13)	18 (39.4)	4 (8.6)	14 (30.4)	4 (8.6)
Thinking, learning, memory, and concentration	8 (17.3)	14 (30.4)	12 (26)	10 (21.7)	2 (4.3)
	1 Not at all	**2 Little**	**3 A moderate amount**	**4 Very much**	**5 An extreme amount**
Body image	4 (8.6)	18 (39.4)	12 (26)	12 (26)	0
Self esteem	8 (17.3)	10 (21.7)	18 (39.4)	10 (21.7)	0
	5 Never	**4 Seldom**	**3 Quite often**	**2 very often**	**1 Always**
Negative Feelings	6 (13)	14 (30.4)	14 (30.4)	4 (8.6)	8 (17.3)
3. Social relationship Domain					
	1 Not at all	**2 Little**	**3 A moderate amount**	**4 Very much**	**5 An extreme amount**

Personal relationships	8 (17.3)	12 (26)	20 (43.4)	6 (13)	0
Sex	12 (26)	12 (26)	22 (47.8)	0	0
Practical social support	6 (13)	16 (34.7)	10 (21.7)	14 (30.4)	0
4. Environment Domain					
	5 Not at all	**4 Little**	**3 A moderate amount**	**2 Very much**	**1 An extreme amount**
Physical safety and security	6 (13)	12 (26)	10 (21.7)	14 (30.4)	4 (8.6)
Physical environment	0	14 (30.4)	14 (30.4)	14 (30.4)	4 (8.6)
	1 Not at all	**2 Little**	**3 A moderate amount**	**4 Very much**	**5 An extreme amount**
Financial resources	0	12 (26)	28 (60.8)	6 (13)	0
Information and skills	0	6 (13)	34 (73.9)	6 (13)	0
Recreation and leisure	6 (13)	10 (21.7)	26 (56.5)	4 (8.6)	0
Home environment	6 (13)	16 (34.7)	14 (30.4)	10 (21.7)	0
Access to health and social care	6 (13)	12 (26)	22 (47.8)	6 (13)	0
Transport	4 (8.6)	16 (34.7)	24 (52.1)	2 (4.3)	0

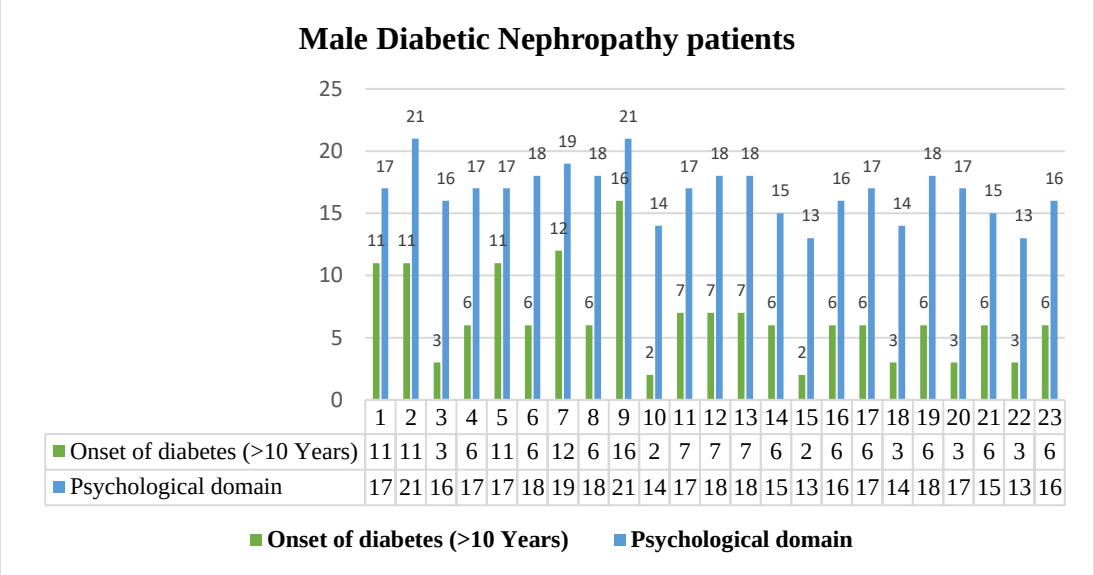
Note: Figures in parenthesis denotes the percentage of the DN patients.

Table 5. Domain wise score of DN Patients (N=100)

Domains	**Score mean ± SD**	
	Male (N=54)	Female (N=46)
Physical health Domain	21.01 ± 3.848	18.652 ± 3.394
Psychological Domain	17.20 ± 2.694	18 ± 2.85
Social relationship Domain	9.055 ± 2.66	7.434 ± 2.68
Environment Domain	26.75 ± 4.96	25.21 ± 2.90

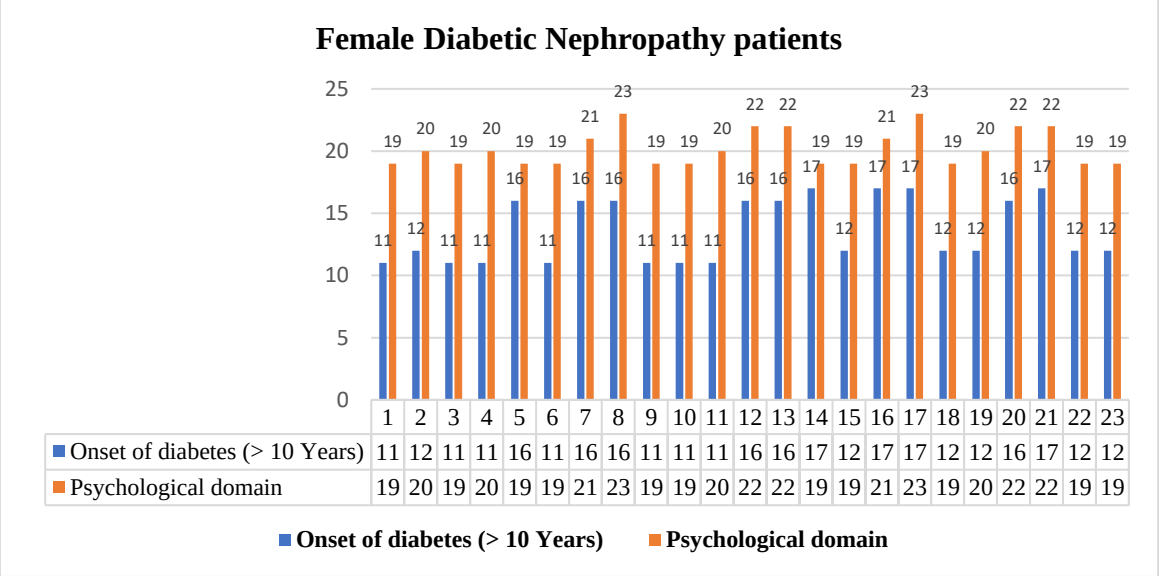
QoL was analysed in four domains namely physical, psychological, social, and environmental domains as, per the WHOQOL questionnaire (Table 5). Maximum mean scores were found for the environmental domain for both male and female i.e 26.75 ± 4.96 and 25.21 ± 2.90. Males had significantly better scores for the physical health domain. Lowest mean scores were obtained in social relationship domain in both males and females i.e 9.055 ± 2.66 and 7.434 ± 2.68 respectively. Almost similar scores were found for psychological domain in males and females i.e 17.20 ± 2.694 and 18 ± 2.85 respectively.

In a study done by (Sahoo et al, 2023) the maximum domain wise score was found in social (65.98 ± 13.89) followed by environmental (61.73 ± 16.27) domain. Least score was obtained in the physical domain (55.62 ± 12.83) amongst the ambulatory diabetic patients attending NCD prevention clinic in eastern India.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Onset of diabetes (>10 Years)	11	11	3	6	11	6	12	6	16	2	7	7	7	6	2	6	6	3	6	3	6	3	6
Psychological domain	17	21	16	17	17	18	19	18	21	14	17	18	18	15	13	16	17	14	18	17	15	13	16

Fig:2(a)



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Onset of diabetes (> 10 Years)	11	12	11	11	16	11	16	16	11	11	11	16	16	17	12	17	17	12	12	16	17	12	12
Psychological domain	19	20	19	20	19	19	21	23	19	19	20	22	22	19	19	21	23	19	20	22	22	19	19

Fig:2(b)

Fig: 2 (a)& 2(b) Correlation between Onset of Diabetes (>10 years) and psychological domain of the Male & Female Diabetic Nephropathy patients.

There was a strong correlation between psychological domain of QoL and duration of diabetes among males and females (r=0.84 and 0.85) respectively. The figures (Fig 2(a) & 2(b)) depict that as the duration of diabetes increases, the psychological scores decrease**.**

CONCLUSION

The study was carried out to assess the QoL of patients receiving treatment from tertiary care hospital of rural Vadodara. The finding showed that 50% of the male DN patients reported good quality of life, with better employment. Although the physical health of the patients came out to be good, but they also had a substantial impact on their overall quality of life. Also, there was significant

connotation of psychological domain of QoL and duration of diabetes. These study underscores the importance of comprehensive care to improve the QoL of patients with Diabetic Nephropathy. There is urgent need for improving health awareness and education among DN female patients undergoing treatment in the hospital.

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A STUDY ON SOIL QUALITY USED IN MAKING OF THE TRADITIONAL EARTHENCOOKWARE

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ABSTRACT

The Cookware plays an important role in deciding the quality of foods cooked. Foods cooked in any cookware pose chance of leaching heavy metals from the cooking vessels to the food cooked. Earthen cookware from time immemorial is believed to be safe and to enhance nutritional quality of food cooked due to the presence of nutrients present in the soil[1]. Revisiting the traditional practice of using earthen cookware is slowly gaining prominence in recent years. The quality of the base materials is important for preparation of the traditional cookware. Hence this study is aimed at assessing the quality of soils used in making of earthen cookware to authenticate its health benefits. The Tiruchirappalli district (Tamilnadu) was chosen as the study area because of its uniqueness in the making of traditional earthen cookware. The soil samples from the lake beds of Thathamangalam (ECWS1), Konalai (ECWS2), and footpath soil from Kottam (ECWS3) were collected directly from the potter. The soil quality of the collected samples was visually examined for characteristics like structure, colour and texture. The turbidity of the soil was measured using turbidity meter. The pH, EC, NPK values, and micronutrients were also estimated using standard procedures. The microscopic structure and elemental composition of the soil along with the atomic weight (ECWS1, ECWS2, ECWS3), were analysed using scanning electron microscopy with the energy dispersive X-ray method**.** The result indicated, the pH of the selected soils samples of Thathamangalam (ECWS1), Konalai (ECWS2), and Kottam (ECWS3) to be 8.66± 0.82, 8.37±0.16, 7.9±0.2 respectively. The salinity of all the three soils were salt free in nature. The potassium content of the ECWS1 (221ppm), ECWS2(228ppm) were high and medium in ECWS3 (106ppm). The soil samples were rated as low and very low levels for zinc and copper content, whereas the iron and manganese content were found to be good. The presence of toxic heavy metals like Lead and Mercury, Nickel and Chromium were found to be "Below Detectable Limits."

Keywords: Clay soil, earthen cookware, heavy metals, micronutrients.

INTRODUCTION

Many Anthropological studies proposes the use of basic natural elements in the preparation of earthen cookware such as space (for processing), earth (clay soil as raw materials), water (for mixing the soil samples), fire (for baking process) and air (for drying the semi processed earthen cookware). The traditional earthen cookware is believed to offer lot of health benefits to the food cooked in it, by minimizing nutrient losses, neutralizing pH of food, enhancing the mineral quality of cooked food (calcium, phosphorus, iron, zinc and sulphur). Besides retaining the temperature of the food for a

longer time, earthen cookware also acts as a non-stick ware (due to the presence of silicon compounds) and requires less oil. It also has better shelf life of food cooked (2018). The modern world is now well aware of the health benefits of using Traditional cookware especially the earthen cookware, is making their comeback into Indian kitchens. The ultimate purpose of any cookware is to give tastier, healthier, and safer food to humans rather than being faster and easier to handle or clean. The cookware aids the cooking medium and food ingredients to get cooked at proper time and temperature to provide consumers with high-quality food. As a result, the quality of the cookware is critical in delivering safe cooked food to the consumer every time it is used. The safety of the cooked food lies in the quality of the raw materials used in the manufacture of the cookware. The dearth in scientific claims related to the quality of soil used in making traditional earthen cookware was noted as a research gap, and hence the study aims at "***Assessing the quality aspects of soils used for making traditional earthen cookware.***"

OBJECTIVES

The objective of the study is

- To investigate the structure, color, texture and water holding capacity of the different types of soil used for making of the traditional earthen cookware.
- To analyze pH, Electrical conductivity, Turbidity, NPK values and Micronutrient content of the soils.
- To detect the presence of the toxic heavy metals in the element composition of the soils.

METHODOLOGY

1.Study Area: Tiruchirappalli, a district located in Tamilnadu, India, was selected based on its authentic cooking practises and uniqueness in the making of traditional earthen cookware.

2.Soil sample preparation:

i)Collection of soil samples: The soil samples from lake beds in Thathamangalam (ECWS1), Konalai (ECWS2), and footpath soil in Kottam (ECWS3) were collected directly from the potter. (**Plate-1**)

ii) Processing of soil samples: The collected soil samples were dried, pulverised into a fine powder, and sieved (3 mm) to get a fine particle and were further transferred into paper bag for analysis.

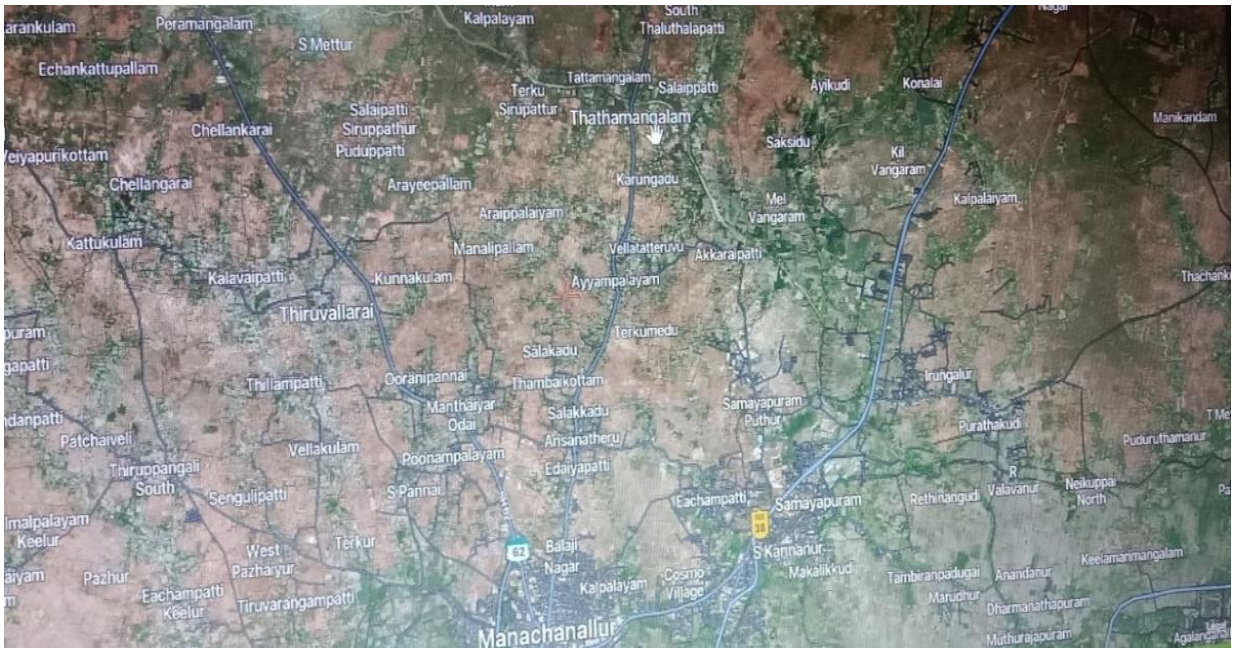


Plate-1
Map showing location of the area for soil collection

3.Physical characteristics of the soil samples:

The quality of the soil used for making the earthen cookware was tested for its structure, colour texture, water holding capacity, Electrical Conductivity, Ph, Turbidity, NPK values, Micronutrients contents and element composition for heavy metals in the soil. The structure, colour and texture of the three soils were examined using the standard procedures, namely, visual assessment, feel method and ribbon formation method.

Visual assessment:

a) Soil structure

The soil samples were spread on a butter sheet with a length greater than 10 cm, and were viewed under well-lit area. The soil was observed for friable fine aggregates, porous texture, and nature of clodding Thus, a soil with friable, fine, subrounded, nutty aggregate with no significant clodding and porous texture was rated as good soil and were given a visual score of two (2). Soils with a significant proportion of both coarse clods and friable fine aggregates that are subangular or angular in shape with no or few pores were rated as moderate soils with a visual score of one (1). The soil with the coarse clods and very few finer aggregates, subangular and angular shapes, and very few or no pores was rated as poor soil (Visual score -0).

b) Soil colour: The soil colour was viewed in bright light visually and the shades of soil was observed

c) Soil Texture:

Feel method: Twenty-five grams of the soils was taken and mixed with 5 ml of the water. The soil was Kneaded until to forms a ball like shape. The textural feel of the soil was tested

Ribbon method: The soils (25 grams) were taken separately and mixed with the water and was made into a ball. The sand ball was placed between thumb and forefinger and was squeezed upward to form a ribbon like shape and was further allowed to break under its own weight. The length of the ribbon was measured in centimeters.

d)Water holding capacity of the soils: The Water holding capacity of the soils was determined by the percolation method.

4.Chemical characteristics of the soil samples

i)pH: The pH of the soil was determined by using potentiometric method.
ii)Electrical Conductivity (salinity): The electric conductivity of the soils was measured in terms of the resistance offered to the flow of current using a conductivity bridge.
iv)Micronutrients: NPK Value: The available Nitrogen, Phosphorus, Potassium content and major micronutrients like Zinc, Copper, Iron and Manganese – were estimated using DTPA (Diethylene Triamine Pentaacetic Acid) method.
v)Heavy Metals estimation: Presence of heavy metals like chromium, Nickel, lead, cadmium, mercury was estimated using AAS (Atomic Absorption Spectroscopy) method. (Manual methods, Soil testing in India,2011)
vi)Turbidity: The turbidity of the soil samples was analysed using Systronics nephelometer model No. 132. The test tube containing distilled water was inserted into the sample holder, and was calibrated to zero at 100 Nephelometric Turbidity Unit. A blank test solution containing hydrazine sulphate solution at 500 Nephelometric Turbid Unit was used as the standard. The test soil sample was mixed with distilled water in the curette was tested for turbid value.

RESULT AND DISCUSSION

QUALITY OF THE SOIL SAMPLES

Plate no: 3
Structure of the soil samples

The Thathamangalam (ECWS1), Konalai (ECWS2), and Kottam (ECWS3) soils- the main raw material used for the making of the traditional earthen cookware were generally surrounded and porous, with friable, fine aggregates and with no significant clodding aggregates. Hence the soil samples were scored as good (Visual score = 2) for their structure quality by the investigator.

a. Thathamangalam soil **b. Konalai soil** **c. Kottam soil**

Plate No: 4
The colour of the soil samples

From the above **Plate no: 4**, the colour of the soil samples from Thathamangalam was light brown in colour whereas the soil from Konalai was dark brown and slightly blackish in nature. Hence based on the FAO (2020) soil testing procedure both the soils were given a visual score of one. Hence, the colour quality of the cookware depends upon the mixture and processing of these three soils.

a.Thathamangalam soil **b.Konalai soil**

c. Kottam soil

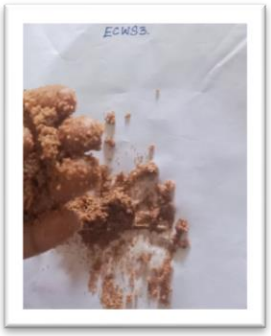


Plate no: 5
Textural quality tested by Feel and Ribbon method

Since the soil of Thathamangalam and Konalai are of clay type, they rolled into firm balls, whereas the Kottam soil did not form a ball due to its sandy nature (**Plate no:5**). The Thathamangalam and

Konalai soil samples formed a ribbon-like shape without any break and measured 9.2 cm in length. Due to this textural quality, the above two soils were used in equal proportion for the making of pots and earthen cookware's. Also, the investigator observed the usage of Kottam soil sample (1/4th proportion) as a binding agent for the Thathamangalam and Konalai soil due to the sandy texture.

Table no:1
Water Holding Capacity (WHC) of the soil samples

S.No	Different types of soil	Weight of the soil(g)	Volume of water poured through V1 (ml)	Volume of water collected in the cylinder V2 (ml)	Volume of the water retained by the soil (V1-V2)	Percentage of Water Holding capacity (WHC)
1	ECWS1	25gm	50 ml	30ml	20ml	80%
2	ECWS2	25gm	50 ml	30ml	20ml	80%
3	ECWS3	25gm	50 ml	34ml	16ml	64%

***ECWS1,2,3-Earthencookware soil samples**

ECWS1 **ECWS2** **ECWS3**

Plate no: 5
Water holding capacity of the soils - percolation method

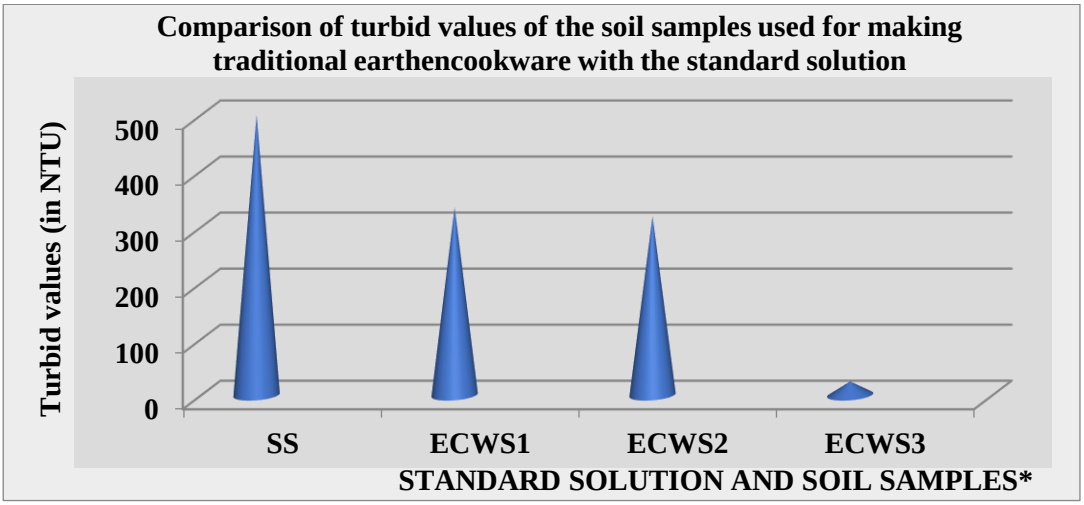
From the **table no :1 & plate no:5**, it was found that the soil samples ECWS1and ECWS2 showed highest percentage of water holding capacity (80%) which can be attributed to the clay type of soil. Since the Kottam soil was sandy in nature, only 64% of water holding capacity was observed.

Table no: 2
Electrical conductivity and pH value of the selected soil samples

Soil Samples	EC (dSm^{-1})	pH value of the soil
ECWS1	0.41 (Salt free)	8.66± 0.82 (Strongly alkaline)
ECWS2	0.16 (Salt free)	8.37±0.16 (Moderately alkaline)
ECWS3	0.13 (Salt free)	7.9±0.2 (Moderately alkaline)
Mean ±SD	0.24±0.12	8.31±0.39

(standards values EC: salt free-0-2; Slightly saline- 4-8, moderately saline 8-15, Highly saline>15, Ministry of Agriculture, Government of India, 2011)

The Thathamangalam soil sample (0.41) had a highest electrical conductivity due to the moderate presence of calcareous substances compared to Konalai (0.16) and Kottam (0.13). We observed the pH of the soil samples to be strongly alkaline for Thathamangalam in nature. The mean and standard deviation of the Electrical Conductivity and pH values of three soil samples were found to be 0.24± 0.12 and 8.31± 0.39, respectively. Since the electrical conductivity was found to be below the standard reference value of 2, it can be inferred that the selected soil samples are salt free.



*SS-standard solution, ECWS1- Thathamangalam soil, ECWS2- Konalai soil, ECWS3- Kottam soil

Figure No:1
Turbidity of the soil samples

From the **Figure no:1**,the turbid value of ECWS1, ECWS2 and ECWS3 was found to be 335 NTU, 319 NTU, 24 NTU. (Nephelometric Turbid Unit) respectively. We also observed a high

turbidity of soil from lake beds at Thathamangalam and Konalai because of high suspension of solid particles, compared to the soil sample from Kottam,

Table no:3

Nitrogen, Phosphorus and Potassium content of the soil samples

Soil Samples	NPK Value of the soil samples (kg/acre)		
	Nitrogen	Phosphorus	Potassium
ECWS1	56	4	221
ECWS2	42	3	228
ECWS3	84	3	106
Mean± SD	60.6±21.38	3.3±0.5	185± 68.5

The soil sample from Kottam reported a higher availability of nitrogen (84kg/acre) followed by Thathamangalam (56 Kg/acre). Likewise, maximum availability of potassium was noted in konalai soil (228 kg/arce) followed by Thathamangalam (221kg/acre). However, the availability of potassium was found to be comparatively low in the soil sample from Kottam. The mean and standard deviation for the NPK value of soil samples was found to be 60.6 ± 21.38; 3.3 ±0.5; and 185 ±68.5.

Table no: 3

Quantum of Major micronutrients in the selected soils samples

Different types of Soil	Zinc (ppm)	Copper(ppm)	Iron(ppm)	Manganese(ppm)
ECWS1	0.63 (low)	0.95 (very low)	5.28 (medium)	3.84 (high)
ECWS2	0.69 (low)	0.87 (very low)	5.49(medium)	3.83 (high)
ECWS3	0.7 (low)	0.93 (very low)	5.27(medium)	3.16 (medium)
MEAN±SD	0.67±0.03	0.91±0.04	5.3 ±0.12	3.61±0.3

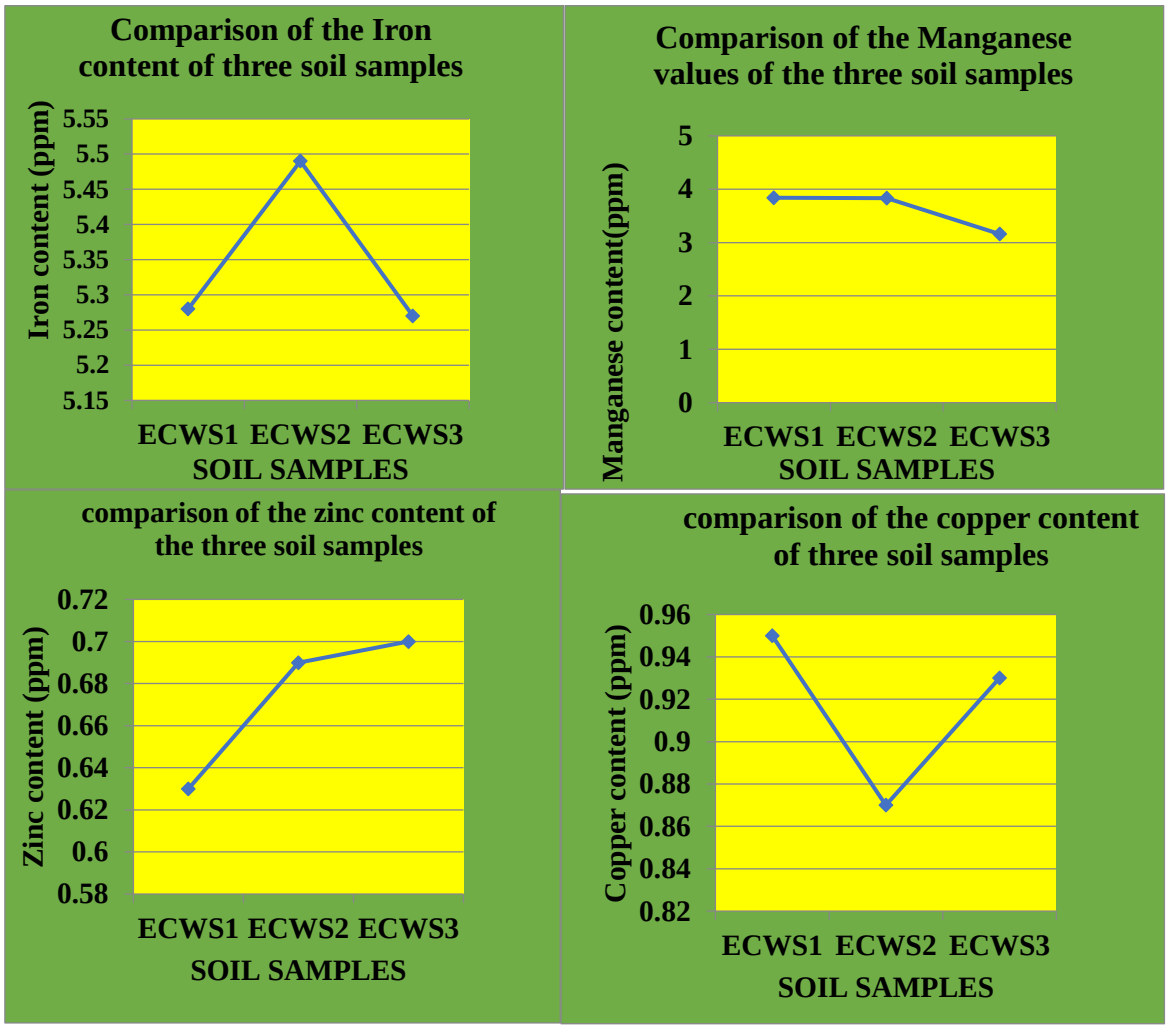


Figure no: 3
Micronutrients presence of the soils used for making traditional earthen cookware

The manganese content was found to be high among the soil samples of Thathamangalam and konalai. According to the soil fertility rating scale by the Ministry of Agriculture, Government of India (2011), all the three selected samples were rated as medium (**Table no: 3, Fig no :3**) with a mean iron content of 5.3 ±0.12ppm; poor level of zinc content (0.67±0.03 ppm) and very poor for copper (0.91±0.04ppm)

Table no :4
Estimation of Heavy metals in the soil samples

Heavy Metals	**Content of the soil samples** (mg/kg)
Essential Chromium and Nickel	Below Detectable Limits
Non-essential Lead, Mercury, Cadmium	Below Detectable Limits

The presence of heavy metals (Table no: 4) such as Lead, Mercury, and Cadmium were below detectable limits.

SUMMARY

The present work was summarized to depict the quality of the Thathamangalam, Konalai and kottam soils used for making traditional earthen cookware. The structure, colour, and texture of clay soils and was found to be good. The mean and standard deviation of the EC and pH values of three soil samples were 0.24 ± 0.12 and 8.4 ± 0.75 respectively. The soil samples obtained from lake beds of Thathamangalam and Konalai had high turbidity and showed suspended solid particles, compared to the footpath soil of Kottam. The mean and standard deviation for the nitrogen, phosphorus, and potassium values of soil samples were found to be 60.6 ±21.38; 3.3±0.5; 185±68.5. The average amounts of the micronutrients in the forms of minerals present in the soil samples were 5.3 ppm for iron; 3.61 ppm for manganese, 0.67 ppm, 0.91 ppm for zinc and copper respectively. The soil samples ECWS1 and ECWS2 showed equal percentage of water holding capacity. The nonessential heavy metals like lead, cadmium, mercury, and nickel, which are toxic in nature, were found to be below the detectable limits.

CONCLUSION

Thus, from the study it was concluded that the qualities of the soil showed salt free salinity and alkaline (medium) in nature. The soil sample was used for the preparation of earthen cookware was packed with nutrients like iron, manganese, zinc, copper, potassium and phosphorus. Thus, these qualities of the soils as base materials for making the traditional earthen cookware may improve the nutritional qualities of the foods cooked in the earthen cookware.

SUGGESTION FOR FUTURE RESEARCH

The base materials used for making of the traditional earthen cookware influences the overall quality of cookware and hence a study on the quality of foods cooked and fermented in the traditional earthen cookware can be taken up in future.

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Awareness and Perceptions of Cancer Associated Malnutrition: A Web Based Survey among Dietitians

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ABSTRACT

World Health Organisation reports that cancer is the greatest cause of mortality worldwide with 10 million fatalities in 2020. Malnutrition affects 20-70 percent of cancer people worldwide, with 10-20 percent of cancer patient deaths due to malnutrition. This leads to poorer quality of life, longer hospital stays, higher treatment costs, higher morbidity and mortality rates. Oncologists and dietitians must prioritize cancer-associated malnutrition. The study surveyed 53 dietitians in Coimbatore to assess if nutrition screening and assessment tools are used by dietitians in clinical practice, to ascertain if gender plays a key role in prevalence of cancer associated malnutrition, to identify the type of cancer that is highly associated with malnutrition in both men and women, to understand the stage of malnutrition in which cancer patient is at the time of diagnosis and to identify the negative outcomes experienced by patients related to food intake. About 26.4 percent of dietitians reported that none of the nutritional screening methods are used to identify nutritional risk in cancer patients. The Patient Generated-Subjective Global Assessment tool for assessing nutritional status was used by 24,5 percent and 88.7 percent of dietitians reported that patients were already moderately malnourished at the time of diagnosis. Malnutrition prevalence is not gender-specific but tumor- and site-specific, with stomach cancer being the most common. Multiple causes, such as pain, decreased oral intake, trismus, decreased appetite, and impaired digestion and absorption, have been associated with malnutrition. The dietitians also revealed the negative outcomes that the cancer patient experiences related to food intake such as vomiting, nausea, decreased oral intake, and decreased appetite.

Keywords: Cancer-associated malnutrition, Dietary intervention, Disease-related malnutrition, Nutritional assessment, Nutritional screening

INTRODUCTION

Cancer was anticipated to cause more than 10 million deaths in 2020, and by 2040, there would be a 29.5 million rise in the number of new cancer cases annually (WHO, 2022). Malnutrition is frequent among cancer patients, affecting almost 50-80 percent and it also accounts for about 20 percent of deaths in cancer (Argilés *et al*., 2014). Malnutrition is also frequently associated with decreased quality of life, more harmful side effects from treatment and poor treatment outcomes in cancer patients (Baracos *et al*., 2018). Malnutrition or undernutrition is defined as "A state resulting from lack of intake or uptake nutrition that leads to altered body composition (decreased fat free mass and body cell mass leading to diminished physical and mental function and impaired clinical outcome from disease"

Malnutrition is a major problem among cancer patients and it can be caused by the disease itself or as a result of medical treatments such as chemotherapy. Identifying Disease-Related Malnutrition (DRM) at the time of cancer diagnosis is important so as to prevent further complications during treatment. The Disease-Related Malnutrition (DRM) with inflammation, the DRM without inflammation, and malnutrition/undernutrition without disease are the three forms of malnutrition recognised by the ESPEN. Additionally, DRM with inflammation may be linked to both acute illnesses like sepsis or acute traumas as well as chronic illnesses like cancer and chronic renal disorders (Cederholm et al., 2017). Cachexia was seen as a term form chronic DRM accompanied with inflammation. "A multifactorial phenomenon, cachexia is often associated with chronic illnesses and is becoming recognised as a co-occurring condition with cancer. It is marked by a heightened systemic inflammatory response, an accelerated rate of protein catabolism, and a significant, involuntary loss of skeletal muscle mass, either with or without loss of fat mass." (Marceca *et al*., 2020).

It has been determined that the increasing loss of muscle mass in cancer is an independent and substantial predictor of overall survival, and that roughly 20 percent of cancer-related fatalities may be caused by cachexia. (Argilés *et al*., 2014). If left untreated, pre-cachexia, cachexia, and refractory cachexia shall cause a gradual loss of function, a low quality of life, toxicity from chemotherapy, a decreased responsiveness to anti-cancer treatments, and an unfavourable prognosis. (Fearon *et al*., 2011). It is important to note that research using mouse models of cancer cachexia have demonstrated that reversing muscle loss can prolong longevity even in the absence of proinflammatory cytokine generation, reduced fat loss or suppression of tumour growth (Zhou *et al*., 2010). In light of this, it is important to consider the patient's comorbidities and then apply the established screening and/or evaluation techniques to swiftly diagnose in a clinical setting and provide intervention (Cederholm *et al*., 2017).

Studies also support the use of muscle preservation as a treatment goal to increase cancer patient's survival. A typical nutritional support cannot totally reverse cachexia, but it is crucial to create a treatment plan that includes nutrition, dietary supplements, pharmacological therapy, exercise and psychological counselling. In situations with reversible cancer cachexia, anticachectic medications are crucial because, when properly combined with anticancer treatments, they can help patients maintain their quality of life and improve their prognosis (Maccio *et al*., 2021). Artificial nutrition, on the other hand, can be included in a palliative care plan in instances of refractory cachexia, which is defined as a cancer stage which is resistant to anticancer treatments (Ruggeri *et al*., 2020). Therefore, Cancer associated malnutrition is to be given prime importance by both oncologists as well as dietitians to improve treatment outcomes.

The role of dietitians in cancer treatment regime is highly important as they will have to work on the dietary modifications in the patient by encountering all their nutritional problems due to disease as well as treatment in order to improve their nutritional status. Thus, the present study has been carried out from 53 dietitians who work at multi-speciality hospitals and who have been handling oncology patient care. The hypothesis of the study is that standard nutrition screening and assessment tools are frequently used as part of routine assessments by dietitians, men experience the highest prevalence of cancer associated malnutrition and there is no association between the type of cancer, stage of cancer and malnutrition. Thus, the study aims to understand about the dietitian's awareness and perceptions specific to cancer associated malnutrition, assess the level of implementation of nutrition screening and nutrition assessment using validated and gold standard

tools in their clinical setting, the common problems that the dietitians encounter in making the patients achieve their nutritional targets, to know at what stage of malnutrition the patients are usually being presented at the time of admission or diagnosis, if the rate of malnutrition is gender specific, the tumours that are frequently associated with malnutrition and to establish or discuss the possible educational strategies to increase awareness of cancer associated malnutrition among the healthcare professionals including oncologists, nurses, dietitians as well as patients and their care takers.

OBJECTIVES

The objectives of the study are:

- To assess if nutrition screening tools and nutrition assessment tools are used by dietitians in clinical practice.
- To ascertain if gender plays a role in prevalence of cancer associated malnutrition
- To identify the type of cancer that is highly associated with malnutrition in both men and women.
- To understand the stage of malnutrition in which cancer patient is at the time of diagnosis and to identify the negative outcomes experienced by patients related to food intake.

METHODOLOGY

Survey Design

A well-designed web-based survey was developed and carried out among dietitians working in multi-specialty hospitals, cancer clinics and freelancers at Coimbatore, Tamil Nadu. The participants were informed that the data elicited will be kept confidential and used for research purpose and their informed consent was obtained. For the conduct of the study, institutional human ethical clearance was obtained and the approval number for the same is AUW/IHEC/FSMD-22-23/FHP-6.

The inclusion criteria were onco dietitians working in various multi-speciality hospitals at Coimbatore, handling or treating patients affected by cancer. The questionnaire as google forms was posted to the dietitians via emails. Questions such as their current practice at hospitals, awareness towards cancer associated malnutrition, the type of cancer with higher rate of malnutrition among men and women, the stage at which cancer is being diagnosed, the stage of malnutrition during diagnosis, the common dietary supplements used to combat malnutrition, its dosage and frequency.

Tools and statistical analysis: The survey has been conducted by developing web-based questionnaires as google forms and the data was analysed using SPSS. Descriptive statistics like frequencies and crosstabulation were used to summarize the responses of the participants.

RESULTS AND DISCUSSION

Using validated nutrition screening tools prove to be beneficial in identifying malnutrition at the time of diagnosis. Malnutrition Universal Screening Tool (MUST), Nutrition Risk Screening (NRS 2002), Malnutrition Screening Tool (MST) are a few validated tools that can be practiced in oncology setting.

Table I: Nutrition Screening Tools and Nutrition Assessment Tools Cross tabulation

Nutrition Screening Tools and Nutrition Assessment Tools Cross tabulation						
		Nutrition Assessment tools[a]				Total
		SGA	PGSGA	MNA	None	
Nutrition screening tools[a]	MUST	10	5	2	0	17
	NRS2002	3	3	0	0	6
	MST	3	1	1	0	5
	None	17	4	2	2	25
Total		33	13	5	2	53
Percentages and totals are based on respondents.						
a. Dichotomy group tabulated at value 1.						

(*Note: Multiple response)

Table I represents the responses by dietitians on their usage of nutrition screening and nutrition assessment tools for oncology patients. It was revealed that most of the dietitians (N=25) does not use any of the nutrition screening tools to carry out a primary screening of patients upon admission. Similarly, it was also found that about 33 dietitians used only Subjective Global Assessment and not Patient Generated-Subjective Global Assessment which is considered as a gold standard tool to perform Nutrition Assessment for oncology patients. The dietitians also revealed that for every inpatient, irrespective of their medical condition, Subjective Global Assessment is the only tool being used in the hospital.

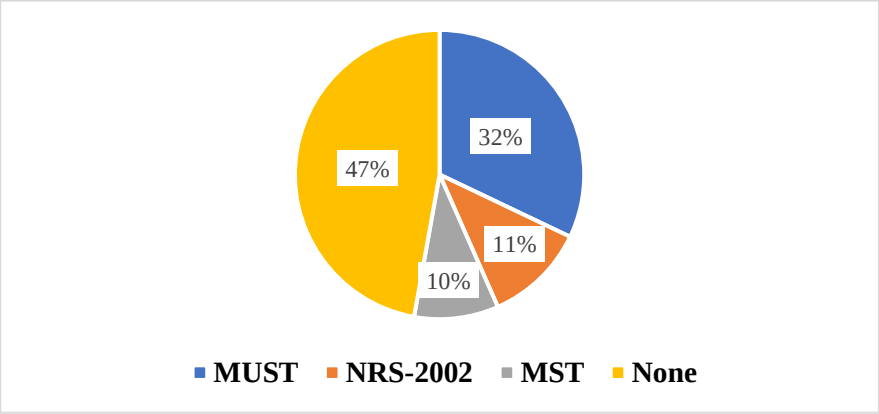

Figure I: Use of Nutrition Screening Tools by Dietitians

(*Note: Multiple response)

It was found that 47 percent of hospitals in which the dietitians work does not use any of the nutrition screening tools to identify the nutritional risk of the patients. According to the dietitians, 32 percent use Malnutrition Universal Screening Tool (MUST), 11 percent use Nutrition Risk Screening (NRS-2002) and nine percent use Malnutrition Screening Tool (MST).

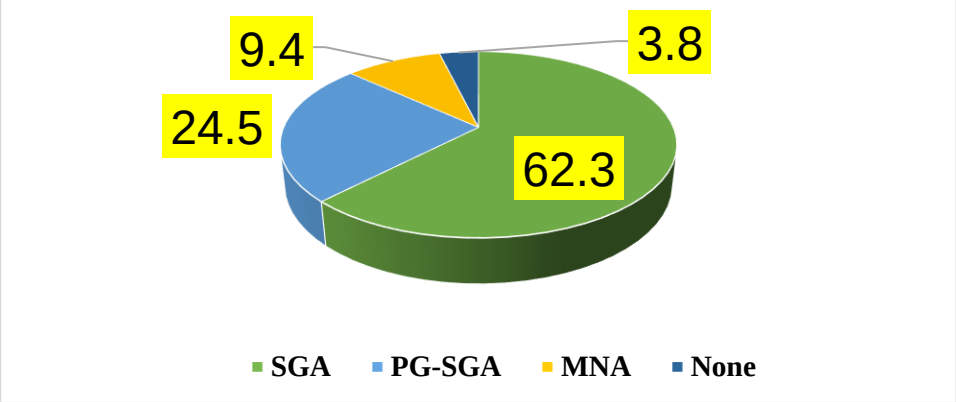

Figure II: Use of Nutrition Assessment Tools by Dietitians

(*Note: Multiple response)

A dietitian's main responsibility upon admission is to examine a patient's nutritional condition using standard and validated tools. The gold standard instrument for oncology patient assessment is Patient Generated Subjective Global Assess (PG-SGA). This study revealed that only 25 percent use PG-SGA, while 62 percent commonly use Subjective Global Assessment (SGA). Mini Nutritional Assessment is used by only nine percent of hospitals, and four percent of clinical settings do not use any nutritional assessment tools at all. The reasons stated by the dietitians for wide usage of SGA are the ease of use, already in practice, lack of awareness about the available gold standard tool and not in a senior level position to suggest using appropriate assessment tools.

The main advantage of adopting PG-SGA is that patients current food consumption will be analysed in detail and compared to normal intake to see if it is unchanged, greater than usual or less than usual. It can also be used to determine if the patient is currently ingesting just liquids, solids, nutritional supplements, very little of anything or only tube feedings or by parenteral nutrition. In addition to food intake, patients are also assessed and scored individually for the symptoms or problems they have which troubles them to consume enough food during the past two weeks, patients' activities and functions, presence of other diseases, metabolic demand and physical examination. Based on the scores the patient is categorized into Stage A (Well nourished), Stage B (Moderately malnourished) and Stage C(Severely malnourished). But through this survey it was found that PG-SGA is not widely used and thereby the oncologists and dietitians will find a huge gap in identifying Disease Related Malnutrition at the time of admission or disease diagnosis.

Additionally, the study aimed to ascertain which population had the highest prevalence of malnutrition and whether gender affected this prevalence. Dietitians found that women are experiencing higher rate of malnutrition (37 percent) than men (36 percent) and children (27 percent). This suggests that malnutrition is tumour and site-specific rather than gender specific.

In addition, the survey also aimed to determine the type of cancer that is highly associated with malnutrition in both men and women. A majority of the dietitians reported that stomach cancer 60 percent, followed by Head and Neck Cancer 51 percent showed highest Disease Related Malnutrition (DRM) in men and 45 percent had reported that stomach cancer, followed by head and neck cancer 36 percent in women had highest Disease Related Malnutrition (DRM). The dietitians also explained that though the prevalence of breast cancer and cervical cancer is high, the prevalence

of malnutrition is not higher and these patients experience only Treatment Related Malnutrition (TRM).

In general, the dietitians shared out of their experiences that the cancers of upper aerodigestive tract and upper digestive tract shows the highest Disease Related Malnutrition (DRM). This is because the patients have difficulty in swallowing, trismus and inflammation which leads to reduced food intake and thereby malnutrition. Figure III and IV depicts the responses given by dietitians to the cancers with highest malnutrition rates in men and women.

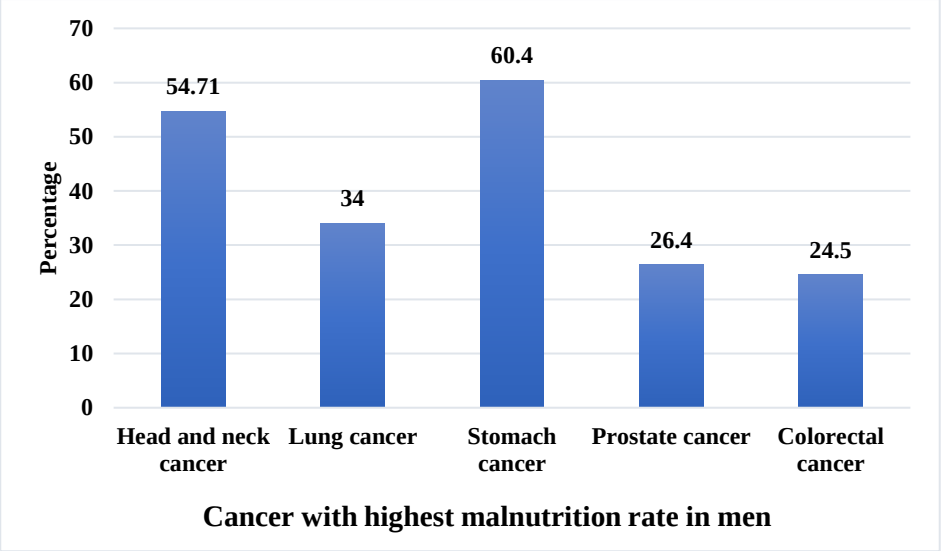

Figure III Cancer with highest malnutrition rate in men

(*Note: Multiple response)

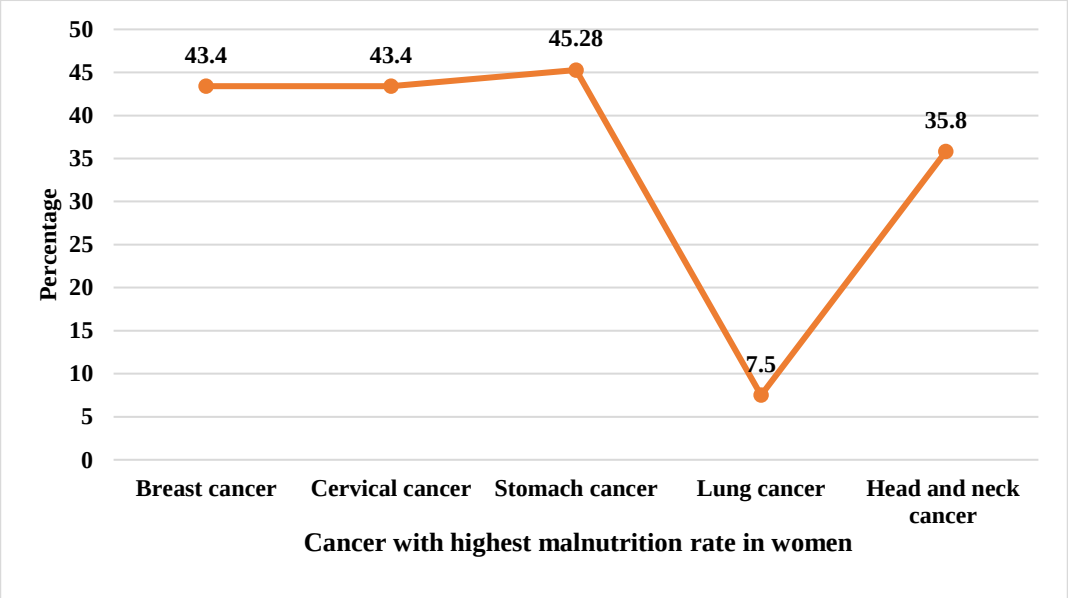

Figure IV Cancer with highest malnutrition rate in women

(*Note: Multiple response)

The study intended to reduce variability by asking about the stage of cancer at which a diagnosis is normally made in a hospital. According to nutritionists, the majority of patients are diagnosed with cancer at Stage II (68%), followed by Stage III (66%) and Stage IV (26%). Figure V depicts the responses of dietitians regarding the stage at which cancer is being usually diagnosed at the hospital.

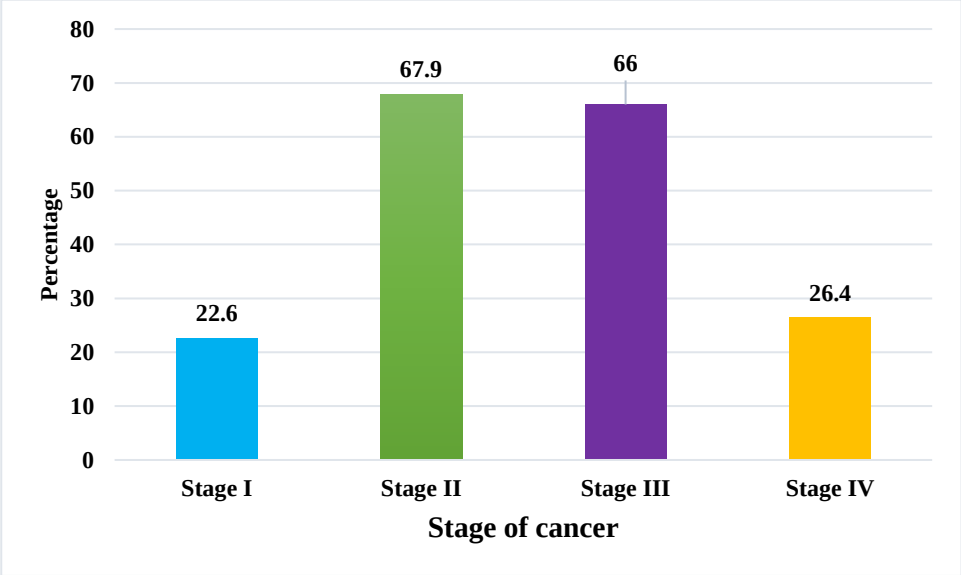

Figure V Stage at which cancer was diagnosed

(*Note: Multiple response)

Dietitians also revealed that the majority of oncology patients arrive as moderately malnourished (Stage B) 89 percent of the time and 32 percent as severely malnourished (Stage C) at the time of admission. This demonstrates that individuals are malnourished even before they are diagnosed or begin therapies such as chemotherapy, radiation therapy, or surgery. Thus, disease-related malnutrition (DRM) is prevalent in cancer patients and must be prioritised. Figure VI shows the stage of malnutrition at which cancer patients are being presented at the time of diagnosis.

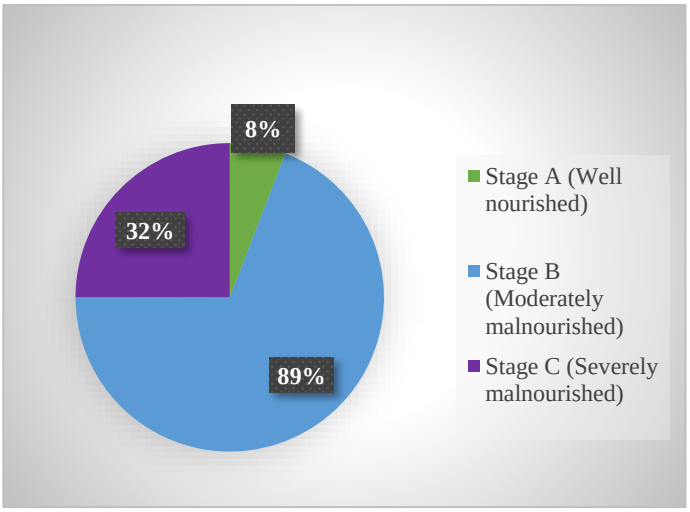

Figure VI Stage of malnutrition cancer patients at the time of diagnosis (Based on PG-SGA/SGA)

(*Note: Multiple response)

Table 2: Stage of cancer at which it was diagnosed and the stage of malnutrition the patients are being presented at the time of diagnosis

Stage of Cancer and Stage of Malnutrition Cross tabulation					
		Stage of Malnutrition[a]			Total
		Stage A	Stage B	Stage C	
Stage of Cancer[a]	Stage I	2	12	3	12
	Stage II	4	33	11	36
	Stage III	3	33	13	35
	Stage IV	1	12	9	14
Total		4	47	17	53
Percentages and totals are based on respondents.					
a. Dichotomy group tabulated at value 1.					

(*Note: Multiple response)

The survey also aimed to understand the common treatment plans available for cancer patients for which 79 percent reported it to be Chemotherapy, 49 percent as surgery, followed by radiation therapy (34 percent). Dietitians had also revealed that in some cases there will be a combination of treatments like surgery followed by chemotherapy, and that the treatment plan would be planned by doctors based on age, site specific, tumour specific, spread of cancer to others organs, and stage of cancer.

The dietitians had a wider perspective of the nutritional problems related to different cancer treatments and that the diet is planned keeping in mind the patient's acceptance, tolerance as well as the nutritional problems due to cancer treatments. The dietitians revealed that the cancer patients require high energy and protein needs to meet their metabolic demands, for which they will place the patients on Oral Nutritional Supplements (ONS) when oral intake is reduced and that the nutritional supplements are either given orally or through Ryle's Tube (RT) feeds based on tolerance initiating at 10 to 15 grams/feed, which upon tolerance and based on requirement could go up to 50 grams/feed. Also, the frequency of providing ONS also depends on the patient's requirements.

The survey further aimed to understand the negative outcomes that the patient experiences related to food intake at the onset of disease and its treatment. Figure VII depicts the negative outcomes that the cancer patient experiences related to food intake with highest being decreased appetite (86.8 percent) and lowest being intolerance to fat intake (11.3 percent).

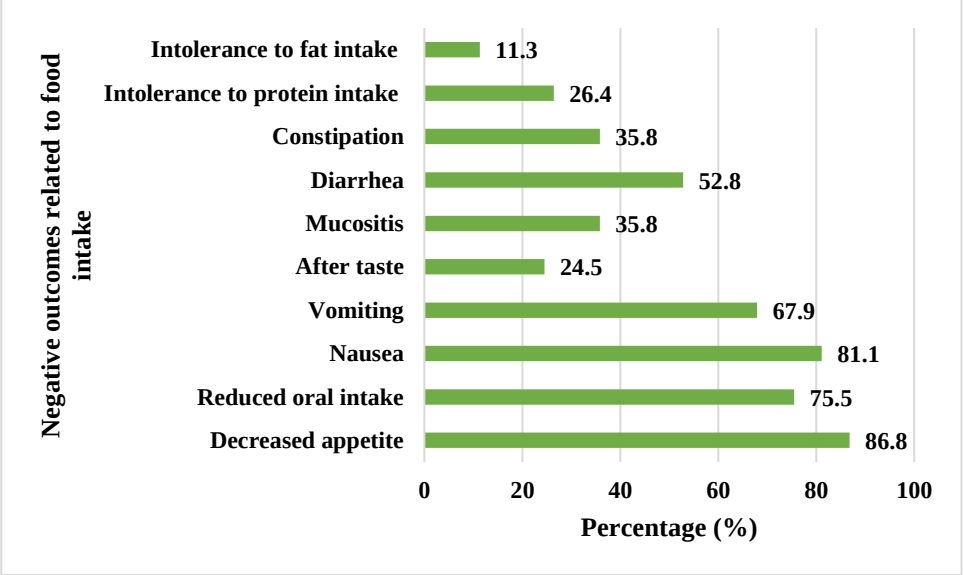

Figure VII Negative outcomes related to food intake

(*Note: Multiple response)

CONCLUSION

The survey indicates that a healthcare gap exists between the perceived need and the actual delivery of care with cancer diets. Standardised methods for nutritional management are necessary to guarantee timely and sufficient nutritional assistance for cancer patients. The use of nutrition screening tools and gold standard assessment tools like PG-SGA should be rapid. In addition, objective tools like Waist Hip Ratio, Mid Upper Arm Circumference, Calf Circumference, Hand Grip Strength, and biochemical parameters such as C-Reactive Proteins, Serum Proteins, Serum Albumin, Serum Globulin levels and Albumin: Protein ratio can help identify disease-related malnutrition. This shall be emphasized and made sure it is put into practice by developing e-standard tools since early diagnosis by oncologists and dietitians can prevent negative outcomes like longer hospital stays, poor quality of life, and reduced prognosis. Early malnutrition can be modest but also it is more treatable than later stages such as cachexia.

FUTURE SCOPE OF THE STUDY

The strength of the study is that the survey was conducted exclusively involving dietitians who have been handling oncology patient care. The web based survey was much easier for the dietitians to bring to light the common problems encountered in making the patients meet their increased nutritional needs, and the grim reality of the patients lack of knowledge, awareness, increased cost of treatment, their inability to afford for oral nutritional supplements and the psychological stress that the patients as well their family members go through. With these inputs, the study in future aims to emphasize using both subjective screening and assessment tools as well as objective tools like measuring Body Mass Index, Waist Hip Circumference, Hand Grip Strength, Skin fold thickness and Body fat composition for oncology patients to identify malnutrition precisely. Along with it, the study emphasizes the dietitians to look at IL-6, TNF α, CRP levels, Albumin: Protein ratio and in addition to observe the patients clinical signs and symptoms, nutrition related impact symptoms, diet history and lifestyle factors like sleep pattern, stress, physical activity, consumption of alcohol and smoking to understand the inflammatory status and nutritional status of

the patients. The findings will be utilised to create e-standard tools that can be used to overcome Disease Related Malnutrition, and it may also be emphasised through educational and awareness campaigns for medical professionals such as physicians, dietitians, nurses, cancer counselling team, and care takers as well.

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A STUDY ON AWARENESS, KNOWLEDGE, AND ATTITUDE OF BREAST-FEEDING PRACTICES AMONG POSTNATAL MOTHERS IN FEROZEPUR DISTRICT OF PUNJAB

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ABSTRACT

Breastfeeding is among the most important factors in birth spacing and child health. Extensive research has established the nourishing benefits of mothers' milk and the significance of exclusive breastfeeding. For the first six months of life, the WHO suggests that newborns should be exclusively breastfed to promote optimal growth and development. After six months, babies should start receiving safe, nutrient-dense solid foods while still receiving breast milk for at least two years. To investigate the knowledge, awareness, and attitude about breastfeeding among lactating moms living both in urban and rural regions of the Ferozepur district, a cross-sectional analysis was conducted. Using the random sampling technique (probability sampling), three hundred respondents were analysed from the six different blocks of the Ferozepur District. The results showed that there is no significant correlation between the mother's awareness & knowledge of breastfeeding on the mother's attitude. It is recommended that more potent community educational strategies be used to inform expectant moms about breastfeeding. Intervention programs should educate pregnant women about exclusive breastfeeding practices, providing antenatal care and support as essential maternal health services.

Keywords: Exclusive Breast Feeding, Knowledge, Attitude, Awareness

INTRODUCTION

The best feeding method is breastfeeding, which is the basis of life. (Temoirokomalani M. D 2021). Breast milk acts as a crucial first vaccine for infants, protecting them from potentially fatal diseases and providing essential nutrients for survival and growth. According to the World Health Organization (WHO) (2016), breastfeeding is a special and beneficial feeding practice during the infancy stage. It may decrease the possibility of obesity and diabetes in future lifespan. As to the guidelines of the baby-friendly program, breastfeeding should begin as soon as feasible because it benefits the growing child, the mother, and the entire family. Breast milk exclusively can support a baby's development long into later childhood stages.

The prevalence and factors influencing breastfeeding use in Punjab, India's remote and rural areas are not well unstated. Several studies have demonstrated a correlation between good nursing and children's increased IQs and brain development. Additionally, it produces a smarter and more intelligent workforce, leading to better economic results. Since breastfeeding improves a child's health and survival, investing in its promotion is a smart move for the growth of human capital.

According to the World Bank's Investment Framework for Nutrition analysis, there is a $35 economic benefit for every dollar invested in meeting the breastfeeding target. The most economical interventions with both health and financial gains are those focused on raising breastfeeding rates.

It is commonly known that breast milk shields a child from a wide range of minor and major health issues as well as developmental complications. The prevalence and factors influencing breastfeeding use in Punjab, India's remote and rural areas are not well understood. Therefore, an effort was made in this study to learn about the Awareness, Knowledge, and Attitude of breastfeeding practices among Postnatal Mothers in Ferozepur District of Punjab. This analysis has resulted in some recommendations for healthy breastfeeding practices among rural postnatal mothers.

LITERATURE REVIEW

Shah, M. (2016) emphasizes how important it is to raise society's understanding and awareness of community-based care. The study concluded that baby feeding patterns are positively impacted by educational attainment. Joseph et al. (2019) discovered that 96% of infant fatalities in underdeveloped nations occur because of inadequate breastfeeding. Dey, S. (2017) reports that in India, less than 50% of infants are nursed within an hour of delivery, and 55% receive exclusive breastfeeding during their first six months. Breastfeeding babies exclusively and from an early age can avert approximately 99,499 pediatric deaths annually from pneumonia and diarrhea. According to Milinco et al. (2019), almost 18% of all infants delivered in Trieste during that time were five months old, the percentage of infants exclusively breastfed was greater than the percentages recorded for the entire child population over the same period (62.3% vs. 42.9% vs. 30.3%). Exclusive breastfeeding had a statistically significant correlation with the number of children, the mode of delivery, breastfeeding counseling, motivation to breastfeed for two years, receiving a postnatal checkup, starting breastfeeding within an hour, and giving colostrum to newborns in the sample survey conducted by Choudhary in 2021. Kaur, R., Kaur, M., and Jyoti (2021) examined the knowledge, attitudes, and breastfeeding habits of women with children under a year old in their research report. The study found a significant positive correlation between knowledge and practices, a non-significant correlation between attitude and practices, and a non-significant correlation between knowledge and attitude.

OBJECTIVES

Breastfeeding awareness is a mother's understanding of breastfeeding's importance, benefits, and techniques for infant health and development, including nutritional value, antibodies, and bonding between mother and child. **Mother's knowledge** includes practical skills like recognizing signs of effective breastfeeding and managing breastfeeding challenges. Therefore, this study aims to investigate the correlation between a mother's awareness and knowledge about breastfeeding practices and their attitude toward breastfeeding.

HYPOTHESES

Ho: There is no significant relationship between the mother's awareness & mother's knowledge of breastfeeding and the mother's attitude they possess regarding breastfeeding.

H1: There is a significant relationship between the mother's awareness & mother's knowledge of breastfeeding and the mother's attitude they possess regarding breastfeeding.

METHODOLOGY

Study Location:

The study examined six blocks in the Ferozepur district of Punjab, including, Ghalkhurd, Zira, Makhu, Guruharsahai Mamdot, and Ferozepur Cantt.

Research Framework

This research was carried out to associate several dimensions that contribute to the mother's attitudes regarding breastfeeding in the Ferozepur district. The framework in this study is based on the relationship between the mother's awareness and the mother's knowledge as the independent variables while the mother's attitude regarding breastfeeding in the Ferozepur district as the dependent variable. An overview of the research framework is depicted in the diagram below:

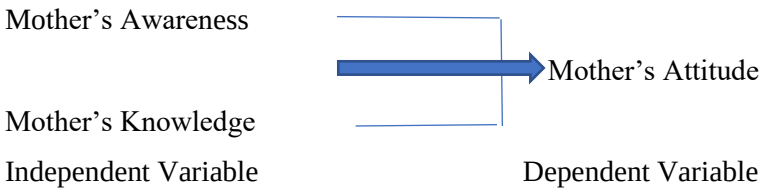

Fig. 1 Research Framework

Sampling Selection and Method

To meet the study objective, 300 nursing mothers were randomly selected from the Ferozepur district in Punjab by using the random sampling (Probabilistic) method to collect the information.

Data Collection Method

A structured questionnaire was employed in the research paper to collect data on the awareness of nursing mothers.

Evaluation of Nursing Mothers' Awareness

The study assessed nursing mothers' awareness of breastfeeding practices using a structured questionnaire, focusing on statements like exclusive breastfeeding, formula feeding, recommended practices, and personal hygiene for both mothers and babies.

Research Tools

Statistical tools were utilized to examine the survey data such as ANOVA, multiple regression, mean, and standard deviation.

FINDINGS AND DISCUSSION

For understanding the results obtained from the research study, knowledge regarding the nursing mother's background plays an extremely vital role. Various parameters related to the profile of the nursing mothers such as religion, age, maternal age at the time of delivery, place of delivery, category, family type, education, family annual income, and occupation were analysed.

Table 1: Demographic Profile of Nursing Mothers

Parameters		Frequency	Percentage
Religion	Hindu	88	29.3
	Sikh	**209**	**69.67**

	Muslim	3	1.0
Age	<20 years	9	3.0
	20- 25years	**150**	**50.0**
	25- 30 years	126	42.0
	30-35years	15	5.0
Maternal age at thetime of delivery	<20 years	9	3.0
	20- 25years	**149**	**49.7**
	25- 30 years	127	42.3
	30-35years	15	5.0
Place of delivery	Hospitals	**263**	**87.7**
	Home	22	7.3
	Any other	15	5.0
Category	General	**162**	**54.0**
	OBC	23	7.7
	SC	90	30.0
	BC	22	7.3
	Any other	3	1.0
Type of the family	Joint	**184**	**61.3**
	Nuclear	116	38.7
Education	Matric and below	**111**	**37.0**
	10+2	93	31.0
	Graduate	51	17.0
	Postgraduate andabove	28	9.3
	Diploma holder	17	5.7
Family annual income	Less than Rs 2.5 lakhs	**206**	**68.7**
	Rs 2.5-5 lakhs	82	27.3
	Rs 5 lakhs- 7.5 lakhs	10	3.3
	Rs 7.5 lakhs- 10 lakhs	1	.3
	More than Rs 10 lakhs	1	.3
Occupation	Business/self employed	5	1.7
	Service	46	15.3
	Housewife/homemaker	**249**	**83.0**

Table 1 presents the demographic profile of lactating mothers and reveals that most of nursing mothers (69.67 percent) belong to the Sikh religion followed by Hindu and Muslim communities. The majority of nursing mothers were young women, with 49.7 percent giving birth between 20-25 years old. Most nursing mothers were from joint families belonging to the General category and having low education levels. Most were found to be homemakers and have an income of less than Rs 2,50,000 per annum.

Descriptive Analysis for Mean

This phase of the analysis examines nursing women's levels of agreement about each variable. A mean value of less than 3 indicates little influence, less than 4 indicates some influence and a value of more than 4 indicates significant influence.

Table 2: Descriptive Analysis for Mean

	Mean	Standard. Deviation	N
Mothers Attitude	3.8582	0.34992	300
Mothers Awareness	3.6269	0.66455	300
Mothers Knowledge	4.1738	0.36096	300

In the table above, three items were established to evaluate the effect of nursing women's awareness and knowledge on mothers' attitudes toward breastfeeding in the Ferozepur district of Punjab. The mean value for these items ranges from 3.6269 to 4.1738, with a standard deviation between 0.34992 and 0.66455. This indicates that most survey respondents agreed or strongly agreed with the majority of the measures measuring the attitudes, awareness, and knowledge of nursing women.

Reliability Analysis

Several approaches were used to evaluate the data's dependability, including checking for collinearity and removing things that didn't suit the variables' fields. The reliability test's result is displayed below:

Table 3: Reliability Analysis

	Cronbach Alpha Value
Mothers Attitude	.720
Mothers Awareness	.825
Mothers Knowledge	.802

A reliability coefficient, which is determined by the Cronbach alpha value derived from the aforementioned research, shows how strongly the items in a set are positively associated with one another. Consequently, the mother's attitude (.720), awareness (.825), and knowledge (.802) Cronbach alpha values are all positive. We discovered that all the study's variables are trustworthy, and the result is good because the range is greater than 0.7, which denotes a positive outcome (Pallant J 2005 pg.92).

Table 4: Correlations

		Mothers attitude	Mothers awareness	Mothers knowledge
Pearson Correlation	Mothers attitude	1	0.199	0.006
	Mothers awareness	0.119	1	0.129
	Mothers knowledge	0.006	0.129	1
Sig. (1-tailed)	Mothers attitude		0.02	0.46
	Mothers awareness	0.02		0.013

	Mothers knowledge	0.46	0.013	
N	Mothers attitude	300	300	300
	Mothers awareness	300	300	300
	Mothers knowledge	300	300	300

Table 3 presents the correlations among the variables in the model. In this instance, the mother's attitude about breastfeeding is significantly correlated with both the Mother's Awareness and Mother's Knowledge measures (.119 and.006, respectively).

Multiple Regression

Multivariate analysis is performed to demonstrate how independent variables affect dependent variables. This test's interpretation is based on its B value; if it is significant at a level of significance lower than.05, the hypothesis will be accepted; otherwise, it will be rejected. However, the below table includes the model summary, coefficient table, and ANOVA table.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.121[a]	.015	.008	.34858

a. Predictors: (Constant), Mothers knowledge, Mothers awareness

b. Dependent Variable: Mother's attitude

In Table 5 the regression model was performed to evaluate the influences of the mother's attitude acquired by the respondents on their awareness and knowledge of breastfeeding. The dependent variable was the mother's attitude; the independent variables are X1- mother's awareness and X2- mother's knowledge.

Table 6: Coefficients of Mother's Attitude Regarding Breast Feeding

Variables	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Significance	Tolerance	VIF
(Constant)	3.668	.247		14.819	.000		
Mother's awareness	.063	.031	.120	2.072	.039	.983	1.017
Mother's knowledge	-.009	.056	-.010	-.167	.867	.983	1.017

Regression fitted $Y= 3.668+ .0683X_1- .0009 X_2+e$

Table 7: Result of ANOVA
Mother's Attitude Regarding Breast Feeding

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.523	2	.262	2.152	.118[b]
Residual	36.088	297	.122		
Total	36.611	299			

According to the multiple regression models, there are two explanatory variables: the mother's attitude and awareness. According to the coefficient of determination R2 value, these factors collectively explained 1.4 percent of the differences in Y.

Furthermore, it has been noted that there is no significant association established between the variables investigated in the hypotheses by the probability value (0.118) of F. The study found no correlation between a mother's awareness and acquaintance of nursing and their attitude toward breastfeeding. The measure of regression establishes a 1.4 percent of the association between the variables tested.

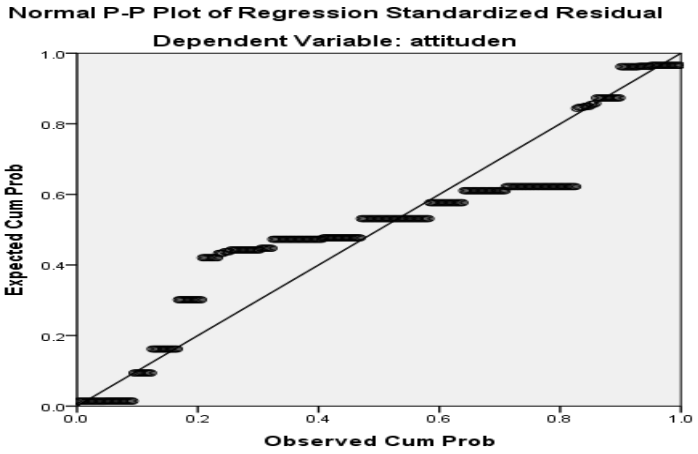

Fig 2 Typical p-p regression plot Variable with Standardized Residual Dependency (Mothers Attitude)

Figure 2 reveals that the Normal Probability Plot points do not align along a straight diagonal line from bottom left to top right.

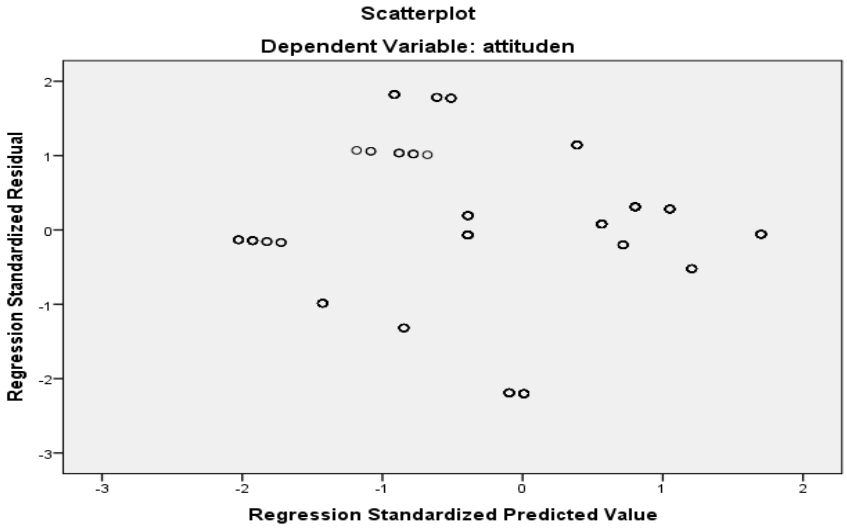

Fig. 3 Scatterplot of Dependent variable (Mothers attitude)

To assess the impact of the respondent's mother's attitudes on their awareness and knowledge about breastfeeding, a scatter plot analysis was conducted in Figure 3. The standardized residuals were not rectangularly distributed, as can be seen in the scatterplot, with many of the scores not centered in the centre (along the 0 points).

CONCLUSION

The study's findings indicate that, despite the mothers' positive attitudes toward breastfeeding, most of them were not completely familiar with the scientific definitions of "exclusive breastfeeding," "infant formula feeding," and "supplementary feeding." The bivariate analysis revealed no significant correlation between the mother's knowledge and awareness and her attitudes.

It can be found that the information provided regarding breastfeeding practices during antenatal and post-natal periods can significantly improve the awareness and practice related to exclusive breastfeeding. This data will also help the policymakers to initiate various campaigns and training programs about the importance of Breastfeeding. Therefore, it is crucial to educate mothers and fathers about breastfeeding throughout pregnancy. Researchers suggest increasing public health education initiatives to promote breastfeeding.

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FATTY ACID PROFILING OF BLENDED VEGETABLE OIL FOR DIVERSIFIED DIETARY NEEDS

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ABSTRACT

Dietary variations play a crucial role in determining a country's health and well-being. The onset of diet-related disorders is closely associated with food intake specifically oil intake. Blending of oils has become a more financially successful technique to improve the nutrient profile of oil while maintaining a balanced fatty acid profile in recent years. Combining vegetable oils increases the concentration of antioxidants and bioactive lipids which in turn improves the stability of vegetable oils besides improving the quality of life. Thus, blending oils to create an alternate cooking medium with desired health advantages is the need of the day. The present investigation aims at designing blended oil and to study its fatty acid profile. Vegetable oil namely flaxseed, groundnut, safflower, gingelly, and sunflower oil were purchased from retail shops in Coimbatore. All the selected five vegetable oils were blended into two different combinations, blended oil– I and II. The blended vegetable oils were stored at room temperature and were analyzed for physical and chemical properties. Fatty acids profiling of blended oil was carried out using standard procedure (Gas Chromatography – Flame Ionization Detector). The Peroxide value of blended oil- I and -II were found to be <0.1 Meq/Kg. The saturated fatty acids content of blended oil I and II was found to be 15g/100g and 40g/100g respectively, similarly monounsaturated fatty acids content of blended oil- I and II was found to be 24.11g/100g and 26.01g/100g respectively. The polyunsaturated fatty acid present in blended oil-I and II was found to be 60g/100g and 32g/100g. The blended oil can serve as a healthy alternative for cooking medium.

Keywords Cardiovascular Disease, Modified Vegetable Oil, blended oil, Omega-3 Fatty Acids, Polyunsaturated Fatty Acids, Unsaturated Fatty Acids

INTRODUCTION

Oil has long been an important staple of people's daily diets around the world, and its use has increased multiple times over the decades. Vegetable oils are considered as a main ingredient in our dietary practices. Bioactive substances, sterols, polyunsaturated fatty acids (PUFA), polyphenols, carotenoids, and other important elements all contribute to the health (Chatzopoulou*et al*., 2020; Sodeifian*et al*., 2019).The nutritional quality of fats and oils has recently acquired prominence due to their strong association with the onset of non-communicable diseases mainly obesity and cardiovascular diseases. Estruch*et al*., (2020) predict a global incidence of 39.7% of cardiovascular disease with further escalation to 40.5 per cent in 2030.As a consequence of significant rise in cardiovascular diseases, much attention has been paid to consumption of fat and oil.

Choosing the right cooking oil significantly contributes to cardiac health. The body's requirement for Polyunsaturated Fatty Acids (PUFA) is not constant; it varies with age, type of work, lifestyle behaviour particularly climatic conditions, health, and other factors.(Simakova *et al*., 2019).Several studies have associated increased omega-3 PUFA intakes, particularly eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), to a lower risk of chronic inflammatory ailments including cardiovascular disease (CVD). (Djuricic*et al*., 2021). Also, antioxidants in oil, such as phytosterols, phytoestrogens, flavonols, carotenes, and tocopherols, prevent cardiac diseases and contribute significantly to nutrition (Cabezas-Zábala*et al*., 2016). No pure oil is with enough oxidative stability, good functional and nutritional qualities. One of the simplest ways to boost nutrient value, fatty acid profiles and storage stability is to combine several vegetable oils with different qualities. (Chopra, 2018).

Thus, blending oils has grown more commercially viable in recent years. Indian culinary practice widely used gingelly, groundnut, sunflower and safflower oil for different recipes and are commonly consumed among Asian population. Gingelly oil (sesame) is abundant in unsaturated fatty acids and antioxidants. When ingested, it reduces the risk for heart disease, due to its antihypertensive and lipid-lowering properties when mixed with other oils (Devarajan*et al*., 2016).Groundnut oil is a good source of antioxidants and polyunsaturated fatty acids and is proved to lowers blood cholesterol and low-density lipoprotein content (Pourrajab*et al*.,2021). Flaxseed contains high omega-3 fatty acid (n-3 and n-6) and nutraceuticals compound that prevents various diseases like cancer, coronary heart disease, diabetes, obesity, gastrointestinal disease, renal disease, and other bone disorders. Sunflower oil, which is high in vitamin E, helps to prevent atherosclerosis, artery disease and stroke. The presence of linolenic and linolenic acids in safflower oil aid in the prevention of thickening of arteries. Functional components (neutraceutical) present in safflower oil is proved to dilute blood, vasodilate blood vessels and reduces blood pressure.

JUSTIFICATION FOR THE STUDY

- Vegetable oils come in a variety of forms, but there is no single edible oil that possesses the appropriate fatty acid composition, oxidative stability and functional characteristics.
- Blending besides enhancing the storage quality of fat by increasing the shelf life of oil, also reduces oxidative damages and improves omega 3 fatty acids that are cardiac friendly and helps in the prevention of disease such as cardiovascular diseases, hypertension and diabetes mellitus.

OBJECTIVE

The objective of the study is to

- To select vegetable oil with high polyunsaturated fatty acids content.
- To design a heart friendly blended vegetable oil.
- To examine the physiochemical characteristic of the blended oil and to study the fatty acid profile of the blended oil.

MATERIAL AND METHODS

Designing a Heart friendly blended Vegetable oil

Vegetable oil namely flaxseed oil, groundnut oil, safflower oil, gingelly oil, and sunflower oil were selected for blending based on their polyunsaturated fatty acids content. The selected oils were purchased from retail shops in Coimbatore. The purchased vegetable oils were blended into two variation - blended oil I (BOGN01) and II (BOGO02) (Table-I). Blending was done in conical flasks using a orbital shaker (90rpm) at 37ºC for 24 hrs. The blended oils were treated with ultrasonic waves in a Bath sonicator. The waves were delivered for 1 minute at 37°C.

Table- I Designing of heart friendly blended vegetable oil

Variation	Vegetable oil	Quality used (ml)
Blended oil-I BOGN01	Groundnut oil	50
	Safflower oil	12.5
	Sunflower oil	12.5
	Gingelly oil	12.5
	Flaxseed oil	12.5
	Total	100
Blended oil-II BOGO02	Gingelly oil	50
	Safflower oil	12.5
	Sunflower oil	12.5
	Groundnut oil	12.5
	Flaxseed oil	12.5
	Total	100

Physical and chemical properties of blended oil

The physical properties such as colour of the blended oil was measured using colour reader (Gowegroup Multitesters). The smoking temperature of blended oil was measured using digital food thermometer (Thermopro).The standard (AOAC-996.06)- (AOAC, 2019) analytical method was used to determine chemical properties such as peroxide value (mohr's method – AOAC 995.33), iodine value (Wijs method – AOAC 920.159), saponification value (AOAC 920.160), and acid value (AOAC 940.28). (AOAC 995.33) were analyzed.

Quantitative analysis of the fatty acid profile of Blended oils (GC-FID)

Quantitative analysis for fatty acids profile of blended oil was carried out using Gas Chromatography – Flame Ionization detection method (AOAC 996.06) - AOAC, 2019.Fat samples (100µl) were taken in a test tube. The mouth of the test tube was closed and shaken well for 10 seconds using a vortex mixture. The tube was made to rest for two minutes and 2ml of hexane was added and shaken well for four minutes. To the sample,50 ml of sodium sulphate was added and centrifuge at 1500 rpm for three minutes. The hexane layer was collected through a 0.22um filter

and injected in Gas Chromatography – Flame Ionization for detection. The fatty acids were then identified in a chromatogram by comparing their retention time to that of the corresponding peak.

The ethical clearance for the present study was obtained for the Avinashilingm Institute for Home Science and Higher Education for Women's Institutional Human Ethics Committee (AUW/IHEC-17-18/FSMD/FHP-02).

RESULT AND DISCUSSION

Table –II: Physical Characteristics of the blended oil

Parameters	Blended oil-I (BOGN01)	Blended oil-II (BOGO02)	Gingelly oil	Groundnut oil
Colour (groove/mm)	Dark Yellow 16.25	Brownish Yellow 19.39	Yellowish red 10.51	Reddish yellow 10.61
Viscosity (CPS)	54	70	55	79
Odour	Nutty smell	Nutty smell	Nutty smell	Nutty smell
Texture	Viscous liquid	Viscous liquid	Viscous liquid	Viscous liquid

Blended oil-I (BOGNO1)- 50ml of groundnut oil, 12.5 ml of sunflower oil, 12.5 ml of safflower oil, 12.5 ml of gingelly oil, 12.5 ml of flaxseed oil.
Blended oil –II (BOGO02)- 50ml of gingelly oil, 12.5 ml of sunflower oil, 12.5 ml of safflower oil, 12.5 ml of groundnut oil, 12.5 ml of flaxseed oil.

The colour of the blended oil-I and II was found to be dark yellow (a*and b*is positive) and brownish yellow colour (a*and b* is positive) respectively. From that it was inferred that in par with commonly consumed cooking oil namely gingelly and groundnut oil. The viscosity of the blended oil-I and II was found to be 54 and 70 Centipoise (CPS). From the study it was observed that the viscosity of blended oil- I to be similar to that of the gingelly oil [55 Centipoise CPS], similarly the viscosity of the blended oil-II was more or less similar to that of the groundnut oil [79 Centipoise CPS]. The texture of the blended oil was non-greasy and had a pleasant mouth feel texture, and it had a distinct nutty aroma that could be is due to the acetic acid that was present in flaxseed oil.

Table –III: Chemical Characteristics of the blended oil

Chemical properties	**Blended oil-I** (BOGN01)	**Blended oil-II** (BOGO02)	**Gingelly oil**	**Groundnut oil**
Peroxide value Meq/kg	<0.1	<0.1	1.40	9.99
Iodine value	15.60	16.63	104-120	77-107
Saponification value Mg/KOH	5.6	7.6	186-195	187-196
Acid value Mg/KOH	1.70	2.23	2.84	3.98

Smoking Point	181ºC	132ºC	140.4ºC	170ºC

Blended oil-I (BOGNO1)- 50ml of groundnut oil, 12.5 ml of sunflower oil, 12.5 ml of safflower oil, 12.5 ml of gingelly oil, 12.5 ml of flaxseed oil.

Blended oil –II (BOGO02)- 50ml of gingelly oil, 12.5 ml of sunflower oil, 12.5 ml of safflower oil, 12.5 ml of groundnut oil, 12.5 ml of flaxseed oil..

The peroxide values blended oil-I and II were found to be less than 0.1 Meq/kg of oil. A peroxide value is a measure of lipid matrix freshness and oxidation during storage. Also, more the peroxide in the oil, the more it oxidized (Sikorska *et al*., 2019). Thus, from the above observation, it can be inferred that the blended oil is superior to the gingelly and groundnut oil in terms of storage quality.

The saponification value of blended oil was observed to be blended oil-I and II to be 5.6 and 7.6 Mg/KOH respectively. According to (Muhammad *et al*., 2011) the molecular mass of fatty acids is inversely related to saponification value, indicating that there is a substantial fraction of fatty acids with lower molecular weight or chain length. The saponification score indicates the presence of more long-chain beneficial fatty acids in the blended oil, such as Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA).

The acid value is a measure of quantum of free fatty acids present in a specific amount of oil. Oil with a higher acid value has more free fatty acids, resulting in poorer quality of oil (Katkade *et al*.,2018)The acid value of blended oil-I and II was found to be 1.70 and 2.23 Mg/KOH which is lesser than groundnut and gingelly oil [(2.84Mg/KOH, 3.98 Mg/KOH) Longvah et al.,2017].

The higher the acid number, more is the free fatty acid value indicating poor quality of oil. Thus, it can be inferred that both the blended oil is superior in terms of quality compared to gingelly and groundnut oil.

A high iodine value indicates that the oil has a significant proportion of unsaturated fatty acids. The blended oil– I (15.60) and II (16.63) were compared to gingelly oil (104-120) and groundnut oil (77-107) According to Dim., 2013the existence of unsaturation is shown by the iodine value. Iodine value of blended oil-I and II was less compared gingelly oil and groundnut oil

The smoking temperature of blended oil-I and II was reported as 181ºC and 132ºC respectively.

Table –IV: Comparison of Fatty acids profile of Blended oil with Gingelly oil and groundnut oil

Type of fatty acids	Blended oil-I (%) (BOGN01)	Blended oil-II (%) (BOGO02)	Gingelly oil (%)	Groundnut oil (%)
Saturated Fatty Acids (SFA)	15	40	16	19
Monounsaturated Fatty acids (MUFA)	25	26	41	54
Polyunsaturated Fatty Acids (PUFA)	**60**	32	42	27
Trans fatty acids (TF)	<0.1	0.081	1.3	0.9
Total fat	97.32	98.52	100	100

Blended oil-I (BOGNO1)- 50ml of groundnut oil, 12.5 ml of sunflower oil, 12.5 ml of safflower oil, 12.5 ml of gingelly oil, 12.5 ml of flaxseed oil.
Blended oil –II (BOGO02)- 50ml of gingelly oil, 12.5 ml of sunflower oil, 12.5 ml of safflower oil, 12.5 ml of groundnut oil, 12.5 ml of flaxseed oil.

Though saturated oils are stable and less prone to oxidation compared to unsaturated oil, consumption of these oils leads to cardiovascular risk. Oil's that are stable with low saturated fatty acids at frying temperature can be designed by blending oil judiciously. In blended oil-I (15), we observed a reduction in the quantum of saturated fatty acid one to four percentage compared single use oil namely gingelly oil (16) and groundnut oil (19). However, the blended oil II showed a greater reduction in the quantum of saturated fatty acid (21-24%) compared to gingelly oil and groundnut oil. Thus, it is evident that blended oil-I is more stable and healthier compared to blended oil-II.

In contrary the percentage of polyunsaturated fatty acids in blended oil I was found to be 18-33 percentage higher compared to gingelly oil and groundnut oil and blended oil-II was found to be five percentage higher than groundnut oil. Since omega-3 polyunsaturated fatty acids aids in the reduction of cholesterol levels in heart patients and a variety of inflammatory illnesses Ghani *et al*., (2019), the higher percentage of Polyunsaturated Fatty Acids (PUFA) in the blended oils can help to lower cholesterol levels and can prevent thrombosis.

Table- V Fatty acids profile of blended oil I and II

Fatty acids Profile of Blended oil-I (BOGN01)	Peak area %	Fatty acids Profile of Blended oil-II (BOGO02)	Peak area %
Saturated fatty acids			
Methyl Palmitate C16:0	11.96	Methyl Palmitate	9.48
Methyl Stearate C18:0	4.33	Methyl Stearate	5.52
Methyl arachidate C20	1.03	Methyl arachidate	0.66
Methyl behenate C22	1.8	Methyl behenate	0.56
Methyl Ligocerate C4	0.68	Methyl Ligocerate	0.28
Monounsaturated fatty acids			
Methyl Oleate C18:1C	35.303	Methyl Oleate C18:1C	35.470
Methyl eicosenoate C20:1C	5.01	Methyl eicosenoate C20:1C	7.239
		Methyl erucate C22:1C	0.439
Polyunsaturated fatty acids			
Methyl linoleate C18:2C	39.208	Methyl linoleate C18:2C	40.340
Methyl linolenate C18:3C	0.648		

Blended oil-I (BOGNO1)- 50ml of groundnut oil, 12.5 ml of sunflower oil, 12.5 ml of safflower oil, 12.5 ml of gingelly oil, 12.5 ml of flaxseed oil.
Blended oil –II (BOGO02)- 50ml of gingelly oil, 12.5 ml of sunflower oil, 12.5 ml of safflower oil, 12.5 ml of groundnut oil, 12.5 ml of flaxseed oil.

Peak values for polyunsaturated fatty acids was observed in blended oil-I and II at the peak area of 39.2 and 40.34 respectively indicating the presence of methyl linoleate a n-6 fatty acid. Marangoni et al., (2020), claims methyl linolenate- a n-6 fatty acid as an oxidative stress marker, with functional properties to decrease blood cholesterol, blood pressure and inflammation.

Similarly, a peak value in blended oil-I for monounsaturated fatty acids was observed at the peak area of 35.303, indicating the presence of Cis -9 oleic acid (n-9). Mauger et al., (2021) claims Cis 9 oleic acid to modulate inflammatory marker by reducing the synthesis of pro-inflammatory mediators.

CONCLUSION

To conclude the present study throw's light on the health benefits of blending one or more vegetable oils. The blended oil-I (BOGN01) formulated using 50 percentage of gingelly oil and 12.5 percentage of each sunflower, safflower, groundnut and flaxseed oil was found to be more stable and functionally superior in quality due to the presence of 18-33% of polyunsaturated fatty acid. Also, the presence of n-6 methyl linolenate and cis form of n-9 methyl oleic acid in the blended oil (BOGN01)-I makes it as a good cardiac friendly alternate cooking source as it helps to modulate the inflammatory markers, by reducing the synthesis of pro inflammatory markers.

SUGGESTION FOR FUTURE RESEARCH

- The fatty acid profile of foods cooked using the blended oil can be studied in future.

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EXPERIENCES OF PARENTS OF RAISING CHILDREN WITH AUTISM SPECTRUM DISORDER (ASD)

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ABSTRACT

Autism Spectrum Disorder (ASD) is a constellation of symptoms varying over a huge range including social deficits in communication and sensory-motor repetition in behavior. This paper showcased the comprehensive study of the lived experiences of parents who have only one child with clinically diagnosed ASD. The case study method was used to get in-depth information about the impact of a diagnosis of ASD on the parents and their ways of coping with it. Semi-structured interviews, observations, and group discussions were used as methods to gather the information. Twenty autistic children were taken for this research. It was found that parents got alarmed when the milestones in their children were delayed or regressed or even, saw slight changes in the social behavior and abnormal communication patterns in the way their children expressed themselves. Parents felt anxious and fearful after the diagnosis but accepting the reality comes with a lot of physical, psychological, emotional, and financial impact. It not only affected the parents but also other family members. Parents adopted various coping mechanisms like faith in religion, family, and social support groups while some adopted meditation and yoga through these times. Parents were advised to overcome the denial of loving their children and take proper therapies for autistic children.

Keywords: Autism Spectrum Disorder, Grief, lived experiences, Regressed milestones, Social stigma, Coping strategies.

INTRODUCTION

Autism spectrum disorders (ASD) are a group of pervasive childhood developmental disorders. Children with ASD are identified by a variety of problems in emotional, physical, and interactive skills, daily living and play, language development, and imitation abilities. The term ASD is an umbrella term used for individuals with core symptoms of impaired social interaction and communication skills, and stereotypic or restricted patterns of activity, interests, and behavior. ASD is found in all races, ethnic groups, and all socioeconomic groups. ASD is a lifelong developmental disorder. As screening and diagnostic techniques are better developed now there is a rise in the identified cases of autism.

Although many parents are aware of differences in their ASD-affected children's development from 18 months of age (Howlin & Moore, 1997), ASD is often not diagnosed until school age. The prevalence of ASD in boys is four times higher than in girls, but ASD in girls is often associated with diseases such as epilepsy. People with ASD may be less able to express what they want or become agitated when their routines are interrupted (Peppe, McCann et al 2007). Individuals with ASD may also have secondary diagnoses such as epilepsy or intellectual disability, making parenting difficult.

Children with ASD often face stigma and discrimination in a variety of settings. Heyworth, Simon, et al, 2023 described that the parent-child bond became stronger during lockdown because of its focus on promoting "the mental health of children above all else". The available literature in India suggests that children with ASD often face significant family challenges requiring external support (Gupta &Singhal, 2005; Krishnamurthy, 2008;).

RELEVANCE OF THE STUDY

The experience of parents raising children with autism spectrum disorder (ASD) reveals a very difficult life. Although ASD characteristics are common across cultures, the experiences of families caring for children with ASD may vary.

The stress associated with raising a child with long-term impairment affects the entire family atmosphere and can negatively impact the parents' quality of life. ASD symptoms are lifelong requiring parents to spend significant time caring for them. The complexity of parental roles and the well-being of parents caring for children with ASD are increasingly public health concerns. The situation and needs of a child with autism affect both the child and the family members who play an important role in the child's upbringing.

The parents of autistic children need more social support, counselling, and higher education to support their child's special needs, as well as ensure their own physical and mental well-being. Understanding the experiences of the parents with ASD is very important as it provides insight into everyday family realities and how ASD affects parent-child dynamics. Compared with parents of children without ASD, they are at increased risk of financial hardships, poor physical and mental health, and a high divorce rate the mothers of autistic children had to restructure their family lives because of the child's unpredictable and difficult behavior.

Keeping the above facts in mind, it was decided to explore the experiences of parents raising a child with ASD living in Delhi. The purpose of the study was to describe the experiences of families living in Delhi, India, and to understand the unmet needs of families raising children with ASD. As a result of these experiences, several unmet needs, particularly for the support of increasingly isolated families and those with limited access to multidisciplinary, evidence-based services for ASD were to be identified.

OBJECTIVES

i) To explore the experiences of parents raising children with Autism Spectrum Disorder.

ii) To find out the different coping mechanisms of the parents.

iii) To suggest recommendations to relieve the caregiving burden of families with ASD child

METHODOLOGY

Tools

I. Semi-structured Interview Guides
II. Observations

III. Group Discussions

The case study method was employed for the study. Detailed data was collected through semi-structured interview guides, observations, and discussions with the subjects to get a proper understanding of the reality of raising a child with ASD.

Data Collection

Identification of the NGOs working for ASD children: Delhi has many NGOs but only a few are working for children with ASD. Two NGOs accepted to participate in the study.

Selection of parents of children with ASD: Parents with autistic children were identified and requested for the interview after explaining the purpose. The inclusion criteria for the parents to participate in the study were: living autistic child with family, the ability to speak Hindi or English, and consent to participate in the study while exclusion criteria included- Parents who refused participation in the study, the family having another autistic child and the child has another physical or mental illness.

Ten parents of children having ASD were selected though there were 22 children. The head of the institution told the researcher about another NGO which was situated in Vasant Vihar. The researcher managed to conduct interviews with 10 parents and so in total 20 parents were interviewed for the case studies.

Administering Semi-structured interview guide: A semi-structured interview guide was designed to collect the required data along with observations and discussions. On average, each interview lasted for 90 minutes ranging from 60–to 120 minutes regarding each participant's condition.

Ethical considerations: Oral consent was taken from the parents for their voluntary participation in the study after informing them about the aims of the study, and participants' consent was taken.

RESULTS AND DISCUSSIONS

Demographic Profile of the Famillies

Age group of parents: Eleven parents were in the age group of 25-30 years at the time of conception of their child, and 6 couples were of the age of 20-25. Contrary to the earlier research that late pregnancies in mothers after 32 years are alarming for the risk of autism but in the present study, only 2 parents were above 30 years and only one couple was between 35-40 years old.

Working mothers: Mothers in 4 families were working. This might be due to the reason that autistic child needs continuous care and supervision by their parents.

Type of family: Sixty percent (12) of parents were living in joint families while 40% were living in nuclear families. The demographic profile of the parents is shown in Table 1.

Table 1: Demographic Profile of the Parents

Characteristics	n% (N) =20
Age of mothers	
20-25	06
25-30	11
30-35	02

35-40	01
Education level	
High school	25% (5)
Graduate	55% (11)
Post graduate	20% (4)
Occupation	
Working mothers	20% (4)
Working fathers	80% (16)
Marital status	
Married	85% (17)
Divorced/ separated	15% (3)
Type of family	
Nuclear	60% (12)
Joint	40% (8)

Age range of children with ASD

No child less than 2 years of age was found for the study which indicates that parents were alarmed only after 2 years when different milestones were delayed. Maximum children were in the age group of 10 to 18 years which shows that diagnosis was very late, which may be due to denial or ignorance on the part of the families.

Birth details of the children

Type of delivery and time: Twelve mothers had normal deliveries and 8 had lower-segment Caesarean section (LSCS). Out of 20 children, only 5 were preterm babies and the rest 15 were full-term.

Birth cry: Seventeen neonates cried immediately after birth and 3 cried later.

Breastfeeding: Eighteen mothers breastfed their child within 2 hours of delivery and 2 mothers-initiated breastfeeding after 2 hours as the child was admitted to the neonatal intensive care unit (NICU).

Reactions to vaccination: No adverse reaction to the vaccination was reported by the parents. Table 3 shows the birth-related information about the children.

Table 2- Birth-related Information about the Children

Variables	**n% (N) =20**
Type of delivery	
Normal	60% (12)
LSCS	40% (8)
Type of baby	
Preterm	25% (5)
Full Term	75% (15)
Birth weight	3000grams +- 750grams
Birth cry	

Cried immediately (normal)	85% (17)
Cried later	15% (3)
Initiation of breastfeeding	
Within 2 hours	90% (18)
2-6 hours	10% (2)
Vaccination	
On-time	100%
Adverse reactions to vaccination	0

Warning signs shown by the children during infancy

Delayed milestones: Most parents got alarmed by something unusual when the milestones were either not achieved or delayed. Nine parents reported that their child's milestones were delayed, 4 reported that earlier they were achieved on time but later slowed down, 3 said that they were on time, 2 parents each said that some were on time and some delayed or some regressed milestones.

Socio-emotional behaviour displayed by the children with ASD: All participants reported poor developmental tasks and unusual behaviors such as avoiding strangers, acting monotonously, staring continuously, repeating things, and avoiding eye contact, as early areas of concern for suspecting their child to be different from that of normal. Problems in speech, communication, and socialization were the key features of atypical behavior that were observed by all the parents among their children. These symptoms were sometimes noticed earlier and sometimes a bit later which may be due to denial of the condition by the parents.

Development of language: Only 10% of children had normal speech development and the rest had only slow and repetitive speech.

Patterns of social interaction: Eight children were comfortable only with parents, 5 children were hyperactive and became violent with strangers, 4 were comfortable only with selective people and 3 took time to become calm with others. Table 3 warning signs shown by the children during infancy.

Table 3: Warning Signs shown by the Children during Infancy

Variables	**n% (N) +20**
Milestones	
On time	15% (3)
On time but slowed	20% (4)
Delayed	45% (9)
Some were delayed	10% (2)
On time but regressed	10 (2)
Injury or disease in growth years	0
Ability to follow commands	
Only parents' commands	33% (5)
Only simple commands	27% (4)
After joining NGO	20% (3)
Language disorders	
Normal speech	10% (2)

Abnormal speech- slow and repetitive	90% (18)
Social interaction patterns	
Family members	40% (8)
Takes time to become calm & comfortable	15% (3)
Selective people	20% (4)
Hyper-aggressive child	25% (5)

Diagnosis of ASD in children

Age of diagnosis: After suspecting the child's behavior, all parents took their children to doctors for treatment. Only 3 parents got alarmed when their child was less than 2 years of age as the child was not able to achieve basic milestones of holding the neck, uttering little words, or hearing simple sounds. Rest 17 were diagnosed when they were 3-10 years of age which was very late and consequently reduced the chances of early intervention.

Reasons for seeking medical help: A major reason for taking them to the doctor was delayed milestones but 3 parents were worried due to the hyper-aggressive behavior of the child, 3 were concerned by the abnormal social and emotional behavior and 2 were stressed about the poor academic performance in schools. Table 4 depicts the information about the diagnosis of ASD among children under study.

Table 4- Diagnosis of ASD in children

Variables	**n% (N) =20**
Age at diagnosis	
0-2	15% (3)
3-5	45% (9)
6-8	40% (8)
Screening done by	
Paediatrist	50% (10)
Psychologist	20% (4)
General practitioner	30% (6)
Main reason for consultation	
Delayed milestones	60% (12)
Poor scholastic performance	10% (2)
Hyper aggressive nature	15% (3)
Abnormal social and emotional behaviour	15% (3)

Experiences of bringing -up children with ASD

Autism can affect various aspects of the life of an individual. Physical, emotional, financial, marital, societal, and psychological aspects of the whole family are affected. The same was revealed through the study.

Reactions of the family to the diagnosis: Many parents became tearful during interviews while describing their feelings. They reported overwhelming emotional reactions to their child's diagnosis as

they could not accept the diagnosis initially. All the families were shocked and sad by the diagnosis but in 13 families, other family members accepted the fact and started the requisite interventions as early as possible, 5 families were extremely grief-stricken whereas 2 families lived in denial for a longer time, and believed in their cultural myths as boys talk late than girls.

Issues faced by the families: Most of the parents faced economic problems due to the single earning member in the family and a huge chunk of earnings was spent on the child's treatment and therapies. Some mothers even had to leave their jobs. The parents reported that the treatment, training, and therapies put huge financial pressure on them.

One of the fathers said that he has shifted his job near to the NGO so that he could easily take his son for the therapies and his wife could do the household chores. It was a very time, resource, and effort-consuming task for parents to look after a child with autism. They had to continuously monitor their child.

Changes in marital relationship: It is found by the interviews that after the diagnosis of the autistic child, their marital relationship was also affected. Sixteen couples shared responsibilities equally and supported each other, 2 were divorced and 1 was separated. One mother reported that though they were living together and sharing responsibilities for the sake of their child but there was no love between them.

One mother was divorced after the diagnosis. One mother was living separately from her in-laws and husband as they blamed her for the disease.

Guilt related to neglect of another child: Many parents reported feelings of guilt related to neglect, inattention, and inadequate parenting of their other children. Seven parents felt that their other child has matured before age, 6 parents accepted that they take their other child to the doctor for regular checkups as they fear the diagnosis of elder child, 4 parents felt that their other child feels helpless by the situation and for the rest, 3 parents, the autistic child is their only child as they did not want to take risk with the other child.

Attendance in family functions: During the interview, parents also said that only one of them attends family functions like marriages and reported that their social circle has reduced.

Support Systems and Coping Strategies of the Families**:** Eight parents felt lucky to have a supportive family, and 7 parents felt that NGOs and parents of other autistic children are the biggest blessings for them as their child has improved a lot after joining the NGO. A few parents sought solace in religious and spiritual activities while 2 families considered their autistic children as blessings to the family.

Anxieties and aspirations of the parents: All the parents were equally worried about the self-dependency of their autistic children. They only wished that their child could become financially independent and few have left everything to God.

The caregiving burdens of life: Taking care of an autistic child was very strenuous and physically taxing for parents as it requires more exertion while performing various tasks.

The transition of their child with ASD to adolescence generated anxiety among all mothers regardless of the child's age. When asked about childcare duties like taking care of the girl child during periods, two mothers reported that they had to take care of the menstrual needs including the change of

sanitary napkins of their adolescent girls with ASD, One mother said that after consulting the doctor they had done uterus removal surgery for their daughter as it was very difficult. Two well-off families even had a permanent maid to take care of their ASD child.

The parents expressed feelings of helplessness regarding uncertainties about the child's education, career, living conditions, and adaptation to adulthood contributed to an intense sense of worry. Parents tried to cope with their situations using various measures like getting training on autism, social support, remaining hopeful for the future, goal setting, availing treatment services, and engaging in religious activities as coping mechanisms. Many parents got motivated by the social groups and other parents having ASD children. They happily sent their child to centers, not only to give them training for a better life but also as a relief for them from stress and to get a little free time for themselves. They all faced the societal stigma and wished that the government would make people more aware of the disorder so that parents could overcome the denial phase and accept the reality with open arms for a better tomorrow.

Education and therapies for children with ASD

Schooling of the child with ASD: Most parents felt that their child could cope in normal schools but all the efforts were in vain. Twelve parents have admitted their children to special schools since the beginning whereas 7 have shifted their child from normal to special school and one child was too young to go to school.

Impact of therapies on children with ASD: Six parents reported that the NGO gave training to their children, conducted behavior modification activities, physical activities, play therapy, and some sort of regular class activities related to their age and cognitive maturity like matching, sorting, recognizing body parts, recognizing weather, colors, animals, fruits, etc.). Nine parents were happy by the pieces of training and therapies given in the institutes. Eleven were receiving behavior therapies at home after following the doctor's advice Though the therapies put a financial strain still 18 parents managed to get speech therapy for their child and 2 parents also engaged their child in music and relationship development therapy.

Impact of Covid lockdown on children with ASD: All parents reported that the pandemic situation badly impacted the progress of the autistic child. As all the NGOs and institutes were closed, 8 parents reported that their child's attention span decreased, 6 parents reported altered sleeping patterns and another 6 parents reported that their children had impulsive mood swings during the Covid lockdown.

Awareness about government programs for children with ASD: Seventeen parents were unaware of any government programs for autistic children, 2 were aware of the Samarth program and one parent knew about the Vikas Day Care Program.

CONCLUSIONS

The present study highlights the diverse and complex realities of bringing up autistic children. Contrary to prevalent medical theories, the study revealed that the risk of having a child with ASD goes beyond increased maternal age, and involves many known and unknown factors. The study revealed that couples below 30 years of age were also having children with ASD. There were more autistic boys than girls. The delayed diagnosis underscores the need for greater awareness and early intervention.

Supportive joint families emerged as an important resource in navigating the challenges of raising children with ASD.

The red flags for parents were developmental delays and atypical behaviors shown by the child. The diagnosis brought grief and denial among parents. However, acceptance of the diagnosis led them to look for tailored interventions. Parents enrolled their children in various therapies

There was a profound impact like marital strain, financial pressure, and emotional turmoil on families after the identification of ASD among children. It impacted family dynamics, and parental health because of the high demands of caregiving, social life, emotions, and the well-being of siblings. All these stressors interfered with and affected the harmonious functioning of the family.

The NGOs created a sense of confidence and happiness in parents. All parents reported that the pandemic situation had badly impacted the progress of the autistic child due to the closure of all institutes. Despite the challenges thrown by the COVID-19 pandemic on institutional support, parents found strength, gained patience, became less prejudiced, and evolved bonds with their autistic children. However, limited awareness about programs, and policies for children with ASD highlighted the need for greater dissemination of the resources and information for families navigating through ASD.

RECOMMENDATIONS

1. Public awareness programs through mass media to make everyone familiar with needs and characteristics, early diagnosis, and early intervention for autistic children should be conducted regularly.
2. It is also important that the parents be educated about the early signs of ASD so that they can recognize these signals as soon as possible
3. Healthcare professionals need to help parents develop effective strategies to manage behavioral challenges among children with ASD.
4. It is important that the government, educational institutions, healthcare professionals, etc. collaborate to increase public awareness about ASD and provide support to parents to help them actively participate in their communities to make people accept this disorder.
5. Sensitization, psycho-social support programs, and services should be provided to family members to cope with the situation.

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INFLUENCE OF PARENTAL EDUCATION ON WRITING SKILLS OF PRESCHOOLERS

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ABSTRACT

Parental educational status is important in promoting children's writing skill development and later academic performance. The study was conducted to understand the effect of parental educational status on their children's writing skills in their early years. A randomized sample of 281 preschoolers from all five zones of the Coimbatore district along with their parents' information accounted for the study. A modified Writing Assessment Pack was used as a tool to measure the level of writing skills of the selected preschoolers. MANOVA statistics were done to test the statistical significance of the effect of parental education on the writing skills of preschoolers. The results showed that the writing skills of the preschoolers were not significantly different based on the parent's education individually. Furthermore, the univariate analysis confirms that a significant effect was found on the scores procured by children on Numeral writing skills within the interactive effect of father's and mother's education $\{F(11,261) = 2.31, p = .010, \eta^2 = .08\}$ in relation to their children's writing skills. The pair wise comparison confirms that the higher the father's education, the higher the writing skills of the preschoolers pertaining to both components - Numeral writing and Emergent writing skills. Mothers' education, in a way, confirms the same only in the Emergent writing skills. Preschooler's writing skill is influenced by their parent's education and later its experiences in long-term educational and career success. Hence, in order to support children's writing skills, the current research would support a policy implication towards the developmentally appropriate practice early childhood curriculum.

Keywords: Writing Assessment Pack, writing skills, preschool children, parental education, school readiness.

INTRODUCTION

Writing readiness skills are essential skills that enable preschoolers to develop the ability to hold and move a pencil fluently and effectively to produce legible writing. Early writing refers to children's first representations of spoken language via written symbols and letters (Puranik et al., 2014), writing names (Gerde et al., 2012), understanding letter-sound mappings (Puranik et al., 2018) and composing a message (Quinn et al., 2021). Having well-developed writing readiness skills promotes preschoolers' self-esteem and academic performance (Kid Sense Child Development Corporation., 2020).Moreover, children's writing in the early years is a good

predictor of their later reading and writing skills in school (Albuquerque and Alves 2019; Kessler et al., 2013).

Treiman (2017) has stated that writing is a mentally challenging task and Elimelech and Aram(2020) stressed its intensity among preschoolers as it is at this stage, that they begin to explore the sound-letter relationships. Aram et al. (2013) confirmed that preschooler's literacy achievements in the early years of school are predicted by their writing skills. Neumann (2016) stated that during writing interactions, parents help their children understand the principles of writing. Subsequently, there is evidence across numerous languages that the nature of parents' writing support predicts children's early literacy skills across orthographies (Bemba – Kalindi et al., 2018; Hall et al., 2015; English – Bindman, 2014; Arabic – Aram et al., 2013; Spanish – Levin et al., 2013; Chinese – Lin et al., 2009).

Puranik et al. (2018) found that home practices associated directly with writing are conceptualised as parental teaching or child-independent practices. They confirmed that the incorporation of essential features of early writing was associated with the frequency of parent–child interactions around writing with a specific didactic focus. With this realization, the researcher proposed a research question 'what are the factors influencing parental involvement? One such is educational status. In fact, studies on parental involvement in children's writing skills show that the factors that significantly influence are: employment status, marital status, family size, and the parental educational level (Porumbu and Necsoi 2013; Epstein et al. 2009; Fantuzzo, Tighe & Childs; 2000). Contrary to Mattingly et al. (2002) and Fan and Chen (2001) concluded that parental involvement is not related to the writing achievement of their preschoolers.

Furthermore, the collated literature pertaining to the role of parent education in developing the writing skills of early childhood has warranted gaps in the Indian context. As only a small number of researches were carried out in India portraying a certain understanding of the effect of parental education on early writing skills, additional research is very much needed. Accordingly, the aim of the current study was to examine the association between the education of the parents and the development of writing skills during early childhood.

The investigator is also aware that studying the impact of parental education on the children's writing abilities won't directly assist the children but formulating strategies for compromising the lacunae in the parental support within the education or classroom setup of the child would help. The most important strategy that can compensate for the predicting effect of socio-demographic variables is by providing a unified curricular setup abiding by core considerations namely developmentally suitable, individually appropriate, and social and cultural relevance**.** These considerations form the base areas of the principle of *Developmentally Appropriate Practices (DAP).*

DAP promotes each child's optimal development and learning through a strengths-based, play-based approach to joyful, engaged learning. DAP offers an environment to the children that promotes language acquisition, numerical knowledge, writing ability and a positive sense of self that allows children to take responsibility for their own learning. Such recourses and experiences throughout the early childhood years, from birth through age eight, are thought to positively affect the development of writing.

OBJECTIVE

To analyse the effect of parental education on the writing skills of children in their early years.

HYPOTHESES

$H_0$1**:** The education of the father does not have an effect on the Numeral Writing Skill of the children in their early years

$H_0$2**:** The education of the mother does not have an effect on the Numeral Writing Skill of the children in their early years

$H_0$3**:** The education of the father does not have an effect on the Emergent Writing Skill of the children in their early years

$H_0$4**:** The education of the mother does not have an effect on the Emergent Writing Skill of the children in their early years.

MATERIALS AND METHODS

A sample size of 281 preschoolers comprising both boys and girls between the age of 3-6 years were randomly selected to analyse the effect of parental education on their writing skills. The sample for the study was drawn from all five zones of the Coimbatore district through the lottery method of selecting private-run kindergartens. A survey method was adopted for this study by using two tools namely the Parental profile of the respondents and the modified Writing Assessment Pack.

Parental profile tool: It was a questionnaire with items concerning the details of the parents of selected respondents regarding their education, filled by the respective parents.

Modified Writing Assessment Pack: The writing Assessment Pack based on the Kindergarten Common Core State Standards of North Carolina served as the base for the assessment. Though the pack was designed based on the developmental milestones of children aged 3-6 years, the Assessment Pack was modified for the current research to fulfill certain criteria related to the relevance and suitability to the Indian context. Accordingly, the pack comprises two components namely Numeral Writing and Emergent Writing Skills and each component has one item.

The minimum and maximum score for each of the component and its corresponding grades were projected in Table I.

Table I: Score and Grades of the components of writing skills

Components	Minimum to Maximum		Grades		
			Basic	Approaching	Master
Numeral Writing	0	30	0-10	10-20	20-30
Emergent Writing	6	8	6	7	8

The children of 3-6 years after the parental consent were tested on their writing skills individually in their respective kindergartens during school hours by the investigator. The testing lasted roughly half an hour for a child and was completed in one session of 15 min each and 1 hour a day on all working days. The data collection process was continuously carried out for three

months. For the purpose of this study, both the face and content validity of the tool were ensured. To ensure

the validity of the questionnaire, the initial drafts of the questionnaire were examined by five experts, and based on the suggestions and comments of these experts, the necessary corrections were made and the final questionnaire was trial tested on a sample of 20 preschoolers. The collected data showed that the preschoolers did not have problems responding to the items in the questionnaire and hence used it for the remaining sample.

Category	Levels of Education	Frequency	Percent
Fathers Education	No formal education	10	3.7
	Primary & Lower Secondary	22	7.7
	Higher Secondary	98	35.0
	Undergraduate	115	41.0
	Postgraduate and above	36	12.7
Mothers Education	No formal education	42	14.7
	Primary & Lower Secondary	71	25.3
	Higher Secondary	91	32.3
	Undergraduate	54	19.3
	Postgraduate and above	23	8.3

Table II: Parents' Educational Status of the selected respondents

The collected data was coded, classified, and tabulated. A two-way MANOVA was performed to examine whether the writing score of the respondent pre-schoolers differed by the parental educationand it also examined if the score differs by the interactive effect of the parental education. The results are interpreted and presented below.

RESULTS AND DISCUSSION

The results were discussed in two subdivisions i) Educational Status of Parents ii) Effect of Parental Education on the Writing Skills of Children

i) Educational Status of Parents

The parental educational status of the selected children was given in the Table II

The table clearly portrays that the majority of fathers (53.7%) were graduates, whereas the graduate mothers were approximately half of the graduate fathers. Moreover, the percentage of illiterate women was 14.7%, which was three times higher than the number of illiterate fathers.

ii) Effect of Parental Education on the Writing Skills of Children

The independent variable for the study was the parental education which has two groups, namely the father's education and the mother's education, and the dependent variable was the writing score (2 components namely Numeral writing, and Emergent writing skills) of the respondents. Hence it was decided to use Multivariate Analysis of Variance (MANOVA) to

statistically compute the data. The results were presented and discussed in four parts: descriptive analysis, the test of assumptions; Multivariate and Univariate analysis of variance on the writing score; and Pairwise comparisons.

a. Descriptive statistics

The mean and SD of the writing scores procured by the respondents based on the level of parental education were presented in Table III.

Table III: Summary statistics of the Writing score procured by the Preschoolers based on their Parental Education ***N=28***

Dependent Variable	Education level	Father's Education		Mother's Education	
		Mean	***SD***	***Mean***	***SD***
Numeral writing skill (Max: 30-Min: 0)	No formal education	10.40	1.58	12.57	.96
	Primary & Lower Secondary	15.03	1.40	13.72	.76
	Higher Secondary	14.85	1.07	**16.24**	**1.24**
	Undergraduate	14.86	.49	15.68	.92
	Postgraduate and above	**15.28**	**.51**	15.75	1.06
Emergent writing skill (Max: 8-Min: 6)	No formal education	4.90	.56	5.41	.34
	Primary & Lower Secondary	6.15	.17	5.84	.27
	Higher Secondary	6.09	.18	**6.51**	**.43**
	Undergraduate	**6.53**	**.49**	6.26	.32
	Postgraduate and above	5.83	.37	6.42	.37

The Numeral writing score was higher among children, whose father's education was at the postgraduate level and the mother's education at the higher secondary level {*M*(*SD*)=15.28(.51) and *M*(*SD*)=16.24(1.24) respectively}. However, the lowest mean score on Numeral writing corresponds to the parents with no formal education {Father's-*M(SD)* =10.40(1.58);Mother's -M *(SD)*=12.57(.96)}.

Undergraduate fathers and mothers with higher secondary levels of education showed a higher mean score on the second component of writing skills, the Emergent writing skill {*M(SD)* =6.53(.49) and *M(SD)* =6.51(.43) respectively}.As with the Numeral writing skill, the preschoolers of parents with no formal education displayed the lowest mean score on Emergent writing skills {*M(SD)*=4.90(.56) and *M(SD)*=5.41(.34) respectively}.

In total, in one of the two components of writing skills assessed among the children of 3-6 years, the mean score states that the fathers who have had the postgraduate level of education had children procuring better scores in Numeral writing. Another component showed a higher score among children whose fathers had undergraduate levels of education. Whereas, in relation to the mother's education, the mean score confirms that the mothers with the higher secondary level of education had children obtaining a higher score in both the two components of writing skills. However, to confirm the results, statistical computation becomes imperative. Accordingly,

MANOVA was carried out further. As MANOVA necessitates certain tests of assumption the following sections provide the same.

b. Tests of assumptions

The assumptions of MANOVA namely, multivariate normality, linear relationship, outliers, multicollinearity, and homogeneity of variance were carried out. For checking the homogeneity of covariance, the Box's M test for equivalence of covariance matrices was used to compare the variations in multivariate tests, and the results were presented in Table IV.

Table IV: Test of Homogeneity of Covariance

Box's M	98.41
F	1.92
df1	45
df2	2753
Sig.	.000

Box's*M* =98.41, *F* (45,2753)=1.92, and *p*<.001 indicate the heterogeneity of covariance matrices across groups. Hence, the sphericity (homogeneity) seems to be not met. Accordingly, the tests for equality of variances in every component of writing score were also conducted and presented in Table V.

Table V: Levene's test of equality of variances in writing scores

Components of writing score	F	*df1*	*df2*	*Sig.*
Numeral writing skills	3.23	19	261	.000
Emergent writing skills	1.80	19	261	.023

As confirmed by Levene's test for equality of variances, Table III showed that the homogeneity of variance was violated for both the components of writing score *F*(19,261)= 3.23,*p*=.000 and *F*(19,261) = 1.80,*p*=.023}.Consequently, the group sizes were equal and hence, Pillai's trace was considered for further analyses. Accordingly, the Multivariate and Univariate tests were performed, analysed, and reported as below.

c. Multivariate and univariate analysis of variances

The test results of the multivariate analysis within the subjects were depicted in Table VI.

Table VI: Multivariate analysis of variance for writing skills

Effect	Pillai's Trace Value	F(*df1, df2*)	*Sig.*	*η2*
Father's Education	.02	.96(8,522)	.465	.01
Mother's Education	.97	.85(8,522)	.551	.01
Father's & Mother's Education	.66	2.11(22,522)	.048	.12

With Pillai's Trace criterion, the dependent variables (2 components of Writing put together)were not significantly different based on the parent's education individually{Fathers- *F*(8,520)=.96, *p*=.465,*Pillai's Trace*=.02, and *η2*=.01 and Mother's- *F*(8,520)=.85, *p*=.551, *Pillai's Trace*=.97, and *η2*=.01}.However, there was a statistically significant difference in the overall writing score procured by children based on the interaction effect between the father's and

mother's education {*F*(22,522)= 2.11,*p*=.048, *Pillai's Trace* =.66, and *η2*=.12}.Yang and Chen (2023), who investigated the effect of the children's writing skills based on their parents' education level observed contradictory results and concluded that parental educational status had no significant impact on preschoolers' writing abilities.

As the statistically significant result was obtained in the interaction effect in the multivariate tests, further follow-up tests were computed and the results of the univariate analysis of variance reporting the influence of the independent variable on each of the dependent variables (2 components of writing) was projected in Table VII.

Table VII: Univariate Analysis of Variance for the components of writing skills based on the parents' education

Source	Dependent variable	Sum of squares	Mean square	F(*df1,df2*)	*p*	*η2*
Father's Education	Numeral writing	112.01	28.00	1.32(4,261)	.262	.02
	Emergent writing skills	11.50	2.87	1.09 (4,261)	.361	.01
Mother's Education	Numeral writing	111.26	27.81	1.31 (4,261)	.265	.02
	Emergent writing skills	11.22	2.80	1.06 (4,261)	.374	.01
Father's & Mother's Education	**Numeral writing**	**538.74**	**48.97**	**2.31 (11,261)**	**.010**	**.08**
	Emergent writing skills	36.42	3.31	1.25 (11,261)	.249	.05

A significant effect was found on the scores procured by children on Numeral writing skills within the interactive effect of father's and mother's education {*F*(11,261) =2.31, *p*=.010,*η2*=.08}. There was no significant effect on the other sources considered over the dependent variable. As at least only one component of the writing skill had significant results in relation to the interactive effect of their parent's education, pair-wise comparisons were performed further to determine which group of parents (based on the education) had children having better writing scores.

d. Pair-wise comparisons

The mean of the writing scores was compared in a pair-wise format across all categories of parental educational status to determine which mean differences were significant and tabulated in Table VIII.

Table VIII Pair wise comparisons of father's and mother's educational status with writing skills

Dependent Variable	Education levels (I)	(J)	(J) Father's Education			(J) Mother's Education		
			Mean Diff (I-J)	SD	Sig.	Mean Diff (I-J)	SD	Sig.
Numeral writing	No formal education	Primary and Lower Secondary	-2.84	1.76	.109	.07	.89	.941
		Higher Secondary	**-4.85***	**1.53**	**.002**	.60	.86	.487
		Undergraduate	**-4.04***	**1.51**	**.008**	-.37	.94	.695
		Postgraduate and above	**-5.75***	**1.64**	**.001**	-.70	1.23	.572
	Primary and Lower Secondary	No formal education	2.84	1.76	.109	-.07	.89	.941
		Higher Secondary	-2.01	1.11	.072	.54	.72	.460
		Undergraduate	-1.20	1.08	.272	-.44	.81	.592
		Postgraduate and above	**-2.91***	**1.25**	**.021**	-.76	1.13	.503
	Higher Secondary	No formal education	**4.85***	**1.53**	**.002**	-.60	.86	.487
		Primary and Lower Secondary	2.01	1.11	.072	-.54	.72	.460
		Undergraduate	.81	.63	.204	-.97	.78	.213
		Postgraduate and above	-.90	.89	.313	-1.30	1.11	.244
	Undergraduate	No formal education	**4.04***	**1.51**	**.008**	.37	.94	.695
		Primary and Lower Secondary	1.20	1.08	.272	.44	.81	.592
		Higher Secondary	-.81	.63	.204	.97	.78	.213
		Postgraduate and above	**-1.71***	**.86**	**.049**	-.33	1.17	.780
	Postgraduate and above	No formal education	**5.75***	**1.64**	**.001**	.70	1.23	.572
		Primary and Lower Secondary	**2.91***	**1.25**	**.021**	.76	1.13	.503
		Higher Secondary	.90	.89	.313	1.30	1.11	.244
		Undergraduate	**1.71***	**.86**	**.049**	.33	1.17	.780

Emergent writing skills	No formal education	Primary and Lower Secondary	-1.00	.623	.110	-.014	.31	.966
		Higher Secondary	**-1.07***	**.54**	**.047**	.427	.30	.164
		Undergraduate	-.85	.53	.109	-.035	.33	.916
		Postgraduate and above	-.91	.57	.113	-.571	.43	.191
	Primary and Lower Secondary	No formal education	1.00	.62	.110	.014	.31	.966
		Higher Secondary	-.07	.39	.848	.441	.25	.087
		Undergraduate	.14	.38	.712	-.021	.28	.941
		Postgraduate and above	.08	.44	.855	-.558	.40	.166
	Higher Secondary	No formal education	**1.07***	**.54**	**.047**	-.427	.30	.164
		Primary and Lower Secondary	.07	.39	.848	-.441	.25	.087
		Undergraduate	.21	.22	.334	-.462	.27	.094
		Postgraduate and above	.15	.31	.620	**-.998***	**.39**	**.012**
	Undergraduate	No formal education	.85	.53	.109	.035	.33	.916
		Primary and Lower Secondary	-.14	.38	.712	.021	.28	.941
		Higher Secondary	-.21	.22	.334	.462	.27	.094
		Postgraduate and above	-.06	.30	.843	-.536	.41	.196
	Postgraduate and above	No formal education	.91	.57	.113	.571	.43	.191
		Primary and Lower Secondary	-.08	.44	.855	.558	.40	.166
		Higher Secondary	-.15	.31	.620	**.998***	**.39**	**.012**
		Undergraduate	.06	.30	.843	.536	.41	.196

The table shows the following:

Numeral writing: Father's education showed a significant difference between the groups of fathers with no formal education with that of the higher secondary, undergraduate, and postgraduate fathers {*I-J (SD)*=-4.85 (1.53), *p*=.002), *I-J (SD)*=-4.04 (1.51), *p*=.008 and *I-J (SD)*=-5.75 (1.64), *p*=.001respectively}. The negative mean differences in all three comparisons indicate that the children of fathers with no formal education were poorer in Numeral writing skills. Hence, higher the education of

the fathers, the higher the preschoolers' performance in numeral writing. Therefore, the hypothesis numbered $H_0$1 stands refuted, denoting that the education of the father does have an effect on the Numeral writing skill of the children in their early years.

The table also states that the mothers' education in between the groups did not show any significant variation. Hence, the writing skill of a preschooler was not influenced by the education of the mothers. With reference to the clarification of hypothesis numbered $H_0$2 which states "the education of the mother does not have an effect on the Numeral Writing Skill of the children in their early years" stands accepted.

Emergent writing skills: Preschoolers whose fathers with no formal education significantly varied with that of their higher secondary completed father counterparts in their child's performance in Emergent writing skills {*I-J (SD)*=-1.07 (.54), *p*=.047)}. The negative mean differences indicate that the higher secondary fathers had children performing better in Emergent writing skills. Thereby the numbered $H_0$3 that states "the education of the fathers does not have an effect on the Emergent writing skills of the children in their early years" stands rejected. No other significant pair wise variations with fathers' education were found. The data relevant to the mother's education confirms that the postgraduate mothers have had preschoolers performing better in Emergent writing skills in comparison to the children of mothers with a higher secondary level of education {*I-J (SD)*=-99(.39), *p*=.012}.Thereby the numbered $H_0$4 that states "the education of the mother does not have an effect on the Emergent writing skills of the children in their early years" stands rejected.

On the whole, the parental education of the selected preschoolers had an effect on their writing skills in terms of the interaction between the fathers and mothers' education. The pair wise comparison confirms that the higher the father's education, the higher the writing skills of the preschoolers pertaining to both components. Mothers' education, in a way, confirms the same only in the Emergent writing skills.

CONCLUSION

The results showed that the writing skills of the preschoolers were not significantly different based on the parent's education individually. However, the univariate analysis confirms that a significant effect was found with the component, Numeral writing skills of the children within the interactive effect of father's and mother's education. However, the issue cannot be fixed by raising the parents' education whereas; looking out for a suitable solution among the young children is feasible. What can we do to improve these preschoolers' writing abilities? Irrespective of the socio-cultural context, or economic status, when every child born is given equal access to a curricular framework that is developmentally appropriate, culturally responsive, and socially relevant, the other extraneous predictors become nullified. Aligned with this and with the Indian National Education Policy 2020, this paper puts forth a recommendation to provide a unified DAP-based curriculum to children in their early years.

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PLAY BEHAVIOUR OF PRIMARY SCHOOL CHILDREN: A DESCRIPTIVE RESEARCH IN ASSAM

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ABSTRACT

Play is crucial for the development of a child, through which children experiment with various ways to solve problems and learn to practice skills needed for social development as well as for enhancing creativity. This paper presents the play behaviour of children in primary schools in Biswanath, Assam. The aim of the study was to identify the type of play behaviour among primary school children in the age group of 6–8 years, who were selected through a random sampling method. A self-constructed questionnaire on play behaviour was used to find out about social and non-social play behaviour among children. This research explores the influence of living areas and siblings on children's play behaviour. The study found that the number of siblings in a family has a significant association with the play behaviour of children. Results found that children in rural areas are better at co-operative play than those in urban and semi-urban areas. It is also found that sibling interactions help children learn skills for interpersonal behaviour and social interaction and engage in social play rather than non-social play.

Keywords: Play behaviour, primary school children, sibling relation, living area.

INTRODUCTION

Play involves activities that are performed for self-amusement and also have behavioural as well as psychomotor rewards. Play promotes learning geared towards self-regulation, language, social competencies, and cognitive and versatile knowledge (NAEYC, 2020). It is well known that a child's playing with others is important to their development. Play provides a relationship between children and the environment that happens naturally and is uninhibited by imagination. In general, children have a natural tendency to play, which activates extensive use of their creativity and is, at the same time, safe and enjoyable. In addition, play is the basis for developmentally appropriate practice for children, which ensures the foundation for their learning (Frost and Sutterby, 2017). With the help of play, a child improves his social skills, relationships with others, self-awareness, cooperation, and negotiation abilities (Newton & Jenvey, 2011; Rentzou, 2014). Additionally, play behaviour determines the child's nature while playing with peers, and individual differences can also be drawn out of it. The play behaviour of children involves both social and non-social play. Social play occurs among pairs or groups of children when the child is motivated

to engage others in playing activities. The child is also interested in social play when he or she possesses the skills necessary to initiate interactions with other children. Parten's (1932) study characterised the developmental sequences of different aspects of children's play behaviour with respect to socialisation, which may range from immature to mature types of social play. For example, the developmental patterns of socialisation in children progress from onlooker play behaviour to parallel play and then to the most interactive social form of cooperative play (Sette et al., 2021). However, the children who are popular among peers and who like to always lead and coordinate the games are mostly involved in cooperative play behaviour (Mamat et al., 2021). In contrast, non-social play behaviour is defined as engaging in solitary activities and behaviours in the presence of other potential playmates. Young children who are shy may have a longing to play with peers, but sometimes due to feelings of social uneasiness and anxiety, they get stuck in the internal conflict that leads to constant watching of other children without showing interest in joining them, i.e., displaying onlooker behaviour or remaining unoccupied near other children (Coplan et al., 2021).

Whatever play behaviour a child adopts, it is crucial to identify the behaviour at a young age, as it determines the child's participation in play activities and also makes sense in development and learning as well. Allowing children time to play is a fundamental part of interacting with others, learning to solve problems, making decisions, remembering information, knowing their own feelings, and also knowing how to deal effectively with such feelings or emotions (Whitman, 2018). Engaging in social play behaviour is crucial because children learn to develop their relationships with others through play, which builds trust among peers and creates emotional bonds that last a lifetime. It also enhances communication skills in those children involved in social play. Furthermore, social play helps in learning skills to build strong bonds with peers, leading to a sense of belongingness outside of the home environment. The academic achievement of children also strongly depends on social skills. Children with good interpersonal skills are better prepared to succeed in school and afterwards. They can take part in group activities by cooperating with each other and also establish good relationships with teachers, which improves their academic environment. Lack of social skills in the early years can result in subsequent behavioural disorders that are both internalised and externalised, poor academic achievement, improper reconciliation of interpersonal relationships, educational and cognitive deficits, loneliness, and psychological problems. Therefore, identifying social and non-social play behaviours of children at an early age is of utmost importance for providing an appropriate environment to children who are lacking in acquiring good social skills to ensure a better educational outcome and a better future for children. Hence, the current study is intended to investigate "Play Behaviour of Primary School Children: A Descriptive Research in Assam" with the following objectives:

1. To identify social and non-social play behaviours of primary school children (6–8 years).
2. To find out if play behaviour differs based on the type of family and the number of siblings in the family.

HYPOTHESIS

1. There is no significant difference found in the play behaviour of children based on the type of family and the number of siblings in the family.

METHODOLOGY

The present descriptive study aimed to study the play behaviour of primary school children (6–8 years) based on living area, number of siblings in Biswanath, Assam, through a random sampling method. A total of 600 primary school children from the age group of 6–8 Years were selected as a sample for the study. The present data were collected through a self-constructed tool on the Play Behaviour Scale' which involves i) the demographic profile of the respondents and ii) play behaviour statements. A total of 40 statements of both social and non-social play behaviour were included in the questionnaire. The tool was subjected to reliability and validity tests; the reliability was computed by Cronbach's alpha, and the total value of the overall variable was 0.875. The items were responded to on a 5-point Likert scale with options of "Strongly Disagree", "Disagree", "Somewhat Agree", "Agree" and "Strongly Agree". For statements of social behaviour, the scoring procedure is as follows: Strongly Agree-5, Agree-4, Somewhat Agree-3, Disagree-2, Strongly Disagree-1, and vice versa for non-social behaviour. The maximum score of the Play behaviour Scale is 200, and the minimum score is 40. The higher score indicates better Social Play behaviour, and the lower score indicates higher non-social play behaviour in children. The range was decided based on the obtained mean value for each dimension and the overall play behaviour score. Prior to collecting data, the researcher established rapport with the mothers of the primary school children through the selected schools. Questionnaires were distributed to the mothers to get data regarding the play behaviour of their children. An assurance was given by the researcher that the collected data would remain confidential and would be used only for research purposes. Efforts were made by the researcher to clarify the doubts of mothers of primary school children (6–8 years) during the phase of data collection.

RESULTS AND DISCUSSION

The purpose of the present study was to find out play behaviour among primary school children (6–8 years) in Biswanath, Assam, based on living area and number of siblings. Findings from the present study are discussed below.

Demographic profile of the respondents

Table -1 Distribution of respondents based on their demographic characteristics

Sl. no.	Demographic Characteristics		Frequency (n=600)	Percentage (%)
1.	Living area	Rural	126	21.0
		Semi-urban	234	39.0
		Urban	240	40.0
2.	No. of siblings	No sibling	272	45.3
		1-2 sibling	328	54.7

From the results of Table-1, it is observed that the majority (40%) of the respondents were from urban areas, followed by semi-urban and rural areas. Most (54.7%) of the children had one or two siblings in their family.

Association of demographic variables with play behavior of children

Table -2 Association between demographic characteristics and parenting behavior of respondents

Sl. no.	Demographic variables	Chi-square test	P value
1.	Living area	6.949	.139
2.	No. of siblings	6.850	.033*

Results from Table-2 showed that there is a significant association between the demographic variable "number of siblings" and the play behaviour of children. No significant association was found with the living area of children in primary school (6–8 years).

Overall Play behavior of children

Table -3 Distribution of level of play behaviour of respondents based on different dimensions

Sl. no.	Play behaviour	High		Average		Low	
		n	%	n	%	n	%
1.	**Non-social**						
	Unoccupied	220	36.7	188	31.3	192	32.0
	Solitary	286	47.7	213	35.5	101	16.8
	Onlooker	134	22.3	374	62.3	92	15.3
	Anxious	193	32.2	264	44	143	23.8
2.	**Social**						
	Associative	263	43.8	228	38.0	109	18.2
	Cooperative	258	43.0	212	35.3	130	21.7
	Games with rules	168	28.0	264	44.0	168	28.0
3.	Total play behaviour	140	23.3	336	56.0	124	20.7

*Multiple responses

Findings from Table-3 describe that in the case of non-social play behaviour, the majority of the children performed at a high level regarding unoccupied, solitary, onlooker, and anxious behaviour as compared to children who had a low score. In the case of social play behaviour, including associative and cooperative play, it was observed that the majority of children had higher scores as compared to the children with low scores. In games with rules, it is observed that an equal percentage of children perform in the high and low categories.

Findings also indicate that most of the primary school children had higher scores in non-social play behaviour, which means children are less involved in non-social play. On the other hand, in social play behaviour, most of the children scored higher. As children grow, their social interactions among peers become more frequent and complex (Berk, 2008). During the shift to

primary school, friendships increase with peers, and children communicate, react to complementary roles, and learn the art of empathy. Social skills like cooperating and sharing with peers, introducing play with other children help a child to interact suitably among all (Samantha A. Sang & Jackie A. Nelson, 2017). Thus, children in primary school perform more social play behaviour than non-social play behaviour.

Play behaviour of children based on living area

Table -4 Distribution of levels and differences in play behaviour of children based on type of living area

Sl no.	Play behaviour	Living area	High		Average		Low		Mean	SD	F value
			n	%	n	%	n	%			
1.	**Non-Social**										
	Unoccupied	Rural	58	46.0	33	26.2	35	27.8	9.03	2.77	.006*
		Semi-urban	84	35.9	77	32.9	73	31.2	8.38	2.51	
		Urban	78	32.5	78	32.5	84	35.0	8.11	2.58	
	Solitary	Rural	68	54.0	35	27.8	23	18.3	20.39	5.20	.080
		Semi-urban	117	50.0	81	34.6	36	15.4	19.81	4.57	
		Urban	101	42.1	97	40.4	42	17.5	19.24	4.62	
	Onlooker	Rural	27	21.4	80	63.5	19	15.1	12.15	3.24	.082
		Semi-urban	60	25.6	138	59.0	36	15.4	11.69	2.84	
		Urban	47	19.6	156	65.0	37	15.4	11.40	3.13	
	Anxious	Rural	50	39.7	47	37.3	29	23.0	15.27	3.98	.102
		Semi-urban	73	31.2	103	44.0	58	24.8	14.84	3.54	
		Urban	70	29.2	114	47.5	56	23.3	14.41	3.78	
2.	**Social**										
	Associative	Rural	65	51.6	35	27.8	26	20.6	18.37	5.56	.214
		Semi-urban	109	46.6	81	34.6	44	18.8	17.57	4.67	
		Urban	89	37.1	112	46.7	39	16.3	17.43	4.93	
	Cooperative	Rural	66	52.4	34	27.0	26	20.6	31.25	8.43	.049*
		Semi-urban	106	45.3	78	33.3	50	38.5	29.49	7.12	
		Urban	86	35.8	100	41.7	54	22.5	29.23	7.93	
	Games with Rules	Rural	43	34.1	45	35.7	38	30.2	14.86	3.65	.123
		Semi-urban	69	29.5	107	45.7	58	24.8	14.24	3.16	
		Urban	56	23.3	112	46.7	72	30.0	14.16	3.06	
	Total	Rural	38	30.2	62	49.2	26	20.6	121.32	29.32	.047*
		Semi-urban	52	22.2	136	58.1	46	19.7	116.03	25.29	
		Urban	50	20.8	138	57.5	52	21.7	113.98	27.25	

*Significant at 5% level, **Multiple responses

In the results from Table-4, it is found that the majority of the children living in rural areas performed better in unoccupied, solitary, anxious, associative cooperative, games with rules, and overall play behaviour than those children in semi-urban and urban areas. Regarding onlooker play behaviour, children in semi-urban areas performed higher than those in rural and urban areas. Results also revealed that there is a significant difference in unoccupied, cooperative, and overall

play behaviour among children in rural, semi-urban, and urban areas. It was observed that rural children had less unoccupied play behaviour and were more involved in cooperative play.

Play improves children's minds, refines their social skills, strengthens their creativity, and helps keep them healthy. Playing outdoors helps children get companions to play in open space, which helps in developing joint goals with peers that lead to building peer relations. Children from rural areas spend more time outdoors and are thus more adapted to the demands of playing with nature outside (Niemisto et al. 2019). The environment created outside will offer stimulating situations for children to expand different aspects of their personalities, which normally do not appear during indoor activities. The findings of Maynard et al. (2013) suggested that outdoor play allows for a deeper knowledge of children, and thus fewer conflicts occur during outdoor play and children tend to cooperate more with each other (McClain C. & Vandermaas-Peeler M., 2015; Bilton et al., 2017). While playing outdoor games, children become both teachers and learners by sharing their skills and knowledge among peers to achieve different tasks. Through play and cooperation with peers, children experience a sense of empathy as they begin to know each other's feelings and needs. Outdoor play increases opportunities for interaction among peers, helping children to become cooperative gradually, and they choose to play in groups rather than playing alone. Thus, rural children choose more cooperative play behaviours than those in urban and semi-urban areas.

Play behaviour of children based on number of siblings

Table -5 Distribution of level and differences in play behaviour of children based on number of siblings

Sl. no.	Play Behaviour	No. of sibling	High		Average		Low		Mean	SD	t-test
			n	%	n	%	n	%			
	Non-social										
	Unoccupied	No sibling	86	31.6	100	36.8	86	31.6	8.06	2.50	.003*
		1-2 Sibling	134	40.9	88	26.8	106	32.3	8.70	2.67	
	Solitary	No sibling	116	42.6	109	40.1	47	17.3	19.25	4.48	.034*
		1-2 Sibling	170	51.8	104	31.7	54	16.5	20.08	4.92	
	Onlooker	No sibling	60	22.1	169	62.1	43	15.8	11.50	2.98	.211
		1-2 Sibling	74	22.6	205	62.5	49	14.9	11.81	3.11	
	Anxious	No sibling	80	29.4	125	46.0	67	24.6	14.44	3.52	.056
		1-2 Sibling	113	34.5	139	42.4	76	23.2	15.02	3.90	
2.	**Social**										
	Associative	No sibling	60	22.1	169	62.1	43	15.8	17.31	4.76	.099
		1-2 Sibling	74	22.6	205	62.5	49	14.9	17.99	5.15	
	Cooperative	No sibling	102	37.5	113	41.5	57	21.0	29.07	7.34	.049*
		1-2 Sibling	156	47.6	99	30.2	73	22.3	30.33	8.07	
	Games with Rules	No sibling	68	25.0	124	45.6	80	29.4	14.02	2.99	.028*
		1-2 Sibling	100	30.5	140	42.7	88	26.8	14.60	3.41	

3.	Total	No sibling	50	18.4	163	59.9	59	21.7	113.65	25.72	.028*
		1-2 Sibling	90	27.4	173	52.7	65	19.8	118.53	27.96	

Findings from Table-5, revealed that children who have one or two siblings performed well in all the dimensions of play behaviour, including unoccupied, solitary, onlooker, anxious, associative, cooperative, and games with rules. Results also found that there is a significant difference in unoccupied, solitary, cooperative, games with rules, and overall play behaviour of children based on the number of their siblings in the family. Children with siblings in the family performed less in unoccupied and solitary play behaviour and had better performance in cooperative, games with rules, and overall play behaviour.

Having a sibling can help a child in numerous ways, either to compete or to provide a support system for each other. Even children can regulate their emotions through the presence of siblings in the family as they learn something new from each other. Older siblings usually tend to take on the role of helping, which inculcates the concepts of self-esteem and social responsibility within a child. The younger siblings, on the other hand, try to imitate their brothers and sisters, which leads them to try new things of their own accord (Fiza Abbas, 2019). Thus, children learn social responsibilities, which they implement in playing situations by cooperating with peers, following directions, etc. Researchers suggested that children with at least one sibling also have a chance of displaying higher social skills (Downey & Condron, 2004; Rochebrochard et al., 2013, Samantha & Jackie 2017). Additionally, children with one or two siblings will attain more social skills from kindergarten to fifth grade than children with no siblings (Downey et al. 2015). Thus, children with siblings can show better social skills, including cooperation and following game rules, while playing with peers as compared to children without siblings.

CONCLUSION

It is recognized that play is necessary for the holistic development of a child, and it provides more benefit to the child when it is driven willingly and freely. Free play allows children to explore, enhance their imagination and creativity. Children get fast access to a wide range of natural materials in rural areas, available in different textures and heights, which inspires children's manipulation and makes use of their senses through play with siblings and also explores more opportunities than in urban surroundings with limited free and natural play.

SUGGESTION FOR FUTURE RESEARCH

The study can be conducted in various parts of the country. Further study on the influence of parental support and parent education on the play behaviour of children could be carried out.

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CHILD SEXUAL ABUSE: AWARENESS AND PERCEPTIONS AMONG TEACHERS OF 3-8 YEARS OLD CHILDREN

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ABSTRACT

The aim of the study was to find out the awareness and perceptions of school teachers on Child Sexual Abuse in Vadodara City. The tool was adopted from The Kailash Satyarthi Children's Foundation. The participants were women school teachers (N=100) who teach children of 3 to 8 years and were selected through purposive snowball technique. Results largely depicted that all teachers were aware as to what is CSA but were not formally trained in the field. The results also highlighted that there is a need to reduce the taboo attached around this subject and all schools must include CSA prevention as a part of the curriculum. The second objective of this study was to formulate an awareness module. The module includes: part one comprising of understanding Child Sexual Abuse and Prevention of Children from Sexual Offence (POCSO) Act, 2012 and the second part of the module elaborates on the role of teachers and school management in prevention of CSA.
Keywords: Awareness Module, Child Sexual Abuse, Teachers

INTRODUCTION

Child Abuse is one of the major problems faced by communities across India. According to national reports the rate of child abuse in schools have tripled in four years since 2017. According to World Health Organisation (1999):

> Child sexual abuse is the involvement of a child in sexual activity that he or she does not fully comprehend, is unable to give informed consent to, or for which the child is not developmentally prepared and cannot give consent, or that violates the laws or social taboos of society. Child sexual abuse is evidenced by this activity between a child and an adult or another child who by age or development is in a relationship of responsibility, trust or power, the activity being intended to gratify or satisfy the needs of the other person. This may include but is not limited to: the inducement or coercion of a child to engage in any unlawful sexual activity; the exploitative use of a child in prostitution or other unlawful sexual practices; the exploitative use of children in pornographic performance and materials.

A school-going child spends a major chunk of his/her day at school. Teachers play an important part in the child's development by listening to, interacting with and monitoring the lives of these children. If they have enough understanding about the safety and protection of the child, they can identify and flag potentially suspicious cases (Kenny, 2004).

REVIEW OF LITERATURE

Carson et al., (2013) conducted a study to understand the deep-rooted prevalence of sexual abuse and exploitation of children in the Indian context. According to this study, 93% of girls abused under the age of 18 are school dropouts and belong to low economic strata of the society. The same study had an element to know the child's perspective, and they pointed out that most of the times the abuser was known or familiar to the child.

Choudhry et al., (2018) published a statistical and elaborated review on the status of CSA in India. This review incorporated qualitative as well as quantitative methods of data collection, and aimed to understand the pattern of child sexual abuse in the past one decade in India and study the distribution of the prevalence estimates for both genders. With this study, it was reported that 4-41% girls and 10-55% boys of school age have experienced sexual abuse. Figures are higher in cases of commercial sex workers, street adolescents, women and children with mental health disturbance

A study by Mohammed (2019) on teachers' perception and attitudes toward child abuse of secondary school in Najaf City (Iraq), covering 400 teachers concluded that 90.5% teachers were sensitive and had a positive attitude towards prevention of child abuse. 59% teachers had high perception, 39% teachers had medium perception and 8% teachers had low perception on child abuse. Teachers reported that a more formal training should become mandatory for all the teachers.

Research by Kenny (2004) on teachers' attitude toward and knowledge of child maltreatment with two hundred teachers of southeast region of USA specifically aimed to understand teachers' understanding of signs and symptoms of child abuse, laws and procedures for reporting child abuse as well as number of reports filed. The teachers reported a lack of awareness of the signs of child abuse and reporting procedures, which may affect their ability to report cases of suspected abuse. The research further recommended that there was a need for standardising training in child maltreatment for all the teachers as well as clear, concise institutional guidelines for reporting child abuse and support for teachers confronted with suspected victims. Two-third of sample teachers did not receive any training in the area of child abuse. Only 9% teachers knew about child abuse, however, 1 million children suffering from abuse were identified in 2003, which indicated that teachers on large extent are unaware about child abuse and cannot spot children who are going through any kind of abuse.

In the Indian context, Protection of Children from Sexual Offence Act, 2012, was enforced into the Indian law system by the Ministry of Women and Child Development with an aim to protect children from all sorts of abuse and exploitation. This act was implemented because there were not enough provisions for child protection from sexual offences in the Indian Penal Code (IPC) before 2012. In the Indian Penal Code, the enforcement of POCSO Act, 2012 has been a major breakthrough to educate the layman that sexual abuse is a punishable offence and reporting of sexual abuse is mandatory. This act has been specially designed to give speedy justice to the child who has been abused along with medical intervention and required psychological assistance.

JUSTIFICATION OF THE STUDY

The review of literature reveals evidences on how child sexual abuse is pertinent not only in India but worldwide, even after implementation of laws and strict structures to stop the crime of child sexual abuse and neglect, the nations are not progressing enough to achieve prevention and protection against child sexual abuse (UNCRC 2011). There has been relatively less evidence on gathering teachers' awareness and perceptions regarding child sexual abuse (CSA) in the Indian context. Abuse of children has significant implications on the very fabric of society. Right from policy to practice, the issue needs to be dealt with from a variety of dimensions encompassing, social, educational, cultural and legal aspects. One of the most significant areas being teacher training, as after parents, teachers have the most important role in dealing with abused children within the school setup. There is a need to better equip teachers with the knowledge required to respond to cases of child sexual abuse appropriately. Therefore, the present study undertook the element to gauge the teachers' awareness and perception levels on child sexual abuse and attempted to augment teachers' awareness about CSA and POCSO Act 2012, with the help of an awareness module.

OBJECTIVES

- To map the awareness and perceptions of teachers on child sexual abuse who teach children of 3 to 8 years old in Vadodara city.
- Design an awareness module for teachers on CSA and POCSO Act, 2012.

METHODOLOGY

Research Design

This research used an exploratory descriptive approach which focused on mapping the awareness and perceptions of teachers of 3-8-year-old children on Child Sexual Abuse. Exploratory descriptive design is a research design that aims to describe phenomena by exploring then from the participants' perspective. (Hunter, McCallum & Howes, 2018) This was a mixed method study in which through a questionnaire, quantitative data was collected followed by telephonic interviews to gather qualitative data.

Tool for Data Collection

The tool utilised for data collection in the research was adopted from the Child Sexual Abuse: Data Collection tool developed by Praharaj et al. (2017) originally used by Kailash Satyarthi Children's Foundation, New Delhi. The tool was translated into Gujarati language (Shah, 2020).

Sample

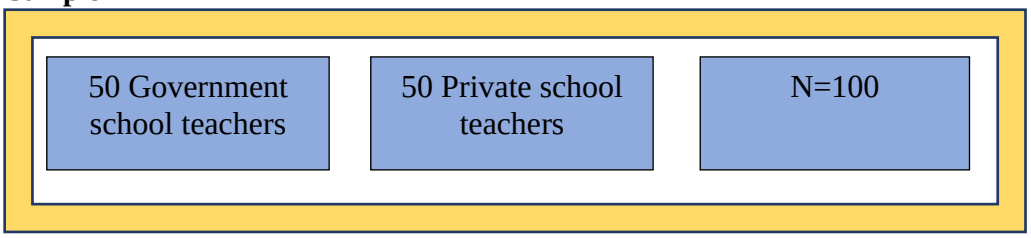

Figure 1

Sample size

Sample selection and description

The samples were selected through purposive snowball technique, 50 participants from government school and 50 participants from private schools were selected. 10 participants from each group were selected for the qualitative data collection. The participants were selected without any discrimination of caste, creed or religion.

Procedure of Data Collection

Quantitative data was collected through an online questionnaire followed by the telephonic interview for qualitative data, which was recorded on the researcher's device and further transcribed.

Pilot Study

A pilot study with ten participants was conducted. The same procedure of filling up the questionnaire followed by the telephonic interview was carried out. It was observed that some questions needed a little prompting from the researcher's side for the participant to better understand the question and respond to it.

Data Analysis

The responses collected through questionnaires were computed into frequencies and graphically represented along with interpretation. For the qualitative data analysis, data was transcribed and transcripts were used.

Ethical Considerations

- Consent from each participant was taken before conducting the study.
- The participants had the liberty to remain/opt out from the study at any point of time.
- No harm was caused to them while conducting the study.
- No personal detail, except the age of the participants was asked.
- All the information shared by the participant with the researcher were only used for study purposes and were kept highly confidential.

RESULTS

Results of the study are described as per the study objectives:

➢ **Awareness and perceptions of teachers on child sexual abuse**

- **Background characteristics**

A total of 100 women teachers from Vadodara City participated in this study.

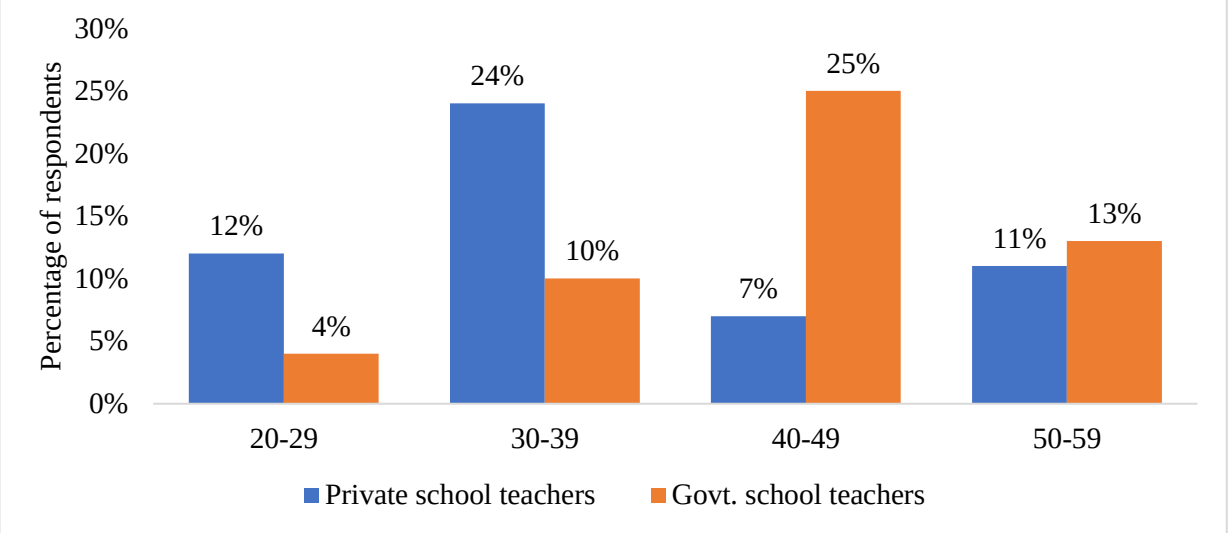

Figure 2

Age Distribution of the Participants

N= 50 private school teachers

N= 50 government school teachers

Figure two represents the age distribution of school teachers in terms of private and government schools. 24% (12) private school teachers were under the age category of 20 to 29 years, 48% (24) teachers under 30 to 39 years, 24% (12) teachers under 40 to 49 years and 4% (2) teachers under 50-59 years. 4% (2) government school teachers were under the category of 20 to 29 years, 20% (10) teachers were under the category of 30 to 39 years, 50% (25) teachers were under the category of 40 to 49 years and 26% (13) teachers were under the category of 50 to 59 years.

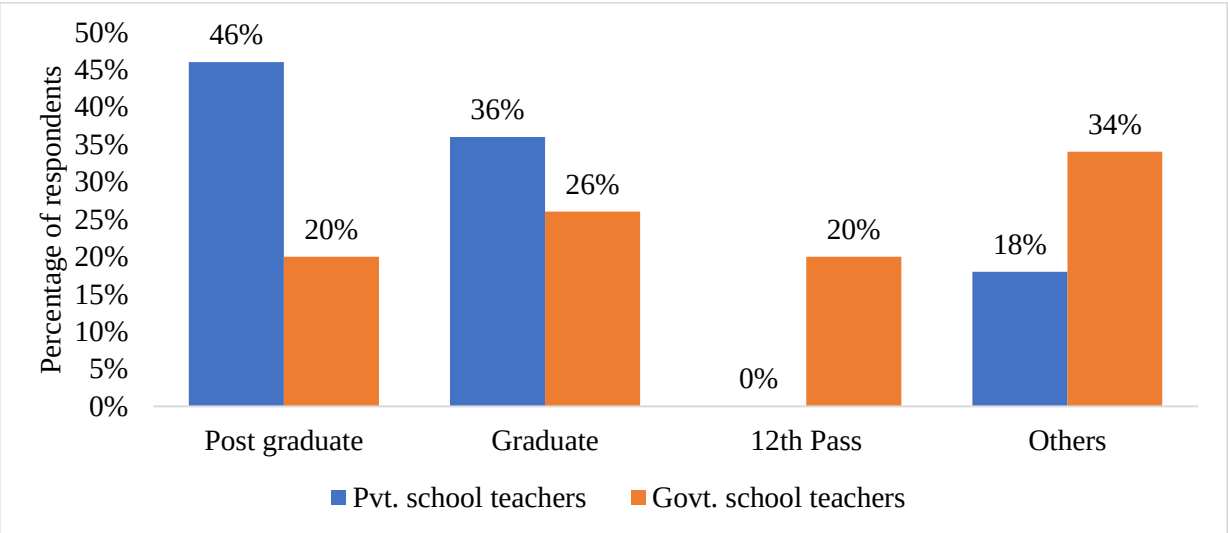

Figure 3

Educational Qualification of the Participants
N= 50 private school teachers
N= 50 government school teachers

Figure three represents the educational qualifications of the teachers. Out of the total sample of 100 teachers, 46% (23) private school teachers and 20% (10) government school teachers were post graduates, 36% (18) private school teachers and 26% (13) government school teachers had graduate degrees. Only 20% (10) government school teachers were 12th pass and 18% (9) private school teachers and 34% (17) government school teachers had other educational qualifications.

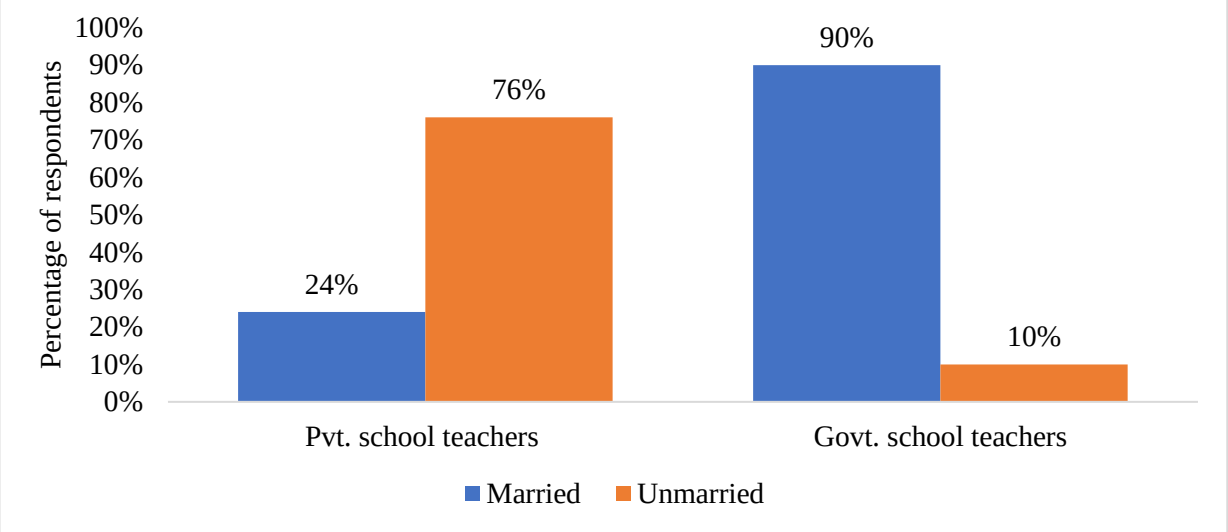

Figure 4

Marital Status of Participants
N= 50 private school teachers
N= 50 government school teachers

Figure four represents the marital status of the participants out of all, 24% (12) private school teachers were married and 76% (38) were unmarried. 90% (45) government school teachers were married and 10% (5) were unmarried.

- **Awareness on child sexual abuse**

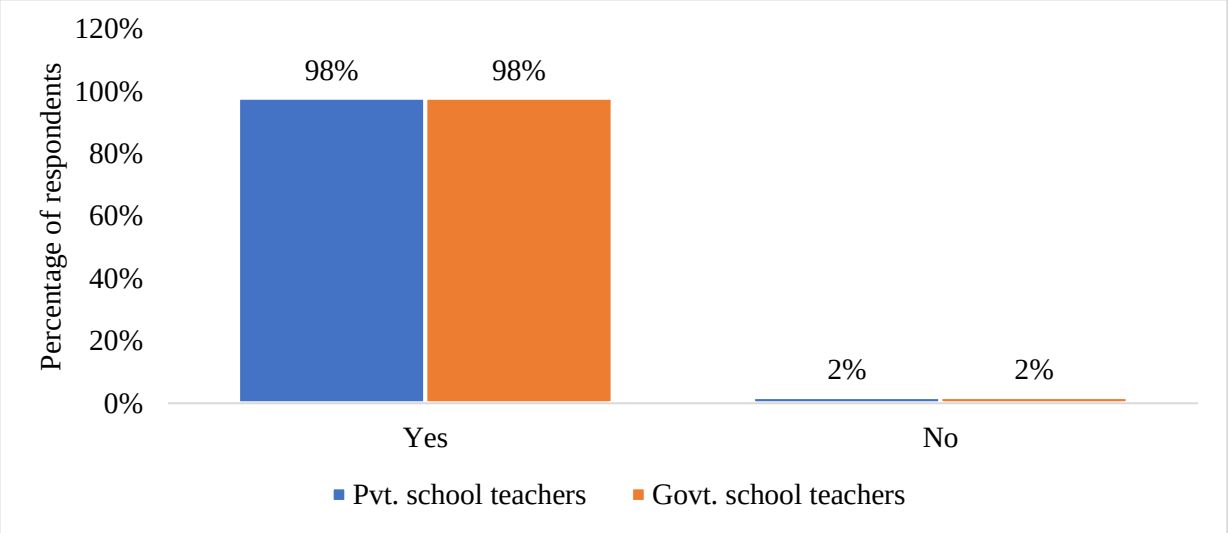

Figure 5

Number of Teachers Aware that Children are Subjected to Various Forms of Sexual Abuse

N= 50 private school teachers

N= 50 government school teachers

Figure five depicts the number of teachers aware on the statement that children are subjected to various forms of sexual abuse. The results show that out of 100 teachers, 98% of participants from both the groups were aware that children are subjected to different kinds of sexual abuses and 2% participants were unaware.

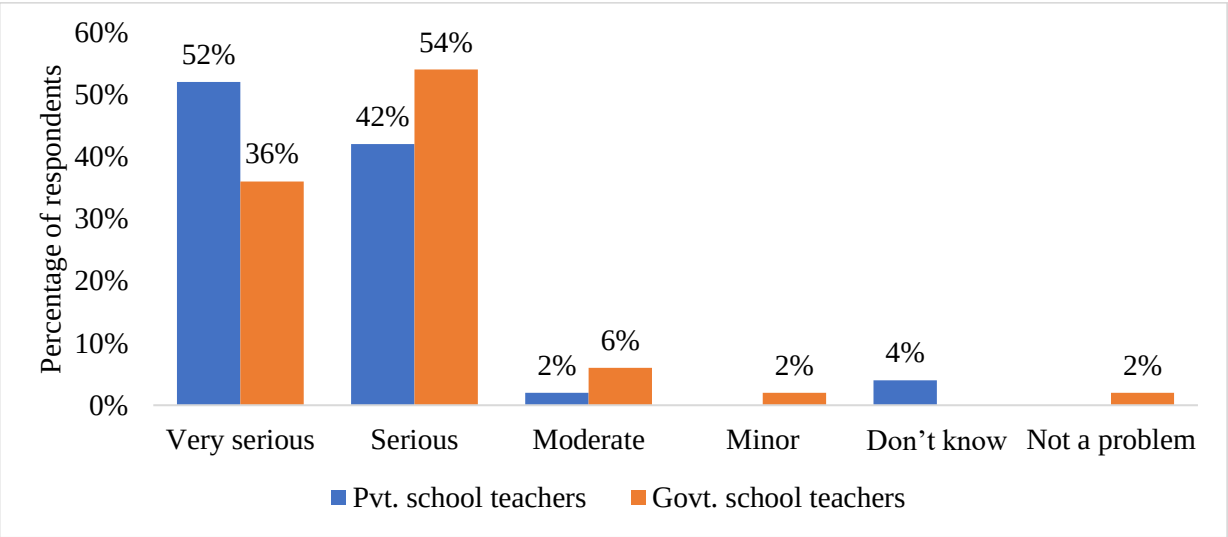

Figure 6

Opinions of Teachers on the Seriousness of CSA as a Problem

N= 50 private school teachers

N= 50 government school teachers

Figure six represents the opinion of teachers on the seriousness of child sexual abuse as a problem, out of 100 participants, 52% (26) private school teachers and 36% (18) government school teachers stated that CSA is a very serious problem, 42% (21) private and 54% (27) government school teachers stated that CSA is a serious problem, 2% (1) private and 6% (3) government school teachers rated CSA as a moderate issue, only 2% (1) government school teacher assigned CSA to be a minor problem, 4% (2) private school teachers responded as don't know and 2% (1) government school teacher responded that CSA is not a problem in India.

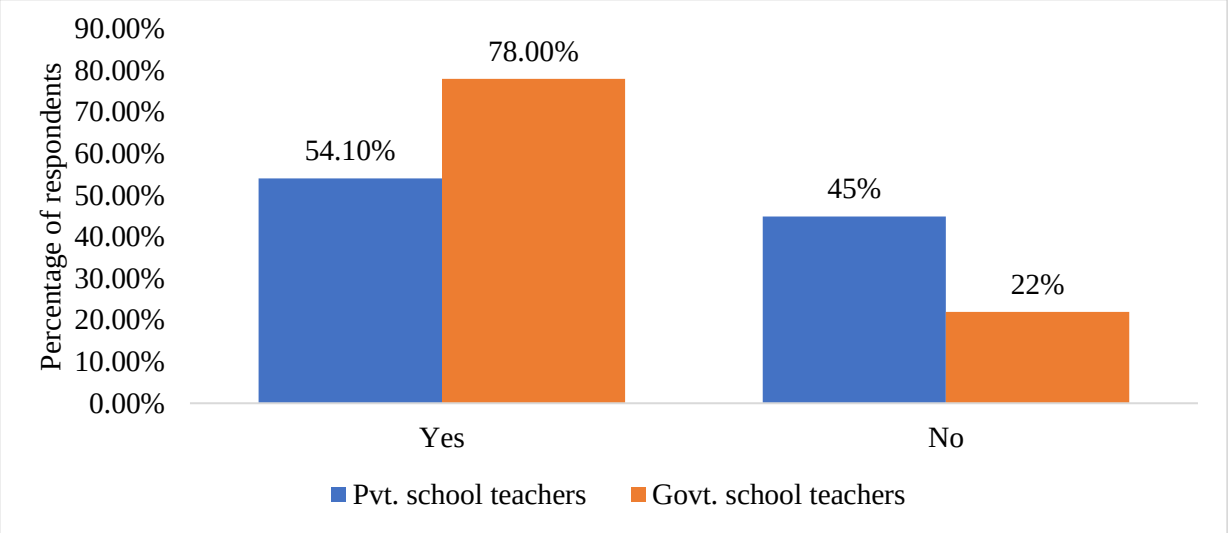

Figure 7

Teachers' Opinion If They Teach Enough on CSA and its Prevention in School

N= 50 private school teachers

N= 50 government school teachers

Figure seven represents the opinions of the participants on if the teachers teach enough on CSA and its prevention in schools for which, 54% (27) private school teachers agreed that they teach enough and 45% (22) teachers disagree that they don't teach enough. 78% (39) government school teachers agree that they teach enough and 22% (11) teachers disagree that they do not teach enough on CSA and its prevention in school.

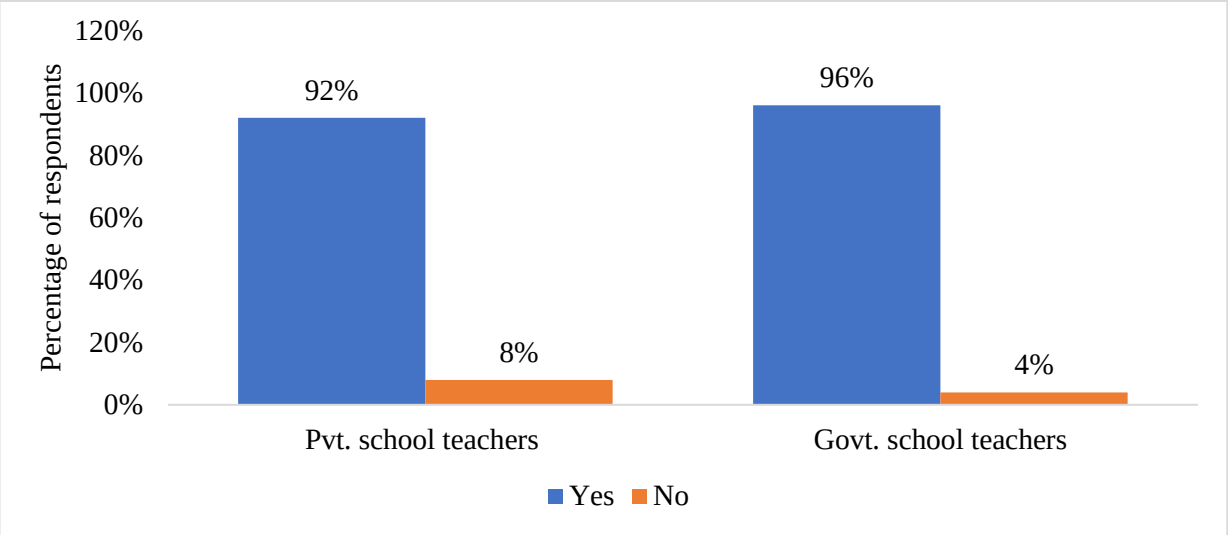

Figure 8

Awareness on the Law of Child Protection Against Sexual Abuse

N= 50 private school teachers

N= 50 government school teachers

Figure eight represents the awareness of teachers on the law for child protection from sexual offences, out of 100 teachers, 92% (46) private and 96% (48) government school teachers were aware and 8% (4) private and 4% (2) government school teachers were unaware.

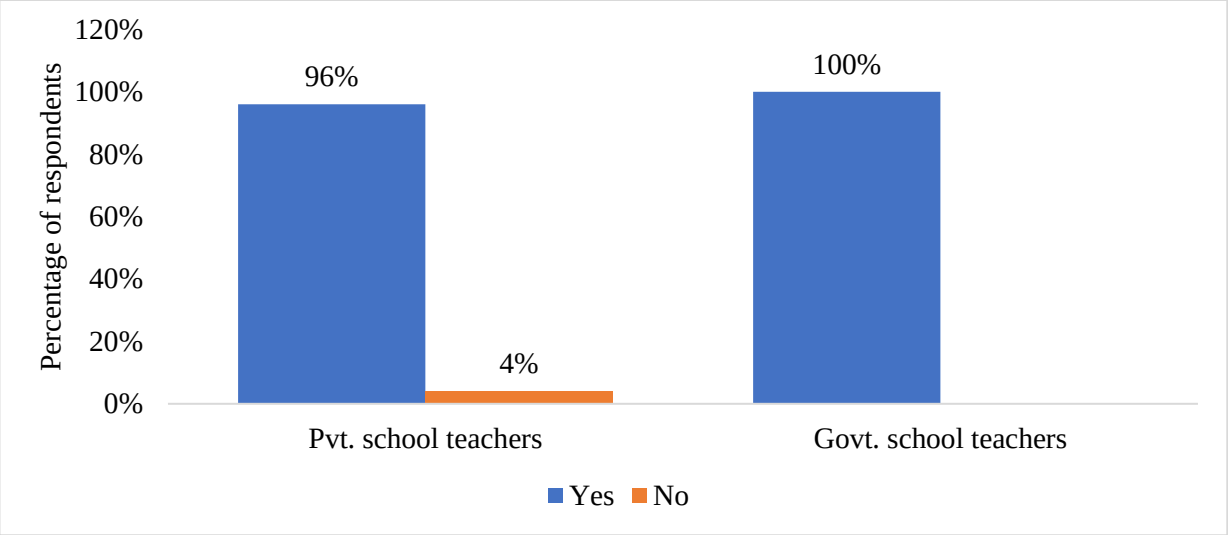

Figure 9

Teachers' Awareness on CSA being a Punishable Offence

N= 50 private school teachers

N= 50 government school teachers

Figure nine describes the awareness on whether child sexual abuse is a punishable offence or not. Out of 100 teachers, 96% (48) private school teachers and 100% (50) government school teachers were aware and only 4% (2) private school teachers were unaware.

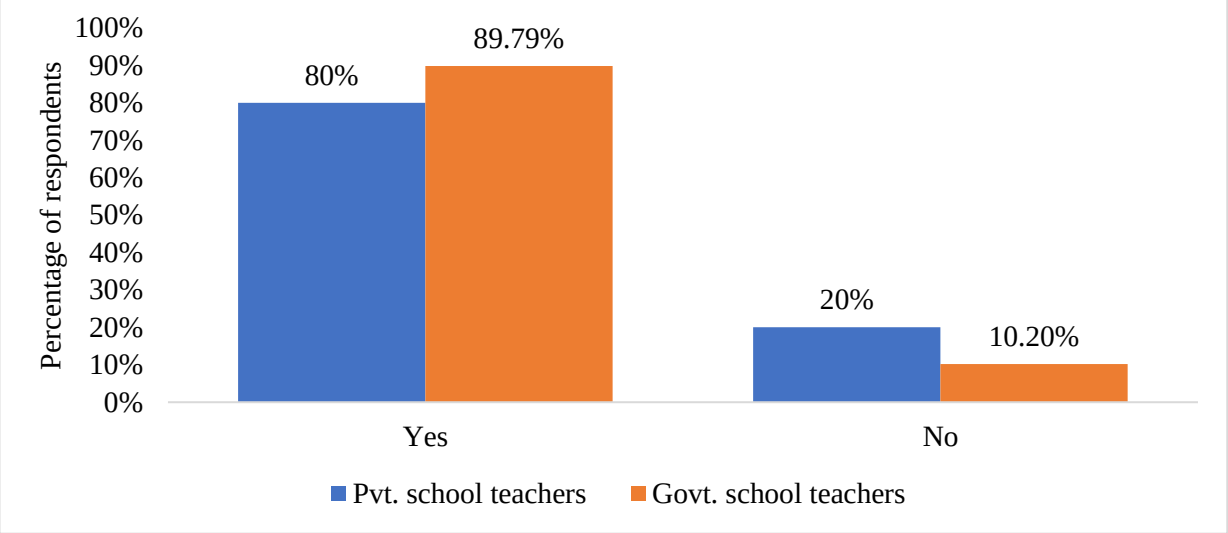

Figure 10

Teachers' Awareness on Child Helpline Number in India
N= 50 private school teachers
N= 49* government school teachers
*One participant did not respond

Figure ten describes the awareness of child helpline number in India, 80% (40) private and 89.79% (44) government school teachers knew that there is a child helpline number and 20% (10) private and 10.20% (5) government school teachers were unaware about the child helpline number service in India.

- **Perceptions on child sexual abuse**

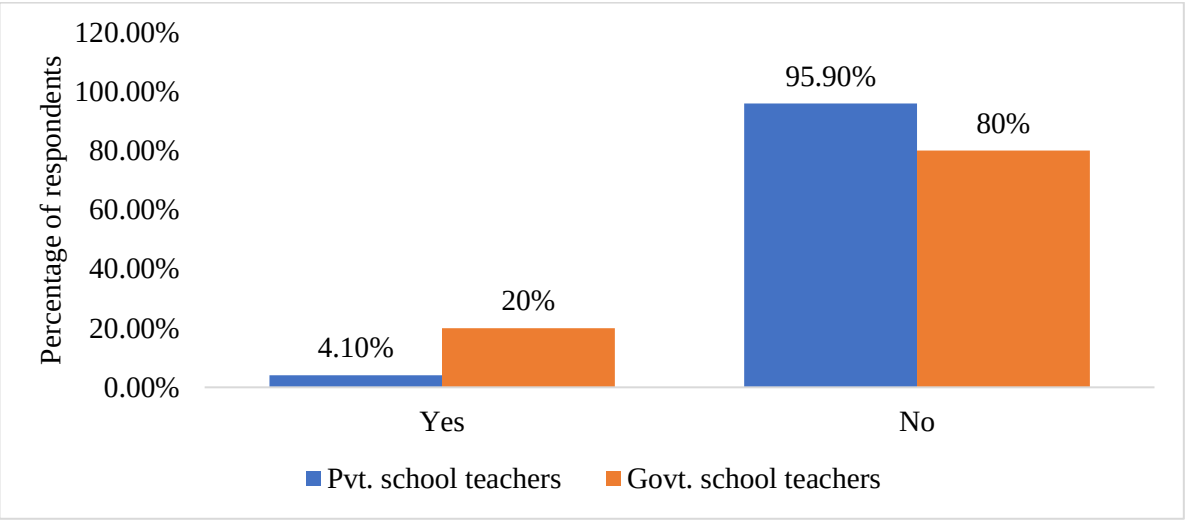

Figure 11

Teachers' Opinion on If Only Girls are Victim of Sexual Abuse
N= 49* private school teachers
*One participant did not respond
N= 50 government school teachers

Figure eleven represents the teachers' opinion on 'if only girls are victim of sexual abuse', 95.9% (47) private school teachers and 80% (40) government school teachers responded as no to the statement and 4.1% (2) private and 20% (10) government school teachers responded as yes that only girls are victim to CSA.

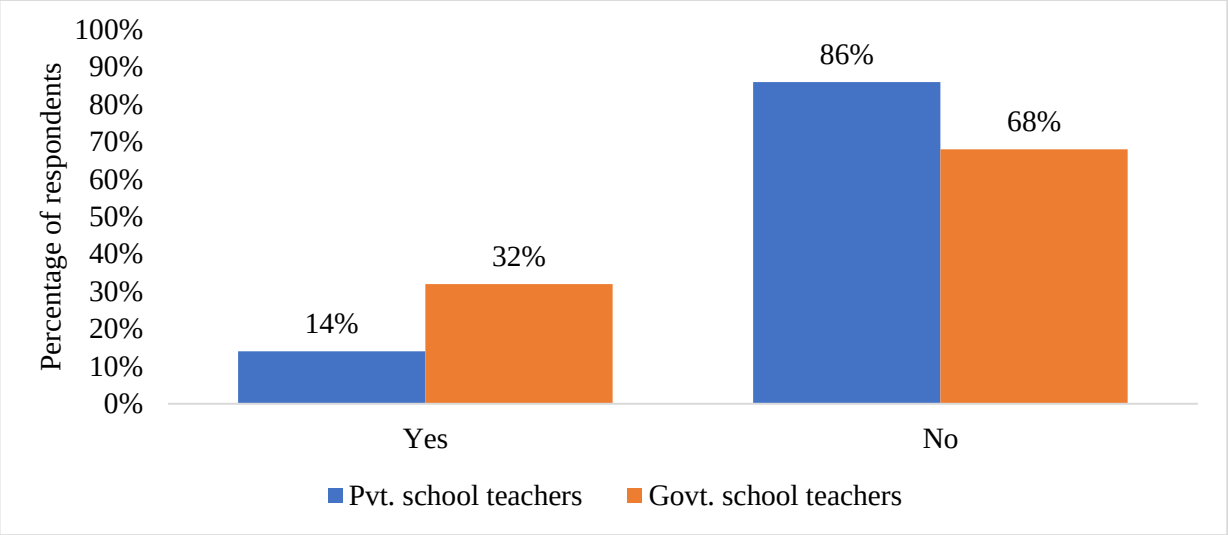

Figure 12

Teachers' Opinion that Sexual Abuse only Happens in Low Socio-economic Status
N= 50 private school teachers
N= 50 government school teachers

Figure twelve describes the teachers' opinion on the statement that sexual abuse only happens in low socio-economic setup. 86% (43) private and 68% (34) government school teachers said no to this statement and 14% (7) private and 32% (16) government school teachers responded yes.

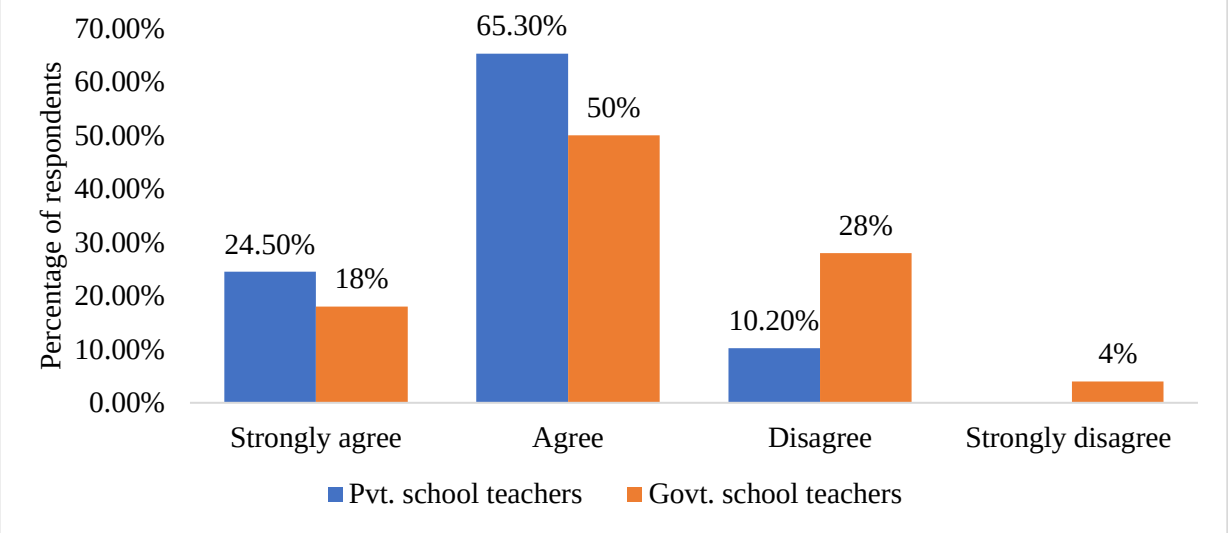

Figure 13

Teachers' Opinion if Most Predators of CSA Belong to the Child's Family

N= 49* private school teachers

*One participant did not respond

N= 50 government school teachers

Figure thirteen represents the opinions of teachers on the statement whether most predators of CSA belong to the child's family. 24.50% (12) private and 18% (9) government school teachers strongly agreed, 65.3% (32) private and 50% (25) government school teachers agreed, 10.2% (5) private and 28% (14) government school teachers disagreed and 4% (2) government school teachers strongly disagreed.

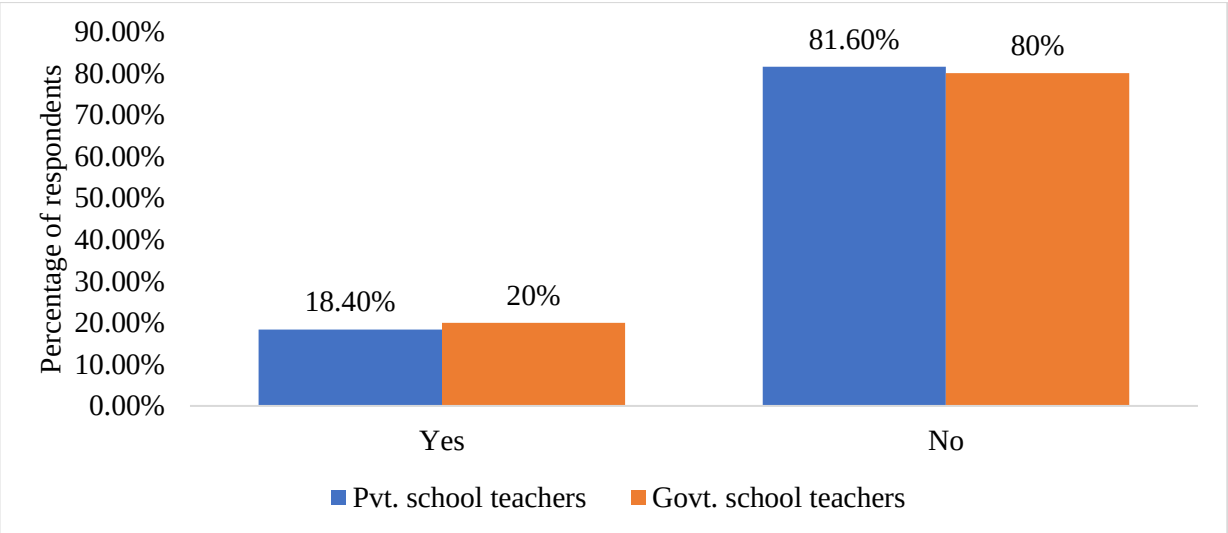

Figure 14

Very Few Children Face Sexual Abuse in India

N= 49* private school teachers

*One participant did not respond

N= 50 government school teachers

Figure fourteen represents the teachers' opinion on the statement that very few children face sexual abuse in India, 81.6% (40) private and 80% (40) government school teachers responded as no to the statement and 18.4% (9) private and 20% (10) government school teachers responded as yes to the statement.

▪ **Experience of sexual abuse during childhood**

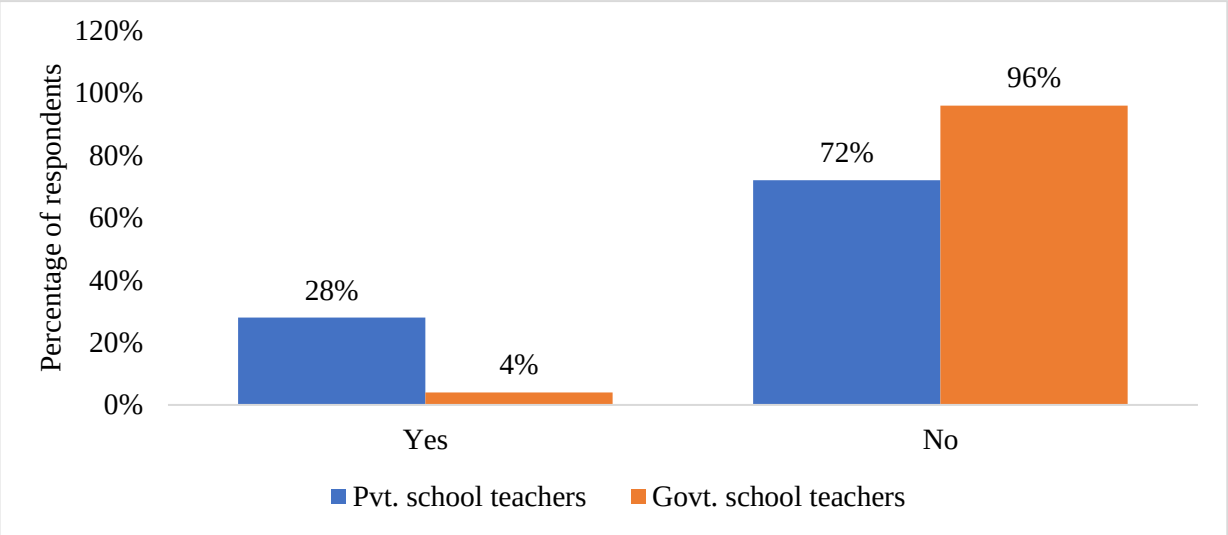

Figure 15

Personal Experience of Sexual Abuse below 18 Years

N= 50 private school teachers

N= 50 government school teachers

Figure fifteen describes if the participant had a personal experience of sexual abuse below the age of 18, out of 100 teachers, 72% (36) private and 96% (48) government school teachers had not experienced sexual abuse below 18 years and 28% (14) private and 4% (2) government school teachers had experienced sexual abuse below 18 years.

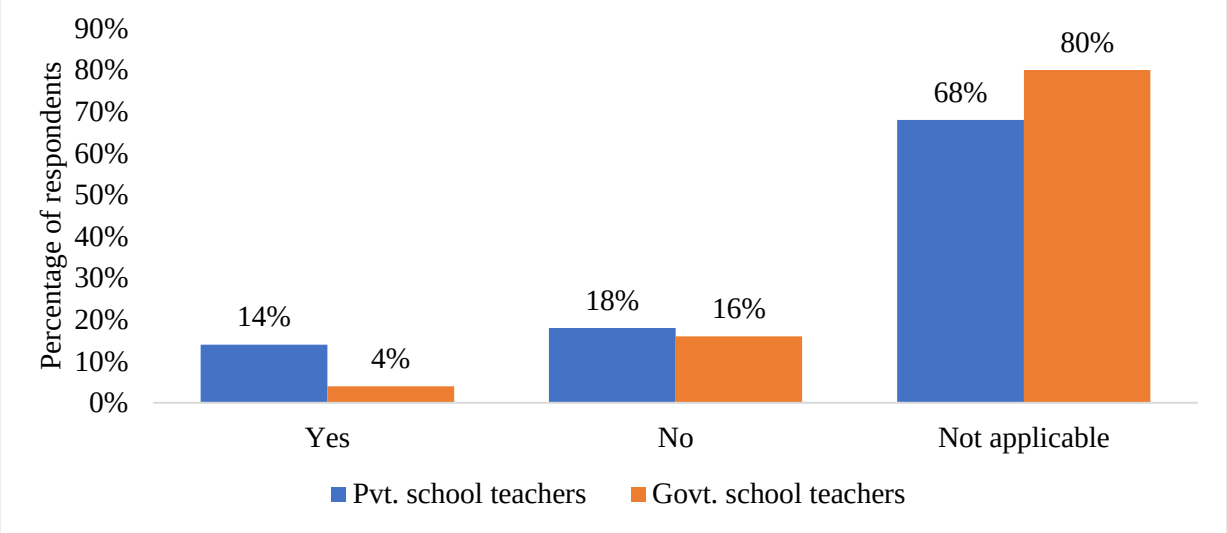

Figure 16

Personal Experience of Sexual Abuse Shared with Anyone

N= 50 private school teachers

N= 50 government school teachers

Figure sixteen describes if the participants had shared that experience with someone, 14% (7) private and 4% (2) government school teachers did report the incident to someone, 18% (9) private and 16% (8) government school teachers did not report the incident to anyone and for the rest of the participants this question was not applicable.

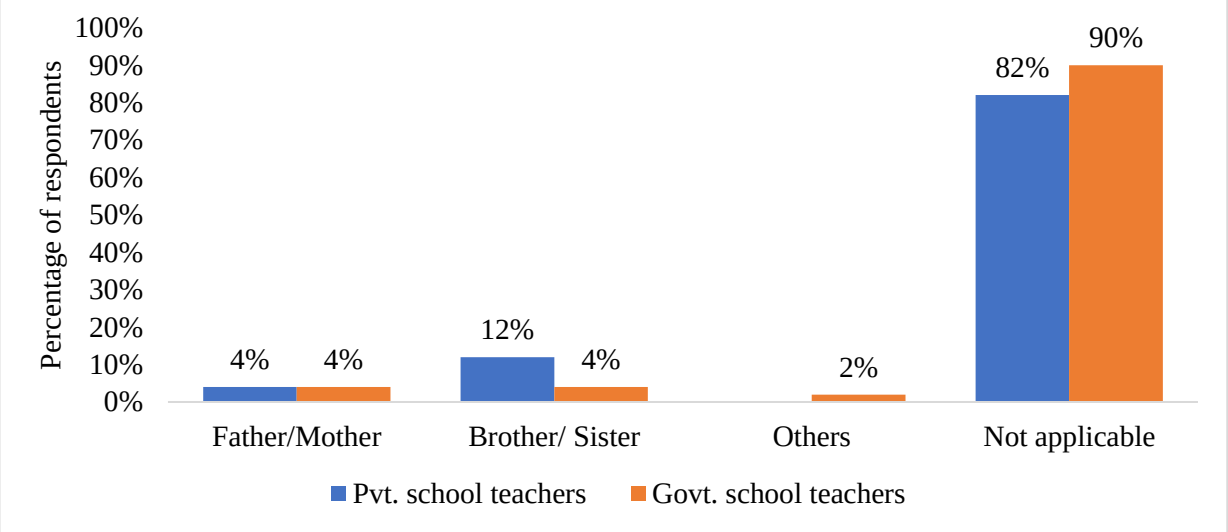

Figure 17

The Person with Whom the Experience was Shared

N= 50 private school teachers

N= 49* government school teachers

*One participant did not respond

Figure seventeen describes the person to whom the participants reported the incident, 4% (2) private and 4% (2) government school teachers reported the incident to parents, 12% (6) private and 4% (2) government school teachers reported to siblings and only 2% (1) government school teacher reported the incident to others, for the rest of the participants this question was not applicable.

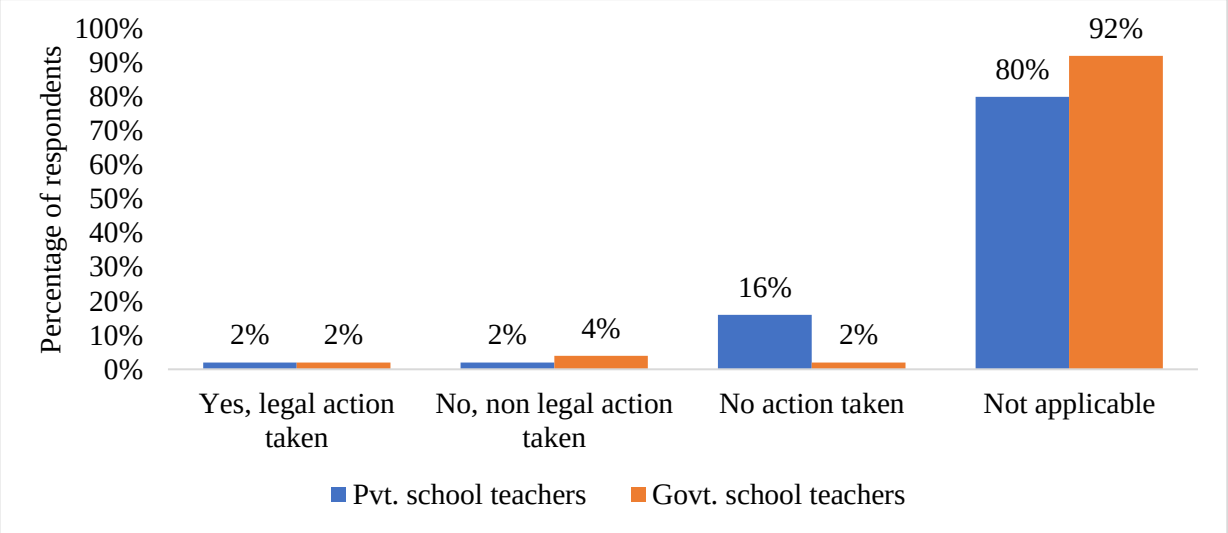

Figure 18

Action Taken
N= 50 private school teachers
N= 50 government school teachers

Figure eighteen describes if there were any actions taken against the predator, 2% (1) of each group reported that yes, legal action was taken, 2% (1) private and 4% (2) government school teachers reported that no, non-legal action was taken, 16% (8) private and 2% (1) government school reported that no action was taken and for the remaining, this question was not applicable.

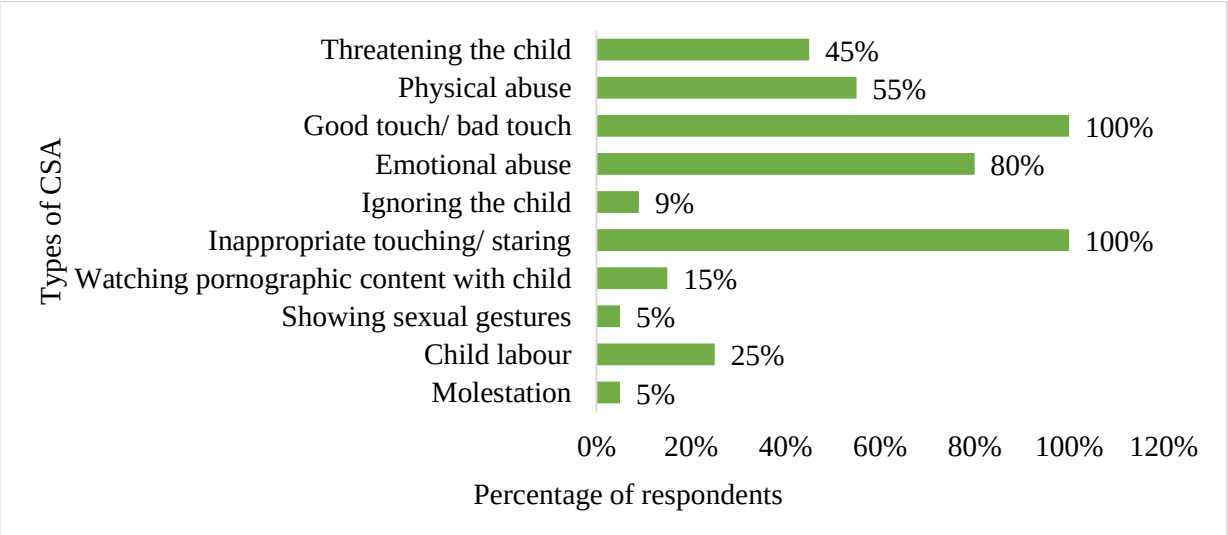

Figure 19

Types of CSA
N= 10 private school teachers

N= 10 government school teachers

Figure nineteen describes the different forms of CSA known to the participants. Their responses were broadly categorised as depicted in the graph above. During the course of data collection, the researcher had an opportunity to interact with the participants and it was observed that not every participant had the proper vocabulary to state the different forms of CSA. Majority of the participants reported that good/bad touch and inappropriate touching/staring are the most commonly observed forms of CSA.

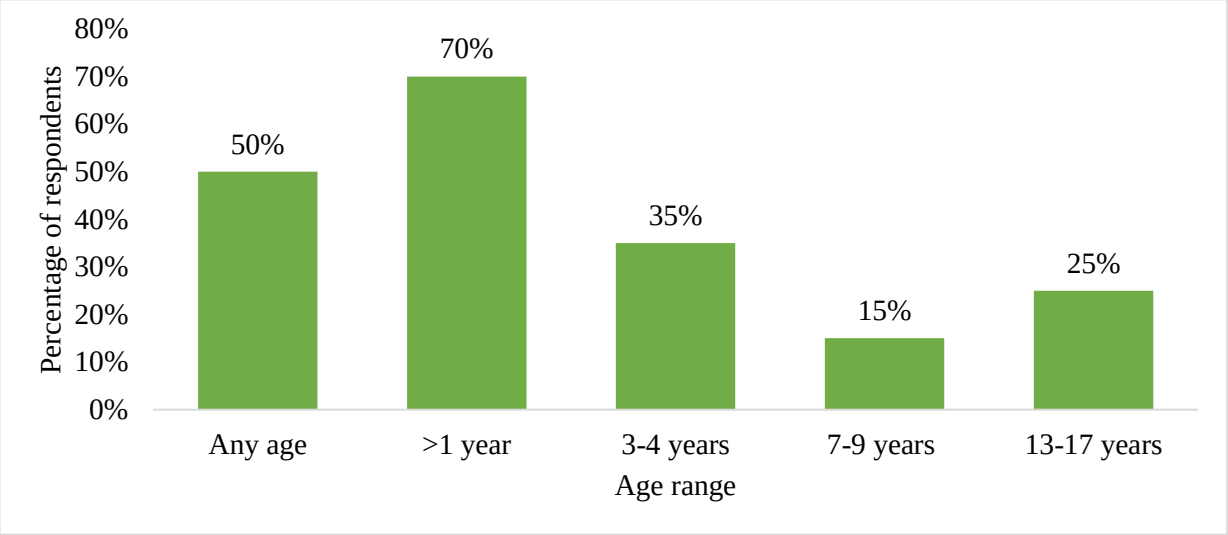

Figure 20

Age at which a Child can become Victim to CSA

N= 10 private school teachers
N= 10 government school teachers

Figure twenty shows the approximate age at which a child is most likely to be sexually abused according to the participants. The age category was not predefined by the researcher, it was the participants who suggested the age bracket for the question asked. 70% participants responded that a child can become victim to sexual abuse even before 1 year and 50% participants reported that it can be any age when a child can become a victim to sexual abuse.

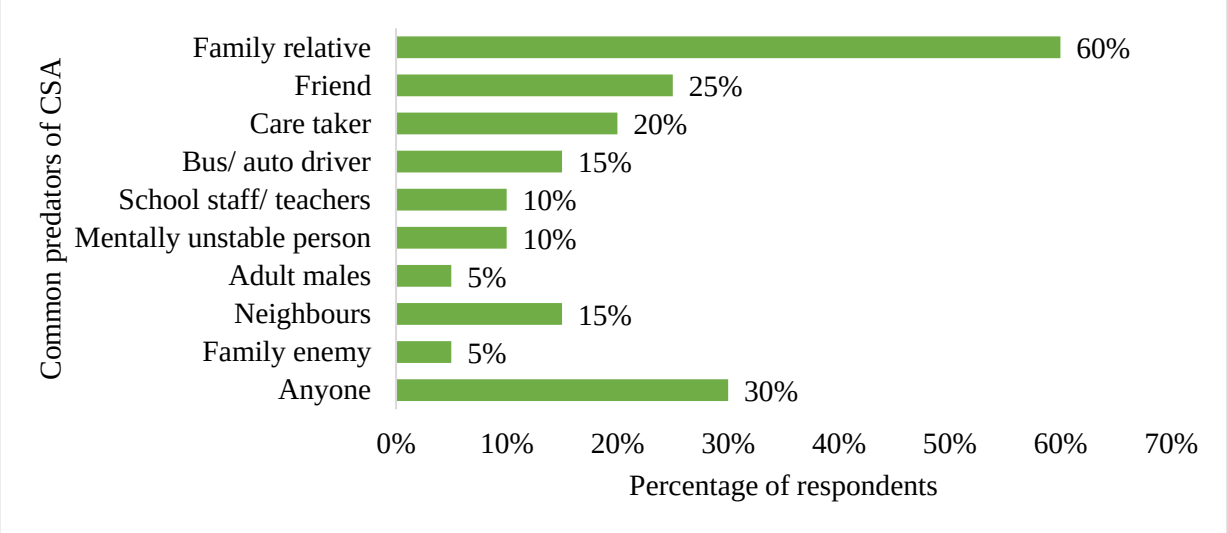

Figure 21

Most Common Predators of CSA
N= 10 private school teachers
N= 10 government school teachers

Figure twenty-one represents the perceptions of teachers on who are the most common predators of CSA in a child's environment. It was also revealed from the telephonic interviews that 60% of the participants responded that the most common predators of CSA were a person who is known to the child and is often a trusted adult. Teachers who have encountered a child's experience of sexual abuse narrated that the child was usually bribed for chocolates or toys.

- **Designing an awareness module for teachers on CSA and POCSO Act, 2012.**

The second objective of the study was to create an awareness module for teachers (who were the participants of the study). The module was created by the researchers as a preliminary compilation of theoretical details about CSA and POCSO Act, 2012, that was presented in a reader friendly manner for the teachers. Part two elaborated on the role of teachers and school management towards prevention identification, and dealing with Child Sexual Abuse, including hands-on information like child helpline number and simple steps towards creation of a school specific child protection policy. Towards the end, there were self- reflective activities for the teachers to perform and reflect upon.

The following were the themes covered in the module:

1- Introduction to Child Sexual Abuse and POCSO Act, 2012
2- Teachers' and School Management's Role
3- Activities for teachers

Being a teacher in a child's environment is a task of responsibility. Teachers have a major role in dealing with abused children, especially as the impact of abuse manifests not only in the external behaviours of the child but also in their covert behaviours. However, teachers need to be supported and trained to deal with this complex context.

The researchers believe that teachers and school managements must pledge to play a proactive role in creating safe and nurturing environment for the children, providing them with the rights they are entitled to and try to supplement the child's life with positive learning experiences.

DISCUSSION & CONCLUSION

The results of the study indicated that not all teachers were trained in the area of child sexual abuse. Government school teachers were made aware about child sexual abuse (CSA) through various initiatives of child protection units and NGOs which work for child welfare, but no formal training was provided. Participants reported that as teachers and school management, they teach children about good/bad touch but they are unable to provide satisfactory information to the children as even today a strong taboo is linked to the discussion of sexual abuse in Indian society. All the participants reiterated that schools must introduce CSA prevention as a part of its curriculum. Positive attitude toward understanding CSA and its severity as a crime would help more children and the people interacting with them become well-informed and sensitive regarding CSA. Participants emphasised that more formal training should be given to teachers to identify the signs of sexual abuse in a child as it is important for the teachers to notice the signs of abuse (both, physical and psychological) in a child as he/she spends majority time of their day at school and also considers the teachers to be their role models. All participants insisted that parent training programs for CSA are a must as teachers alone would not be able to deal with the menace of CSA.

The study further revealed that there was only a general awareness about CSA and the law to protect children, and teachers were unaware about the specific details related to CSA and the POCSO Act. Detailed information on CSA and POCSO Act, 2012 was compiled in the awareness module along with the necessary steps of action needed for teachers and school management if they encounter such a situation. It is further recommended that formal training and sensitisation programs on the subject of CSA should be mandated for all early childhood teachers and management authorities. Furthermore, CSA should be made as a requisite component of pre-service, in-service training and professional development of early childhood educators.

SUGGESTIONS FOR FUTURE RESEARCH

Further studies can be conducted on understanding the opinions of special educators and parents of children with disabilities on Child Sexual Abuse (CSA). A comparative study between the awareness and perspectives of both male and female teachers could be carried out, and in true spirit of research inquiry, opinions of other genders can be studied in depth, to better understand the social context of Child Sexual Abuse.

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AWARENESS REGARDING MANAGEMENT OF BREAST CANCER AND BREAST SELF-EXAMINATION: A CROSS SECTIONAL STUDY

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HSAI-2023-BH-1420-LF

ABSTRACT

Breast cancer is a world-wide issue and the primary cause of mortality in women around the world. The current research was conducted to evaluate awareness for breast cancer, its management and practice regarding breast self-examination (BSE) among women in Patna, Bihar. A community based cross-sectional research has been performed among early and middle adulthood between the age group of 19-45 yrs, using simple random sampling. Questionnaire cum interview method was employed. The data has been estimated and analyzed utilizing descriptive and inferential statistics. An overall of 272 participants have been involved in the research. The women mean age was 23.73±6.44 years. Most of the study participants (90.44%) had no breast cancer family history. Majority of them 247 (90.8%) have been aware of breast cancer. Awareness regarding symptoms (56.61%) was also found to be moderate, followed by risk factors and their management (60.03%). Regarding practices towards BSE, only 33.08 percent of the study subjects had heard about it. Although only 15.07% of respondents perform BSE just for general awareness about their breasts, the remaining believe that performing BSE is not at all necessary. The findings of the research revealed that awareness regarding breast cancer is good, while awareness regarding practices towards BSE has been seen to be poorer. Regarding breast cancer prevention, the majority of 173 (63.60%) assumed that the breast cancer could be managed or cured if detected at an early stage. There is a positive relation among awareness of breast cancer and selected socio demographic profile of the females.

Keywords: Breast cancer, knowledge, awareness, breast self-examination, practice

INTRODUCTION

Breast cancer is a worldwide problem that poses a serious threat to public health and affects both sexes equally, regardless of social class, race, or religion (Ullah et al., 2021). Cancerous cells of the breast usually develop a tumor, which is frequently detectable on X-ray or felt as a lump. Records from the WHO and IARC indicate that five major dietary and lifestyle choices—high body mass index, low physical activity, tobacco use, and alcohol consumption—account for about 1/3 of cancer-related deaths (Stewart and Wild, 2014). Breast cancer symptoms involve lumps in the breast or an armpit, variations in shape or size, discharge of blood from nipples, inverted nipples, rashes around nipples, changes in breast skin color as well as peeling and flaking in the skin of the breast or nipples. Pain in one of the breasts, obesity, short-duration

lactation, fatigue, anxiety, and depression are also common conditions in breast cancer. Breast cancer can be detected through CBE (Clinical Breast-Examination), Mammography, and BSE (Breast Self-Examination). The evidence shows that women who correctly practice BSE on a monthly basis are likely to detect a lump in initial stages of its growth, resulting in initial treatment and a better survival rate. (World Health Organization, 2022). Although there is no specified cure for breast cancer by adopting certain preventive measures one can treat and manage the condition through diet modification. Doing physical activities and exercises on a regular basis. Dietary intake of specific nutrients can significantly alter the risk of breast cancer. Vegetable oil, fruits, and vegetables high in B-carotene and vitamin E are thought to offer protection against breast cancer. In India, a woman is diagnosed with the breast cancer in every 4 min, with 1,78,000 new cases diagnosed annually, according to a study by GLOBOCON 2020. Breast cancer has surpassed cervical cancer as the most common cancer among Indian women (Mary, 2022).

Purpose of the study:

Awareness regarding breast cancer, its symptoms, and its complications is necessary for the women around us. Thousands of women die every year due to a lack of awareness and a fear of discussing the illness due to cultural or social norms. Modern women believe that breast feeding can cause breast distortion. However, lack of breast-feeding is one of the major causes of breast cancer. One's education also plays an important role in self-examining for a lump or any abnormality in the breast in order to practice breast self-examination confidently and to detect early signs and disease symptoms, leading to early treatment.

OBJECTIVES

i. To assess the knowledge about breast cancer.
ii. To assess the knowledge and practices regarding BSE.
iii. To find out the awareness regarding the management of breast cancer.
iv. To find out the association between awareness of breast cancer and selected socio-demographic variables" like age, marital status, educational qualification, employment status and family history.

HYPOTHESIS

i. There is a significant relation among awareness of breast cancer and selected variables such as educational qualification, age, employment status, marital status, and family history.

METHODOLOGY

The present paper is a community-based cross-sectional research. For the research, samples of 272 females between the age group of 19-45 years, living in urban areas of Patna were selected. Apart from selecting married and uneducated women, young females and educated ones were also included in the study for the purpose of inculcating awareness regarding breast cancer at its early stage leading to early detection. The study was quantitative and conducted in the form of a survey. Considering the objectives of the study, the survey cum interview method was employed. A simple random sampling approach has been utilized to choose the respondents. A questionnaire was developed with close-ended questions. Proceeding that, a pilot study was conducted on a small sample (N=10) to test the feasibility of the tool, in different areas of Patna. The questionnaire was revised after the study for the final data collection. The collected data were coded, tabulated, and

compiled for the interpretation of the findings. Descriptive and inferential statistics were employed in the estimation and analysis of the data. The relationship between certain socio demographic factors and breast cancer awareness was ascertained using the Pearson correlation method.

RESULTS AND DISCUSSION

Socio-demographic profile of the respondents: -

Table 1: - Distribution of the respondents on the basis of their socio-demographic profile (N=272)

Demographic variables	Numbers	Percentage
Age (years)		
19-25	214	78.67
26-32	22	8.08
33-39	17	6.25
40-45	19	6.98
Mean -23.73, SD - 6.44		
Marital Status		
Married	60	22.05
Unmarried	210	77.20
Divorced	1	0.36
Widowed	1	0.36
Employment Status		
Student	204	75
Employed	25	9.19
Housewife	43	15.80
Educational Qualification		
Above	7	2.57
Masters	48	17.64
Graduate	180	66.17
Intermediate	2	0.73
Matriculation	22	8.08
Below matriculation	13	4.77
Family History		
Yes	26	9.56
No	246	90.44

Table 1 reveals that a total of 272 respondents with a mean age of 23.73±6.44 years were included in the study. Only 6.25 percent of research participants were between the ages of 33 and 39, followed by 6.98 percent between the ages of 40 and 45, while the majority of responses (78.67%) were in the 19 to 25 age range. 180 of the study individuals (66.17%) had a bachelor's degree or above, 48 (17.62%) had a master's degree, and 2.57 percent had a higher degree. About 22.05 percent of the participants reported being married. The majority of them (almost 75%) were students, followed by housewives (43, or 15.80%). Regarding the breast cancer family history, the respondent's majority 246 (90.44%) had no family history.

Objective 1: To assess the knowledge about breast cancer

This segment deals with the knowledge about the breast cancer among women which includes awareness of breast cancer, its symptoms along with risk factors related with it.

Table 2: -Distribution of the respondents based on their awareness of breast cancer

Variables	Frequency	Percentage
Yes	247	90.80
No	8	2.94
I don't know	17	6.25
Total	272	100

The awareness about the breast cancer illustrated in Table 2 shows the response analysis of respondents regarding the term 'Breast Cancer'. The obtained data depicted that the majority (90.80%) of respondents have been aware of this term while only 6.24 percent of them had never heard of this disease.

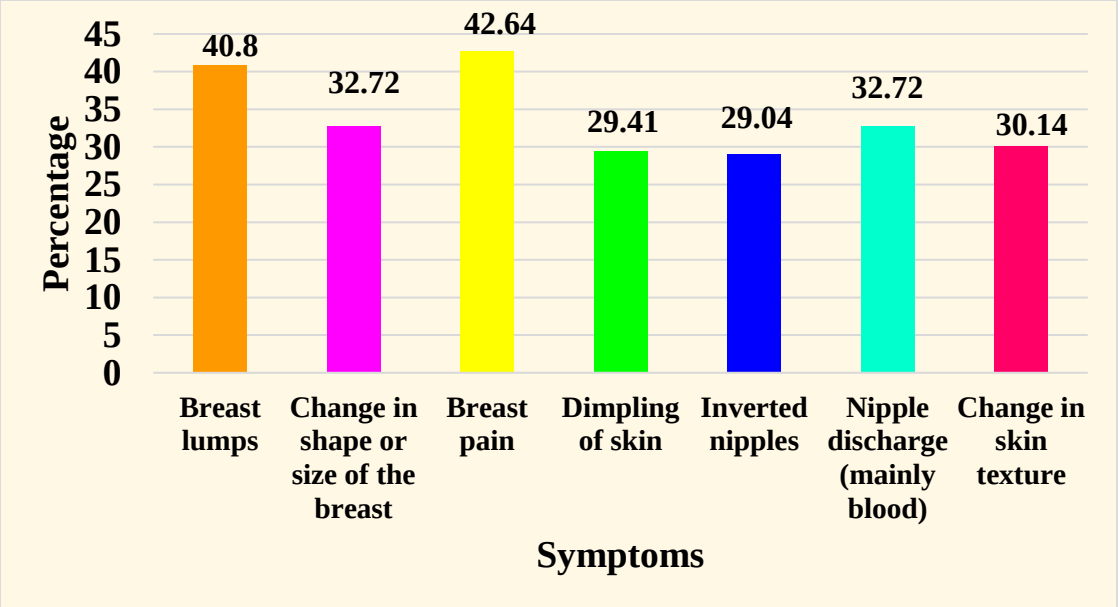

Figure 1: - Distribution of respondents on the basis of their knowledge about symptoms of breast cancer

The data furnished in Figure 1 pertains to knowledge on the subject of symptoms of breast cancer. About 40.80 percent of the participants acknowledged breast lumps and breast pain (42.64%) as breast cancer's possible risk factors. Variations in breast shape or size (32.72%), nipple discharge, mainly blood (32.72%), and change in skin texture (30.14%) were the breast cancer most frequently correctly identified symptoms. Moreover, a minority of the respondents believed that dimpling of skin (29.41%) and inverted nipples (29.04%) may also be signs of breast cancer.

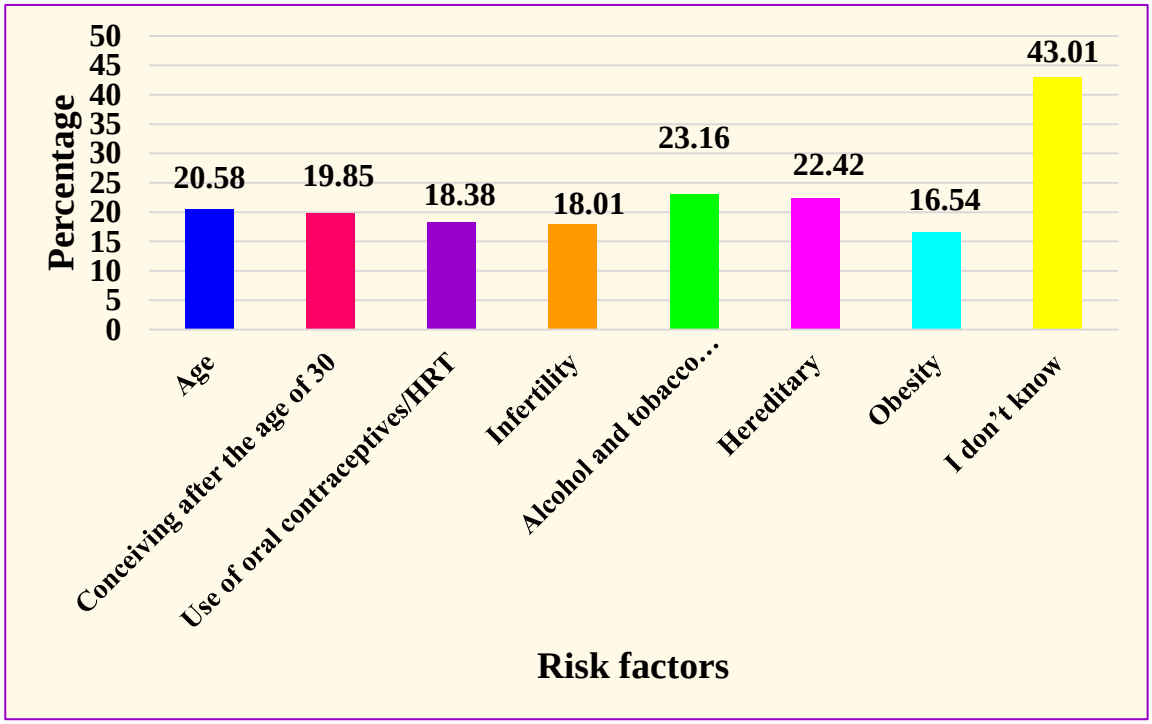

Figure 2: - Distribution of respondents on the basis of their knowledge of risk associated with breast cancer

Fig. 2 indicates the respondents' knowledge regarding breast cancer risk factors. Results revealed that 23.16 per cent of respondents believed consumption of alcohol and tobacco and hereditary (22.42%) are major risk factors associated with breast cancer followed by age (20.58%), conceiving after the age of 30 (19.85%), utilization of oral contraceptives or HRT (18.38%) and infertility (18.01%).

Table 3:- Dissemination of partakers based on their awareness regarding risk factors related to menses

Variable	Frequency	Percentage
Early menstruation (<12 years)	81	29.77
Late menopause (>55 years)	107	39.33
I don't know	157	57.72

The data given in Table 3 revealed that a minority of the participants have been aware of the breast cancer complex risk factors which are early menstruation onset (29.77%) and late menopause (39.77%) whereas more than half of the participants (57.72%) were unaware about this issue.

Table 4: - Distribution of respondents on the basis of their source of information about breast cancer

Source	Frequency	Percentage
Social media/internet	155	56.98
Newspaper	35	12.86
Books/magazines	23	8.45
Family/peer groups	54	19.85
Doctor/health worker	48	17.77
I don't know	5	1.38

The data given in Table 4 reveals that the majority (56.98%) of the samples acquired information through social media and the internet while only (8.45%) of the participants attained information through books and magazines. Other sources of information include newspapers (12.86%), family and peer groups (19.85%), and doctors/health workers (17.77%) while only 5 of them were unaware of this disease. A related study by Tura et al. (2019) observed that the primary source about the breast cancer was the social media.

Objective: 2 To assess the knowledge and practices regarding Breast Self-Examination

This segment is concerned with the evaluation of the awareness & practices regarding BSE including frequency of doing BSE, correct positions, and proper age to start this examination.

Table 5: - Distribution of participants on the basis of their awareness regarding BSE

Variable	Frequency	Percentage
Yes	90	33.08
No	56	20.58
I don't know	126	46.32
Total	272	100

The awareness about BSE is illustrated in Table 5 in which more than one-third of the participants (33.08%) have heard about BSE while the majority of them were unaware of it. A similar study in Karnataka by Jaswanth S et al. (2022) depicted that the majority of respondents (86.05%) had never heard of BSE.

Table 6: - Distribution of partakers on the basis of their practices regarding BSE

Variable	Frequency	Percentage
Yes	41	15.07
No	70	25.73
I don't know	161	59.19
Total	271	100

The analysis in Table 6 included information on practices of BSE where the majority of respondents (59.19%) were found to be unaware of BSE practices while only 15.07 per cent of them practiced BSE.

Table 7: - Distribution of participants on the basis of frequency of doing Breast Self-Examination

Variable	Frequency	Percentage
Daily	8	2.94
Weekly	21	7.72
Monthly	59	21.69
Once in 6 months	23	8.46
I don't know	161	59.19
Total	271	100

The data demonstrated in Table 7 revealed that 21.69 percent of the participants replied BSE must be conducted on a monthly basis followed by daily (2.94%), weekly (7.72%), and once in 6 months (8.46%). Further, more than half of the participants (59.19%) don't know the frequency of doing BSE.

Table 8: - Distribution of study subjects on the basis of their knowledge of the correct position of doing BSE

Variable	**Frequency**	**Percentage**
Sitting	51	18.75
Standing	72	26.47
Lying down	65	23.89
I don't know	128	47.05

It is clear from Table 8 that 26.47 per cent (72) of respondents believed that standing is the correct position for doing BSE, 23.89 per cent of them believed lying down is the correct position while 18.75 per cent of them said sitting is the correct position of doing BSE. About 68.05 per cent of the respondents said standing is the correct position of performing BSE in a research done by Gore et al. (2022) that is relatively higher as compared the current research.

Table 9: - Distribution of respondents on the basis of knowledge regarding age at which BSE must be started

Variables (age)	**Frequency**	**Percentage**
20	63	23.16
30	27	9.93
40	17	6.25
I don't know	165	60.66
Total	272	100

The information provided in Table 9 reveals that one-third of the participants were unaware of the age at which BSE must be started. About 23.16 per cent of study participants said that 20 is the correct age at which BSE must be started while only 6.25 per cent of them believed that it should be started at the age of 40.

Objective: 3 To find out the awareness regarding the management of breast cancer.

This segment deals with awareness regarding the management of breast cancer including dietary modification, stress management, and physical activity is discussed in this section.

Table 10: - Distribution of partakers on the account of their awareness regarding dietary management

Variable	Frequency	Percentage
Balanced diet	137	50.36
B-carotene rich foods	111	40.80
Vitamin-E rich foods	108	39.70
I don't know	127	46.69

The information provided in Table 10 deals with awareness regarding dietary management in the prevention of breast cancer. About 50.36 per cent of the respondents believed that a balanced diet is very helpful in coping with breast cancer followed by β-carotene rich foods (40.80%). Awareness regarding vitamin E-rich food in the prevention of breast cancer was found 39.70 per cent while 46.69 per cent of them were unaware of prevention strategies regarding breast cancer.

Table 11: - Distribution of partakers on the basis of their awareness regarding physiological management

Variable	Frequency	Percentage
150 min/week of moderate exercise	97	35.66
75 min/week of vigorous exercise	74	27.21
Either of them	24	8.82
I don't know	77	46.69
Total	272	100

The response analysis in Table 11 revealed that 97(35.66%) of study partakers claimed 150 min/week of moderate exercise including walking may help in the prevention of breast cancer cases while 74 (27.21%) of them believed that 75 min/week of vigorous exercise such as running, swimming etc would be helpful against breast cancer. About 8.82 per cent of the participants replied with either of these exercises may be executed depending upon the availability of time.

Table 12: - Dissemination of partakers on the basis of their awareness regarding stress management of breast cancer

Variable	Frequency	Percentage
Regular physical exercise	202	74.26
Yoga and asana	205	75.36
Meditation	201	73.89
I don't know	49	18.01

Table 12 indicates the respondents' awareness regarding stress management in breast cancer patients. The outcomes reported that 74.26 per cent (202) of respondents believed in regular

physical exercise to cope with anxiety or stress whereas 75.36 percent of them claimed yoga and asana should be performed to reduce anxiety followed by mediation (73.89%).

Table 13: - Distribution of respondents on the basis of their awareness about the diagnosis of breast cancer

Variable	Frequency	Percentage
BSE	123	45.22
CBE	125	45.95
Mammography	128	47.05
I don't know	110	40.44

Table 13 displays the response analysis for various breast cancer diagnoses, including BSE, CBE, and mammography. The analysis specifies that out of 272 respondents, 123 (45.22%) believed that BSE is helpful in breast cancer early detection, followed by, CBE 125 (45.95%). More than one-fourth of the participants said mammography is the authentic way while 40.44 per cent of them were unaware of diagnosis of breast cancer. Similar research done in Mumbai by Prusty et al. (2020) investigated that majority of the respondents (41.9%) were about CBE followed by BSE (6.5%) and mammography (0.2%).

Table 14: - Distribution of partakers on the basis of their awareness regarding the prevention of breast cancer

Variable	Frequency	Percentage
Yes, if detected early	173	63.60
No, it can't be managed	19	6.98
I don't know	80	29.41
Total	272	100

The respondents' awareness regarding the prevention of breast cancer is depicted in Table 14. Out of the total, 173 (63.60%) respondents believed that the breast cancer could be cured if detected initially while 6.98 per cent of them denied that breast cancer can be cured.

Objective 4: To find out the association between awareness of breast cancer and selected socio-demographic variables like age, educational qualification, marital status, employment status, and family history of the respondents

Table 15:- Distribution of correlation between awareness of breast cancer and age

Variables	Test	Awareness of Breast Cancer	Age
Awareness of Breast Cancer	Pearson Correlation	1	.029
	Sig. (2-tailed)		.630
Age	N	271	271
	Pearson Correlation	.029	1
	Sig. (2-tailed)	.630	
	N	271	271

According to Table 15 age of the respondents is positively correlated to awareness of the breast cancer among the respondents. As the age increases the awareness also increases about breast cancer.

Table 16: - Distribution of correlation between awareness of breast cancer and marital status

Variables	Test	Awareness of Breast Cancer	Marital status
Awareness of Breast Cancer	Pearson Correlation	1	.233**
	Sig. (2-tailed)		.000
Marital status	N	271	271
	Pearson Correlation	.233**	1
	Sig. (2-tailed)	.000	
	N	271	271

**. Correlation is significant at the 0.01 level (2-tailed).

It is clear from Table 16 that awareness about breast cancer directly correlates with the marital status of the respondents.

Table 17: - Distribution of correlation between awareness of breast cancer and respondent's educational qualification

Variables	Test	Awareness of Breast Cancer	Educational Qualification
Awareness of Breast Cancer	Pearson Correlation	1	.057
	Sig. (2-tailed)		.349
Educational Qualification	N	271	271
	Pearson Correlation	.057	1
	Sig. (2-tailed)	.349	
	N	271	271

It is evident from Table 17 that breast cancer directly correlates with the educational qualification of the respondents. As the respondents go to higher education their awareness also increases about breast cancer. Higher educated respondents are much more aware of it as they gain knowledge from different sources such as newspapers, research articles, media, and many more such different platforms.

Table 18:- Distribution of correlation between awareness of breast cancer and Employment Status

Variables	Test	Awareness of Breast Cancer	Employment status
Awareness of Breast Cancer	Pearson Correlation	1	.137*
	Sig. (2-tailed)		.024
Employment status	N	271	271
	Pearson Correlation	.137*	1
	Sig. (2-tailed)	.024	
	N	271	271

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation among awareness of breast cancer and employment status is illustrated in Table 18. According to the given sample size employment status is positively correlated to breast cancer awareness among respondent's data.

Table 19: - Distribution of correlation between awareness of breast cancer and Family history of breast cancer

Variables	Test	Awareness of Breast Cancer	Family history
Awareness of Breast Cancer	Pearson Correlation	1	.026
	Sig. (2-tailed)		.668
Family history	N	271	271
	Pearson Correlation	.026	1
	Sig. (2-tailed)	.668	
	N	271	271

The correlation shown in Table 19 revealed that a breast cancer family history is positively correlated to breast cancer awareness among the respondent's data. As the respondents come to know about breast cancer in their family, they are much more aware of it and take precautions regarding this.

CONCLUSION

The outcomes of the research showed that awareness regarding breast cancer is good, while awareness regarding practices towards BSE has been seen to be poorer. Regarding breast cancer prevention, the majority of 173 (63.60%) believed that breast cancer could be managed or cured if detected at an initial stage. Thus, this research emphasizes that there is a need to raise breast cancer awareness and the significance of practices for BSE which will enable breast cancer to be detected at its early stage. The present study demonstrated an association of this disease to the respondent's level of education, status of employment, marital status, and breast cancer family history, respectively.

RECOMMENDATIONS

- The topic of breast cancer should be involved in high school and college leading to early detection of the disease.
- Health education programs can be conducted regarding breast cancer, its management, and practices among women.
- With social media campaigns, the influence of popular figures should be used to promote awareness regarding breast cancer along with practice towards BSE.
- The Ministry of Health in collaboration with non-profit organizations can establish breast cancer clinics with a multidisciplinary team of psychiatrists, nutritionists, counselors, and yoga experts providing holistic management to breast cancer patients.
- A mobile application can be developed to connect and provide guidance to young girls who can enhance their quality of life, self-esteem, and confidence and assist in detecting and managing the disease.
- Comparative research could be done to evaluate the awareness regarding breast cancer & practice towards BSE between educated and uneducated housewives.

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MENTAL HEALTH STATUS AND PARENTAL SELF-EFFICACY OF PARENTS OF CHILDREN WITH AUTISM

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ABSTRACT

The current study was undertaken with a sample of 143 parents drawn through simple random sampling from various special schools in Coimbatore city of Tamil Nadu. The main aim was to assess the level of mental health and parental self-efficacy of parents with children with Autism. Socio-demographic profiles of parents were collected using a self-constructed questionnaire. The mental health inventory was used to assess the mental health status of parents and the early intervention parenting self-efficacy scale (EIPSES) was used to assess parenting self-efficacy. The investigation found that parents with autistic children have poor to very poor levels of overall mental health. The findings reveal that the majority of parents reported average to low levels of parental self-efficacy and very few parents showed a high level of parenting self-efficacy. The mental health of parents of children with ASD and parenting self-efficacy did not show a significant correlation, however, only group group-oriented attitude dimension of mental health was found to be a significant predictor for parenting self-efficacy.

Keywords- Autism, Mental health, Self-efficacy, Parents

INTRODUCTION

ASD is a neurodevelopmental disability characterized by problems related to communication, social interaction, and repetitive behaviour. According to the National Center on Birth Defects and Developmental Disabilities (2022), “some children with ASD need a lot of help in their daily lives; others can work and live with little to no support”. ASD typically manifests in the first three years of life and is a disorder that affects 1 in 100 children worldwide, with symptoms varying between each person (Global Prevalence of Autism, 2022).Children diagnosed with ASD may fail to respond when they are called by their names, and they often avoid eye contact. Most of them have difficulty interpreting the feelings of others because they are not able to understand social cues such as the tendency of voice or facial expressions; in most cases, they lack empathy (Kishore, &Basu, 2014).

Deater-Deckard (2004) explains that, “parenting a child with ASD can compound the hardship and may experience significant stress while coping with developmental concerns that

result in social, economic/financial difficulties; physical and psychological difficulties; and low quality of life". FiratS,et al (2002) also said that, "parents often experience frustration and pessimism. It also has been reported that parents of children with autism experience more marital distress and conflicts which substantially contributes to the existing strain of parenting an autistic child". Tarabek J (2011) says that, "mothers experience a greater impact than fathers. They blame themselves for their children's disorder and they are also the parent who was most likely to be held responsible for their child's behavior. There exists a chain of events or circumstances that hamper the mental health status of parents with an autistic child. Parents undergo immense pressure of managing the child, themselves, and their family bringing work-life balance".

Parental self-efficacy is a belief in one's ability to complete parenting tasks, which is critical for parenting quality. Pakenham et al. (2014) examined the "role of mental health within the parental coping process of adjusting to their child's ASD diagnosis and found that parents with better mental health and coping skills had higher self-efficacy". Kuhn and Carter (2006) examined that, "the association between mental health and parental self-efficacy and found that maternal depression, stress, and guilt all accounted for unique variance in self-efficacy. Parents who reported higher levels of mental health and parental self-efficacy were also more active in promoting the development of their children, suggesting that self-efficacy may also play a role in parenting positive behaviors. Parents with low self-efficacy tend to experience more distress and report higher levels of parenting stress and depression". Guay (2009) added that, "social support is an important resource that can help individuals cope with stress, enhance self-confidence and improve mental health and self-efficacy."

Garrido et al., (2020) establish that, "families of children with ASD had lower social support than families of children with typical development. Social support was positively related to mental health and self-efficacy and it was determined to be a critical component of family interventions. With more support, parents of children with ASD may experience lower parental stress, better partnerships with professionals, and self-efficacy". Zeng et al., (2020) says, "Although there was evidence of a positive association between social support and parental mental health, there is limited information about whether social support acts as a mediator between cognitive variables in families of children with ASD. The attention toward maintaining adequate parental mental health in families of children with ASD is of great importance, there is not enough evidence to demonstrate the association between the mental health of parents and self-efficacy".

Parents of autistic children might report higher or average levels of self-efficacy because of their indispensable effort to provide the necessary care in the form of training and practices for their autistic child to promote them to be self-supporting. At the same time, may suffer from issues with mental health due to the strain and trauma they undergo in the management of their daily life activities. The current study, given the above facts, was planned with the following objectives

OBJECTIVES

- To assess the level of mental health and parenting self-efficacy of parents with ASD children
- To examine the influence of mental health on parenting self-efficacy.

METHODOLOGY

A total number of 143 parents were selected from various special schools in Coimbatore city of Tamil Nadu. The consent letter was submitted to the school authorities and permission was sought to conduct the study in their respective schools. After collecting relevant literature about the study including a range of available related tools, three sets of tools were selected for the study. The investigator developed a tool to elicit the general profile of respondents viz age and qualification of parents, occupation, family income, number of siblings, family type and area of residence, etc. Mental health inventory by Jagdish and Srivastava (2005) and the Early Intervention Parenting Self-Efficacy Scale (EIPSES) by Guimond, Wilcox, and Lamorey (2008) were used to assess the mental health and self-efficacy of parents.

The mental health inventory tool has 72 items using a 5-pointLikert scale which are distributed in six dimensions namely Positive mental health Self-Evaluation (PMHSE), Perception of Reality, Integration of Personality, Autonomy, Group Oriented Attitudes and Environmental Mastery and responses ranging from very good to very poor. Total scores measure that the higher the score higher the mental health.

The Early Intervention Parenting Self-Efficacy Scale (EIPSES) consisted of 16 items using a 7-point Likert scale for responses ranging from strongly disagree (1) to strongly agree (7) indicating higher scores greater the perceived self-efficacy.

Further, the investigation sought the institute's research ethics committee clearance. Rapport was established with participants; the collected data were consolidated, tabulated, and classified according to the levels as per the norms of the manuals. Data were processed statistically by using SPSS software. Descriptive statistics and regression analysis were applied to find the significant association between mental health and parenting self-efficacy of parents of autistic children.

RESULTS AND DISCUSSION

The results of the study are interpreted and discussed as follows

Table-I Socio-demographic condition of the parents of autistic children

Variables	Particulars	n=143	%
Sex of Parents	Father	35	24.5
	Mother	108	75.5
Qualification	HS	3	2.1
	Graduate	55	38.5
	Post-Graduate	83	58.0
	Ph. D	2	1.4
Occupation	Govt. employed	16	11.2
	Private Sector	31	21.7
	Home Maker	92	64.3
	Self- employed	4	2.8

Family Income	2-5 Lakhs	29	20.3
	5-10 Lakhs	102	71.3
	10 lakhs &Above	12	8.4
Family Type	Nuclear	108	75.5
	Joint	35	24.5
Area of living	Urban	122	85.3
	Semi-Urban	21	14.7

In the present study parents were the full-time primary caregivers of their autistic children. Mothers mostly accompanied their children to school, therapies, and treatments. From the table, it can be seen that the majority of parents who responded (75.5%) were mothers and (24.5%) of them were fathers.

Educational qualification plays an important role in the parents' lives for better understanding and acceptance of their child's disability as well as realizing the need for pre-requisite skills. From the present study, we can see that 58%of the parents were postgraduates; while 38.5% of the parents had pursued their graduation. The rest (2.1%) of the parents had studied up to high school and (1.4%) had completed their Ph.D.

Autism has an immense impact on the family as parents are required to provide full-time care for their children with autism. At the same time, a job is so important for providing for the family and contributing to the family's income. In the present study, a higher percentage of parents 21.7% were working in the private sector, 11.2% of them were government employees and 2.8% were self-employed. With regards to mothers, the majority (64.3%) of them were homemakers. It can be seen that (71.3%) of families' annual income was reported to be under the 5-10 lakhs range, some (20.3%) of families' income was under 2-5 lakhs and 8.4% of family's income was above 10 lakhs. In India even though many live in nuclear families, they reside near their extended family. In this present study, the majority of (75.5%) the families were nuclear families, and 24.5 % were from joint families. Tracing the area of living of the selected respondents, the majority (85.3%) were living in urban areas, whereas (14.7%) of the families were residing in semi-urban areas.

Table-2 Level of Mental Health of parents of autistic children

Dimension of Mental Health	**Levels of Mental Health**				
	Very Good	**Good**	**Average**	**Poor**	**Very Poor**
PMHSE	-	2(1.4%)	29 (20.3%)	94 (65.7%)	18 (12.6%)
Perception of reality	-	-	2(1.4%)	102 (71.3%)	39 (27.3%)
Integration of personality	-	-	8(5.6%)	87 (60.8%)	48 (33.6%)
Autonomy	-	3 (2.1%)	50 (35.0%)	83 (58.0%)	7 (4.9%)
Group oriented attitudes	-	-	6 (4.2%)	87 (60.8%)	50 (35.0%)

Environmental mastery	-	-	9 (6.3%)	85 (59.4%)	49 (34.3%)
Overall Mental Health	-	-	-	121(84.6%)	22(15.4%)

Table 2 shows the levels of mental health of parents with children with autism. A higher percentage (84.6%) of parents showed a poor level and 15.4 percent of parents reported to be in a very poor level of overall mental health**.** Looking into the dimension-wise mental health, in the dimension of PMHSE (parents' mental health self-evaluation) parents showed poor (65.7%) to average (20.3%) levels of mental health. Parents' involvement in providing for their children keeps increasing and they do not realize that they have completely forgotten to think about themselves. Though they understand their mood changes and fluctuations they would not do much about managing due to the dearth of time they get to spend on themselves.

In the dimension of perception of reality, it can be seen that the majority (71.3%) of the parents were showing poor to very poor levels (27.3%) of mental health. It is very important to note how parents understand and interpret autism in their children. Accepting the child's condition, and adapting to it, getting mentally prepared to support and encourage the child to develop takes a toll on parents.

In the dimension of integration of personality, parents were showing poor (60.8%) to very poor (33.6%) levels of mental health. Personality is said to be the organization of thinking, feeling, and behaviour. Bringing all the traits in unity such as emotions, intelligence, impulses, choices, desires, motives, etc is called the integration of personality. When parents find it difficult to organize this effectively, conflict arises and they might fail in attaining an ideal personality.

Parents showed a poor (58.0%) to (35.0%) average level of mental health in the dimension of autonomy. Autonomy in mental health generally is about having informed consent about something that they want to decide, and choose which is best for them independently. Parents face a lack of social acceptance for their children or less support from family, relatives, or the community. Their decisions are greatly influenced by this and it will incapacitate the parents to live a life of their own making.

Group-oriented attitudes dimension of mental health showed that 59.4% of parents had a poor to very poor (35.0%) level. Parents work as a team or with a team to provide the required care and guidance for their children. However, parents may withdraw themselves from being a part of a group due to various reasons based on the circumstances they are in. Like, the experiences they would have undergone due to the child's behaviour, a family not responding to them to work as a team, and letting down by co-workers and friends would have pushed them to have a settled feeling about not being a part of the group.

Lastly, in the dimension of environmental mastery, 59.4% of parents reported having poor to very poor levels (34.3%). Environmental mastery reflects how an individual utilizes the prospects effectively to manage their activities. Parents of autistic children testified to having poor to very poor levels of environmental mastery due to the feeling that they are not able to create a situation to benefit themselves or their child or family.

Table-3 Level of parenting self-efficacy of parents of autistic children

Parenting self – efficacy	High	Average	Low
	31 (21.7%)	61 (42.7%)	51 (35.7%)

Levels of parenting self-efficacy can be seen in Table 3, 42.7 percent of parents testified an average level, 35.7 percent of parents reported a low level and 21.7 percent of parents came up with a high level of parenting self-efficacy. Parents, despite their mental health status, are trying their best to give their children the needed training, intervention, and education to have a better lifestyle. But autism is a lifelong process, and at some point, in time, they lose their strength and hope because of the day-to-day events and circumstances of life. Parents' attitudes towards autism also might steer the parenting self-efficacy bringing it down to average to low or rising to high.

The results of multiple linear regression

A multiple linear regression analysis was conducted to examine the relationship between parents' mental health and parenting self-efficacy. The relevant assumptions were tested where a sample size of 143 was deemed to be adequate given the independent variable was seven. The assumption of singularity was met and, in the correlation, the independent variables did not have coefficient loadings of more than 0.8. The collinearity statistics were met with tolerance being less than 1 and VIF with less than 10. Extreme univariate outliers were not found and the cook's distance was found to be in the acceptable range.

Table 4(a) - Relation between Parents' Mental Health and Parenting Self Efficacy

Multiple linear Regression								
	Parenting Self Efficacy	PMHSE	Perception of Reality	Integration of Personality	Autonomy	Group-Oriented attitudes	Environmental Mastery	Parents Mental Health
Parenting Self Efficacy	1.000							
PMHSE	-.021	1.000						
Perception of Reality	.025	.192	1.000					
Integration of Personality	.109	-.016	.097	1.000				
Autonomy	.050	.016	.041	-.171	1.000			
Group-Oriented attitudes	**-.184****	.034	.044	-.397	.256	1.000		
Environmental Mastery	-.076	.004	-.113	-.091	.217	-.007	1.000	
Parents Mental	-.033	.263	.261	.029	.306	.293	.198	1.000

Health								

Table 4(a) – The results explain the correlation test between the mental health of parents of children with autism and parenting self-efficacy. Dimensions of mental health such as PMHSE, perception of reality, integration of personality, autonomy, group-oriented attitudes, environmental mastery and parents' mental health are the independent variables while parenting self-efficacy is the dependent variable. The figures in the table showed that only the dimension of group-oriented attitudes (-.184**) was found to be having significant negative correlation with parenting self-efficacy.

Table 4 (b)

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.238	.057	.008	8.423

a. Predictors: (Constant), Parents Mental Health, Integration of Personality, Environmental Mastery, PMHSE, Perception of Reality, Autonomy, Group-Oriented attitudes

b. Dependent Variable: Parenting Self Efficacy

Table 4 (c)

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	576.343	7	82.335	1.161	.330[b]
	Residual	9577.867	135	70.947		
	Total	10154.210	142			
a. Dependent Variable: Parenting Self-Efficacy Category						
b. Predictors: (Constant), Parents' Mental Health Category, Integration of Personality Category, Environmental Mastery Category, PMHSE Category, Perception of Reality Category, Autonomy Category, Group-Oriented attitudes						

Coming to table 4 (b) and (c) represents the model summary and ANOVA respectively. The table shows that the R-value is .238 which indicated the relationship between the independent and dependent variables to be positive with 5.7% of the variance with R^2 being .057 and as per ANOVA, there was no significant relationship between mental health and parenting self-efficacy with F (7,135) = 1.161, P = .330.

Table 4 (d)

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	T	Sig.
(Constant)	63.641	5.976		10.650	.000

PMHSE	-.281	1.212	-.020	-.232	.817
Perception of reality	.278	1.599	.015	.174	.862
Integration of Personality	.576	1.418	.038	.406	.685
Autonomy	1.795	1.276	.129	1.407	.162
Group-oriented Attitude	-3.172	1.522	-.205	-2.085	**.039**
Environmental mastery	-1.497	1.309	-.102	-1.144	.255
Overall mental health	.177	2.339	.008	.076	.940
Dependent Variable: Parenting Self-efficacy					

Further, the multiple linear regression analysis depicted that the group-oriented attitude (ß = -3.172, t = -2.085, P = 0.039) was the only dimension that predicted parenting self-efficacy in the study. It can be understood that one-unit change in the group oriental attitude will decrease the-3.172 score in parenting self-efficacy of parents of autistic children. Apart from this PMHSE, perception of reality, integration of personality, autonomy, and environmental mastery were found to not determine parenting self-efficacy in the present study.

DISCUSSION

Parents of children with ASD are at risk for increased levels of emotional problems and fight against the challenges of hopelessness along with depression, anxiety, distress, guilt, and coping with different stressful events in everyday life. Parents continually carry the burden of raising an autistic child, thereby experience stress-related issues. Therefore, parents experience poor psychological well-being and low resilience, which results in increasing stress levels and feelings of despair (Desmarais, Barker, & Gouin, 2018)**.** Li et.al. (2015) explains that "parents with autistic children have higher levels of stress and psychological disturbances. Also, parents of children with ASD reported significantly more parenting stress symptoms, more depression symptoms, and more frequent use of active avoidance coping, than parents of typically developing children".

Indeed, it has been found that parenting a child with ASD can cause a disturbance in the whole family and may create several economic, social, physical, and psychological issues (Hartley et al., 2010). Therefore, in the proposed interventions for a child having ASD, it is necessary to give importance to the mental health status of that child's parents. In the journey of providing the best effort and care to an autistic child, usually, parents have forgotten to take care of themselves and their own mental and emotional health.

According to Fields (2006), "Parents of children with autism spectrum disorders (ASD) may be at particular risk for lower parenting self-efficacy due to specific symptoms associated with the disorder. Since children with ASD struggle with difficult and rigid behavior, parents may likely experience more failure and frustration with typical parenting strategies".

Ryan (2010) explains overall parenting self-efficacy, "which indicates that parents of children with autism are at particularly high risk for lower levels of parenting self-efficacy. Higher levels of stress, depression, and a difficult parent–child bond seen in parents with a child with ASD

also place them at higher risk. Lower levels of parenting self-efficacy may then exacerbate problems at home and interfere with their child's treatment. If parents of children with ASD are experiencing lower parenting self-efficacy, it is important to understand why and how professionals can help address parenting self-efficacy in treatment".

Russell and Ingersoll (2020) say that "if the parents have positive attitudes toward their child, it might help parents to reduce their mental stress positively and make better levels of confidence". Feng et al., (2021) also supported that, "parents with greater parental efficacy are more involved in rehabilitation and treatment processes. Some studies have revealed improvement in the levels of parenting self-efficacy among parents who take part in psycho-educational interventions and parent training". Benedetto et al., (2021) say that, "greater parenting sense of competence predicts better parent–child relationships and less parenting stress. Mothers with a high parenting sense of competence often have higher intervention willingness and motivation, can promote family members to actively participate in parenting, and play a vital role in children's therapy".

CONCLUSION

Parents with autistic children always need support from their family and society. In this present study, the researcher observed the common challenge faced by the parents of children with autism is negative reactions from society. All human beings live in a society, there are different types of people having different mindsets about autism. Some of them are not supportive, kind, or accepting. Thus, getting negative impacts from people impacts the mental health and self-efficacy of the parents to raise their child and the challenges they will face in the coming time. Here is the requirement of a sensitization programme for gaining their self-efficacy and strengthening their mental health and parental self-efficacy.

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EMOTIONAL DEPENDENCY IN ROMANTIC RELATIONSHIPS AMONG EMERGING ADULTS

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ABSTRACT

Formation of romantic ties and experiencing love are of crucial importance in the life of an emerging adult with associated developmental consequences. Romantic partners are potentially a source of immense happiness and emotional support and hence, there is a possibility to lose oneself in a relationship. Romantic relationships unfold in a gendered context. The paper explores the effects of gender role beliefs, societal influences, and gender differences on the experiences of emotional dependency. The study involved completion of the assessment measures: emotional dependency questionnaire and gender role attitude scale by emerging adults involved in a heterosexual relationship in two states, Gujarat (n=190) and Uttarakhand (n=195). Statistical tests such as t-test, ANOVA, correlation and regression were used to analyze the data. As per the findings there was no overall significant gender or state differences in the experiences of emotional dependency. Nevertheless, significant differences in gender were observed in Gujarat with men being more dependent on women. It is of utmost importance to divert scientific attention towards gender and emotions with special focus on socialization practices normalizing emotional expression, regardless of gender.

Keywords: gender role beliefs; emotional dependency; romantic relationships

INTRODUCTION

Arnett (2014) introduced “emerging adulthood” as a distinct period of development ranging from 18-29 years. Globalization has propelled professional and educational opportunities, eventually translating into late marriage and parenthood (Jodhka & Prakash, 2016), making emerging adulthood observable in various regions of urban India (Kapadia et al., 2007). Emerging Adulthood is marked by identity search in the realms of work, love and romance (Arnett, 2006).

Romantic love is a prevalent experience of majority of people however; it is manifested and expressed in different ways. Individual's perception of romantic relationships is deeply shaped by the culture a person belongs to, influencing individual's perception of relationship (Karandashev, 2015; Hatfield, Rapson, & Martel, 2007). Karandashev (2015) also opined that although; love is universal, but still culturally specific.

In a context such as India, with its hierarchical and patriarchal values, family ties and kinship patterns, there is a deep significance of familial integrity and loyalty (Sachdeva & Misra, 2008). Marriage is perceived as a bearer of carrying forward such principles (Sheela & Audinarayana, 2003). Love marriages face challenges, possibly due to the pressure ascribed to the institution of marriage in Indian culture (Kakar & Kakar, 2007).

However, the Indian societal fabric is experiencing social and economic transformation profoundly shaping the norms of interpersonal relationships among youth in India (Hindin & Hindin, 2009). Young Indians are harmonizing conventional principle with individualistic romantic ideals, transcending the dichotomy of love and arranged marriages in search of a companionship that affectionate, equal and intimate while also supporting the values cherished by parents and family (Kashyap, 2020). Thus, India seems to be adopting a more flexible attitude towards "love", specifically in the urban areas (Gala & Kapadia, 2014). Despite shifts, generally, the typical cultural expectation for women is to marry after entering a relationship. This social often places the onus of maintaining and sustaining a relationship on a woman. Perhaps, such cultural and societal persuasions may contribute to the perception that dependency in romantic relationships is normally thought to be a characteristic of women.

A certain degree of dependence is generally viewed as acceptable within a relationship but couples may encounter situation where one person experiences heightened dependency rendering them unable to maintain a balanced self-control. Consequently, the emotional dependency which is needed for a wholesome relationship can transform into a detrimental dynamics known as "emotional dependency". Emotional Dependency involves a continuous pattern of unmet emotional needs that an individual attempts to fulfil in unhealthy way through other individuals (Blasco, 2000), and emanates behavior like manipulation (Del Castillo et al., 2015), loss of identity (Schaeffer, 2012), and low self-esteem (Estévez et al., 2017; Castello, 2005).The conventional Indian context shaped by religious beliefs, customs, age-old prejudices, limited education and financial reliance, expects women to depend on men (Sharma, 2005). Women are socialized for dependency whereas men are trained for dependency early in life. As per Alonso-Arbiol et al. (2002), emotional dependency is recognized as a trait of women, primarily due to the gender role stereotypes rather than the actual gender roles differences. Research shows mixed findings on the link between emotional dependency and gender, with some suggesting that shy women were more prone to depend on their partner compared to non-shy women (Myers et al., 2007). In contrast, Marcos et al. (2020) revealed that adolescent boys exhibited higher emotional dependence on girls, while others reported no significant gender differences (e.g., Jaramillo & Hoyos, 2009). Collectively, the literature on emotional dependency has not been able to reach a unanimous consensus regarding the connection between emotional dependency and gender.

Romantic relationships satisfy the need of close human bonds and can possibly lead to emotional dependence on the partner. However, there is a scarcity of literature on emotional

dependency in the Indian context. Investigating factors leading to emotional dependency within a non-western framework will add to the deeper understanding of relationship dynamics.

The study explores urban context of Gujarat and Uttarakhand. Gujarat, recognized for fast growing economy and women's empowerment (Bhatt & Shastri, 2018), contrasts with Uttarakhand's relatively strong cultural tradition, particularly in patriarchal rural areas (Moller, 2003; Rangan & Jewitt, 2001). The population growth in urban areas of Uttarakand can be attributed, at least in part by migration from hill districts (Mamgain & Reddy, 2015). This migration pattern has become a norm wherein people are permanently relocating and settling in places like Nainital, Haldwani and Dehradun instead of returning to their native villages. This migration shapes new identities and culture, as individuals try to maintain connections with their mountain homes while acclimatizing to novel situations (Pathak et al., 2017). Hence, it would be intriguing to understand how regional differences in cultural and gender mentalities in interaction with the influences of gender influences the way an individual behaves, reacts and emotes in a romantic relationship. The current research plans to study these differences between Urban Uttarakhand and Urban Gujarat.

OBJECTIVES

1. To determine the influence of gender and gender role beliefs on emotional dependency in romantic relationships.
2. To find out regional differences between Gujarat and Uttarakhand in the above-mentioned objective.

MATERIAL AND METHODS

The research aimed to understand the influence of gender and gender role beliefs on emotional dependency in the state of Gujarat and Uttarakhand. The study comprised of emerging adults aged 18-29 years from urban educated families in a heterosexual romantic relationship lasting a minimum one year. Using purposive and snowballing technique, 385 participants were selected, with 190 from Gujarat and 195 from Uttarakhand.

The research participants were selected from different colleges and social places using social media, notices, flyers, and word of mouth. Data was gathered through Google forms owing to the aftermaths of the COVID during the time of data collection. There were a few validation questions like "please choose option 3 as the answer" to check the attention of the participants. Participation involved the completion of the following measures:

Emotional Dependency Questionnaire

The data was gathered utilizing the Emotional Dependency Questionnaire (EDQ) which was developed and validated by Lemos and Londoño (2006). The scale pertains to six factors namely separation anxiety, affective expression, modification of plans, fear of loneliness, borderline expression and search for attention. It contains 23 items with strong levels of reliability (Cronbach Alpha of 0.927) and explained 64.7% of the variance.

Gender Role Attitude Scale (GRAS)

This scale created by Zeyneloğlu and Terzioğlu (2011) was employed to assess participants' attitude towards gender roles. It contains 38 items across five domains namely egalitarian gender roles, female gender roles, traditional gender roles, marriage gender roles and male gender roles. The scale's Cronbach alpha reliability for 38 items was 0.92.

JASP software and excel was used to analyze the data. All the participants provided full informed consent and they were informed of their right to withdraw from the study at any point. The study obtained ethical clearance by the Institutional Ethics Committee for Human Research (IECHR), Faculty of Family and Community Science, The Maharaja Sayajirao University of Baroda (Ethical Approval # IECHR/FCSc/PhD/2021/1).

The subsequent section outlines the findings of the study.

RESULTS

The data underwent normality checks through the Shapiro-Wilk test and Levene's test to assess variance equality. The outcomes of these tests are presented in Table-1 and Table-2. Subsequently, decisions regarding further statistical analysis were made based on the test results, and observations of QQ plots and histogram.

Table 1 Descriptive Statistics for Shapiro-Wilk Test Summary Table for Emotional Dependency

Gender	State	M	mdn	SD	W	p
Men	Gujarat	77.42	77.500	20.91	0.983	0.307
	Uttarakhand	71.22	68.000	19.81	0.956	0.003
Women	Gujarat	71.34	71.000	22.52	0.980	0.136
	Uttarakhand	71.09	69.500	21.63	0.982	0.180

Table 2 Levene's Test Summary Table for Emotional Dependency (EDQ)

	Gujarat		Uttarakhand	
Parameters	F	p	F	p
EDQ	0.194	0.660	1.262	0.263

The influence of gender and state on emotional dependency

A two-way ANOVA was conducted to examine the impact of gender and the state (Uttarakhand or Gujarat) on emotional dependency (Table-3).

Table 3 ANOVA Summary Table for Emotional Dependency

Source	*df*	MS	*F*	*p*	Effect Size
Gender	1	927.16	2.04	0.153	0.003
State	1	999.52	2.20	0.138	0.003
Gender * State Interaction	1	850.59	1.88	0.17	0.002
Residuals	381	452.50			

Note.—MS = Mean squares

Analysis of the simple main effects indicated that the state a person belongs to did not show a statistically significant impact on emotional dependency (p = .138). Similarly, the examination of simple main effects demonstrated that gender does not significantly impact emotional dependency (p = .153). Further, there was no statistically significant interaction between gender and state with regard to emotional dependency (F(1, 381) = 1.88, p = .17). Thereafter, gender differences in emotional dependency were assessed separately in the state of Gujarat and Uttarakhand, respectively (Table-4).

Table 4: Independent t-test Summary of Gender Differences in Emotional Dependency (EDQ) in Uttarakhand and Gujarat

	Group	N	Mean	SD	Statistic	DF	p
Uttarakhand	Men	95	71.22	19.81	0.44	193	0.965
	Women	100	71.09	21.63			
Gujarat	Men	90	77.42	20.91	-1.92*	188	0.05
	Women	100	71.34	22.52			

*p = 0.05

A t-test was performed to compare the emotional dependence between men and women. There existed a significant gender difference in emotional dependency in Gujarat with men (M= 77.42, SD = 20.91) scoring high on the emotional dependency than women (M =71.34, SD = 22.52); t =-1.92, p = 0.05. However, no significant difference in emotional dependency was observed among men and women in Uttarakhand.

Relationship between gender role beliefs and emotional dependency

Correlational analysis was used to assess the relationship between gender role beliefs and emotional dependency (Table-5).

Table 5 : Spearman's Correlations between subscales of Gender Role Beliefs and Emotional Dependency

Variable			1	2	3	4	5	6	7
1.	Emotional Dependency	r_s	-						
		p	-						
2.	Gender Role Beliefs	r_s	-.151**	-					
		p	.003	-					
3.	Egalitarian	r_s	.023	.531***	-				

	Gender Roles	p	.653	<.001	-				
4.	Marriage	r_s	-.136**	.780***	.367***	-			
	Gender Roles	p	.007	<.001	<.001	-			
5.	Female	r_s	-.168***	.786***	.271***	.527***	-		
	Gender Roles	p	<.001	<.001	<.001	<.001	-		
6.	Traditional	r_s	-.113*	.850***	.355***	.552***	.541***	-	
	Gender Roles	p	.026	<.001	<.001	<.001	<.001	-	
7.	Male Gender	r_s	-.118*	.807***	.389***	.605***	.549***	.678***	-
	Roles	p	.021	<.001	<.001	<.001	<.001	<.001	-

***p<.001, **p<.01, *p = 0.05

The results indicated a negative association between gender roles beliefs and emotional dependency. Furthermore, there was a negative correlation observed between female gender roles and emotional dependency, $r_s(385) = -.168$, $p<0.001$; a significant negative correlation between male gender roles and emotional dependency $r_s(385) = -.118$ $p = .021$, a significant negative correlation between traditional gender roles and emotional dependency $r_s(385) = -.113$, $p = .026$, and a significant negative correlation between marriage gender roles and emotional dependency $r_s(385) = -0.136$, $p = .007$.

Simple linear regression was employed to examine whether gender role beliefs served as a significant predictor of emotional dependency. The findings of the regression analysis are presented in Table-6. Results indicated that gender role beliefs explained a statistically significant 2.5% of the variance on emotional dependency, $F (1, 383) = 9.862$, $p = .002$, $R^2 = 0.025$.

Table 6: Regression coefficients of Emotional Dependency

Model		Unstandardized	Standard Error	Standardized	t	p
1	(Intercept)	105.761	10.593		9.984	< .001
	Gender Role Beliefs	-0.199	0.063	-0.158	-3.140	0.002
2	(Intercept)	94.56	13.996		6.756	< .001
	Egalitarian	0.299	0.379	0.044	0.791	0.43
	Female	-0.702	0.285	-0.161	-2.465	0.014
	Marriage	-0.069	0.357	-0.013	-0.192	0.848
	Traditional	-0.09	0.295	-0.024	-0.306	0.76
	Male	-0.168	0.443	-0.031	-0.38	0.704

Multiple regression was used to test if sub-scales of Gender Role Attitude Scales significantly predicted participants' emotional dependency. The findings of the regression analysis indicated that egalitarian, female, marriage, traditional, and male gender roles accounted for 3.8% of the variance in emotional dependency, $F (5,379) = 2.995$, $p = 0.012$, $R^2 = 0.038$. Further, the examination of the individual predictors revealed that female gender roles were significant predictor in the model.

DISCUSSION

The findings did not reveal any overall statistically significant gender variations, yet significant gender differences emerged specifically within the state of Gujarat. Moreover, the descriptive statistics indicated that men were more emotionally dependent on women. Despite the lack of Indian literature on emotional dependency; the results align with recent studies conducted

in Latin American, which suggests that a greater number of men rely emotionally on women (Estévez et al., 2018; Urbiola & Estévez, 2015). The present results are in contradiction with a few South European studies that suggest. For example, emotional dependency was a more common occurrence in women compared to men owing to biological and cultural reasons (González-Jiménez & Hernández-Romera, 2014). Women, influenced by social conventions, exhibit greater empathy and maintain affective ties, while men are supposed to showcase detachment and individualism. Likewise, Alonso–Arbiol et al. (2002) proposed that women had higher emotional dependence compared to men.

A significant finding of the study was that gender role beliefs significantly predicted emotional dependence aligning with the findings of Rowell (2011) who stated that gender and gender ideology profoundly impacted the preferences of mutual emotional dependence. A study was carried out by Cionea et al. (2019) to examine the cross-cultural differences in romantic relationship expectations in India and the United States. The results suggested that women in both cultures adhered to the conventional expectations of femininity, thus valuing emotional closeness and support. They additionally stated that women undergo socialization processes that condition them to think more about their romantic expectations compared to men, which renders those expectations more important for women. Benjanyan et al. (2014) compared the romantic ideals young adults in India and America and established that gender boundaries are becoming permeable, allowing for more spaces for men and women to be less gender defined. However, socio-cultural discourses define "appropriate" behaviors for men and women with explicit gender scripts (Uberoi, 2006), and emotional expressions are gendered. The norms of gender for men are constructed around masculinity (Sivakumar & Manimekalai, 2021), and emotional hardiness (Shrestha et al., 2019), controlling emotions, and handling difficult situations independently are the important attributes of being a man (Manirajah, 2013).

CONCLUSION

The study focused on understanding the influence of gender on emotional dependency in romantic relationship. The results revealed no significant gender or state differences; however, there were variances between genders within the states. This indicates that notwithstanding pan-cultural Indian mentalities, there are region specific differences influenced by varying region-specific gender socialization practices. Modernized and economically developed India is giving way to socio-demographically different heterogeneous communities with varied socialization goals and practices (Raval et al., 2013), hence the different experiences in Gujarat and Uttarakhand.

Unlike the predominant socio-cultural narrative, men exhibited greater emotional dependence on women. Men are increasingly engaging in more emotional work within relationships challenging the conventions of hegemonic masculinities (Holmes, 2015), and are not afraid of expressing emotions in the relationships (Forrest, 2010). Men and emotions remains one of the least studied areas in the scientific realm, hence, it is of primary importance to divert academic attention towards it. The practical implications include potential applications in workshops, counseling, early childhood education and gender-sensitive and gender-neutral. The study carries significance for educational interventions for developing healthy relationships, particularly strategies for couples' communication. Additionally, the study's insights can be used in professional settings to offer spaces to communicate and clarify misunderstood emotions and

ways of expressions. Future studies could be conducted involving family to understand what familial context could predict emotional dependency and what constitutes healthy and unhealthy dependency within the larger context of Indian families. Moreover, it could be worthwhile to explore how relationships kept hidden or unknown to family members influence emotional dependency and well-being.

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EXPLORING FOOD RESPONSIVENESS AND FOOD FUSSINESS IN CHILDREN WITH SPECIAL NEEDS AND TYPICALLY DEVELOPING CHILDREN TO UNDERSTAND THEIR EATING BEHAVIOUR

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ABSTRACT

Children with special needs face developmental and nutritional challenges which hinder their proper growth and development. Improper muscle coordination, cognitive impairment, inadequate family and societal support are a few causal factors behind these anomalies. Mealtime behavior problems like food refusal, food selectivity, mealtime aggression, rumination, pica and insufficient feeding skills are commonly observed among such children and they may often face specific barriers to having a healthy relationship with food. In view of the above the present study was designed to determine the eating behavior of typically developing children and children with special needs in Prayagraj city of the state of Uttar Pradesh with regards to their food responsiveness and food fussiness to find out if there was a significant difference in the nutrient intake or dietary habits of children belonging to early childhood years (2-7 years) in both the groups. Purposive sampling technique was employed to select the children from both the groups. The child eating behavior questionnaire (CEBQ) was administered to assess children's eating style. Demographic information was obtained using a self-designed questionnaire. Univariate and bivariate statistical analysis of the eating behavior of children in both the groups was done by using SPSS (20.0) version. Significant association was reported between both the groups over one question only out of the total five questions asked under food responsiveness. Similarly, significant association was reported between both the groups over one question only out of total six questions asked under food fussiness. The study concluded that both the categories of children had almost similar eating behaviour over food responsiveness and food fussiness. An understanding of the development of normal feeding behavior in infants and young children makes it easier to differentiate between self-limited concerns and those requiring further intervention.

Keywords: children with special needs eating behavior, food responsiveness, typically developing children

INTRODUCTION

'Children with Special Needs' is a terminology used for children who face developmental challenges more than typically developing children and its repercussions may possibly last a lifetime. The developmental milestones of these children are not at par with the typically developing children and they need extra support and guidance in meeting their academic, social, emotional and medical needs. They encounter a large number of problems related to their daily

living skills like food habits, eating pattern, emotional disequilibrium, behavioral and health issues. Such children may be suffering from various kinds of disabilities which may interfere with their normal brain functioning and cause lack of coordination.

According to the CRPD, children with disabilities "*include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis*".

Children with special needs may be categorized as suffering from Autism, Attention Deficit Hyperactivity Disorder (ADHD), Cerebral palsy or Down syndrome. Feeding and mealtime behavior problems like food refusal, food selectivity, mealtime aggression, rumination, pica and insufficient feeding skills are commonly observed among such children and they may often face specific barriers to having a healthy relationship with food. Nutritional Disorders in such children may manifest in the form of inadequate nutrient intake due to poor feeding techniques; gross motor self-feeding impairment, swallowing difficulties, regurgitation, and gastro-esophageal reflux; limited appetite, food aversion and food refusal; and coughing, choking or vomiting during eating.

In a study on nutritional status in children with special needs it was seen that these children were shorter than typically developing children. Children in the age range of 4-9 years weighed less and had deficient calorie intake and those in the range of 10-16 years weighed more and had surplus calorie intake than typically developing children. **(Jacob 2021)**

A wide range of eating problems may be encountered by autistic children causing meal time conflicts. They may experience a number of different issues with food like having a preference for soft or crunchy foods. Kids who only eat soft foods may have weak jaw muscles that make eating chewier food unpleased. Sitting still and showing food appropriate behavior at mealtime can also be a challenge for them. Acid reflux is a common childhood disorder but in autistic kids behavioral change like jumping around, becoming wild or crying correlate to the exact time that the acid backs up in the child's throat. Constipation caused either by a limited diet or delayed toileting has the potential to make eating very uncomfortable for a child who feels full or has a stomach ache. Issues with diarrhoea can be related to a child's diet but may also be caused by malabsorption of certain sugar.

Children with Down syndrome, meanwhile, may prefer softer foods because of difficulties encountered when chewing or swallowing. In some infants caradiopathy may impair food tolerance; in others, unfavorable upper airway anatomy may increase the frequency of aspiration. In a study done by **Samantha *et al.* (2021)** children with Down syndrome showed significantly greater feeding problem than typically developing children. These children showed slow drinking behavior & more food avoidant eating behavior.

Strimas *et al.* (2008) found in his study that Attention-deficit/hyperactivity disorder (ADHD) symptoms are significantly associated with over eating. ADHD symptoms relate positively to forms of overeating such as eating in response to negative mood, environmental cues rather hunger and binge eating **(Davis *et al*. 2008).** In a study conducted on children with Cerebral Palsy lack of appetite, constipation, difficulty in swallowing and feeding dysfunction was reported in 38.3%, 25%, 19.2% and 21.7% children respectively. **Erkin *et al.* (2010)**

Obesity and low activity level, constipation and nutrient drug interactions and allergies have been reported to have an impact on overall nutritional status of children with special needs. Since feeding problems may reduce food consumption in such children, dietary counseling of the parents and other family members may be useful to counter the nutrient and mineral deficiencies and monitor the excessive intake of fat.

JUSTIFICATION OF THE STUDY

Children with special needs may suffer from inadequate nutrient intake either due to feeding problems or poor feeding knowledge among care providers. Fulfilling the needs of children with disability and providing then support as positive discrimination would ensure their healthy development and participation in school life and generate positive effect on their academic achievement.

There is a dire need to pay attention to children's eating behavior because of an increase in childhood obesity rates and its long-term health consequences because preferences formed early in life continue into adult life. Children may show positive or negative food eating behaviors due to the strategies followed by governments, schools, parents and other stakeholders who are concerned with childhood nutrition. Child feeding practices and behavioral interventions may modify patterns of intake. Dietary changes accompanied by behavior change methods, exercise and parental involvement can be important in the long-term success.

The present study was an attempt to understand how the food preferences of children are shaped through children's food experiences. It also helped to understand how parents and environment might affect and shape the current and long-term eating behaviors of typically developing children and children with special needs. An understanding of the development of normal feeding behavior in infants and young children will make it easy to differentiate between self-limited concerns and those requiring further intervention.

In view of the above the present study was designed to determine the eating behavior of typically developing children and children with special needs with regards to their food responsiveness and food fussiness to find out if the nutrient intake or dietary habits of children with special needs differed significantly from those of typically developing children of Early Childhood years (2-7 years). Hence the study was undertaken with the following objectives:

OBJECTIVES OF THE STUDY

- To study the food responsiveness of typically developing children and children with special needs
- To study the food fussiness of typically developing children and children with special needs
- To compare the eating behavior of typically developing children and children with special needs on the basis of their food responsiveness and food fussiness to find out the significant differences.

HYPOTHESIS

I. **H_0:** There is no significant association between food responsiveness of typically Developing Children and Children with Special Needs.
H_a: There is a significant association between food responsiveness of typically Developing Children and Children with Special Needs.

II. **H_0:** There is no significant association between food fussiness of typically Developing Children and Children with Special Needs.
H_a: There is a significant association between food fussiness of typically Developing Children and Children with Special Needs.

III. **H_0:** There is no significant association between eating behaviour of typically Developing Children and Children with Special Needs.
H_a: There is a significant association between eating behaviour of typically Developing Children and Children with Special Needs.

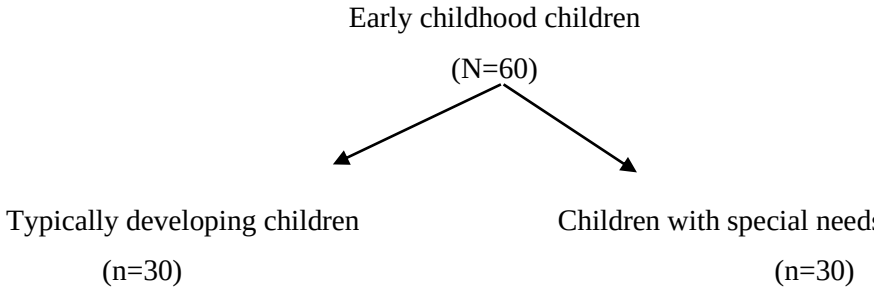
MATERIALS AND METHODS

Research Design

This was a cross sectional study design in which information was gathered about eating behavior of children with special needs and typically developing children.

Sampling

The study was conducted in Prayagraj city of the state of Uttar Pradesh. Purposive sampling technique was employed to select the children belonging to the early childhood years (2-7 years) from both the groups. Thirty typically developing children of the specified age group were randomly chosen from MaaBharti School Allahapur, Prayagraj while thirty children with special needs were randomly selected from Sneh School for Special Children, Ashok Nagar, Allahabad and UDAAN Institute, Prayagraj. Both the institutes catered to the needs of the special children like those suffering from Autism Spectrum Disorder, Down syndrome, Attention Deficit Hyperactivity Disorder and Cerebral Palsy.



Tools Used

The child eating behavior questionnaire (CEBQ) designed by **(Wardle *et al*. 2001)** was used to assess children's eating scale style. A self-designed questionnaire was used to obtain demographic information about the respondent's parents and the respondents. The questionnaire consisted of general information items like Education, Income and Occupation of the respondent's parents, the religion and caste of the respondents, the type of disability faced by children with special needs and their level of disability.

Procedure of Data Collection

The entire study was conducted in two phases. During the first phase thirty typically developing children of early childhood years (2-7years) of Maa Bharti School, Allahapur in Prayagraj were identified. The General information questionnaire and the eating behaviour traits were assessed with the Child Eating Behaviour Questionnaire (CEBQ), completed by the parents on behalf of their child. During phase II thirty children with special needs of early childhood years (2-7years) were identified from Sneh School of special children and Udaan Institute, Prayagraj and information was acquired about the eating behavior of their children.

The entire survey was carried out for a period of one month from March 25 – April 25, 2022.

Statistical Analysis

Univariate and bivariate statistical analysis of the child eating behavior for children with special needs and typically developing children was done by using SPSS(20.0) version.

RESULTS AND DISCUSSION

This section finds out the significant differences between food responsiveness and food fussiness of children with special needs and typically developing children.

Table-1 Distribution of the Typically Developing Children and Children with Special Needs according to their Food Responsiveness

S. No	Questions based on Food Responsiveness	Criteria of Response	Typically Developing Children (N=30)		Children with Special Needs (N=30)		$\chi 2$ Value	Result
			N	%	N	%		
1.	My child is always asking for food	Never	3	10	3	10	3.099	P >.05 Non Significant
		Rarely	4	13.3	3	10		
		Sometime	10	**33.3**	16	**53.3**		
		Often	8	26.7	6	20		
		Always	5	16.7	2	6.7		
2.	If allowed to my child would eat too much	Never	6	20	3	10	6.630	P >.05 Non Significant
		Rarely	5	16.7	7	23.3		
		Sometime	8	**26.7**	9	30		
		Often	5	16.7	10	**33.3**		
		Always	6	20	1	3.3		
3.	Given the choice, my child would eat most of the time	Never	3	10	1	3.3	13.210	P <.05 Significant
		Rarely	2	6.7	2	6.7		
		Sometime	5	16.7	16	**53.3**		
		Often	11	**36.7**	10	33.3		
		Always	9	30	1	3.3		
4.	Even if my child is full up s/he finds room eat his/her favorite	Never	2	6.7	3	10	1.929	P >.05 Non Significant
		Rarely	3	10	1	3.3		
		Sometime	10	**33.3**	12	**40**		
		Often	10	**33.3**	11	36.7		
		Always	5	16.7	3	10		
5.	If given the chance, my child would always have	Never	3	10	1	3.3	8.115	P >.05
		Rarely	5	16.7	8	26.7		

	food in his/ her mouth	Sometime	4	13.3	9	30		Non-Significant
		Often	11	**36.7**	11	**36.7**		
		Always	7	23.3	1	3.3		

*Result was considered significant at 5 % level of significance (P< .05)

Table 1 reveals that maximum percentage of parents of children with special needs (53.3%) responded that their child was always asking for food (sometime) in contrast to 33.3% parents of typically developing children. Maximum percentage of parents of children with special needs (33.3 %) said that it happened often that their child would eat too much if they allowed him/her to do so in contrast to (26.7%) parents of typically developing children who said that this happened sometimes with their children. Maximum percentage of parents of children with special needs (53.3%) said that sometimes their children would eat much if choice based food was given to them in contrast to 36.7% parents of typically developing children who were of the opinion that if they gave choice to their child he/she would of the eat most of the time often. Maximum percentage of parents of children with special needs (40%) said that their child would often eat their favorite food even if they were full in contrast to 33.3% parents of typically developing children.

Maximum percentage of parents of children with special needs and typically developing children (36.7%) each said that their child loves food and if given the chance he/she would always have food in his/her mouth. It was also seen that both typically developing children and children with special needs have a strong liking for their favorite foods and always like to eat it even when their stomach is full or when there is an option of choice-based foods. Out of total five questions asked under food responsiveness, significant association was reported between typically developing children and children with special needs over one question only. However, no significant association was reported between the two categories of children over the remaining four questions. It was thus seen that the children with special needs were more interested in eating all the time as compared to the typically developing children. They showed more craving for food and also had frequent outbursts of hunger. Similar findings were reported by **Hwang *et al.* (1997)** who said that children with disabilities exhibit more desirable dietary habits, such as having regular meals and not skipping breakfast, compared to children with no disabilities because their parents determine their method of eating.

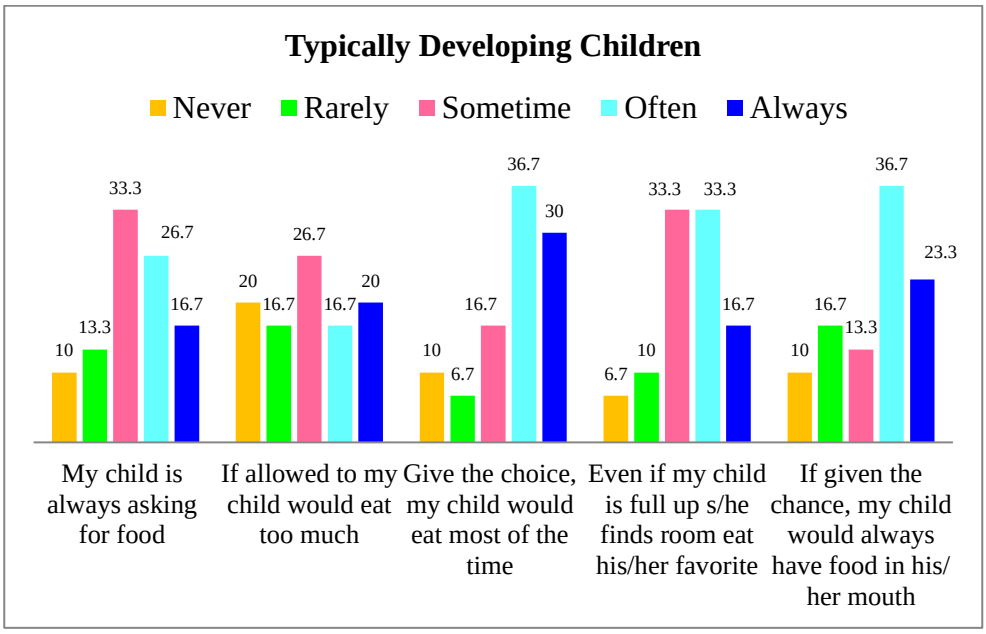


Fig-1 Distribution of the Typically Developing Children according to their Food Responsiveness

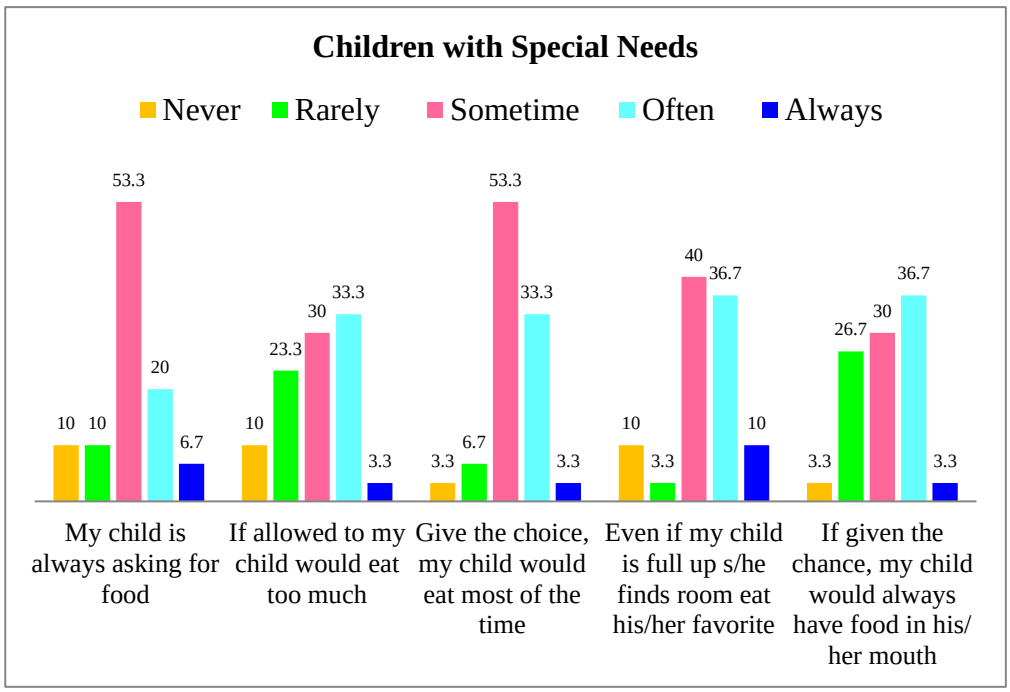


Fig-2 Distribution of the Children with Special Needs according to their Food Responsiveness

Table-2 Distribution of the Typically Developing Children and Children with Special Needs according to their Food Fussiness

S.No.	Questions based on Food Fussiness	Criteria of Response	Typically Developing Children (N=30)		Children with Special Needs (N=30)		$\chi 2$ Value	Result
			N	%	N	%		
1.	My child refuses new food at first	Never	5	16.7	-	-	5.698	P >.05 Non Significant
		Rarely	5	16.7	7	23.3		
		Sometime	9	**30**	9	30		
		Often	8	26.7	10	**33.3**		
		Always	3	10	4	13.3		
2.	My child enjoys tasting new foods	Never	1	3.3	1	3.3	2.253	P >.05 Non Significant
		Rarely	2	6.7	3	10		
		Sometime	3	10	6	20		
		Often	9	30	10	**33.3**		
		Always	15	**50**	10	**33.3**		
3.	My child enjoys a wide variety of foods	Never	1	3.3	-	-	9.793	P <.05 Significant
		Rarely	4	13.3	3	10		
		Sometime	3	10	13	**43.3**		
		Often	8	26.7	7	23.3		
		Always	14	**46.7**	7	23.3		
4.	My child is difficult to please with meals	Never	4	13.3	1	3.3	2.075	P >.05 Non Significant
		Rarely	6	20	6	20		
		Sometime	8	26.7	10	**33.3**		
		Often	9	**30**	10	**33.3**		
		Always	3	10	3	10		
5.	My child is interested in tasting foods s/he hasn't tasted before	Never	1	3.3	2	6.7	3.097	P >.05 Non Significant
		Rarely	5	16.7	4	13.3		
		Sometime	6	20	11	**36.7**		
		Often	12	**40**	10	33.3		
		Always	6	20	3	10		

6.	My child decides that s/he doesn't like a food, even without ta sting it	Never	1	3.3	2	6.7	3.778	P >.05 Non Significant
		Rarely	4	13.3	6	20		
		Sometime	8	26.7	11	**36.7**		
		Often	7	23.3	7	23.3		
		Always	10	**33.3**	4	13.3		

*Result was considered significant at 5 % level of significance (P< .05)

Table 2 elucidates that maximum percentage of parents of children with special needs (33.3%) reported that their child refused to try new food at first often in contrast to 30 per cent parents of typically developing children who said that their child refused to try new food sometimes. Maximum percentage of parents of typically developing children (50%) said that their child always enjoyed tasting new foods in contrast to 33.3 per cent parents of children with special needs who said that their child enjoyed tasting new foods always as well as often. Maximum percentage of parents of typically developing children (46.7%) said that their child always enjoyed a wide variety of food in contrast to 43.3 percent parents of children with special needs who said that their child enjoyed a wide variety of food sometimes.

Maximum percentage of parents of children with special needs (33.3%) said that it was difficult to please their child with new meals often and sometimes in contrast to 30 per cent parents of typically developing children who said that often it was difficult to please their child with meals. Maximum percentage of parents of typically developing children (40%) said that their child would decide that he/she doesn't like a food even without tasting it often in contrast to 36.7 per cent parents of children with special needs who said that their children sometimes showed disliking for a new food without tasting it. Maximum percentage of parents of typically developing children (40%) said that their child was interested in tasting a new food often in contrast to 36.7% parents of children with special needs who reported that their child was interested in tasting a new food only sometimes. Out of total six questions asked under food fussiness, significant association was reported between typically developing children and children with special needs over one question only. However, no significant association was reported between the two categories of children over the remaining five questions. Similar findings were reported by **Lockner*et al*. (2008)** in their study. They found that compared with parents of typically developing children, parents of children with ASD were more likely to report that their children were picky eaters and resisted trying new foods, and they were less likely to describe their children as healthy eaters or that they eat a variety of foods.

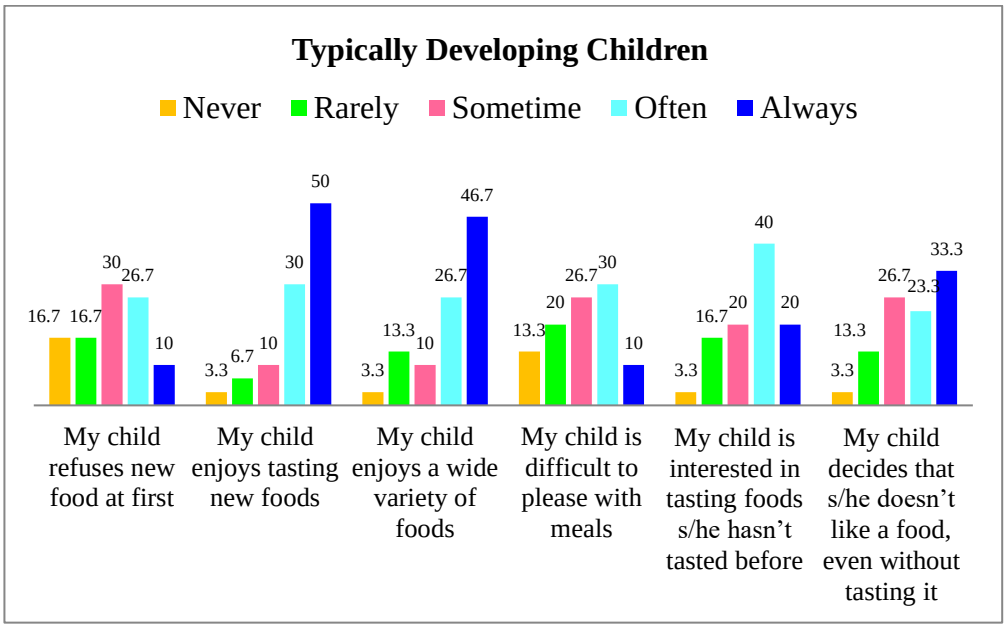


Fig- 3 Distribution of the typically Developing Children according to their Food Fussiness

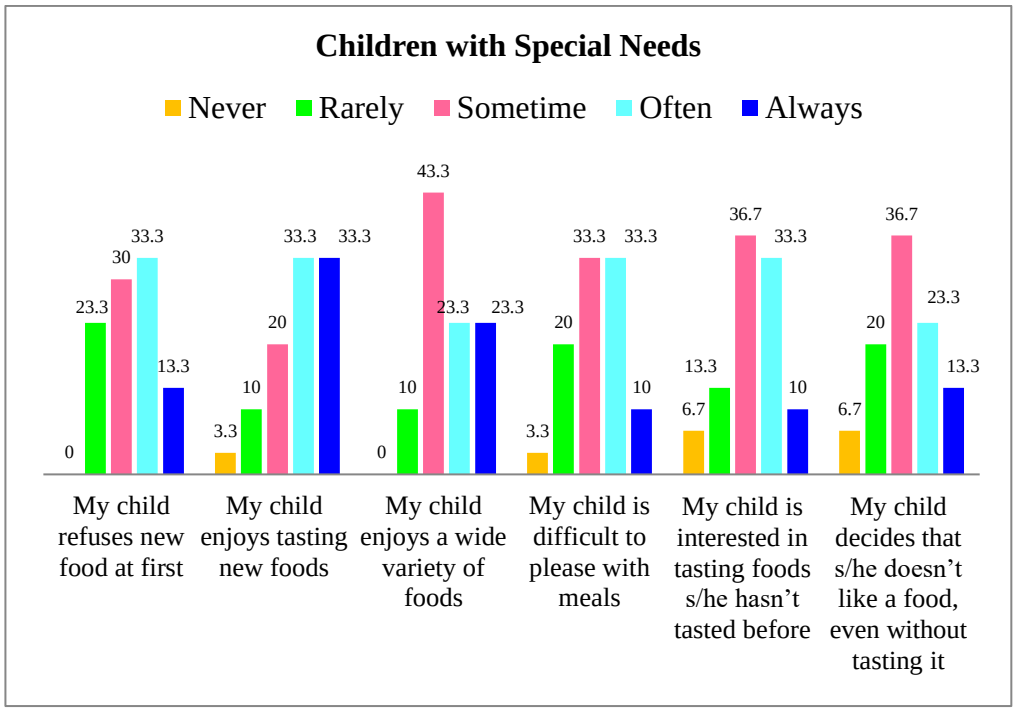


Fig-4 Distribution of the Children with Special Needs according to their Food Fussiness

CONCLUSION

In response to question asked under food responsiveness and food fussiness, significant difference was reported between categories of children over one question only, hence we can say that both the categories of children have almost similar behaviour over food responsiveness and food fussiness. On the basis of the above study it can be concluded that typically developing

children and children with special needs have almost similar eating behaviour in Prayagraj city. The findings of the study were based on limitations like small sample size and time constraints but larger studies may have the power to detect the relationship between the variables. However, the findings also reveal to some extent that children with special needs show variation in eating behavior when compared to the typically developing children due to emotional turmoils like anxiety and anger. They also enjoy less during meal times, do not enjoy a wide variety of foods and also finish their meals slowly. It is also concluded from the study that both the categories of children are fussy eaters and have a small appetite.

RECOMMENDATIONS

- There is a need to pay great attention to children's eating behavior because of an increase in childhood obesity rates and its long-term health consequences because preferences formed early in life continue into adult life.
- Child feeding practices and behavioral interventions may modify patterns of intake. Dietary changes accompanied by behavior change methods, exercise and parental involvement can be important in the long-term success.
- Behaviour analysis and proper stimulation of children during meal times especially the children with special needs may be effective in improving their eating behavior.

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EXPLORING THE PERCEPTIONS OF YOUNG GIRLS ABOUT MENSTRUAL HYGIENE PRACTICES

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ABSTRACT

Menstrual hygiene is a crucial aspect of female health and well-being, yet it remains a taboo topic in many societies, leading to a lack of awareness and inadequate support for women and girls. This qualitative study was conducted to explore the perceptions of young girls on Menstrual Hygiene Practices in different socio-economic classes. A total of 30 participants, 10 participants from each lower, upper-middle, and upper class between the age of 18-24 years and who resided in Delhi-NCR were part of the study. The objectives of this research were to understand the state of menstrual hygiene management, notions and perceptions related to hygiene practices which include the knowledge about myths and social taboos associated with menstruation, and to gain insights into the beliefs and opinions about menstrual hygiene products. The modified Kuppuswamy scale 2022 was used to categorize participants in different socio-economic classes and an interview schedule was used to collect data for the study. The main conclusions highlighted the need to improve menstrual hygiene management among girls despite recent advancements, as it was discovered that participants from low socio-economic profiles still struggle with managing menstruation due to a lack of knowledge about hygiene, the stigma associated with menstruation, and lack of access to menstrual products. Additionally, it was shown that people in the upper-middle and upper classes are still hesitant to transition to alternative hygiene products because there is less family engagement on the topic of menstruation, which leads them to carry out their own research on new products for hygiene management. Though, in a few families, it was noted that menarche was seen as a moment of celebration whereas in some it is still linked with a lot of myths and social taboos.

Keywords: Awareness, Hygiene, Menstrual Product, Menstruation, Social taboos

INTRODUCTION

Menarche, a significant milestone that begins during adolescence, is acknowledged as an event of significance which requires extra care. As a result, maintaining good hygiene practices during menstruation is crucial for keeping a healthy life. Menstrual hygiene is a necessary aspect of a woman's life. "*Menstruation is a recurrent, normal physiological phenomenon in women's reproductive life"* (Mohammed Gena, 2020, p. 1).

As a result, access to education about menstruation beginning in adolescence may promote safe practices and assist in alleviating the suffering of millions of women. The United Nations states that "women and adolescent girls use a clean menstrual management material to absorb or collect blood that can be changed in privacy as often as necessary for the duration of the menstruation period,

using soap and water to wash the body as needed, and having access to facilities to dispose of used menstrual management material" are examples of adequate menstrual hygiene management.

Menarche marks the beginning of reproductive capacity as well as the development of secondary sexual traits. There have always been a variety of perceptions about menstruation in different parts of the world. Its influence is determined by how well girls are prepared at school and home for the changes that will occur when their first menstrual period begins, as well as the lifelong changes that will follow.

Menstruation and menstrual practices continue to encounter severe societal, cultural, and religious limitations, posing a significant barrier to menstrual hygiene management (Kaur et al., 2018).

Food taboos, untouchability, and other cultural attitudes regarding menstruation are unfavorable to people's dignity and health. However, modifying people's perceptions of social taboos associated with menstruation depends in large part on education. Menstruation is a normal biological activity that has been cloaked in mythology, endowed with both positive and evil symbolisms and has been the topic of numerous taboos and rites in all traditional societies for as long as historical records exist.

Also because of advancements in technology and the influence of social media on society, girls have started adopting other menstrual practices such as the use of tampons, menstrual cups, and recyclable cloth pads. Even their mindset related to social taboos has changed a lot. In order to understand the status and perception of menstrual hygiene, beliefs, and opinions on menstrual products among young girls belonging to different socio-economic statuses this study was conducted.

JUSTIFICATION OF THE STUDY

Previous research has so far examined how individuals manage menstruation, hygiene behaviors, disposal methods, and access to clean water and sanitation facilities. Also, they have studied barriers to accessing affordable menstrual products, policies and initiatives aimed at addressing menstrual health. Current study tries to lay the foundation for understanding various aspects of menstrual hygiene management with a focus on intersectionality, considering how factors like socioeconomic statuses intersect to influence menstrual experiences and hygiene practices.

OBJECTIVES

- To know the status of menstrual hygiene management among selected young girls.
- To study the notions and perceptions of young girls related to menstrual hygiene in different socioeconomic strata. (Here the notion refers to the beliefs, attitudes and understandings that girls hold regarding menstruation and hygiene practices. Whereas perception refers to how participants with their subjective understanding perceive and interpret the importance of hygiene and implications associated with menstruation.)
- To elicit beliefs and opinions about menstrual products such as menstrual cups, tampons, and recyclable cloth pads. (Here beliefs refers to the principles or convictions that a participant holds which can be influenced by factors like culture, education, experiences and social environment. whereas opinion refers to a personal viewpoint or a judgment that participant holds on menstrual products mentioned above.)

METHODOLOGY

Sample of the study

- For this study, 30 young girls were selected consisting of 10 participants each from the lower, upper-middle, and upper socio-economic statuses respectively. The age range of the participants was 18-24 years.

Selection of respondents

- Purposive and snowball sampling was used for sample selection. The participants from different socio-economic strata (lower, upper-middle, and upper class) were equally selected. Participants were first contacted through phone calls, to make them aware of the objectives of the study and to seek their consent for participation in the study.
- Also, for the participants belonging to low socio-economic status, a non-governmental organization was reached out to contact the participants.

Tools for data collection

- The Kuppuswamy Scale: The Modified Kuppuswamy Scale (2022) is a socioeconomic categorization system used to classify people or families according to their occupation, level of education, and income. Table 1 details the scale and its components.

Table 1: Parameters and score of the Kuppuswamy Scale

PARAMETERS	SCORE
1. Education of the Head of the family	
● Professional Degree	7
● Graduate	6
● Intermediate/diploma	5
● High School	4
● Middle school	3
● Primary school	2
● Illiterate	1
2. Occupation of the Head of the family	
● Professional	10
● Semi-professional	6
● Clerical/Shop/Farmer	5
● Skilled worker	4
● Semi-skilled worker	3
● Unskilled worker	2
● Unemployed	1

3. Family Income per month (Rs.)	
• ≥185,895	12
• 92951-185894	10
• 69535-92950	6
• 46475-69534	4
• 27883-46474	3
• 9308-27882	2
• ≤9307	1

After knowing about all the factors of participants, scoring was done based on the criteria mentioned in Table 2.

Table 2: Scoring of the Kuppuswamy Scale

Total Score	Socioeconomic class
26-29	Upper class
16-25	Upper middle
11-15	Lower Middle
5-10	Upper lower
Below 5	Lower

However, the present study consists of participants belonging to three categories i.e., lower, upper-middle, and upper class.

- Semi-structured interview– The interview was prepared in cognizance of the objectives of the study, to gather more in-depth information from the participants. This tool allowed for the more comprehensive response of the participants to the themes. Areas for interview included:
  - Age of menarche
  - Prior knowledge of menstruation
  - Personal experiences about the menstrual cycle
  - Products used and alternatives of currently using products during menses
  - Myths and taboos they believe in
  - Opinion on myths and social taboos related to menstruation
  - Cultural beliefs on menstrual practices
  - Advice from gynecologist

RESULTS

1. Age of attaining Menarche

In Davangere, India, Mane et al.'s (2016) study found a favorable correlation between socioeconomic class and the mother's menarcheal age and the menarcheal age of the girls. Additionally, the higher and upper-middle groups experienced delayed menarche, whereas the lower middle and upper-lower classes saw earlier menarche. The study discovered that the lowest and maximum menarche ages are 10 and 15 respectively.

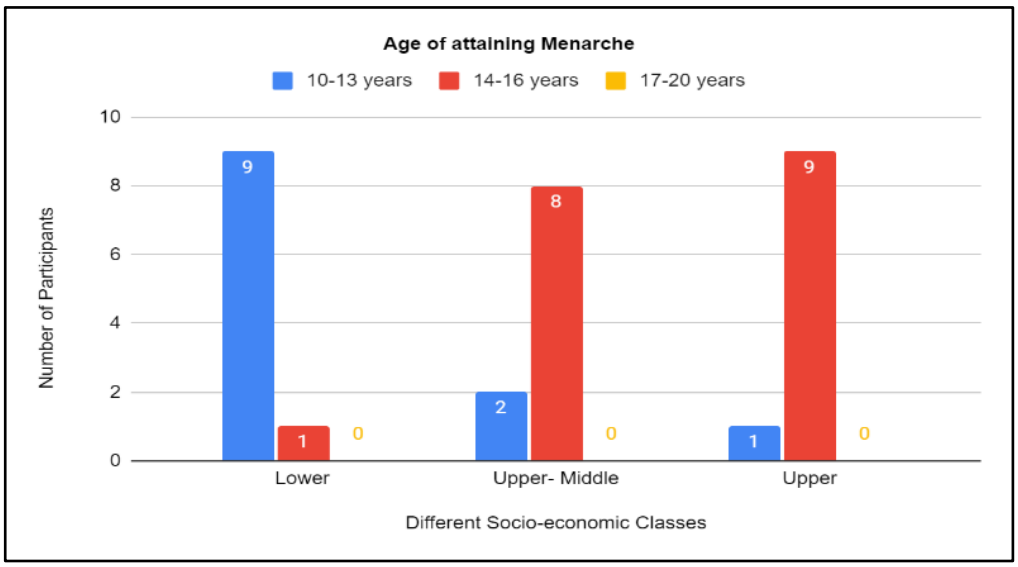

Figure 1: The Age of Attaining Menarche in Different Socio-economic Classes

The current data revealed that in the Lower class, 9 out of 10 participants responded that they got their periods at 10-13 years whereas the rest 1 participant got them at 14-16 years of age (Refer Figure 1).

In the Upper-middle class, 8 out of 10 participants got their first periods at the age of 14-16 years whereas 2 participants got them at the age of 10-13 years.

In the Upper class, 9 out of 10 participants got their first periods at the age of 14-16 years whereas one participant got them at the age of 10-13 years.

2. Reaction and first sharing of Menarche

According to a study by Gold-Watts et al. (2020) in rural Tamil Nadu, reaching menarche was viewed as both a joyous and a painful event. Positive features included how girls experience happiness or delight as a result of celebrating menarche rites of passage into womanhood, which are marked with gifts of clothing and gold ornaments from families. Negative features, on the other hand, focused on the contradictions and complexity of menstrual and menarcheal experiences.

Another study by Ranjan and Rathisha (2022) revealed that the mother is typically (45.7%) the source of knowledge and information regarding menstruation, followed by relatives (23.3%) and

teachers (18.1%) for adolescent females. Only 6% of adolescent girls said that they learned about menstruation from friends and sisters, and only a small percentage said they learned about it via media, books, and magazines.

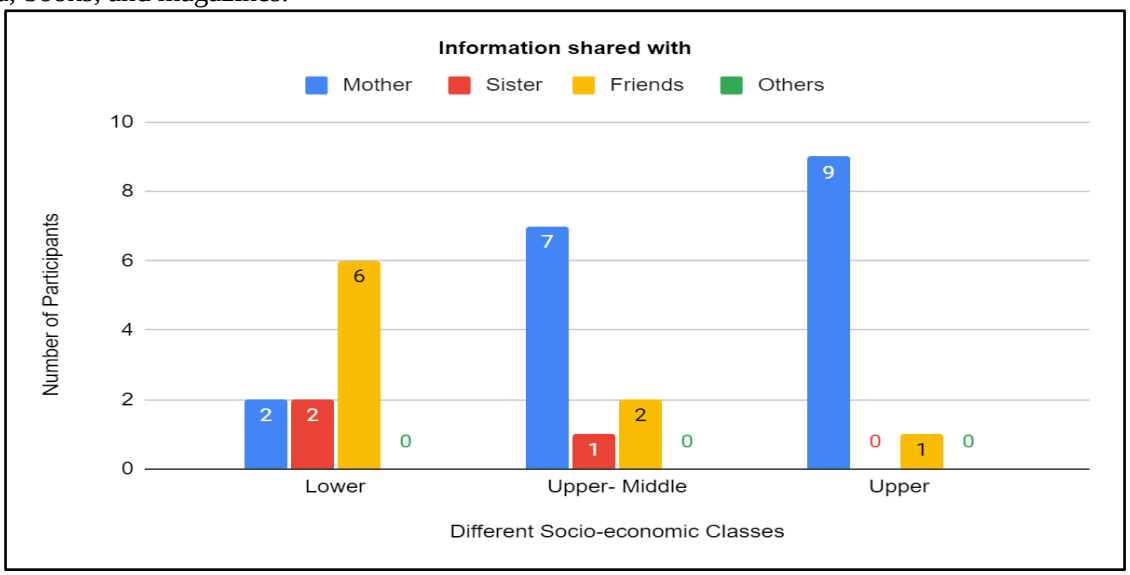

Figure 2: Sharing of Menarche Experiences by Participants

The data in the present study (Refer Figure 2) revealed that in the lower class, participants were scared, confused, embarrassed, and feeling very unhappy about themselves at the onset of menstruation. Six out of 10 participants shared their experience with their friends whereas 2 participants shared it with their elder sister and the remaining 2 shared it with their mother.

Participants from upper-middle class were a little aware of menstruation beforehand through their family and friends, so they were better prepared for it and had a feeling of happiness and felt normal about it. Seven out of 10 participants received prior information from their mother, whereas 2 got informed through their friends and the remaining from their elder sisters.

Whereas in the upper class, most of them were quite aware of it before it happened as they had menstrual hygiene sessions in their schools. Also, many of them talked to their mother and friends beforehand about the same. One participant responded, "I still remember that day, my family was so happy that they organized dinner to which my close family relatives were invited."

3. Experience and feelings during the Monthly Menstrual cycle

During the menstrual cycle, many people experience different physical and emotional symptoms. Physical symptoms can include cramping, pain, headaches, fatigue, and bloating. Whereas emotional symptoms can vary widely, common experiences can include mood swings, anxiety, and irritability.

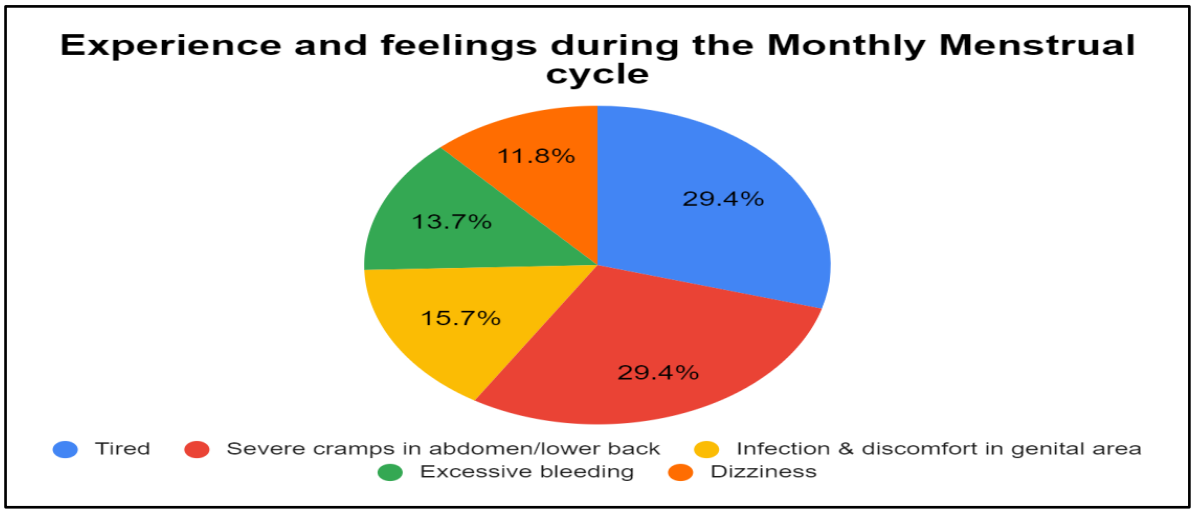

Figure 3: The Experiences of Participants during their Monthly Cycle

In the lower class, it was found that participants felt more tired, and had severe cramps in the abdomen/ lower back, dizziness, excessive bleeding, and infection and discomfort in the genital area.

In the upper-middle class, it was also found that most of the participants experienced pain, tiredness, and severe cramps in the abdomen and lower back.

In the upper class, it was found that participants experienced pain, and cramps abdomen/ lower back. And a few responded that their cycle went very smoothly.

4. Understanding of beliefs and opinions about menstrual hygiene products

Participants of each socioeconomic statuses opted for those menstrual hygiene products which provide them comfort, convenience, affordability, and adequate protection to them.

Figure 4: Commonly used Menstrual Hygiene Products

5. Menstrual Hygiene Products used during menstruation and Opinion on alternative products

The selection of menstrual hygiene products can be based on individual preferences, needs, and access to resources.

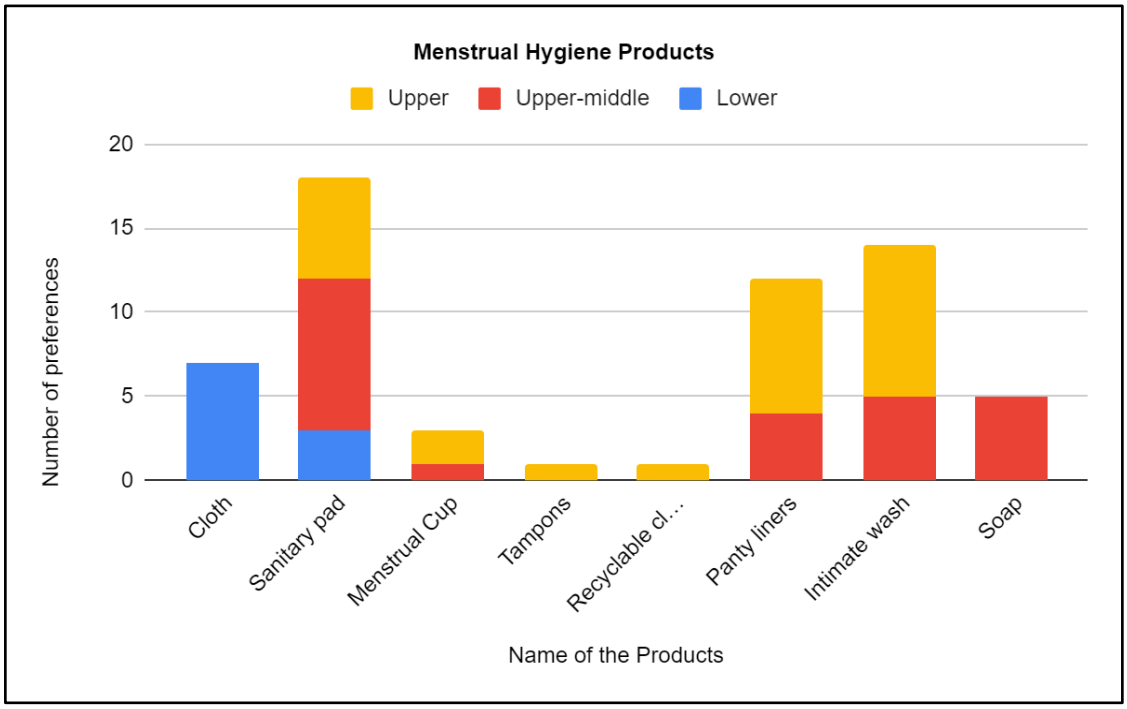

Figure 5: The Preferences for Menstrual Hygiene Product

The data shows (Refer Figure 5) that in the lower class, it was noted that 7 out of 10 participants used cloth whereas the rest 3 used sanitary pads on the first two days of their cycle, and for the rest days they used cotton fabric/cloth.

In the upper-middle class, it was found that 9 out of 10 participants used sanitary pads and 1 used a menstrual cup. Also, they prefer using other products like Panty liners, intimate washes, and soap.

In the upper class, it was found that 6 out of 10 participants used a sanitary pad, 1 participant used a tampon, 1 used a recyclable cloth pad, and the other 2 participants used menstrual cups. Along with this, they also used panty liners and intimate washes to maintain hygiene during their menstruation.

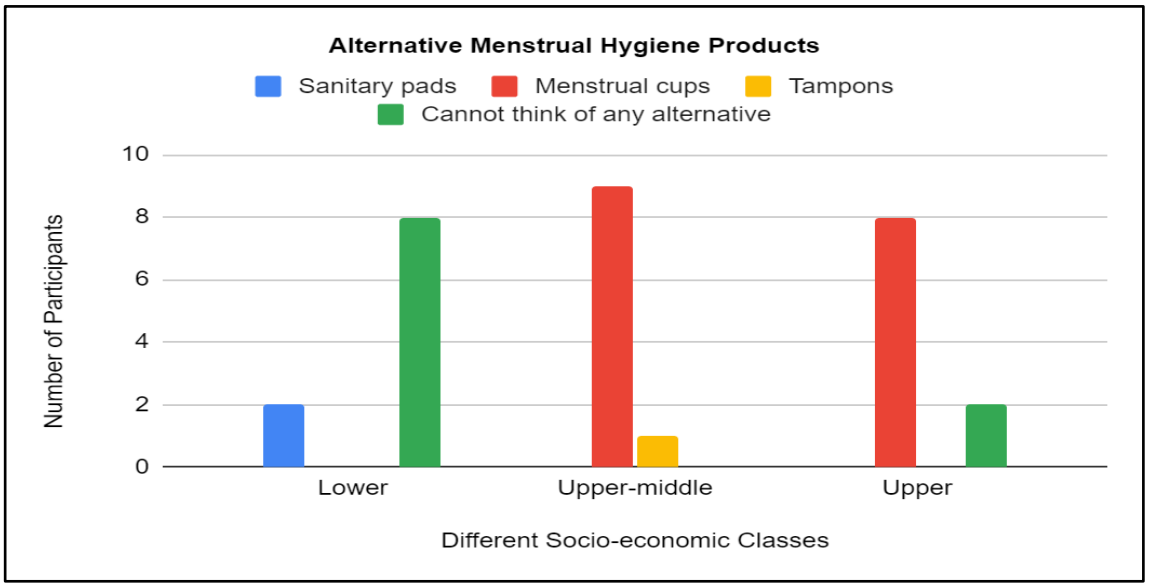

Figure 6: The graph represents the alternative menstrual products

In the lower class, most of the participants responded that they cannot think of any alternative as they think cloth is the most comfortable product. Whereas only 2 participants responded they could think of using the sanitary pad as an alternative to cloth because it will prevent staining.

In the upper-middle class, 9 out of 10 participants responded that they can think of menstrual cups as an alternative to the current product as it is more environmentally friendly and cost-effective too.

In the upper class, 8 participants responded that they think menstrual cups as a perfect alternative to switch because of their reusability, comfort, convenience, and health benefits. Whereas 2 participants responded they cannot think of any alternative as they are already using menstrual cups and find it most effective to use.

6. Reasons for apprehension regarding the use of an alternative product

Many participants think that there are various reasons for not switching to menstrual cups:

- They have a fear of inserting menstrual cups inside their body
- Their mothers have a fear of the thought of their daughters inserting menstrual cups inside the vagina.
- Some are not confident enough.
- Some are researching more about the product.

7. Seeking Gynecologist Advice

In the lower class, it was found that they usually do not seek advice from gynecologists. Once a year or two if they experience any problem then they visit Mohalla Clinic near their house. Sometimes they even discuss it among the females of their age group.

In the upper-middle class, it was found that they visit gynecologists once every 6 months or whenever they feel like there is a need.

In the Upper class, participants responded whenever they found a need to consult a doctor. But one of them said, *"I do not visit often because my mother isn't very supportive of it and when you're still financially dependent on your parents, you have to rely on their decisions."*

8. Activities that are forbidden during menstruation

A study conducted by Yaliwal et al. (2020) in a region of North Karnataka stated that many of the girls observed cultural taboos during their periods, refraining from participating in religious and cultural rituals, abstaining from certain foods and beverages, sitting outside the home, and avoiding touching others. Some of the girls were also forbidden from playing and asked to spend the night away from their families.

The present study revealed the lower class, it was found that participants are not allowed to cook or handle food items, enter places of worship such as temples, or touch sacred products/items, also they are not even allowed to sleep on the same bed.

In the Upper- middle class, most participants responded that they were not allowed to enter temples, touch holy books, or touch various food items in the kitchen such as water pots and pickles as they thought it would become foul; some participants also added that they were not even allowed to wash their hair till their third day. One participant said, *"In my Sikh family, there are no such activities that are forbidden for a menstruating girl."*

In the upper class, there were similar responses noted such as they were not allowed to touch sacred items or enter temples, head washing for the first two days was prohibited, and touching some food items in the kitchen was not allowed during menses.

9. Perception of Social taboos

A study by Yaliwal et al. (2020) described that in most Indian households, females are forbidden from eating or touching sour food items like pickles. Different beliefs forbid women from entering holy places because they will 'pollute' that place. Some traditions celebrate a girl's menarche in accordance with their culture.

Data shows that in the Lower class, many participants said they do believe in such taboos like not entering the kitchen, temples, sleeping on the same bed, and so on. And according to them, it is all right to believe in such taboos as their ancestors also followed the same instructions.

In the upper-middle class, it was found that they are trying not to believe in such taboos as they refer to menstruation as a very natural process and it should not stop us from participating in or doing any activities in our day-to-day lives.

The upper class believed that these notions were quite old-fashioned and there is so much awareness in society.

10. Myths related to the menstrual product

Research by Tembo et al. (2020) in Zimbabwe revealed that due to the lack of information about menstruation, menstrual cups are linked to strong societal ideas about the preservation of virginity.

The only myth that the researchers got to know in all three different categories of socio-economic classes was that participants believed that using a menstrual cup or tampons can create problems in the vagina such as the tearing of the hymen. Even their parents are not comfortable with their daughters' using tampons and menstrual products for their menstrual management.

11. Religion and Cultural Aspects of Menstruation

Research by Gold-Watts et al. (2020) showed that several cultural norms had an impact on the experiences of females. In many cultures, they are not allowed to enter the temple or their home's puja room while they are menstruating, demonstrating how these beliefs guide actions in their daily lives.

In the lower class, participants are much more oriented toward their religion and culture and do believe in such taboos and myths that are associated with it.

Whereas in the upper-middle class and upper class, it was found that people are changing their age-old established norms related to menses but still there are various taboos and myths which have an important place in their religion and culture.

12. Evolving Concept of Menstruation

In the lower class, it can be observed that there is no such change in their perception of menstrual hygiene. They still prefer using cloth, following various myths that are linked with menses.

Whereas in the upper-middle and upper class, the perception of menstruation is changing as more people are realizing the value of menstrual health and the need to break down social and cultural taboos associated with this normal biological occurrence. Various participants stated that:

- *"Yes, it has evolved a lot. There is more acceptance, talking openly, and knowledge about menstruation to everyone."* (Stated by one of the participants from the upper-middle class)
- *"Awareness among all genders is increasing. Advertisements on television have started showing red blood which was blue earlier."* (Stated by one of the participants from the upper-middle class)
- *"I feel that now we are moving towards a more inclusive definition of menstruation which ensures that individuals are more comfortable with their bodies, and their gender identities rather than just being reduced to their biological sex."* (Stated by one of the participants from the upper class)

SUMMARY AND CONCLUSION

This study explores the experiences of girls aged 18-24 from lower, upper-middle, and upper-class backgrounds regarding menstruation. In the lower class, most girls started menstruating between ages 10 and 13, experiencing emotions like shame, fear, and confusion. They lacked prior knowledge of the menstrual cycle and faced various physical discomforts. They primarily used cloth for the first two days due to comfort and affordability issues and only sought medical help in emergencies. Cultural and religious beliefs led to strict menstrual taboos.

Upper-middle-class girls reached menarche between 14 and 16, having received education about menstruation from school and family. They preferred menstrual cups and sanitary pads, using additional hygiene products. Some preferred menstrual cups due to cost-efficiency and eco-friendliness, though a few hesitated due to discomfort. Regular gynecologist visits were common, and they aimed to challenge menstrual stigmas.

In the upper class, participants began menstruating between 14 and 16, with families providing information. They used various hygiene products and considered menstrual cups and tampons comfortable. They observed restrictions during menstruation but generally viewed it as a natural process.

Across all backgrounds, lower-class women lacked menstrual hygiene knowledge and hesitated to discuss it. Cultural influence affected female health and hygiene. Parent-child communication on menstruation was lacking, and young girls sought information from peers. Media representations of menstruation have evolved into a more realistic portrayal. In summary, this study highlights disparities in menstrual experiences and the need for improved education and communication about menstrual hygiene, transcending cultural norms.

SUGGESTIONS

- The study emphasized the significance of community-based interventions that can assist in addressing the obstacles to getting information and menstrual hygiene products.
- It also suggests that there is a need for focused policies and programmes that can help people from various socioeconomic levels manage their menstrual hygiene. For instance, non-governmental organizations and the government can work together to identify and solve the community's demand for menstrual hygiene.
- Also, early education of girls in schools by integrating the concept of menstrual hygiene in their respective curricula can be done.
- Various NGOs can collaborate with companies associated with the manufacturing and branding of menstrual hygiene products such as Whisper, Stayfree, Niine, and so on, to organize campaigns and workshops in local communities.
- Campaigns, Workshops and School programs must focus on enhancing the Mother-Daughter / Parent-Child relationship.

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PARENTAL INVOLVEMENT IN CHILDCARE ACTIVITIES DURING COVID-19

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ABSTRACT

On December 31, 2019, CORONA VIRUS was identified in China. The first case of COVID-19 infection was reported in Kerala, India, on January 27, 2020, when a 20-year-old female presented to the Emergency Department in General Hospital, Thrissur, Kerala, with a one-day history of dry cough and sore throat. A lockdown was imposed to contain the spread of the Virus. The closure of schools was the biggest challenge for parents. It caused stress among the parents as they had to take up roles of teachers, friends, counselors, and guides, besides their exclusive roles as parents. The concept of education changed to homeschooling and later to online classes, which further increased the responsibilities of the parents. Parents had to maintain a balance between their own work schedules and childcare activities, and many reached a stage of parental burnout. The present paper is an attempt to understand the parental involvement in childcare related activities during lockdown.16 mothers and 14 fathers were the respondents in this retrospective study which was based on recall method. A self-devised Parental Involvement with Children during COVID Lockdown (PIWCDCL): Daily routine checklist was used for data collection. The findings show that as compared to fathers and mothers' involvement was found to be more in childcare activities like general activities, preparing meals, academics, health, and safety, developing social and intellectual skills, promoting emotional skills of child. Moreover, in terms of frequency, mothers' involvement was found to be average in childcare activities as compared to fathers. Based on the findings some strategies for crisis time parenting have been suggested too.

Keywords: Children, COVID, COVID Parenting, Crisis Time Parenting, Parents, Parenting Strategies

INTRODUCTION

COVID-19 was the biggest threat causing havoc in the life of each segment of the population. Nobody could ever have imagined that a virus- could become a world disaster. In man made, natural disasters or wars women, girls, and children have been found to be the worst sufferers. During Vietnam and Afghanistan wars schools were destroyed and students used to move to dark places to study to avoid attack from enemies; along with this the deteriorated mental health, fear of losing parents, low immunization rate, and sexual violence too were reported (Prasad, 2011). Natural disasters can also cause stress among children due to death or illness of parents, change in jobs, moving to a new school or home, breakdowns in social networks, abuse, neglect, migration (Kousky,2016). During disasters different resilience strategies have been adopted by the people. It

is important to document the best practices so that others in the same situation may benefit from these and resilience building strategies may be developed.

The need to understand Crisis Time Parenting is imminent to develop strategies for the future. COVID Lockdown and the continuous stressful news from around the world made parenting a challenging task. Parents needed to be active 24x7 for their children and with the shift in the educational system they were the only ones remaining as references for the children who were confined to their homes. During COVID-19 parents were forced to change their parenting style as well as their level of involvement. For the present study, Parental Involvement would mean the investment that parents make in the childcare related activities. ,. Moreover, parents and children suffered from psychological trauma of home confinement, loss of jobs, loss of dear ones, disease, and many other pressures, and children being the silent observers needed full support and cooperation from their families to comprehend what was happening around them. Closure of schools for a long duration created a concept of new 'normal' with which the children and their parents had to cope with.

The long phase during closure of schools was difficult as well as challenging for parents and children. Despite being stressed themselves, parents had to exhibit resilience to bring positivity to children during prolonged periods of lockdown. The parental roles needed to be relearned, and adapted by parents with learning of new skills, one of them being the online mode of teaching; these changes caused apprehension among parents in the context of the future of their children since everything was uncertain and no one had the answers.

Attachment theory introduced by John Bowlby and Mary Ainsworth in 1950's could be correlated with parenting during COVID-19 where parents used to consider and respond to their child's needs in sensitive and loving manner. Parents, apart from valuing academic scores tend to nurture talents of their child with enforcement of some healthy rules as per their child's comfort. Mothers are mostly found to be responsible for successfully balancing / managing domestic work, childcare responsibilities, their work schedule, and family together (Mendonca et al.,2023). COVID-19 Lockdown rendered the change in parenting roles, and with an extension of lockdown period mothers having younger children were managing great amounts of household chores, demands of family, work pressure, job insecurity, restriction over hiring any household help , never ending kitchen time along with childcare responsibilities (Sen et al., 2022., Tayal & Mehta,2023). The crisis and uncertainty created a demand for every family member to adjust and understand and rediscover each other, which was impossible due to the busy routines of home, office, and schools, otherwise. Hence, a need was felt to understand the nature of involvement of both parents in childcare -related activities during the period of lockdown, and how both parents contributed and in which domains. The present study was a preliminary work, which was carried out in this direction.

Due to the increase in the number of cases, the Government of India implemented a 55-day lockdown. Jammu and Kashmir too went into lockdown from 25th March 2020 till 3rd May 2020.Although the decision was taken for the betterment of the general population, but closure of educational institutions was more challenging for the parents. . The present paper is based on a retrospective study and recall method, where parents described their experiences with children during the lockdown period. The parental involvement has been defined as their role in the different domains of childcare on daily basis like their education, play, health, academics, entertainment, promoting emotional wellbeing, developing social and intellectual skills The paper will also help in suggesting some strategies that needed to be adopted by parents during crisis. One of the limitations of the present study is the small sample size.

OBJECTIVES

1. To understand the level of involvement of parents in child- care activities during COVID-19 lockdown.
2. To suggest strategies for building parental capacities during crisis.

METHODOLOGY

Locale of study: -The sample was selected randomly from the urban areas of Jammu, winter capital of the Union Territory of Jammu and Kashmir. Jammu city, known as City of Temples, situated on the banks of the Tawi River, surrounded by the Himalayan Mountains. The city has a population consisting of Hindu, Muslim, and Sikh and Christian communities. The language of the people is Dogri. The total population of Jammu City was 6,91,000 as per the 2011 Census .

Sample: The sample consisted of 30 parents, 14 Fathers and 16 Mothers, from Jammu city whose children were in the age group of 10-13 years presently, and who were 8-10 years at the time of COVID lockdown, i.e. in their middle childhood.

Criteria for sample selection:

- **Residence**: Only parents belonging to Jammu City were selected.
- **Age of the reference child**: Only parents having children between the ages of 8-10 years, during COVID-19 were selected.
- **Mothers Education**: Mothers who had at least attained their Bachelor's Degree were selected.

Tool used:

Parental Involvement with Children During COVID-19 Lockdown (PIWCDCL) Daily Routine Checklist:

This was a self-devised tool prepared for the present research. A list of childcare activities, that the parents of 8-10 years old children had undertaken during the COVID-19 lockdown, was prepared after a series of discussions with parents, experts, and the review available regarding different type of childcare activities. During discussions parental involvement was mostly found in the areas of daily routine activities like waking up the child, brushing, bathing, combing hair , cutting nails, along with preparing meals, academics, health, safety, promoting emotional skills, and development of social and intellectual skills. A checklist was prepared and after discussion with parents and experts some modifications were included, and a final list of activities was prepared.

The final checklist had eight major domains of childcare activities/skills. Each domain consisted of several items as given in Table 1a. The statements were further divided into 2 sections. Section one was related to statements which would assess the involvement of parents in childcare activities during COVID lockdown, which must be answered as **Yes**, scored as 1, or **No** scored as 0. Section two was used to know the frequency of involvement of the parents and other caretakers in the childcare, which must be answered as **Always** scored as 2, **or Sometimes** scored as 1 or **Never** scored as 0.The total scores and their interpretations are given in Table 1a and Table 1b .The purpose was also to know the difference regarding involvement of fathers, mothers, other family members in daily childcare activities. In the present study the involvement of other caretakers was found to be minimal, hence the data has been presented only for mothers and fathers.

Table1 (a) Scoring of items of PIWCDCL (Section-1)

Parental involvement in Childcare Activities			
Activities/Skills	**No. of items**	**Scores (Yes Response scored as 1, No as 0)**	
		Minimum	**Maximum**
General activities	8	0	8
Preparing meals	11	0	11
Online shopping	4	0	4
Academic related activities	16	0	16
Health and safety	15	0	15
Emotional Wellbeing	9	0	9
Social skills	14	0	14
Intellectual skills	13	0	13
Maximum Score		**0**	**90**

Table 1(b) Interpretation of scores of PIWCDCL (Section -1)

Range of Scores (%)	**Actual Scores**	**Level of involvement**
0-25	0-23	Low
25-50	23-45	Medium
50-75	45-68	Average
75-100	68-90	High

After calculating minimum and maximum scores for the given items in **Table1(a)** of PIWCDCL, mean, standard deviation and mean percentage were calculated, and based on mean percentage, a criterion was developed for assessing the levels of involvement of parents in childcare activities, by calculating quartiles as depicted in **Table 1(b)**. Higher scores indicate a higher level of parental involvement

Table2 (a) Scoring of items for PIWCDCL (Section-2)

Frequency of Involvement			
Activities	**No. of Items**	**Scores** Always score response as 2, Sometimes as 1, Never as 0	
		Minimum	**Maximum**
General	8	0	16
Preparing meals	11	0	22
Online Shopping	4	0	8
Academics related Activities	16	0	32
Health and safety	15	0	30
Emotional well-being	9	0	18
Social skills	14	0	28
Intellectual skills	13	0	26
Maximum score		**0**	**180**

Table 2(b) Interpretation of scores for PIWCDCL (Section 2)

Range of Scores (%)	Actual Scores	Level of involvement
0-45	0-48	Low
45-90	48-96	Medium
90-135	96-144	Average
135-180	144-180	High

After calculating minimum and maximum scores for the given items in **Table2 (a)** of PIWCDCL, mean, standard deviation and mean percentage were obtained, based on mean percentage, a criterion was developed for assessing the levels of involvement of parents in childcare activities during COVID lockdown by calculating quartiles as depicted in **Table 2(b)** Higher scores indicate a higher level of parental involvement.

Data Collection

Preliminary Investigation: Before the data collection the checklist was evaluated by experts (Faculty members from the Department of Home Science, University of Jammu). After some modifications as per given suggestions, pretesting of the tool was done on 30 parents.

Final Data Collection: Data was collected through home visits in urban areas of Jammu and office visits within the University of Jammu premises, after seeking the consent from the parents. The

purpose of the checklist was explained to parents, and it was handed over to them, and the fathers and mothers, who were not couples, to fill in the data.

Data Analysis: Data was analyzed with the help of SPSS software. The results were analyzed after the variables were coded and entered in SPSS. Mean, standard deviation, mean percentage, and t test was calculated, for the analysis of the data.

RESULTS AND DISCUSSION

The present research was conducted to understand the level of parental involvement in childcare activities during COVID 19 Lockdown. A detailed checklist was prepared by interviewing the parents which was later evaluated by the experts in Human Development. The findings were analysed and are presented below. The aim was to know the level and frequency of involvement of both the parents, data about significant others in the family was minimal hence has not been described here.

Table 2 Background Information of respondents

Background Variables	**Father (N=14)**	**Mother (N=16)**	**Total (N=30)**
Qualification of parents			
10th	1(7.1%)	-	1(3.3%)
12th	3(21.4%)	-	3(10%)
Graduates	8(57.1%)	4(28.5%)	12(40%)
Postgraduates	2(14.2%)	7(43.7%)	9(30%)
Professional	-	5(31.25%	5(16.6%)
Occupation of parents			
Govt. Employee	5(35.7%)	4(28.5%)	9(30%)
Private Employee	7(50%)	2(12.5%)	9(30%)
Business	2(14.2%)	2(12.5%)	4(13.3%)
Homemakers	-	8(50%)	8(26.6%)
Type of family			
Joint family	6(42.8%)	11(687%)	17(56.6%)
Nuclear family	8(57.1%)	5(31.25%)	13(43.3%)

Table 2 reveals that most fathers (57.1%) were graduates and (43.7%) of mothers had obtained master's degree. Most of the fathers (35.7%) were working in private sectors whereas 50% mothers were homemakers. Many (42.8%) of fathers belonged to joint families whereas (57.1%) of mothers belonged to nuclear families.

Table 3 Parental Involvement in childcare activities during COVID Lockdown

Involvement of parents											
Activities/ skills	**Scores**			**Mothers (N=16)**				**Fathers (N=14)**			
	No. of items	**Minimum**	**Maxi-mum**	$\bar{x}$	σ	**Mean %**	**Level of involvement**	$\bar{x}$	σ	**Mean %**	**Level of involvement**
General activities	8	0	8	5.1	0.47	63.5%	Average	1.0	0.34	12.5%	Low
t-value=27.0*											
Preparing meals	**11**	**0**	**11**	**9.25**	**0.37**	**84%**	**High**	2.7	0.43	24.5%	Low
t-value=44.8*											
Online shopping	4	0	4	0.87	0.41	21.7%	Low	0.64	0.37	16%	Low
t-value=1.60(NS)											
Academic related activities	**16**	**0**	**16**	**14.5**	**0.28**	**90.6%**	**High**	3.0	0.39	18.75%	Low
t-value=93.6*											
Health and safety	**15**	**0**	**15**	**12.6**	**0.36**	**84%**	**High**	9.8	0.47	65.3%	Average
t-value=18.4*											
Emotional Wellbeing	**9**	**0**	**9**	**7.3**	**0.39**	**81%**	**High**	4.5	0.50	50%	Medium
t-value=17.2*											
Social skills	**14**	**0**	**14**	**11.8**	**0.36**	**84.2%**	**High**	7.2	0.50	51.4%	Average
t-value=29.1*											
Intellectual skills	**13**	**0**	**13**	**7.5**	**0.49**	**57.6%**	**Average**	**4.1**	**0.46**	**31.5%**	**Medium**
t-value=19.5*											
Total scale score -90			Mean score of mothers			69.0	Mean score of fathers				33.4
			S.D			7.26	S.D				3.12
t-value=16.9*											

***Significant at p-value<0.0001, Non- significant (NS)**

Table 3 shows that during lockdown mothers' involvement was found to be ***high*** in childcare activities related to academics, health, and safety, promoting emotional wellbeing, social skills and preparing meals and it was ***average*** for general activities and promoting intellectual skills. On the other hand, fathers' involvement was found to be ***average*** regarding childcare activities of health and safety, developing social skills and it was medium for promoting emotional wellbeing and intellectual skills. ***Low involvement*** of both parents was found in the online consumer behavior of children. Mean score for fathers was 33.4± 3.12 which shows ***medium*** level of involvement, and for mothers it was 69.0 ± 7.26 showing ***average*** level of involvement. Significant differences were found in involvement of both parents in childcare activities favoring the mothers in general

activities, preparation of meals, activities related to academics, health and safety, promotion of emotional wellbeing, and development of social and intellectual skills.

Table 4 Frequency of Parental involvement in Childcare during COVID Lockdown

Frequency of involvement											
Activities	**No. of Items**	**Scores**		**Mother (N=16)**				**Father (N=14)**			
		Mini-mum	**Maxi-mum**	**$\bar{x}$**	**σ**	**Mean %**	**Level**	**$\bar{x}$**	**σ**	**Mean %**	**Level**
General activities	8	0	16	10.37	0.89	64.8%	Medium	2.07	0.65	12.9%	Low
t-value=28.7*											
Preparing meals	11	0	22	17.4	2.67	79%	Medium	2.2	0.93	10	Low
t-value=20.2*											
Online shopping	4	0	8	1.5	0.57	18.75 %	Low	0.64	0.37	8	Low
t-value=4.8*											
Academic related activities	16	0	32	25.3	0.73	79%	Medium	4.7	0.63	14.6	Low
t-value=82.1*											
Health and safety	15	0	30	22.9	0.77	76.3	Medium	19	4.7	63.3	Medium
t-value=3.2*											
Emotional well-being	9	0	18	10.3	0.74	57.2	Medium	5.9	0.80	32.7	Low
t-value=15.6*											
Social skills	14	0	28	22.5	0.76	80.3	Medium	15.6	0.98	55.7	Medium
t-value=21.6*											
Intellectual skills	13	0	26	12.0	0.85	46.15	Medium	7.7	0.82	29.6	Low
Total scale score-180			Mean score of mothers			122	Mean score of fathers				58
			S.D			13.04	S.D				6.57
t-value=16.58*											

***Significant at p-value<0.0001, Non- significant (NS)**

During lockdown, the frequency of involvement of mothers (Table 4) was found to be ***medium*** for childcare activities related to academic, promoting emotional wellbeing, health, and safety, developing social, intellectual skills, and preparing meals. Fathers also showed a ***medium*** frequency of involvement in childcare activities for health and safety and developing social skills, with ***low*** frequency of involvement in general and academic activities, promoting emotional wellbeing, preparing meals, and developing intellectual skills. ***Low involvement*** of both parents was found in the online consumer behavior of children. Total mean score for fathers was 58 ± 6.57showing ***medium*** frequency of involvement, and 122± 13.04for mothers showing ***average*** frequency of involvement. Significant differences among parents were found in frequency of their

involvement in all the above given activities/ skills, with mothers being more frequently involved in childcare activities than fathers.

DISCUSSION

Parents play an important role in child's life, and how much they engage themselves in different areas of their child's development for building up his/her overall personality is what called as parental involvement (Joshi & Varshney, 2022). As per human development perspective parents are the major source of training and developing the child socially, and many psychologists and economists believe that parents are investing resources in developing social, emotional, psychological wellbeing of child (Ford et al., 2016).

The analysis of the Parental Involvement with Children during COVID Lockdown (PIWCDCL) daily routine checklist shows that the involvement of mothers and fathers in childcare activities, during COVID-19 lockdown, was not similar, fathers were found to be either sometimes/ never /very few times involved in childcare activities in comparison to mothers. Mothers' level of involvement, apart from academics and general activities, was frequent in context of health of child, developing social skills, understanding emotional needs of the child, academics, preparing favorite dishes for them, teaching religious hymns etc. The crisis forced everyone to stay and work from home, but the major task of childcare seems to have fallen on mothers only as per the findings given above.

Mothers had an important place in children's understanding COVID-19 pandemic (Gokalp & Kemer 2022). They were known to be brave, resilient, and creative because of their determination towards family and its members during COVID-19. Homemakers were totally absorbed in household chores, tended to have low self-esteem, stress, depression, anxiety caused due to social isolation, restricted movements and focus on family only, and those working from home needed to spare time for household chores, childcare as well as for her work all alone without any division of work (Wala, 2021).In spite of all the stress they contributed frequently to childcare as is apparent from the present study too. They kept their families going and strong with all the efforts they could put in.

Based on the observations and interactions with the parents some strategies have been proposed for Crisis time Parenting

- **Physical and Mental Health of Parents:** -Being physically strong parents will be able to manage all their responsibilities easily. Parents may experience anxiety, stress, sadness, loneliness, other mental disorders that may worsen with time. Parents must be resilient enough during crisis, and they need to distract their mind by involving themselves in activities like watching favorite movies, reading favorite books, trying new recipes for family, painting connecting with friends through social media, doing yoga, going for walk, listening to music, starting online business, family workout sessions for maintaining physical health.
- **Family mental health: -**During any crisis the whole family needs to change their way of living to avoid conflicts. Though there was nothing positive about COVID Lockdown, but it was like an opportunity, where families could spend quality time with each other.
- **Involvement in Childcare and involvement of children in household activities:-** During crisis children need to be explained the "whys?" and "Why not?". Parents can dedicate some quality time with children by involving them in household activities like cleaning, washing, dusting, experimenting and preparing dishes together, making their bed

themselves, arranging books, clothes, watering plants, with inclusion of some fun and physical activities like playing with toys, storytelling, artwork, singing rhymes, dancing, sketching, drawing, making documentaries, scrapbook, reading comics/story books to channelize their energy level.

- **Positive Reinforcement of Good Behavior: -**Children, while dealing with the consequences of crisis may show anger or misbehave with parents; positive reinforcement can be helpful in such situations. Daily life examples or narrating some religious or moral stories can be helpful to change behavior of children. Parents need to appreciate their changed behavior also.
- **Keeping the children in Loop of information and model good behavior:** To satisfy children's curiosity, parents need to be honest while conveying any kind of information. During crisis they themselves need to follow the same rules, and model good behavior for children especially those are below 5 years of age.
- **Restrict the Screen time:** - In present scenario the biggest challenge for parents was to keep children away from a screen, due to online education Smart phones/tablets are becoming essential learning tools as well as addictions that can further affect their overall development. Parents need to set some rules regarding screen time. Children can be encouraged to do some stretching exercises, set priorities like finishing homework / household work before using the mobile/ tabs, ensure no usage during mealtime or before sleep. Active supervision is needed by parents to monitor body posture, screen brightness, and screen distance that can build up interaction between them and moreover help parents monitor their usage. Most importantly parents themselves need to limit their smart phone usage and spend more time with children.

Limitation: One of the limitations of the study is the limited sample size.

CONCLUSION

COVID-19 pandemic altered the lifestyle of people all around the world and it took a lot of time for everyone to adapt and adjust during pandemic and after pandemic. It changed the lifestyle of children leading to reduced physical activity, inadequate sleep quality, increased screen time, unhealthy eating habits and feeling of loneliness due to restricted social interactions whereas parents also suffered from psychological distress due to financial hardships, loss of work, loss of interactions, additional responsibilities, closure of schools, suspended educational services, uncertainty of future, death of closed ones etc. The present results show that the mothers were more involved in childcare related activities during the COVID Lockdown phase and based on the findings some strategies for Crisis Time Parenting have been proposed. More such studies are required which can document the parenting strategies during the COVID 19 period, so that they can be used for developing Family Resilience Building Programs, online and offline, in Indian context.

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THE DIFFERENCES IN GENDER AND AREA OF RESIDENCE ON SOCIAL MATURITY AMONG ADOLESCENTS: A DESCRIPTIVE STUDY

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ABSTRACT

Social maturity is the capacity to function in a responsible and suitable manner and adolescence is characterized by biological development and social changes and expresses mature behaviour. Social maturity permits a more detailed perception of the social environment which helps adolescents to influence social circumstances and develop stable patterns of social behaviour. The present study aims to analyse the "social maturity among adolescents". The prescribed sample size is 550 adolescents with 186 males and 364 females. The sample were collected through a simple random sampling method and the tool used was Rao's social maturity scale. To analyze the data Kruskal-Walli's test was used. The result indicates that females have shown a higher level of social maturity compared to males and there is no significant difference in the level of social maturity among adolescents across gender. Regarding the area of residence, social maturity is higher among adolescents from urban area compared to adolescents living in rural area. There is no significant difference in the level of social maturity among adolescents based on area of residence.

Keywords: Adolescents, Interpersonal Adequacy, Personal Adequacy, Social Adequacy, Social Maturity,

INTRODUCTION

Adolescence is a stage of life characterized by biological development and social changes. It has evolved over the past 100 years, with onset sped up by puberty and endpoint age extended into the 20s (Sawyer et al. 2018). Along with physical change and growth, adolescents also go through emotional, psychological, social, and mental development. Three stages of adolescence can be widely distinguished: early adolescence (about between the ages of 11 and 13), middle adolescence (roughly between the ages of 14 and 17), and late adolescence (roughly between the ages of 17 and 19) (Salmela-Aro, 2011). Adolescence is a challenging period for researchers due to its variable nature and generic nature. It is also difficult to define identity, which includes socio-political stances, existential standpoints, and internal wants, capacities, and self-perceptions (Marcia, 1980). Social maturity permits a more detailed perception of the social environment

which helps adolescents to influence social circumstances and develop stable patterns of social behavior (Bretsch, 1952)

Social maturity involves emulating role models to achieve acceptable social behavior, encompassing interactions with mature individuals, forming relationships, and respecting authority figures (Shanmuganathi, 2020). It entails responsible conduct in interactions, fostering adaptive functioning, and goes beyond mere social skills and competence (Marschark et al., 2017). Rao (1986) defines it as understanding the social world, including relating to acquaintances, friends, and authority figures. Personal adequacy, a key aspect, encompasses work orientation, self-direction, and stress management (Rao, 1986). Work orientation involves job-related skills, self-direction entails independence and control, while stress management involves facing challenges confidently and with emotional stability. Interpersonal adequacy includes communication, enlightened trust, and cooperativeness (Rao, 1986). Communication involves oral and written skills, enlightened trust pertains to accepting others' decisions, and cooperativeness is adhering to social rules agreeably. Social adequacy, the third domain, encompasses social commitment, tolerance, and openness to change, reflecting unity, sensitivity, and adaptability in social settings (Rao, 1986).

Singh et al. (2013) conducted a study based on gender differences and it was found that the social adequacy component of social maturity was higher among girls. However, Pant and Singh (2017) found that educated mothers' children were socially more mature than uneducated mothers. Similarly, it was observed from the study of Arshi and Sahai (2022) that there is no difference between the social maturity and adjustment of adolescents. Also, Masoume Shokrollahzade, Parisa Sadat Seyed Mousavi, et al. (2021) revealed that there was a relation between parent attachment and social maturity but there is no relationship between peer attachment and social maturity among adolescents.

RATIONALE OF THE STUDY

The development of social skills, emotional intelligence, and responsible behaviour required for navigating social interactions and relationships in a positive and adaptable way is referred to as social maturity in adolescents. Social maturity is important among adolescents because it is helpful to build a healthy connection with their classmates, families, instructors, and other people in their lives. They can demonstrate empathy, comprehend and control their emotions, and effectively communicate to build strong relationships. Also, it is found that adolescents with social maturity have more capacity to handle conflicts more productively. Socially mature adolescents frequently perform better academically because they can work well with peers, ask teachers for assistance when necessary, and participate effectively in group projects. Additionally, they frequently participate more actively in class debates, which enhances the learning environment. It can also infer that adolescent’s mental health is always important so the improvement of social maturity can benefit mental health. Teenagers who can deal with social difficulties and form sustaining connections are less likely to feel depressed or lonely. For overall well-being and quality of life, there are some skills which can be interviewing for jobs, building relationships, and networking. So, when adolescents are more socially mature, they can develop all these skills. So, it was found that social maturity is important for adolescents' overall well-being and their quality of life.

OBJECTIVES

- To study the level of social maturity among adolescents based on their gender.
- To study the level of social maturity among adolescents based on their area of residence.

HYPOTHESES

The alternative hypotheses formulated for the present study are as follows;

H0:1 There will be a significant difference in the level of social maturity and associated variables (Personal Adequacy, Interpersonal adequacy, social adequacy) across gender

H 01:1 There will be a significant difference in the level of personal adequacy among adolescents across gender

H 01:2 There will be a significant difference in the level of inter-personal adequacy among adolescents across gender

H 01:3 There will be a significant difference in the level of social adequacy among adolescents across gender

H 01:4 There will be a significant difference in the level of social maturity among adolescents across gender

H0:2 There will be a significant difference in the level of social maturity and associated variables (Personal Adequacy, Interpersonal adequacy, social adequacy) across area of residence

H 02:1 There will be a significant difference in the level of personal adequacy among adolescents across area of residence

H 02:2 There will be a significant difference in the level of inter-personal adequacy among adolescents across area of residence

H 02:3 There will be a significant difference in the level of social adequacy among adolescents across area of residence

H 02:4 There will be a significant difference in the level of social maturity among adolescents across area of residence.

METHODOLOGY

Problem

Is there any significant difference in the level of social maturity among adolescents across the demographic details?

Variables of the study

- ***Independent Variable:*** Gender, Area of residence
- ***Dependent Variable:*** Social Maturity (Personal Adequacy, Inter-personal Adequacy & Social Adequacy)

Research Design

- ***Quantitative research design***

The study is Quantitative and adopted a between-group research design to assess if there is any significant difference in the dependent variable across the independent variable. A quantitative between-group design, often referred to as a between-subjects design or an independent-groups design, is a research method used to compare two or more distinct groups to determine if there are significant differences in a particular variable. Here the researcher finds a significant difference in social maturity and its associated variables among adolescents across the gender and area of residence.

Sampling design and Sample size

The sample for the study comprised 550 adolescents with 186 males and 364 females from 23 higher secondary schools situated in the Ernakulam district of Kerala and were selected through a simple random sampling method. The sample consisted of both male and female adolescents between the ages of 15 and 18 years. Adolescents from both urban and rural areas were considered for the study. The data was collected from December 2021 to March 2022.

Inclusion & Exclusion Criteria

Inclusion Criteria:

- Adolescents between the age group of 15-18 years
- Adolescents from schools who gave consent
- Adolescents studying in Ernakulam district

Exclusion Criteria:

- Adolescents aged below 15 and above 18
- Adolescents with any abnormality like ADHD or any physiological or psychological disability

Tools

The following tools were used to collect the data.

- **Demographic Details:** It includes details such as age, gender, and area of residence.
- **Rao's Social Maturity Scale:** The scale was developed by Nalini Rao in 1986. This is a 90-item scale that can be group administered. It measures social maturity in adolescents with three sub-scales, further detailed into three more subscales each. The three sub-scales are Personal Adequacy (PA), Interpersonal Adequacy (IA), and Social Adequacy (SA). Responses are taken on a rating scale of 'strongly agree' to 'strongly disagree'. The reliability of the sub-scale's ranges from 0.91 to 0.63. Criterion validity is high against teacher ratings on the social maturity of the students. Scoring is done with the help of a stenciled scoring key. Appropriate normative data is provided and along with scores on the nine sub-scales, a total social maturity score is also obtained.

Data analysis

To achieve the above-mentioned objectives, the investigator has employed the following statistical techniques.

Descriptive Statistics

- **Mean:** It is the "average" you're used to, where you add up all the numbers and then divide by the number of numbers. The "median" is the "middle "value in the list of numbers.

Inferential Statistics

- **Kruskal-Wallis Test:** The Kruskal-Wallis test, also known as "one-way ANOVA on ranks," is a nonparametric method for evaluating differences among groups of an independent variable based on a continuous or ordinal dependent variable, serving as an alternative to traditional one-way ANOVA.

Ethical Considerations

- Informed consent was taken from each school
- Confidentiality and anonymity of the participants were assured
- Voluntary participation and withdrawal at any stage is assured

- The study ensured the minimization of harm in any manner.

RESULTS

5.1 Distribution of adolescents based on gender

Table 5.1 and Figure 5.1 shows the distribution of adolescents based on gender.

Table 5. 1 Distribution of adolescents based on Gender

Age	Frequency	Percentage
Male	186	34%
Female	364	66%
Total	**550**	

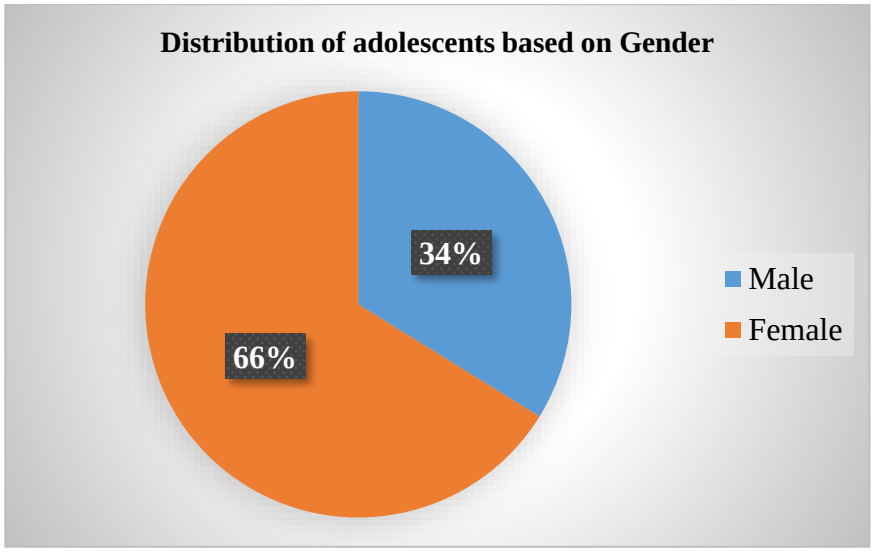

Figure 5. 1 Distribution of adolescents based on Gender

Table 5.1 and Figure 5.1 show the distribution of adolescents based on gender the result shows that the highest were N=364 (66%) are females and the lowest N=186 (34%) are males.

In contrast with the present study Jayasree and Rani (2021) found that male participants are more than female participants.

5.2 Distribution of adolescents based on gender

Table 5.2 and Figure 5.2 shows the distribution of adolescents based on area of residence.

Table 5. 2 Distribution of adolescents based on area of residence

Area of Residence	Frequency	Percentage
Urban	403	73%
Rural	147	27%
Total	550	

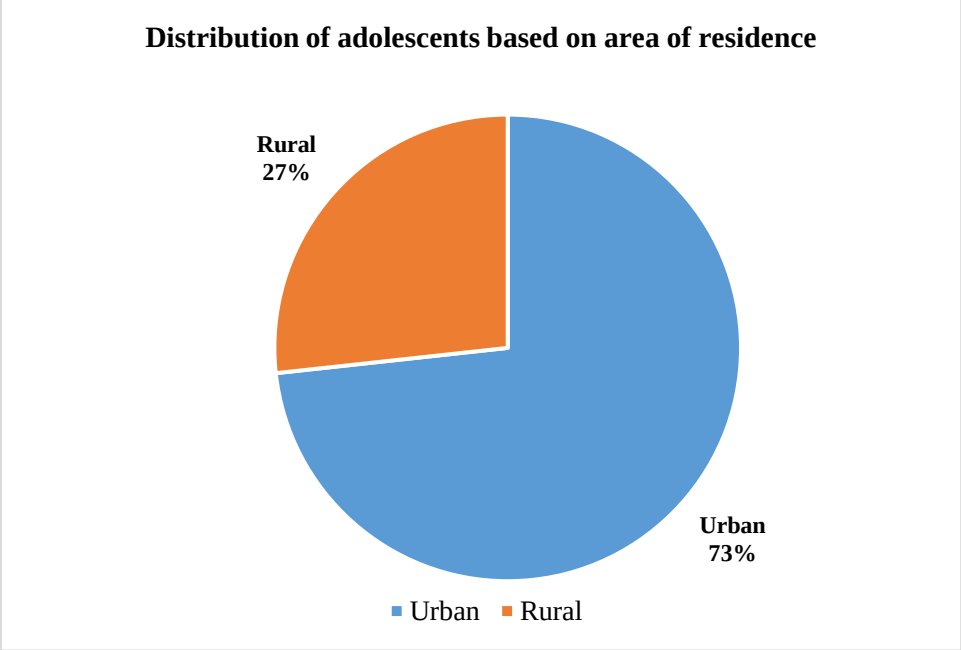

Figure 5. 2 Distribution of adolescents based on area of residence

Table 5.2 and figure 5.2 shows the demographic distribution of adolescents based on area of residence the result shows that the highest number N=403 (73%) of adolescents are from urban area while the lowest N=147 (27%) were from urban area.

In contrast to the present results Peter (2012) stated that, the adolescents were equally belonging to rural and urban areas.

5.3 Kruskal Wallis test on the difference in the level of social maturity and associated variables across gender

To test the difference in the levels of social maturity and its associated variables across gender the researcher used the Kruskal-Walli's test. The obtained results are given in Table 5.3 and Figure 5.3

H 01: There will be a significant difference in the level of social maturity and associated variables (Personal Adequacy, Interpersonal adequacy, social adequacy) across gender

Table 5. 3 Kruskal Wallis test on the difference in the level of social maturity and associated variables across gender

Variables	Gender	N	Mean	Chi-square	Sig.
Personal Adequacy	Male	186	284.24	.852	.356
	Female	364	271.03		
Interpersonal Adequacy	Male	186	245.72	9.900	.002
	Female	364	290.72		
Social Adequacy	Male	186	249.77	7.384	.007
	Female	364	288.65		
Social Maturity	Male	186	258.50	3.218	.073
	Female	364	284.19		

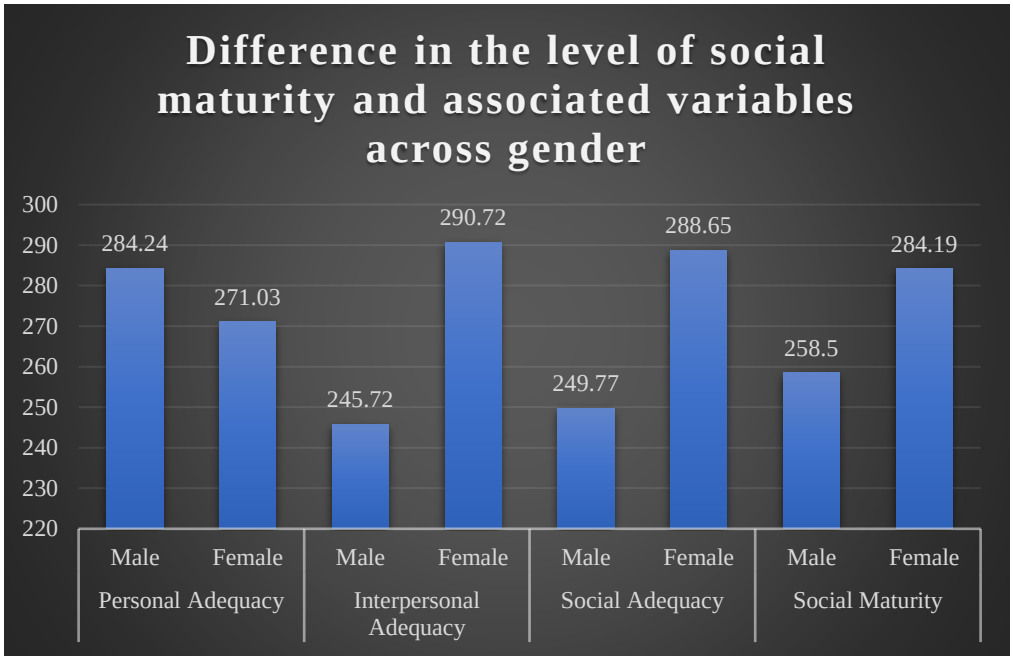

Figure 5. 3 Kruskal Wallis test on the difference in the level of social maturity and associated variables across gender

Table 5.3 and Figure 5.3 show the difference in the level of social maturity and associated variables across gender using Kruskal-Walli's test. The result shows that there were N=186 males and N=364 female adolescent participated in the study. The mean value obtained in the dimension of personal adequacy for males is M=284.24 and for females M=271.03 and the Chi-square value is $X^{2=}$ .852 with a corresponding significant value p=.356 which is greater than .05 level of significance. In interpersonal adequacy, the mean score for male M= 245.72 and female M=290.72, and Chi-square value obtained is X^2=9.900 with corresponding significant value p=.002 which lower than 0.05 level of significance. Similarly, in Social a dequacy the mean value for male M=249.77 and for female M=288.65, and the Chi-square value X^2=7.384 with a corresponding significant value p=.007, which is lower than 0.05 level of significance. And in overall social maturity the mean value for male M=258.50 and for female M=284.19, and the Chi-square value obtained is X^2=3.218 with a corresponding significant value p=.073 which is greater than 0.05 level of significance.

From the result it can be inferred that, in personal adequacy male show higher level than female and there is no significant difference between them. Hence the alternative sub hypothesis H01:1 is rejected and restated with null hypothesis that there is no significant difference in the level of personal adequacy among adolescents across gender. In contrast in interpersonal adequacy female has showed higher level than male and there is a significant difference between them. Hence the alternative sub hypothesis H01:2 is accepted. Similarly, in social adequacy also female showed higher than male and there is a significant difference between them. Hence the alternative sub hypothesis H01:3 is accepted. While in overall social maturity among adolescent's female has showed higher than male and there is no significant difference between them. Hence the alternative sub hypothesis H01:4 is rejected and is restated with null hypothesis that there is no significant difference in the level of social maturity among

adolescents across gender. So, as a whole interpersonal adequacy and social adequacy has showed a significant difference among adolescents based on their gender.

The findings of Singh, Pant, & Valentina's (2013) study in line with the current research. In their study, it was discovered that among various aspects of social maturity, girls scored higher than boys in terms of social adequacy. Additionally, no significant differences were detected between adolescents based on their gender in our study.

The present study contradicts the findings of Choudhary and Madhuri (2014) as their research suggested a significant difference in the level of social maturity among adolescents based on gender. In contrast, the current study's results do not support this conclusion or indicate a significant gender-based difference in social maturity among adolescents.

5.4 Kruskal Wallis test on the difference in the level of social maturity and associated variables across area of residence

To test the difference in the levels of social maturity and its associated variables across area of residence the researcher used the Kruskal-Walli's test. The obtained results are given in Table 5.4 and Figure 5.4

H 02: There will be a significant difference in the level of social maturity and associated variables (Personal Adequacy, Interpersonal adequacy, social adequacy) across area of residence

Table 5. 4 Kruskal Wallis test on the difference in the level of social maturity and associated variables across area of residence

Variables	Area of Residence	N	Mean	Chi-square	Sig.
Personal Adequacy	Urban	403	279.50	.956	.328
	Rural	147	264.54		
Interpersonal Adequacy	Urban	403	273.02	.367	.545
	Rural	147	282.29		
Social Adequacy	Urban	403	290.61	13.653	.000
	Rural	147	234.09		
Social Maturity	Urban	403	281.71	2.304	.129
	Rural	147	258.47		

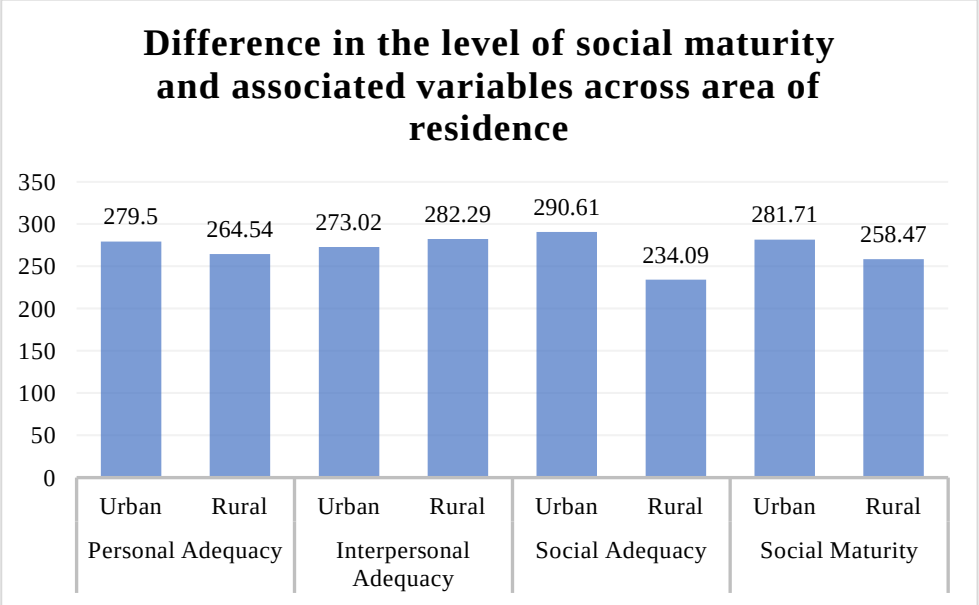

Figure 5. 4 Kruskal Wallis test on the difference in the level of social maturity and associated variables across area of residence

Table 5.4 and Figure 5.4 shows the difference in the level of social maturity and associated variables across area of residence using Kruskal-Walli's test. The result shows that there were N=403 adolescents from urban area and N=147 adolescents from rural area who participated in the study. In personal adequacy, mean value obtained for urban area is M=279.50, and for rural area M=264.54 and the Chi-square X^2=.956 with a corresponding significant value of p=.328 which is greater than 0.05 level of significance. In interpersonal adequacy mean score value for urban area is M=273.02 and for rural area M=282.29, and the Chi-square value obtained is X^2=.367 with a corresponding significant value p=.545, which is greater than 0.05 level of significance. While in social adequacy the mean value obtained for urban area M=290.61 and for rural area M=234.09, and the Chi-square value is X^2=13.653 with a corresponding significant value p=.000 which is lower than 0.01 level of significance. And in overall social maturity mean score for urban area is M=281.71 and for rural area is M=258.47 and the Chi-square value X^2=2.304 with a corresponding significant value p=.129 which is greater than 0.05 level of significance.

From the results, it can be inferred that in personal adequacy adolescents from urban area showed higher level than adolescents from rural area and there is no significant difference between them. Hence the alternative sub hypothesis H02:1 is rejected and is restated with a null hypothesis that there is no significant difference in the level of personal adequacy among adolescents across area of residence. Similarly in interpersonal adequacy adolescents from rural area showed higher level than urban adolescents and there is no significant difference between them. Hence the alternative sub hypothesis H02:2 is rejected and is restated with null hypothesis that there is no significant difference in the level of interpersonal adequacy among adolescents across area of residence. In contrast in social adequacy adolescent from urban area showed higher level than rural residents and there exists a significant difference between them. Hence the alternative sub hypothesis H02:3 is accepted. While on overall social maturity adolescents from rural showed higher levels than urban adolescents and there is no significant difference between them. Hence the alternative sub hypothesis H02:4 is rejected and is restated

with null hypothesis that, there is no significant difference in the level of social maturity among adolescents across area of residence. So, as a whole only social adequacy showed a significant difference among adolescents across their area of residence.

The study conducted by Bordhan in 2015 aligns with our current research. Bordhan's findings suggested that there is no notable disparity in the social maturity levels of adolescents based on their residential area.

The research conducted by Choudhary and Madhuri in 2014 contradicts the findings of the current study. According to their research, they discovered a notable difference in the social maturity levels of adolescents depending on their place of residence.

CONCLUSION

Based on the data collected and analyzed the researcher came to the conclusion that females have higher levels of interpersonal adequacy and social adequacy than males. But in the case of personal adequacy males showed higher levels than females. And in social maturity, females showed a higher level of maturity than males. So, it can be concluded that there exists a significant difference in the level of interpersonal adequacy among adolescents across gender. Similarly, there exists a significant difference in the level of social adequacy among adolescents across gender. In the case of area of residence, people living in the urban area showed a higher level of personal adequacy and social adequacy than adolescents living the rural area. In the dimension of interpersonal adequacy adolescents in rural area showed a higher level than adolescents from urban area. In the case of overall social maturity adolescents from urban area showed a higher level than adolescents from rural area. Hence, it can be concluded that there is a significant difference in the level of social adequacy among adolescents across the area of residence.

IMPLICATIONS

- Findings could be used in the development of educational programs that focus on promoting social maturity skills among adolescents.
- Findings could be used by schools to incorporate activities and interventions that help students develop social maturity, empathy, communication skills, conflict resolution, and other social competencies.
- The study's findings could be used by psychologists, counsellors, and other mental health workers to enhance adolescent emotional maturity.
- The findings could be used to develop social maturity skills among adolescents for the preparation of adulthood

LIMITATIONS AND SUGGESTIONS

Limitations

- The study limited only to one district of Kerala
- The sample in the study is not normally distributed
- Respondents bias may affect the study
- Lack of psychological or educational intervention

Suggestions

- The study could include adolescents from different districts of Kerala

- The study could include a greater number of samples
- The study could include a psychological or educational program to improve social maturity among adolescents

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