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FROM THE EDITOR'S DESK

The 'Aatmanirbhar Bharat' campaign launched in the eye of the COVID-19 storm (May 2020) focuses on making India economically, technologically and infrastructurally self-reliant. Shri Narendra Modi pointed out five 'I's to make India a self-reliant economy. These induce intent, inclusion, investment, infrastructure and innovation... Innovation is at the forefront of India's "Make in India" and "Start-up India" initiatives and the aim is not only to make in India but also to innovate in India and transform the Indian economy.

Addressing the nation on India's 74th Independence Day from the ramparts of the Red Fort, the prime minister said that Education has a crucial role to play in making India self-reliant and prosperous. The institutes of Higher Education offering Home Science as a field of study have a scope of playing a significant role in research and innovation for progress of the nation towards self-reliance. They act as a catalyst in the objective of the nation to have sustainable development in attaining self-reliance.

To deliberate upon this thought and to discuss the practices followed, activities undertaken, issues and challenges faced, and to develop strategies to meet the goals, the expert academicians were brought on a common platform by The Home Science Association of India. The national level conference was held on the theme "Innovation and Incubation Opportunities in Home Science for Self-Reliant India".

The 34th Biennial National Conference of the Home Science Association of India was organised by the Kerala State Chapter of HSAI from December 15th to 17th 2022, at St. Teresa's College (Autonomous), Kochi, Kerala. Through thought provoking plenary sessions, lectures, panel discussions, paper and poster presentations the august gathering could come out with some recommendations in relation to the theme.

The present issue of the journal incorporates a brief report of the conference and the award-winning papers for Junior Scientist, Mid-Career Scientist and Senior Scientist Categories.

Wishing each individual and institution to have enhanced research culture and to take up more and more innovative and incubation activities

PROF. MANEESHA SHUKUL

THE INDIAN JOURNAL OF HOME SCIENCE

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ECO FRIENDLY PRINTING ON COTTON FABRIC WITH PELTOPHORUM PTEROCARPUM FLOWERS

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ABSTRACT

Growing awareness towards environment has created interest on eco products among consumers worldwide. Artificial colourants are replaced by natural dyes to avoid the pollution problems. Though natural dyes are widely used in research, their application in textile printing is limited. There are endless resources available in India which can be utilized for imparting colour in textiles. This necessitates the use of natural dye in printing of textile which may help in reducing effluent. Producing different shades and fixing of natural dye on cotton can be done with the help of mordants. Mordant not only give specific colours, they as well improve washing and light fastness. A study was done by using flowers of *Peltophorum pterocarpum* as coloring material for preparing printing paste. Since pretreatments and auxiliaries used in textile finishing may also cause pollution natural mordants and eco-friendly pretreatments were followed for a pollution free printing process. The printed samples were then assessed for their colour fastness and physical properties.

Keywords: Eco pretreatments, Mordant, Natural dye, *Peltophorum pterocarpum*, Printing

INTRODUCTION

Environmental consciousness has been growing among the consumers around the world especially textiles. In recent times there is increasing interest for use of eco-friendly dyes on fabrics owing to worldwide environmental awareness (Saravanan et al, 2013). Researchers are trying to develop various solutions which are safe for human being, natural and sustainable. Natural dyes produce unique, soothing and soft shades as compared to chemical dyes. Vegetable dyed and printed fabrics are still not extensively available to mass consumers (Divya Ojha et al, 2019). Use of natural thickening agent for preparing printing paste needs to be studied due to the reason of environmental pollution from the effluent and printing waste from the synthetic thickening and binding agents in printing units. It is not only essential to use natural or eco-friendly materials but the process followed in producing eco-friendly products also to have energy efficient routes, utilize natural mordants and harmless inorganic salts (Das, 2011). The art of printing through hand printing methods will help in more employment of local young generation. Screen printing still dominates the textile printing market with 80% of global output. Keeping in view the importance of eco-textiles, this study was carried by printing on cotton fabric using screen printing with flowers of *Peltophorum pterocarpum* as natural dye source, myrobalon and pomegranate rinds as mordant and Gum Arabic as natural thickener.

OBJECTIVES

- Prepare eco-friendly printing paste using *Peltophorum pterocarpum* as natural dye
- Printing on cotton fabric using screen printing method and
- Evaluating the colour fastness of the printed samples.

METHODOLOGY

The materials and methods used for the study are explained here.

Selection of Material

Cotton is commonly used fabric. It is used throughout in India at all the times of year. It also possesses suitable mechanical qualities like high tensile strength and dye ability. Hence cotton woven fabric was selected for the study.

Selection of natural dyes

At present dye yielding plants are available as wild at large and hence need to be planted with purpose. *Peltophorum pterocarpum* commonly known as Copper pod or Yellow flame tree is used as shade tree usually seen along road sides. Its flowers and barks can be used as natural dye for textile materials. In young trees periodic flowering could occur throughout the year (Orwa et al, 2009). The flower resources are unutilized and wasted, though the tree flowers twice in a year. For the study, the fresh flowers were collected, dried in shade, and ground to powder form in a mechanical grinder and stored in an air tight container.

Mordants used

Natural dyes have limited substantively and require application of mordant to enhance the fixation of the colorant on textile substrate by the formation of the complex ion with the dye (Prabhu et al, 2012). Natural dyes can be fixed on cotton with the help of natural or metallic mordant. But the metallic mordants are not always eco-friendly and some of them are hazardous. Myrobalan is found to be a source of tannin (Khan et al 2005). Pomegranate rinds and myrobalan are commonly used as mordants in natural dyeing. Hence pomegranate rinds and myrobalan were chosen for study. Mordanting techniques employed were pre, post and simultaneous mordanting.

Thickeners

Arabic gum is commonly used as a natural gum in textile printing (Gahlot, 2003). It is a high solid content thickening agent. The thickener for printing was made by mixing necessary amount of Arabic gum with cold water and soaked in water for eight hours, during which it was stirred at regular interval. The lumps and floating bits were filtered and then solution was boiled with constantly stirring for one hour. The boiled solution was strained well and stored to prepare the printing paste.

Methods

The woven cotton fabric was desized by immersing it in water completely and boiled for fifteen minutes. The desized fabric then again was washed to remove any residual dirt and completely rinsed in water. Soaking the fabric in butter milk is traditionally followed method of pretreating fabrics (Shenai, 1997). Pretreatment was given by soaking the fabric in buttermilk for 24 hours. The fabric was then thoroughly rinsed and dried.

Printing Paste Preparation

Printing paste was prepared by mixing *Peltophorum pterocarpum* flower as dye in powder form with Pomegranate rinds and Myrobalon as mordant and Gum Arabic solution as a thickener. The paste was prepared by sprinkling the dye powder and the mordant with gum solution gradually until it forms a smooth paste without lumps. Three separate printing pastes were used for printing.

Recipe 1:

Peltophorum pterocarpum flower Powder four parts
Gum Arabic solution one part

Recipe 2:

Peltophorum pterocarpum flower Powder four parts
Pomegranate rinds two parts
Gum Arabic solution one part

Recipe 3:

Peltophorum pterocarpum flower Powder four parts
Myrobalon powder two parts and
Gum Arabic solution one part

Printing

Screen printing method is commonly employed technique of printing throughout the world. Screen printing can be done either by hand or by an automatic process (Boruah and Kalita, 2016). Screen printing using natural dye was found to be effective. Hence screen-printing method was adopted for the study.

Printed samples of the study were allowed to dry and set by heat and then washed in water. Samples, then, were pressed and evaluated.



Figure 1a



Figure 1b



Figure 1c



Figure 1d



Figure 1e



Figure 1f

Figure 1: Printed Samples with *Peltophorum pterocarpum* flower as dye

DP- printed with dye source and Pomegranate rinds, DM- printed with dye source and Myrobalan, D- *Peltophorum pterocarpum* flower dye source, P- Pomegranate rinds, M- Myrobalan, 1- Premordanting, 3- Post mordanting

RESULTS AND DISCUSSION

The printed cotton fabric samples were tested for tensile strength, elongation and colour fastness test for washing, sunlight, crocking and pressing.

Tensile Strength

Eureka Tensile Strength Tester was employed to measure tensile strength and elongation of original and printed samples. The readings were then compared for change in the fabric strength after printing and noted.

The Tensile strength of samples in warp and weft directions are given in Table 1 and Table 2 respectively.

Table 1 Tensile Strength – Warp

| S.No | Samples | Mean Strength (Kgms) | Loss over original (Kgms) | Percentage Loss over original |
|------|----------|----------------------|---------------------------|-------------------------------|
| 1 | Original | 46 | - | - |
| 2 | DP | 38 | 8 | 17 |
| 3 | DM | 38 | 8 | 17 |
| 4 | D1P | 34 | 12 | 26 |
| 5 | D3P | 34 | 12 | 26 |
| 6 | D1M | 42 | 4 | 9 |
| 7 | D3M | 38 | 8 | 17 |

The strength of the printed samples was found to be decreasing as compared to original sample in its warp side. Samples D1P and D3P had maximum loss of twenty six percent followed by samples DM, D3M and DP. Minimum decrease of nine percent was found in sample D1M.

Samples treated with pomegranate rinds as mordant were found to decrease in strength than that treated with myrobalon mordant.

Table 2 Tensile Strength – Weft

| S.No | Samples | Mean Strength (Kgms) | Loss over original (Kgms) | Percentage Loss over original |
|------|----------|----------------------|---------------------------|-------------------------------|
| 1 | Original | 45 | - | - |
| 2 | DP | 35 | 10 | 22 |
| 3 | DM | 36 | 9 | 20 |
| 4 | D1P | 38 | 7 | 16 |
| 5 | D3P | 40 | 5 | 11 |
| 6 | D1M | 40 | 5 | 11 |
| 7 | D3M | 38 | 7 | 16 |

The tensile strength of samples on weft direction also decreased in comparison to its original. DP sample had a loss of twenty two percent followed by DM with loss of twenty percent. All the printed samples were found to have a decrease in strength both warp and weft direction when compared to the original material.

Fabric Elongation

The Fabric elongation percent along warp and weft directions is presented in Table 3 and Table 4 respectively.

Table 3 Fabric Elongation -- Warp

| S.No | Samples | Mean Value (inches) | Loss (inches) | Percentage Loss |
|------|----------|---------------------|---------------|-----------------|
| 1 | Original | 1.8 | - | - |
| 2 | DP | 1.4 | 0.4 | 22 |
| 3 | DM | 1.6 | 0.2 | 11 |
| 4 | D1P | 1.2 | 0.6 | 33 |
| 5 | D3P | 1.4 | 0.4 | 22 |
| 6 | D1M | 1.3 | 0.5 | 28 |
| 7 | D3M | 1.3 | 0.5 | 28 |

Fabric elongation of printed sample decreased for all sample along the warp direction. Maximum decrease of 33 percent was found in sample D1P. Minimum decrease of eleven percent in elongation was seen in sample DM along warp direction.

Table 4 Fabric Elongation - Weft

| S.No | Samples | Mean Value (inches) | Loss (inches) | Percentage Loss |
|------|----------|---------------------|---------------|-----------------|
| 1 | Original | 1.6 | - | - |
| 2 | DP | 1.4 | 0.2 | 14 |
| 3 | DM | 1.4 | 0.2 | 14 |
| 4 | D1P | 1.3 | 0.3 | 19 |
| 5 | D3P | 1.3 | 0.3 | 19 |
| 6 | D1M | 1.2 | 0.4 | 25 |
| 7 | D3M | 1.3 | 0.3 | 19 |

The elongation of printed samples along weft direction also decreased with maximum difference of twenty five percent in D1M and minimum decrease in elongation of fourteen percent in samples DP and DM. As the tensile strength decreased, the elongation percent also reduced considerably in all the printed sample irrespective of the mordant and mordanting method.

Colour Fastness tests

Colour fastness tests were carried out to assess fastness towards sunlight, washing, wet crocking and dry crocking, wet and dry pressing. The dyed fabrics 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 samples are presented in Table 5

Table 5 Colour Fastness

| S.No | Sample | Sunlight colour change | Washing | | Pressing | | | | Crocking | | | |
|------|----------|------------------------|---------------|----------|---------------|----------|---------------|----------|---------------|----------|---------------|----------|
| | | | Colour change | Staining | Wet | | Dry | | Wet | | Dry | |
| | | | | | Colour change | Staining |
| | Original | | | | | | | | | | | |
| 1 | DP | ¾ | 3 | ¾ | 4 | 3 | 4/5 | 4/5 | 3 | 3 | 4 | 4/5 |
| 2 | DM | ¾ | 3 | ¾ | 4 | 2/3 | 5 | 4/5 | 4 | 3 | 4 | 4 |
| 3 | D1P | 3 | 2 | 3 | 3 | 3 | 5 | 4/5 | 4 | 4 | 4 | 4 |
| 4 | D3P | ¾ | ¾ | 3 | 4 | 2/3 | 4/5 | 4/5 | 4 | 4 | 4 | 4/5 |
| 5 | D1M | ¾ | 3 | 3 | 4 | 3 | 4/5 | 4/5 | 3 | 3 | 4 | 4 |
| 6 | D3M | 3 | 2 | 3 | 3 | 2/3 | 4/5 | 4/5 | 3 | 4 | 4 | 4 |

Note : 1 -very poor; ½- 2 - poor ; 2/3-3 -Moderate; ¾ -Fair ; 4 -Good; 4/5-Very good; 5-Excellent

In the Colour fastness test towards sun light printed samples D1P and D3M had moderate fastness and other samples were fair. Pre mordanted with myrobalon and post mordanted with

pomegranate rinds samples were found to be effective under sunlight tests. Wash fastness of samples D3P had fair, DP, DM and D1M had moderate, D1P and D3M had poor fastness in colour change and most samples had fair to moderate rating in staining tests. In colour fastness to wet pressing- the samples had good to moderate fastness. Samples DP1, D2 and DP2 were good, samples DM1 and DM2 were moderate fast to colour change. The staining test showed fair and moderate fastness. For dry pressing test samples were excellent and had very good fastness for colour change. Staining test of all samples showed very good fastness. Crocking tests reveals that samples D1M and D3M had moderate fastness and other samples had good fastness to wet crocking. Staining test revealed good fastness in all samples. In dry crocking test, samples had good to very good fastness in colour change and staining tests.

SUMMARY AND CONCLUSION

Dyes acquired from nature are eco-friendly and have good demand today. Metallic mordants used in dyeing industries may produce intense and fast colours, but not eco-friendly and many are harmful. Considering these points flowers of *Peltophorum pterocarpum* were used as natural dye. Pomegranate rinds and myrobalon for mordants and Arabic gum as natural thickener were selected for the screen printing on cotton fabric. In this study, different shades were obtained using different mordants and mordanting technique. Printed samples were assessed for their tensile strength, elongation and colour fastness. The results showed that strength reduced in all the printed samples and elongation percent was also decreased after the printing process. Considerable difference in fastness was observed in pre mordanting method with the selected mordants. It could be concluded that printing with *Peltophorum pterocarpum* as natural dye will help in producing pollution free product. Use of natural mordants and thickeners will reduce the effluent discharge during the process. In textiles printing with natural dye may reduce the effluent. Colour fastness ranges from moderate to good for washing, sunlight and crocking tests. This natural printing process could be carried out at rural level which might help in generating income for the people.

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PROCESS OPTIMIZATION OF EXTRACTION OF PINEAPPLE LEAF FIBRE FROM AGROWASTE

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ABSTRACT

In agricultural sector, there is an environment and technical issue during disposal process of agrowaste after harvesting. Utilization of recoverable waste are getting more and more important day by day since recovering wastes are both economic and environmental benefits. Nowadays, there are some efforts being made worldwide in order to promote agricultural waste in a series of value-added products. Pineapple leaf fibre (PALF) extracted from the green pineapple leaf, an agrowaste reveals its immense potentiality in the field of textile and non-textile sectors particularly due to the disposal problem after harvesting for cleaner and green environment. This research is to study the influence of surface treatment for pineapple leaf fiber (PALF) on the mechanical properties of PALF. PALF was treated with alkalis and enzymes to improve the spinnability. After treatments the spinning performance of PALF such as fineness, bundle strength, breaking tenacity and breaking elongation properties have been studied. It showed that the physical and structural characteristics of scoured plus bleached and four hours pectinase treated PALF were best. Surface modification of fibres after various treatments was also investigated by using Scanning Electron Microscopy. The results show that surface characteristics like whiteness, yellowness, and brightness signifies that the scoured plus bleached fiber gave best result. Current research results will bring out logical and reasonable utilization of PALF for various applications.

Keywords: Agrowaste, Breaking Tenacity, Bundle Strength, Elongation, Enzymes, PALF, SEM, Whiteness, Yellowness.

INTRODUCTION

India is primarily an agricultural country which has plenty of agricultural product and by-products which can be extracted into natural fibers, like kenaf, jute, sisal, pineapple leaf, banana stem and others. Pineapple leaf fiber (PALF) waste is abundantly available and can be obtained at lower cost since its full potential is being overlooked by the community while treated as waste to which usually end up in the dumpster or worse, disposal by incineration; defying the whole purpose of being environmentally friendly. Generally agriculture material and forest produces 30-40% agro-waste which is disposed by burning and decomposed, lead to environmental hazards, so to solve this problem proper utilization of the waste can be done in value adding processing to improve the economy of cultivation and give an employment potential^[2].

Pineapple is cultivated in tropical and subtropical regions of India, approximately in 87.2 thousand hectare of land and ~600 thousand tons of pineapple leaf fibre can be extracted from this agro-waste leaves after harvest of the fruit^[4] Pineapple leaf fiber (PALF), is obtained from the leaves of pineapple plant *Annanas comosus* family of "*Bromeliaceae*", these leaves are not even suitable for cattle feed and after harvest of fruit the disposal of leaves becomes a big problem. There are varieties of pineapple around the world like: smooth Cayenne, Queen and Queen

Victoria, White Perola, Giant Kew, Red spinach plant, the Formosa etc, are used for its fiber. It is an edible fruit bearing plant that has medicinal values has now finds another avatar in textile applications^[3]. Beside its fruit, using the leaves as fiber as well is good commercial sense, especially when the eco-conscious designers are looking to move away from leather and synthetics. After harvest of the pineapple fruit, the plant leaves which are of 50-180cm long and sword like separated from the trunk, are unutilised and need global attention for its commercial exploitation. The fibers are detached from these leaves by hand scarping and by decorticator machine. These bundles of cellulosic strands are then washed and hung to dry under sun. A kilo of leaves can provide up to 15-18 pieces of white, creamy lustrous fiber, about 60cm long each cemented together by lignin, pentose-like materials which contribute to its strength. The Pineapple leaf fiber can easily retain dyes because of its cellulosic nature, sweat absorbent and breathable, and it has good antibacterial and deodorization properties. In today's world with the energy crisis and environmental increasing degradation the need for natural fibre and eco-textile is making way.^[1] Hence, Pineapple fiber can be used for industrial purposes without any additional cost.

This study is an attempt to utilise pineapple agrowaste, its leaves to extract PALF fibers for value adding stuffs, determination of PALF Physical and Chemical properties by evaluating its results through mechanical and Optical tests such as Tensile Strength, S.E.M and Spectrophotometer to evaluate the potential of fiber for its yarn spinnability.

OBJECTIVES OF THE STUDY

Therefore, the study was envisaged with the following objectives.

1. To study the morphology and physical properties of procured pineapple fiber.
2. To optimize chemical and enzyme treatment conditions for softening of pineapple fiber.
3. To test the physical properties and chemical composition of untreated and treated pineapple fibres to evaluate the potential of fiber for its yarn spinnability.

METHODOLOGY

The materials and methods used in the study are as follows.

Raw material

Pineapple fiber were procured from 'Merita Cottage', Meghalaya, India with the help of environmentalist Sheerard Wallang.

Determination of preliminary data

Preliminary confirmatory tests of the raw fiber using burning, chemical solubility and microscopic test were done.

Chemical composition of fiber was done to determine the contents present in the fiber as per the tests suggested by "Turner and Doree".

The moisture regain of PALF measured by oven dry method following ASTM-D 2654-76 under standard testing atmosphere of 65% relative humidity and at 27°C.

The gravimetric fineness expressed in mass per unit length was ascertained by cutting and weighing method. Small lengths of fibres/ filaments were cut into 10 cm length and 20 pieces were counted and weighed in precision micro balance. The results are expressed in gm/ km i.e., tex.

Chemical treatments on raw pineapple fibres

Researcher carried out several chemical treatments to modify fiber quality.

All the fibre was scoured with 2g/l detergent and 2g/l sodium carbonate at 80°C for 45mins. The material to liquor ratio was maintained at 1:40. The fabrics were thoroughly washed and then air dried. This treatment on fibers help in removal of dirt and gummy substance that sticks between the strands of fibers and help fibers to separate from each other, more align and colour of the fibers are also enhanced.

The chemical treatment of the scoured fibre was done by two methods. At first the fibre was bleached with H₂O₂ (4% on weight of fibers), NaOH, material liquor ration 1:40 at 80°C for 60 min. In second treatment scoured fibres were treated with two enzymes i.e., Cellulase and Pectinase that are procured from Rossari Biotech Ltd., Ahmadabad, Gujarat, in which 2 grams of grey fibers were subjected to enzyme treatment with constant pH of 5-5.5 at 50°-55°C temperature to M: L of 1:60 at three different time intervals 2, 4 and 8 hours.

The softener was prepared by the combination of non-ionic emulsifying agents (leboline) and Rice bran oil (RBO) treated for 30 mins.

Mechanical and Optical tests

Three mechanical properties were considered for the treated fibers assessment: Tensile Strength, Whiteness index and S.E.M.

The tensile properties of fibre were measured using UTM (Universal Tensile testing machine) following standard parameters for fibres (ASTM D 3822) maintaining 10 gauge length and 300 m/min traverse.

Whiteness index of fibers determined on the spectra scan 1500A Spectrophotometer. ASTM standard was used to determine whiteness and yellowness and brightness from the reflectance values obtained from spectrophotometer.

Treated fiber was observed under the S.E.M (scanning electron microscope) at 500x and 250 x magnifications to closely observe the changes occurs in treated fibers.

RESULTS AND DISCUSSION

Fiber confirmation tests

Burning test

It shows that fibres quickly catch fire and residue left was soft grey ash with burning paper odour. It shows that PALF is multicellular fibers like other vegetable fibers and associated with high cellulosic content.

Solubility test

Fibers were dissolved in 99% of conc. H₂SO₄ when subjected to heat for 5 min, which confirms its cellulosic nature.

Microscope test

It was used to examine the morphology of the pineapple fiber at two different resolution i.e. 10X and 45X are shown in Figure 1, it shows that demonstrates polygonal cross section with a lumen in centre, has no skin structure and very irregular in shape. The longitudinal view of surface of raw pineapple fibers is very smooth without any pore or pit on the surface, which depicts the presence of wax, lignin, and other fatty acids on the surface. Striated pattern on the surface of fibers can also be observed very clearly at 45X magnification.

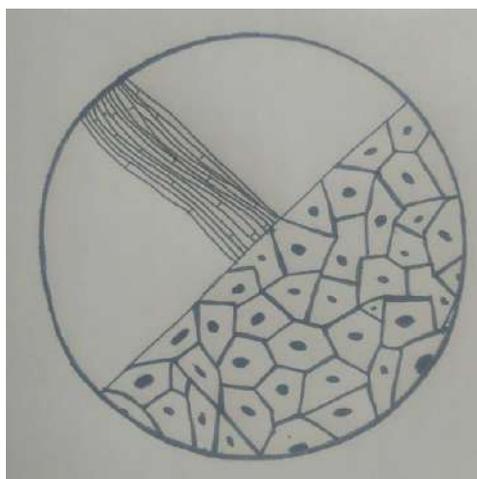


Fig. 1 Longitudinal and cross-sectional view of pineapple fiber

Therefore, the results obtained after the confirmatory test were satisfactory and clearly reveals that the fiber used in the study is Pineapple leaf fiber.

Physical properties of PALF

Physical properties of pineapple fibres before the chemical treatment have been studied and reported as shown in Table1. The data in table 1 shows the PALF fineness i.e., 67cm, Fineness 69.165 denier, and 5.9% Moisture content, 6.26% Moisture regain.

Table 1- Physical properties of PALF

| Properties | Results |
|--------------------------------|---------|
| Length of the fiber (cm) | 67.00 |
| Fineness of the fiber (Denier) | 69.165 |
| Moisture Content (%) | 05.90 |
| Moisture Regain (%) | 06.26 |

Chemical Composition of PALF

The major chemical composition of PALF are cellulose and lignin shown in Figure 2. Natural fibres are constituting of cellulose and lignin; these celluloses consist of many fibrils along the length which is, associated with hydrogen bond to provide strength and flexibility.

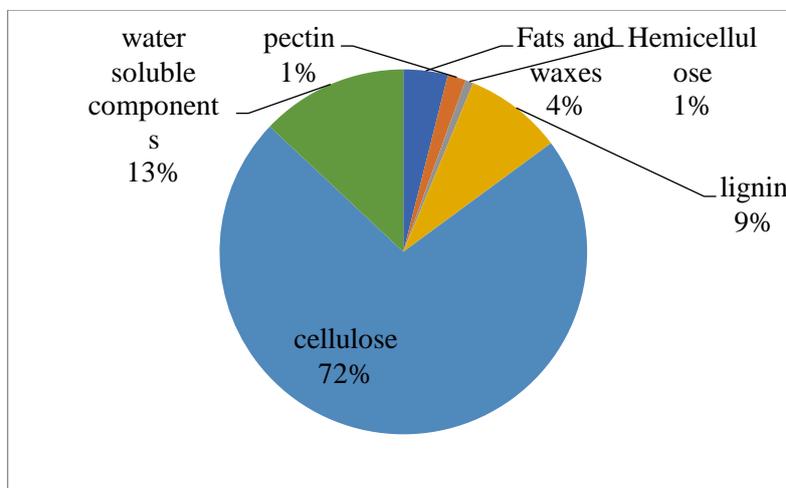


Fig 2- Chemical composition of PALF

Differing composition may be attributed to factors including source of fibers, age of fibers, climate conditions and the process used in obtaining the fibers.

Effect of Chemical treatments on PALF

Based on the properties tested on controlled pineapple fibers, to enhance its inbuilt properties and improve its spinnability some chemical treatments were performed.

- **Scouring**

For conventional scouring, the fibers were treated with Na_2CO_3 . This process helps in removal of dirt and gummy substance from fibers which showed in Fig. 3c

- **Bleaching**

Scoured fibers were emerged in the chemical solution for an hour at 80°C . Refer Table 1, this treatment enhances the fiber color. Effect of Chemical treatments on grey Pineapple leaf fiber “PALF” is shown in Fig. 3d.

The main drawbacks PALF is hydrophilic nature; it does not make good bonding with hydrophobic matrix, particularly at high temperatures [27]. Interfacial quality between PALF and polymer could be enhanced by using NaOH. Moreover, the surface modification by chemicals like sodium hydroxide (NaOH), can minimize water absorption and improves the mechanical properties. (21)

NaOH reacts with hydroxyl groups of the cementing materials in natural fibers and brings on the destruction of the cellular structure, thereby spitting the fibers into filaments. Hydrogen peroxide (H_2O_2) bleach improves PALF fineness by 5-6%.

- **Enzymatic treatment**

Enzymes are biocatalysts without which no life in plant or animal kingdom can be sustained. Enzymes are protein complex molecules and the Cellulases are multi component. These enzymes were extensively used in textiles finishing, to improve the hand of fabrics.

Scoured fibers were treated with constant pH of 5-5.5 at 50°-55°C temperature to M: L of 1:60 at 2, 4 and 8 hours with *Cellulase* and *Pectinase* enzymes and then washed with distilled water and dried. The result revealed that both the enzymes showed good tenacity with load and elongation at 4 hours.

- **Oiling treatment**

It was done with rice bran oil; scoured fibers were emerged in emulsion solution for 30 mins to increase the surface softness and maintain its moisture.

Oil treatment was successful in making fiber smooth and soft but there was a rapid decline in strength.



Fig 3a: Just after extraction of fibers



Fig 3b: After several water washes



Fig 3c: Scoured Pineapple fibers



Fig 3d: Bleached Pineapple fibers

Fig. 3-Effects of chemical treatments on grey Pineapple leaf fiber

Results of these treatments were evaluated by testing its strength and by subjective test. After individual treatments to evaluate best resulted fibers, three tests are conducted in Department of Textile testing, Faculty of Technology and Engineering and in Department of Clothing and textiles, Faculty of Family and Community Sciences.

Mechanical tests and Optical tests

- **Tensile Strength**

Table 3. shows that grey fiber is itself having an excellent strength of 4.35gm/den, after Scouring strength of PALF increases to 4.91gm/den. To enhance fiber colour bleaching which is an essential step, found satisfactory in terms of its strength i.e. 4.72gm/den. Fibers were treated with two enzymes Cellulase (E1) and Pectinase (E2), which indicates, when fibers were treated with Pectinase enzyme for 4 hours gives best results i.e. 5.93gm/den.

Table 2-Tensile Strength of grey and treated Pineapple fibers; E1: Cellulase E2: Pectinase

| Treatment | | Denier | Max. load gf | Extension at max. (mm) | Stress in gm/den | Strain % | |
|----------------------------|----|---------|--------------|------------------------|------------------|----------|-------|
| Raw fiber (control sample) | | 33.9 | 137.63 | 0.06 | 4.35 | 12.07 | |
| Scoured fiber | | 32.7 | 161.3 | 0.52 | 4.91 | 10.5 | |
| Scoured+ Bleached | | 39.97 | 135.58 | 0.72 | 4.72 | 14.40 | |
| Scoured + Enzyme treated | E1 | 2 hours | 54.63 | 167.04 | 0.33 | 3.01 | 6.66 |
| | | 4 hours | 37.64 | 146.14 | 0.53 | 3.96 | 10.62 |
| | | 8 hours | 46.62 | 133.24 | 0.33 | 3.07 | 6.75 |
| | E2 | 2 hours | 34.15 | 153.22 | 0.58 | 4.64 | 11.76 |
| | | 4 hours | 22.54 | 129.52 | 0.54 | 5.93 | 10.81 |
| | | 8 hours | 68.80 | 237.87 | 1.07 | 3.85 | 21.5 |

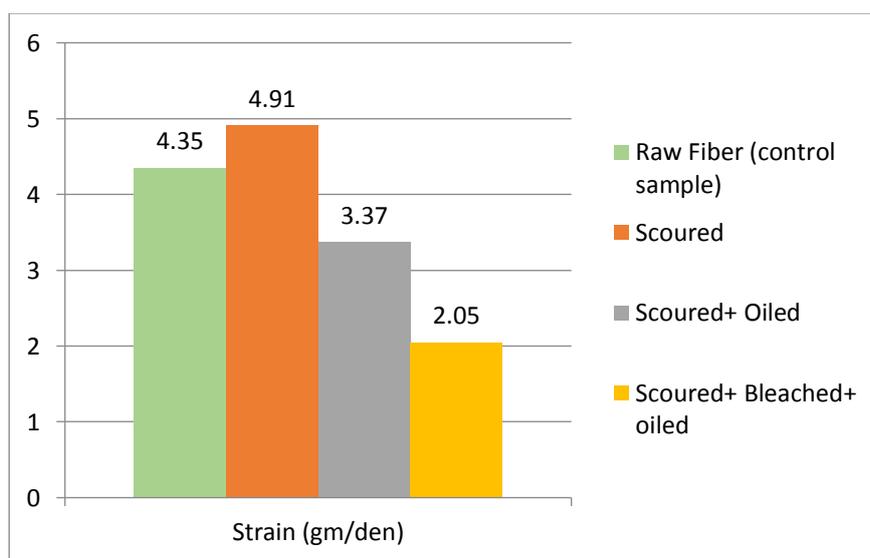
Further, an experiment was conducted on the best resulted treatment with pectinase enzyme on bleached fibers for 4, 8 and 12 hours, reason being bleached fiber give higher whiteness index i.e. 71.41 as compared to other treatments (refer Graph. 3). Therefore, calculating the results it was concluded that with increase in treatment hours the fiber strength decreases. Table 3, indicates coefficient of variance is more in Scoured+ bleached+ 4-hour pectinase i.e. 37.70%, and Scoured+ Bleached+ 8 hours pectinase is 48.25% as compared to scoured+ bleached treatment i.e. 28.50%.

Table 3- Tensile Strength of PALF when treated with Pectinase enzyme for more hours

| Treatments | | Denier | Max. load gf | Extension at max. (mm) | Stress in gm/den | Strain % | Coefficient of variance (%) |
|-------------------------------|---------|--------|--------------|------------------------|------------------|----------|-----------------------------|
| Scoured + Bleached | | 39.97 | 135.58 | 0.72 | 4.72 | 14.40 | 28.50 |
| Scoured+ Bleached + Pectinase | 4 hours | 26.44 | 100.74 | 0.62 | 4.31 | 12.57 | 37.70 |

| | | | | | | | |
|------------------------------|----------|-------|--------|------|------|-------|-------|
| Scoured+ Bleached+ Pectinase | 8 hours | 34.29 | 138.53 | 0.75 | 4.67 | 15.12 | 48.25 |
| Scoured+ bleached+ Pectinase | 12 hours | 27.41 | 98.51 | 1.04 | 3.67 | 20.9 | 47.88 |

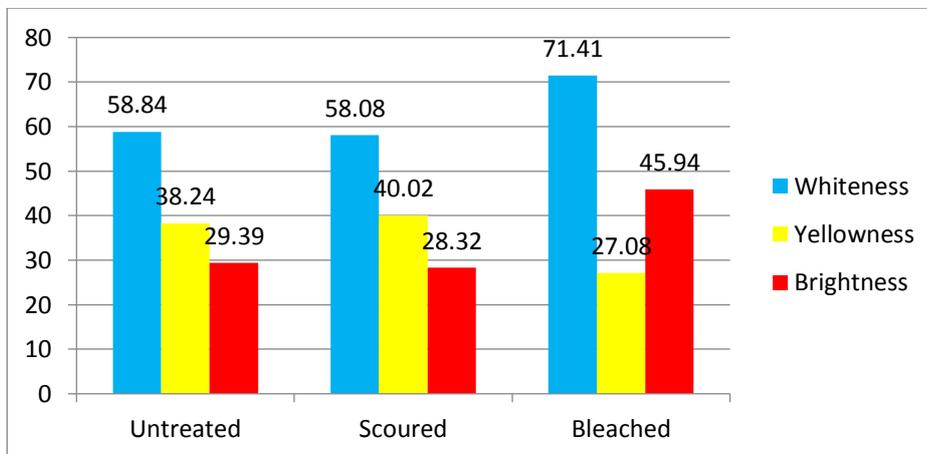
Oil treatment was successful in making fiber smooth and soft but there was a rapid decline in strength after oiling to 3.37gm/den and 2.05gm/den, therefore this treatment is not used further in the study because it was affecting the strength property of the fiber. Graph 2, clearly presents the data after Oiling treatment.



Graph 2-Tensile strength of PALF after oiling treatment

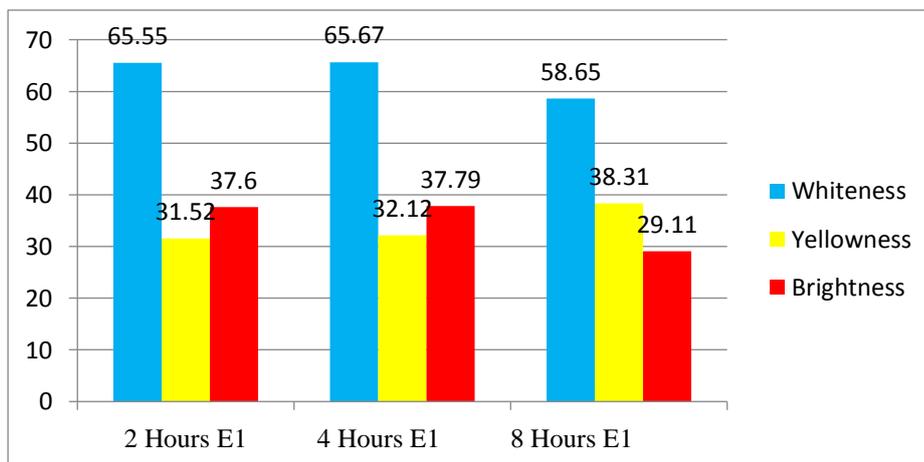
3.4.2 Whiteness, yellowness and brightness index

Grey and treated fibers were measured on the spectra scan 5100A spectrophotometer. The untreated and scoured fibers have almost same whiteness, brightness and yellowness index at different untreated and enzymes treated fabrics.



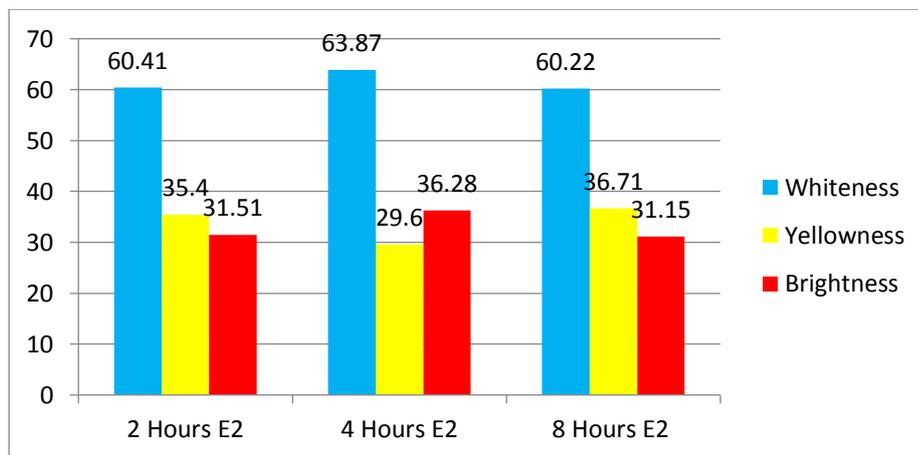
Graph 3-Whiteness, yellowness and brightness index of untreated and chemical treated Pineapple fiber

Graph 3 shows that bleached fiber has maximum whiteness 71.41%, brightness 45.94% and minimum yellowness i.e., 27.08. On the other hand, untreated and scoured fibers have almost same whiteness, brightness and yellowness index giving not much differences



Graph 4-Whiteness, yellowness and brightness index of enzyme treated Pineapple fiber E1: Cellulase

Pineapple fibers were treated by Cellulase at three different hours i.e. at 2, 4 and 8 and it was observed from Graph 4 that the whiteness, yellowness and brightness of Cellulase treated Pineapple fiber at 2 hours (E1) showed maximum whiteness and brightness and minimum was observed at 8 hours therefore, with increasing hours the brightness and whiteness reduces and yellowness increases, which means that increasing time affects its whiteness and brightness index.



Graph 5-Whiteness, yellowness and brightness index of enzyme treated Pineapple E2: Pectinase

Graph 5 is showing the whiteness, yellowness and brightness of Pectinase treated Pineapple. Pectinase treated enzyme at 4 hours showed maximum whiteness and brightness and minimum yellowness as compared to Pectinase treated pineapple treated at 2 hours and 8 hours.

3.4.3 Scanning Electron Microscope

Fibers were observed under 250X and 500X magnifications. Fig4a and 4b shows the traces of pithy materials on **untreated fiber** surface. Each tie marks on the fiber surface of each bundle consist of several fibrils.

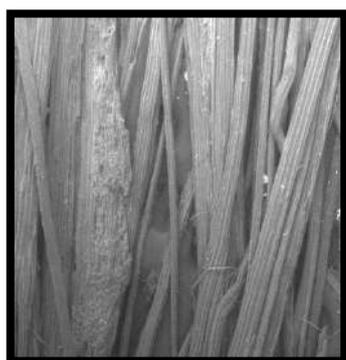
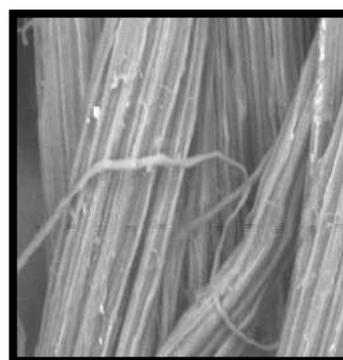


Fig.4a: Untreated fiber at 250XFig.



4b: Untreated fiber at 500X

Fig. 5a and 5b shows **Scoured fiber** and it was observed that the fibers become smooth in texture turn into more align and smooth in texture, it is can be attributed to the removal of hemicellulose and others extractives.

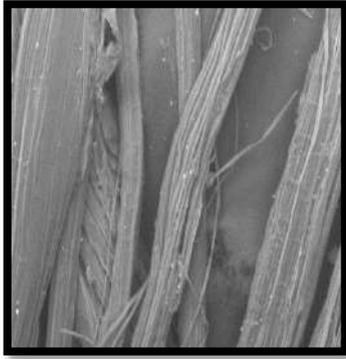


Fig. 5a: Scoured fiber at 250X

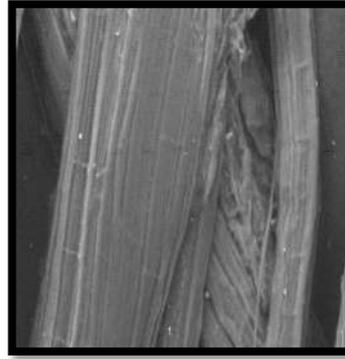


Fig. 5b: Scoured fiber at 500X

Fig. 6a and 6b indicates, the brightness and brightness were increased due to bleaching agent and the fiber become more even and align.



Fig. 6a: Scoured + bleached PALF at 250X

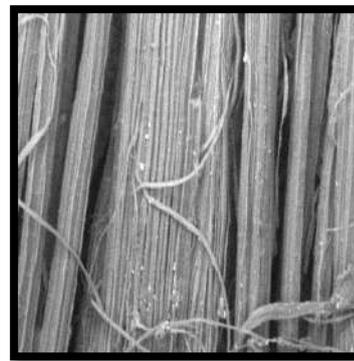


Fig. 6b: Scoured + bleached PALF at 500X

Fig. 7a and 7b shows enzyme treated fiber with 4 hours pectinase but it was observed that there is not such difference in the alignment of fibers found.

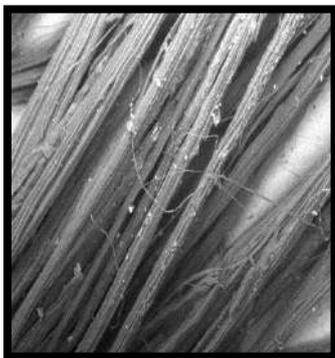


Fig. 7a: Scoured+ 4hourspectinase PALF at 250X

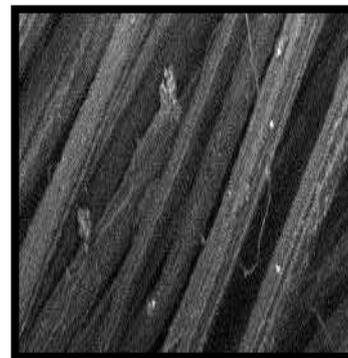


Fig. 7b: Scoured+ 4hourspectinase PALF at 500X

Fig. 8a and 8b shows that fibers have fewer entanglements with more smooth texture.

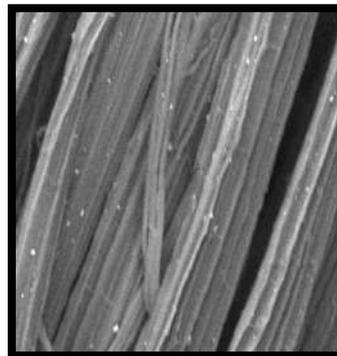
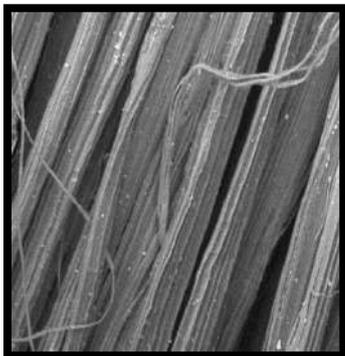


Fig. 8a: Scoured+ 8hours pectinase PALF at 250X **Fig. 8b: Scoured+ 8hours pectinase PALF at 500X**

Fig. 9a and 9b show the broken fibers which clearly reveals that fiber loses its strength when treated with oil.

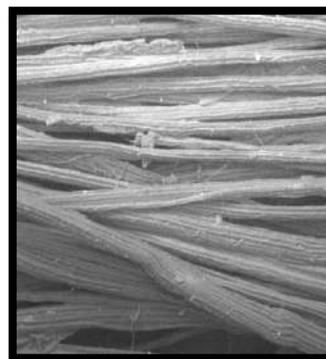


Fig. 9a: Oil treated PALF at 250X

Fig. 9b: Oil treated PALF at 500X

Concluded results obtained that bleached fibers were selected because of its good brightness and whiteness index and tensile strength (4.72gm/den) used for spinnability of yarns.

CONCLUSION

- PALF obtained from the leaves of pineapple plant undergo several physical (length, fineness, moisture content) chemical (scouring, bleaching) enzymes (Cellulase and pectinase) and oiling treatments, best results shown by the Scoured+ Bleached treatment when tested for its mechanical properties.
- In the present study, mechanical properties such as tensile strength, Optical properties like S.E.M and Spectra scan1500A Spectrophotometer of PALF has been stated, which shows that PALF itself has good tensile strength, but after chemical treatments its strength as well as colour increases, which shows the possibility to convert this agro-waste to value added products by simple chemical modifications.
- Study also revealed a negative result when fibers treated with oil, however, the researcher's aim was to give fibers or end product a softer feel/ touch ,which is somehow achieved, but by affecting its inbuilt property ,i.e., strength, which was not a good sign for this allied fiber ,therefore, this treatment was not further carried.

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- It is also concluded that enzymatic scouring of PALF is a good method because of its biodegradable nature, but it is cost effective as it requires more hour and resources for treatment. Therefore, after concluding all the results, Scoured+ Bleached fibers are used for yarn spinning.
- These results show that it is possible to produce PALF yarn in conventional spinning process without any additional cost that effectively helps to reach zero waste management.
- All these factors make them interesting from the viewpoint of industry that strives to reduce its environmental impact and to appeal to the environmentally conscious consumer.
- From the socioeconomic perspective, PALF can be a new source of raw material to the industries and can be potential replacement of the expensive and non-renewable synthetic fibre.

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ADAPTATION OF ZARDOZI EMBROIDERY ON YOKES DESIGNED FOR YOUNG GIRLS' ETHNIC WEAR

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ABSTRACT

The term "zardozi" describes the method of attaching embellishments to various fabrics using metal-bound threads. Due to the fact that ethnic wear has long been popular among females in India, brands and established players have recently entered the market for children's ethnic wear and are now providing youngsters with products with ethnic styling. The main aim of this research is to explore and document the developments in Zardozi embroidery and to carry out design interventions by developing Zardozi embroidery and layout designs suitable for young girls' ethnic wear using the traditional technique of embroidery and the more contemporary computer embroidery technique. A survey was carried out, commencing with interviews of the artisans of Dulagarh and Nayakpara villages of Howrah District, in West Bengal. 81% of respondents were aware of Zardozi embroidery and most of them were keen on Zardozi embroidery for ethnic wear, especially in the variations through computer embroidery for cost cutting. Paisley, being a popular motif in Zardozi was selected for embroidery. 30 different layouts for yokes and sleeve borders were designed using Corel draw, 10 layouts were selected with the help of textile experts' comments for final execution. 30 samples of yokes and sleeve borders were embroidered with Zardozi - 10 each for hand embroidery, computer embroidery and their combination. The cost was then computed for all 3 categories and then the final survey with 100 participants was done and results were statistically analysed. Therefore, contrary to popular belief, the results of the research were in themselves a revelation that, Zardozi is not a style which has been forgotten due to the onset of other methods of embroidery. Instead, the dynamic nature of the art has been incorporated into newer styles to keep the tradition alive. The final survey revealed that the respondents were keen to buy the samples which had a combination of hand and the computer embroidery which incorporated the best of both styles, ancient as well as modern.

Keywords: Computer Embroidery, design intervention, ethnic wear, traditional embroidery, zardozi.

INTRODUCTION

Embroidery enables the quality of art craft in stitching to come out explicitly (Pandit, 1998). It dates back to the remotest period of history and in the country's regional traditions. Every region of India has a unique embroidery style that captures its particular cultural essence (Purvar, 2012). Zardozi embroidery has come to India from Persia. Its literal translation of "zar" (gold) and "dozi" (embroidery) refers to the technique of sewing embellishments on to various fabrics using metallic-bound threads (Crill, 1999). From the time of the Rig Veda, zardozi needlework has existed in India. There are various instances where zardozi needlework is mentioned as an embellishment on gods' clothing. Initially, the stitching was done with real gold leaf and wires made of pure silver. Today, however, artisans combine silk thread with copper wire that has been polished in gold or silver. This is due to the fact that gold and silver are no longer as readily available as they once were. The creations in Zardozi work are painstakingly and delicately done by hand, and are ageless and free of the constraints of trends (Bhatia, 2005). In any artefact and culture, the use of gold

tends to symbolize wealth and power; the fabrics with Zardozi are no exception. The oldest documentary evidence to what could have been the earliest artefacts embroidered in precious metal is to be found in the Vedic age (Gupta, 1996). However, 'zardozi' as a class of artisans along with other artisans followed the footsteps of the conquerors sultanate in the twelfth century down the mountain passes of the Khyber on to the plains of Indian subcontinent (Rama, 2008). Not only were depictions of royalty and nobles highly adorned in gold and diamonds, but even depictions of horses, camels, and elephants all have lavishly embroidered saddles. The Ain-i-Akbar provides an extensive overview of work, particularly the shawls (Brijbhusan, 1990).

A number of other ornamental materials were used in Zardosi with its increasing demand in the exports. Other embroidery materials used can be metal threads such as 'kasab', 'badla', 'dabka', 'kora', 'gijai', 'nakshi', 'salma', 'chikna', 'khiccha', 'chalak', 'kangani', 'trikona' etc. Silk and other fiber threads are also being used (Srikant, 1999). Beautiful metal embroidery known as zardozi was once reserved for India's kings and other nobles. Additionally, it was employed to adorn the scabbards, wall hangings, elephant and horse accessories, as well as the walls of the royal tents (Bhatnagar, 2005).

The Geographical Indication Registry has given the GI designation to all Zardosi textiles produced in Lucknow and the areas around it. Zardozi speciality regions include cities like Hyderabad, Delhi, Agra, Kashmir, Kolkata, Varanasi, and Farrukhbadare. For investors, this has helped to distinguish the craft from fake goods and has also aided in the preservation of one of Lucknow's finest and most traditional art forms. Thanks to the concerted efforts made by connoisseurs and couturiers of the world, traditional Indian embroidery now has a foothold in international houses. Designs from the past are being used with brilliant effects on ethnic Indian and Western ensembles (Khan, 1997).

Justification: It is the younger generation's responsibility to preserve the richness of Indian culture in the new millennium as they enter the field of design using cutting-edge tools, techniques, and materials. They must also use modern technology to transform traditional motifs into modern, stylized forms so that future generations will be aware of their ancestors' ancient arts and crafts. Since Zardozi embroidery is a well-known craft worldwide, it is necessary to record the original motifs, fabrics, techniques, and colours used in modern fashion as well as with the new technique (computer embroidery), in order to make it accessible to everyone who wants it. In light of the aforementioned considerations, this research on Zardozi embroidery has been formulated.

OBJECTIVES

The following goals were conceptualised for the study:

1. To explore and record the organisation of the industry, the manufacturing process, the colours and designs utilised, their significance, and the welfare advantages of the artisans in relation to zardozi embroidery.
2. Design intervention by developing Zardozi embroidery and layout designs suitable for young girls' ethnic wear.

3. To develop embroidered products such as yokes suitable for young girls' ethnic wear using variations in Zardozi embroidery and computer embroidery for upliftment of the craft and study their acceptability.
4. To construct a product such as detachable yoke, this could be used as a patch on different ethnic wear, for young girls.

METHODOLOGY

The study was undertaken in two phases. An exploratory field research was conducted as part of the project's first phase in order to gain a thorough understanding of both traditional and modern state of the art and craftspeople. The study examined the sector's structure, production processes, colours, and designs, as well as its relevance, social standing, and welfare advantages for artisans. The study's second stage concentrated on changing the motif and design before moving on to product development. The methodology listed below details the steps performed for data gathering and analysis while keeping the study's goals in mind.

Phase I of the study

For the purpose of learning more about the artisans' backgrounds and production methods, a thorough interview schedule was developed. The study was conducted at Dulagarh and Nayakpara which are situated at distance of twenty five kilometres and sixty kilometres from Howrah respectively. Here ten zardozi were interviewed. It is said that the zardozi embroidery is majorly done in these two areas near Kolkata. Apart from these, this embroidery is even carried in villages like Pachala, Moijoti and Beltala. This was administered on artisans from craft cluster in Howrah district through non-participant observation. The descriptive nature of the desired answers and the artists' limited literacy were taken into consideration when selecting these tools.

Phase II of the study was undertaken in the following stages:

- a. Creating a Questionnaire:** To learn more about the respondents' awareness of zardozi embroidery, a structured questionnaire was created and administered on hundred mothers of young girls.
- b. Selection of Motifs:** The motifs for zardozi were chosen from a variety of sources, including data gathered from existing literature, online sources, and a field survey carried out during Phase I of the study.
- c. Modernizing Zardozi motifs with CAD:** Zardozi's paisley motif was altered and modernized to produce stylized designs. CAD software, specifically COREL Draw, was used to design the structure into a contemporary form (VersionX).

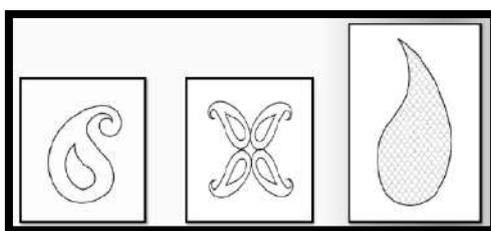


Fig.- 1: The Adaptation of Paisley Motif

d. Arrangement of Modified Paisley Motifs in Different Layouts: The modified motifs were placed in a layout for yokes that are appropriate for young girls' ethnic clothing. Thirty different arrangements were made for each modified motif.

- L1: Buti in drop repeat
- L2: Buti in Jaali form
- L3: Mirrored buti
- L4: Central butta
- L5: Central butta with all over jaal
- L6: Central butta with side jaal
- L7: All over jaal
- L8: Central bel with side jaal
- L9: Side bel with central jaal
- L10: Buti and butta repeat

e. Evaluation of the Developed Layouts: The developed layouts were evaluated by a panel of ten textile experts including textile designers, manufacturers of embroidered textiles and boutique owners. One best layout from each of the ten selected category was used to apply on the yokes and sleeve band for young girl's ethnic wear. The designs were scored as 1, 2, 3, 4 and 5 corresponding to average, fair, good, very good and excellent respectively. The attributes on which the evaluation of designs was done were appropriateness for product, clothing components present and overall aesthetic appeal.

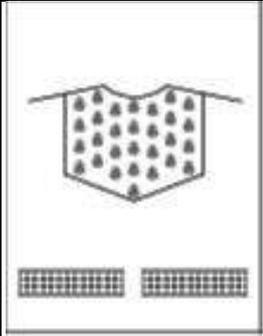
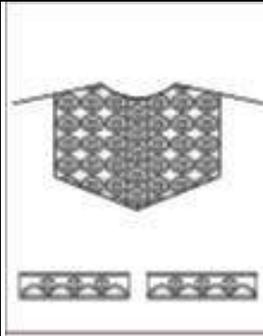
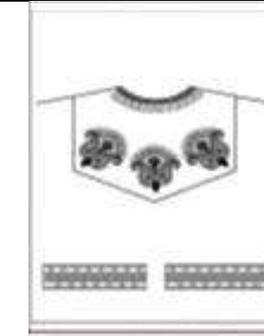
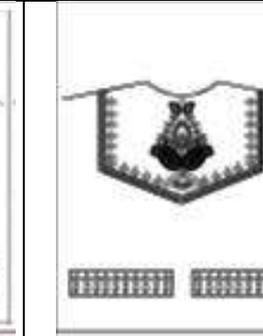
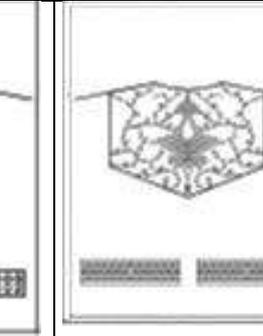
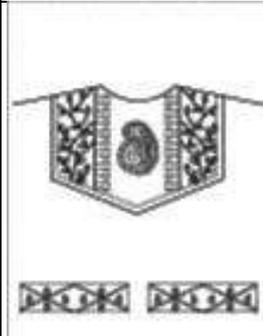
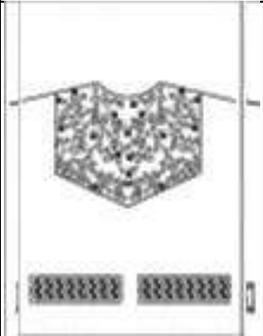
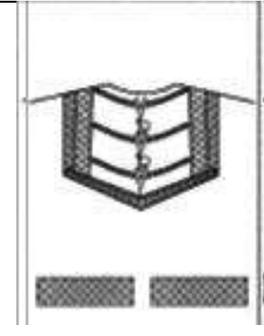
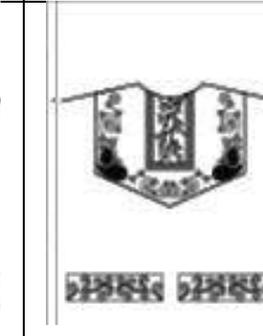
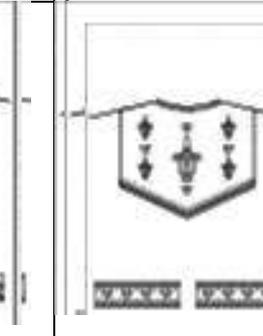
| | | | | |
|---|---|---|--|---|
|  |  |  |  |  |
| Buti in drop repeat | Buti in jaali form | Mirrored buti | Central buta | Central Butta with jaal |
|  |  |  |  |  |
| Central Butta with Side Jaal | All over Jaal | Central Bel with Side Jaal | Side bel with Central Jaal | Buti and Buta Repeat |

Fig. - 2: The Ten Selected Layouts

f. Creation of Embroidered Samples and their Assessment

The 10 layouts, one from each category, were utilized to create prototypes of embroidered clothing for young girls, including yokes and sleeve bands.

Category A: Execution of Zardozi hand embroidery for ten samples

Category B: Execution of Computer embroidery for ten samples

Category C: Execution of the Combination of hand embroidery and computer embroidery for ten samples.

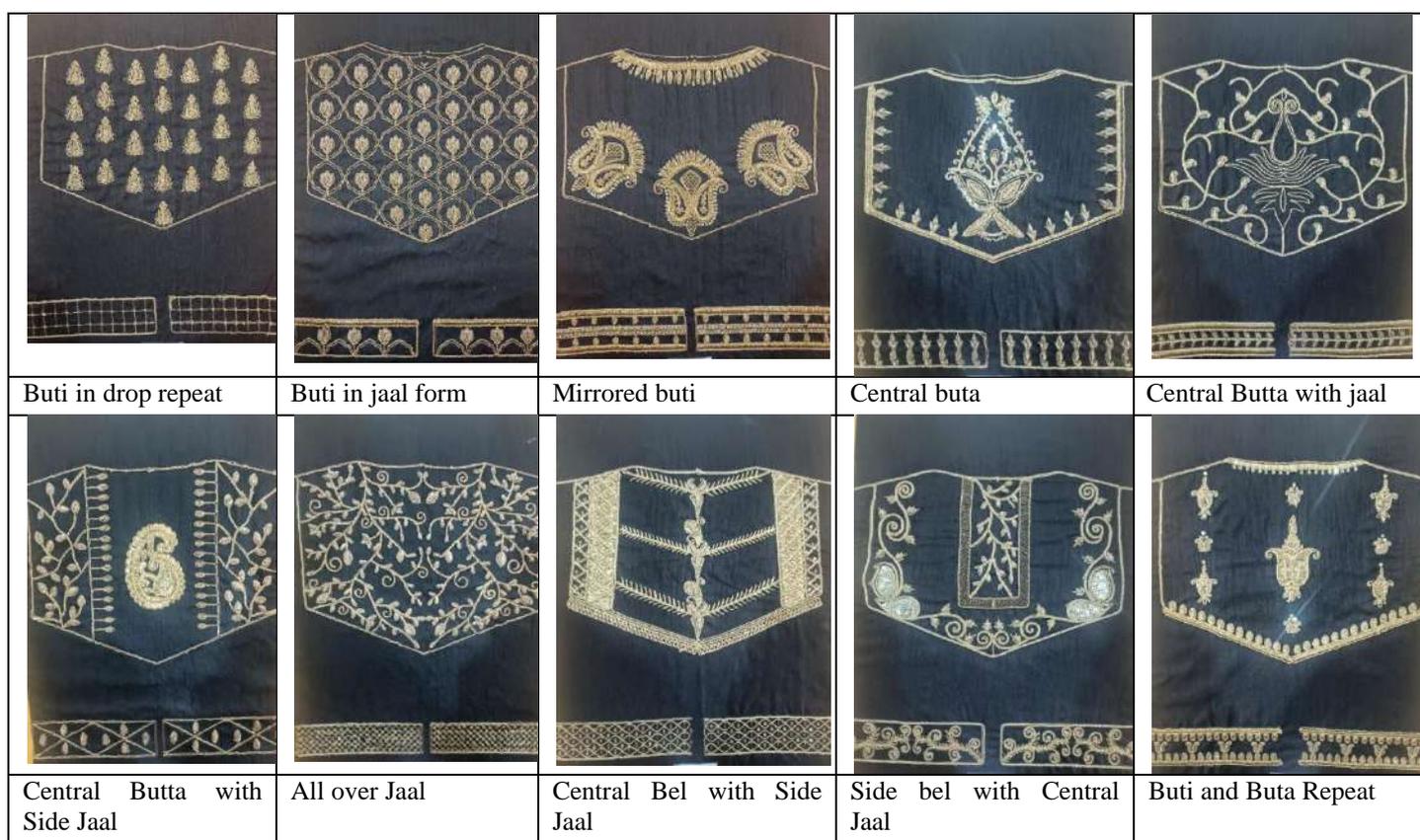


Fig.- 3: Most Preferred Samples (Category C)

g. Product Development and Cost Calculation: The selected layouts and technique were used to develop yokes and sleeve band and costing was done.

h. Acceptability of Developed Product: A Likert-scaled assessment performed on 100 respondents (mothers of young girls) revealed the product's acceptability. The following factors were taken into consideration when rating: the quality of the embroidery, the design's clarity, its applicability, the attractiveness of the fabric, the colour scheme, the product's overall appearance, and the price.

i. Construction of a Detachable Yoke and to Assess its Acceptability:

The developed samples can be used as detachable yokes which can be used as a patch on different ethnic wear for young girls. The developed detachable yoke was shown to the respondent for assessing the acceptability.

j. Analysis of Data: The data collected was subjected to detailed statistical analysis by using Percentage, Ranking, Pie diagram, bar diagram and Single -factor ANOVA.

RESULTS AND DISCUSSION

The findings are presented phase wise.

Phase I of the study

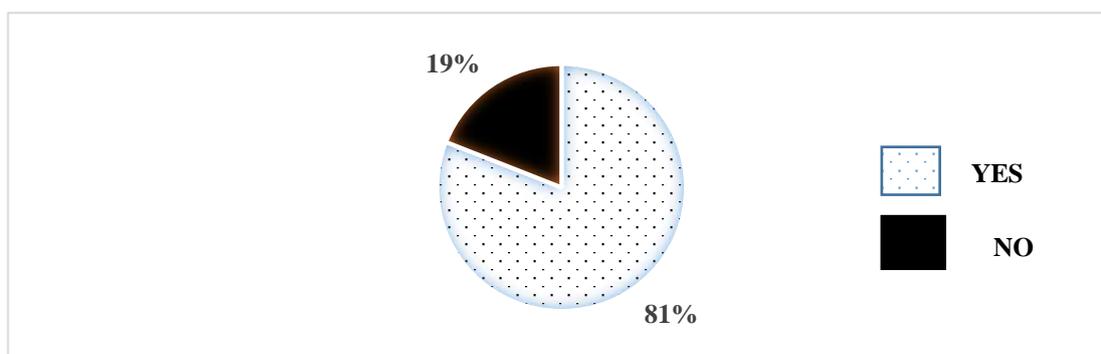
Many facts were gathered by interviewing artisans of Zardozi embroidery who were located in Nayakpara and Dulagarh villages of Howrah. It was a useful study as it helped to realize the shortcomings of Zardozi embroidery and to work more on that. At present, raw material, which is used as a base fabric for all the three categories, is usually made of Dupion silk. Usually dabka and tikki are used which is gold in colour for the hand embroidery and thick and thin dori thread are used for the computer embroidery. Sewing needles (No. 6–10), an embroidery frame, scissors, pencil markers, chalk powder, tracing paper, and other materials are a few of the instruments needed to complete the project. Drawing the designs directly onto the fabric using a pencil marker or transferring them onto paper, then creating pores with needles, is how the designs are applied to the fabric. The tracing sheet is placed on the selected cloth, and a thick mixture of blue chalk powder and kerosene is rubbed onto the tracing paper. The outline of the drawings is created on the fabric by the chalk powder being absorbed by the pores in the tracing sheet. Problems faced by Zardozi artisans in the surveyed area were lack of education, lack of fund and electricity.

Phase II of the study

a. Awareness about Zardozi Embroidery

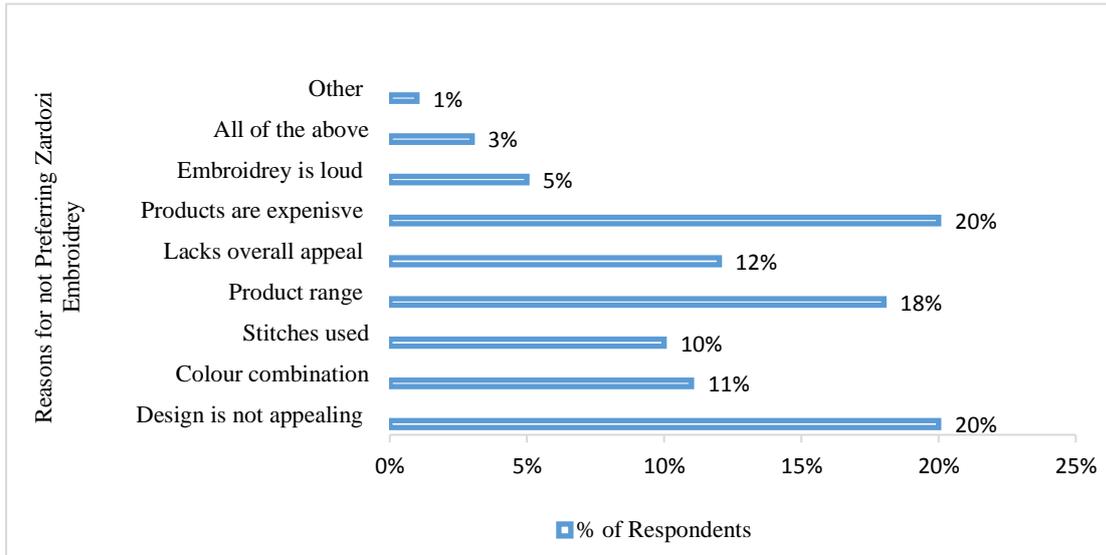
1. Eighty one percent of respondents were aware of Zardozi embroidery and nineteen percent were not aware of Zardozi embroidery.

Graph 1: Awareness towards Zardozi Embroidery

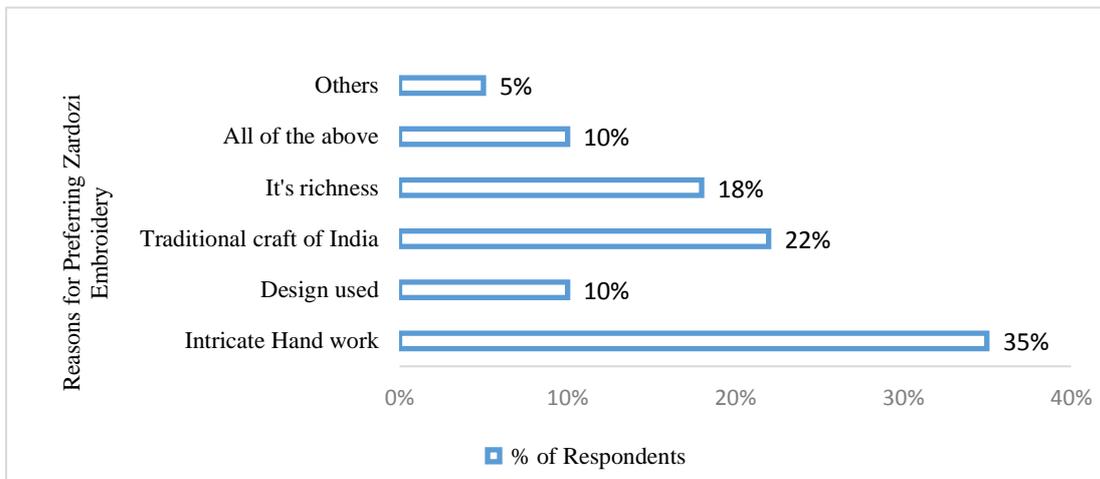


2. Amongst the respondents who did not like the embroidery reasoned it to non-appealing designs and high price of the products and reason of liking the embroidery was because of its intricate work and also appreciation for Indian heritage.

Graph 2: Reasons for Not Preferring Zardozi Embroidery

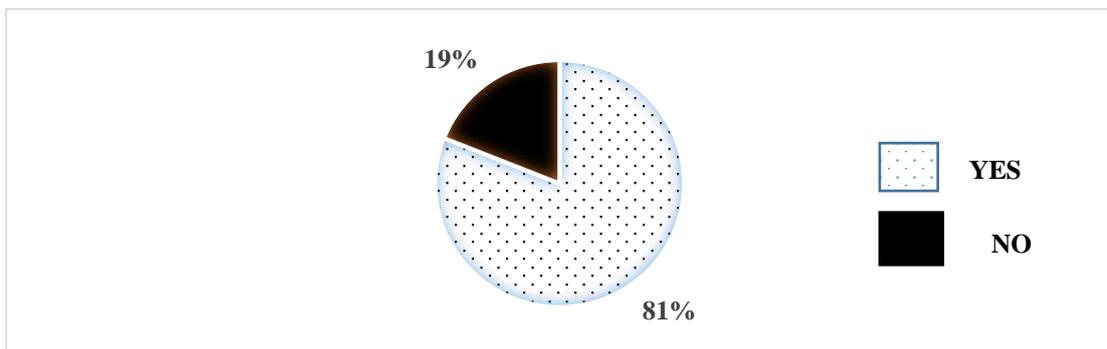


Graph 3: Reasons for Preferring Zardozi Embroidery



- Eighty one percent respondents, amongst those who knew about the embroidery, were interested in seeing innovations in the design for the Zardozi embroidery.

Graph 4: Interest in Innovation in Zardozi Embroidery



b. Preference towards Developed Samples

1. Thirty samples showing three different techniques of embroidery: hand embroidery, computer embroidery, Combination of both hand and computer embroidery were developed and evaluated. With respect to following attributes, samples were assessed on a five point scale:
 - Neatness
 - Clarity of Design
 - Design suitability
 - Fabric appeal
 - Colour combination
 - Overall appeal
 - Cost effectiveness
2. Highest rank was obtained for combination of both Hand and Computer embroidery over other techniques. This probably could be because the respondents felt that the combinations was keeping the tradition of Zardozi embroidery alive, yet with the use of some computer embroidery, the products could be more cost effective and sellable. Though the cost of hand embroidery was higher, it was ranked at the second position, probably because of its richness and traditional look which was been completely lost in the samples embroidered using only computer embroidery.

Table- 1: Preference for Embroidery Technique

| Technique | \bar{X} | Rank |
|---------------------|-----------|------|
| Hand embroidery | 4.92 | II |
| Computer embroidery | 4.69 | III |
| Combination of both | 5.17 | I |

3. All the evaluations were tested through one way-ANOVA test. There was a significant difference in the acceptability of the final developed samples for category A and C, and no significant difference in acceptability for the computer embroidery samples as this category of the samples were of uniform appearance and being mechanized; probably gave more or less a similar look.
4. In all the categories, with respect to the neatness, design layout and overall aesthetic appeal, samples were assessed. Hand embroidered yoke with Mirrored butti, sample number SA3 was ranked one, probably because it had many details and yet its design was clear and well defining. Also the pairing of yoke with sleeve band could be appreciated. The sample number SA1 with butti in drop repeat was ranked the last probably because the design had less of design clarity and the layout not very interesting. It was felt that since the hand embroidery is labour intensive and expensive work, choice of design and raw materials should be appropriate.

Table- 2: Preference for Embroidered Samples

| SAMPLE NO. | CATEGORY A (Hand Embroidery) | | SAMPLE NO. | CATEGORY B (Computer Embroidery) | | SAMPLE NO. | CATEGORY C (Hand & Computer Embroidery Combination)) | |
|------------|---------------------------------|------|------------|-------------------------------------|------|------------|---|------|
| | X | Rank | | X | Rank | | X | Rank |
| SA1 | 1.09 | X | SB1 | 3.61 | IX | SC1 | 4.21 | VI |
| SA2 | 1.58 | VIII | SB2 | 3.54 | X | SC2 | 4.29 | V |
| SA3 | 3.24 | I | SB3 | 4.40 | V | SC3 | 3.80 | IX |
| SA4 | 1.76 | VII | SB4 | 4.05 | VII | SC4 | 3.95 | VIII |
| SA5 | 2.43 | IV | SB5 | 4.34 | VI | SC5 | 3.68 | X |
| SA6 | 2.65 | III | SB6 | 5.28 | II | SC6 | 5.02 | I |
| SA7 | 2.96 | II | SB7 | 5.47 | I | SC7 | 4.74 | II |
| SA8 | 1.14 | IX | SB8 | 3.81 | VIII | SC8 | 4.08 | VII |
| SA9 | 2.24 | V | SB9 | 4.48 | III | SC9 | 4.61 | III |
| SA10 | 2.08 | VI | SB10 | 4.77 | IV | SC10 | 4.36 | IV |



Fig.- 4: Rank I (Category A, B and C)

In the computer embroidery category, with respect to the neatness, design layout and overall aesthetic appeal, samples were assessed. Yoke with all over Jaal, sample number SB7 was ranked one, because it had the best design clarity, design layout and overall aesthetic appeal. The sample number SB2 butti in jaali form was ranked the last probably because it lacked overall aesthetic appeal and was too heavy for the end use.

Combination of hand and computer embroidered yoke with central butta and side jaal, sample number SC6 was ranked one, probably because it had many details and yet its design was

clear and well defining. The sample number SC5, Central butta with all over jaal was ranked the last probably because the sample was too cluttered and heavy for its end use.

5. Concept of Detachable yoke for using and reusing the embroidered yokes on different types of ethnic wear was appreciated by hundred percent respondents.



Fig.- 5: Detachable Yoke Embroidered in Hand and Computer Embroidery Combination

SUMMARY, CONCLUSION AND IMPLICATIONS

India is the only country in the world with an unbroken, living vibrant tradition of crafts. It is neither feasible nor desirable to retain every last remnant of the past as cultures naturally develop. However, it is obvious that some kinds of information and talent should be preserved. These would, at the very least, include those that, through their inherent beauty, cultural significance, or value as a knowledge base, represent a priceless resource. They would also include those that have the potential to be exploited to produce a sustainable income and preserve traditional lifestyles. It is necessary to make efforts to maintain this cultural heritage of arts and crafts, and this can be done by either recording the many antiquated traditions or by fusing them. It is the younger generation's responsibility to preserve the richness of Indian culture in the new millennium as they enter the field of design using cutting-edge tools, techniques, and materials. They must also use modern technology to transform traditional motifs into modern, stylized forms so that future generations will be aware of their ancestors' ancient arts and crafts. Since Zardozi stitching is a well-known skill worldwide, it is important to record the original motifs, fabrics, techniques, and colours utilised in modern fashion. Hence keeping the above points in mind this study on Zardozi embroidery and its adaptation using computer embroidery has been formulated. Interviews with Zardozi needlework craftsmen in Howrah's Nayakpara and Dulagarh districts yielded a wealth of information. It was a beneficial study since it made Zardozi embroidery's flaws more apparent and motivated further improvement. Due of its complexity, laboriousness, and time-consuming nature, zardozi is pricey in marketplaces. However, if various stitching techniques were investigated to

make it more commercially viable, this ancient art could be more accessible to the general public and grow in popularity. Because it generated a good blend of traditional hand work with machine work and also proved to be more cost effective, the study's attempt to use a combination of hand and computer embroidery could be pursued commercially.

Many poor rural residents would also be given employment possibilities as a result of this. If zardozi stitching is explored more toward the use of methods and designs while maintaining its natural appeal, it has the ability to make an impact and can even become commercially accessible. Therefore, contrary to popular belief, the results of the research were in themselves a revelation that, Zardozi is not a style which has been forgotten due to the onset of other methods of embroidery. Instead, the dynamic nature of the art has been incorporated into newer styles to keep the tradition alive. The final survey revealed that the respondents were keen to buy the samples which had a combination of hand and the computer embroidery which incorporated the best of both styles, ancient as well as modern.

Further work can be carried to train the women artisans in computer embroidery so that they can use a combination of hand and computer embroidery to create more cost-effective innovative products. This study can be extended and experimented with different methods of embroideries developing different range of products.

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A STUDY ON ADAPTATION OF TRADITIONAL YAKSHAGANA ART FORM USING DIGITAL PRINTING ON T-SHIRTS

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ABSTRACT

India's culture is as diverse as its vast landscape. India is a diverse country, a fact that is evident in its people, culture, and environment. India's culture evolves in the same way as its vast topography and geography do. Culture is a collection of advantages of human existence that defines it openly and ideally separates distinct groups. The study was inspired by the face and emotional expressions, which are by far the most distinctive features of this art form. Happy, sad, angry, surprised, bad, disguised, and fearful were some of the prominent motifs represented in Yakshagana facial and emotional expressions, which were drawn from secondary sources such as novels. Using CAD tools such as Photoshop and Corel Draw, the selected motifs of these facial-emotional expressions were tweaked and adapted to produce other motifs. The statistical analysis between the two factors i.e., different printed products and different attributes, was found to have a significant difference among acceptability of the eight different printed products and also different attributes on its acceptability.

Keywords: Digital prints, Digitization, Emotion wheel, Facial emotions, Pop art, Yakshagana

INTRODUCTION

India may be a diverse country, a fact that is evident in its people, culture, and environment. Culture is a collection of advantages of human existence that defines it openly and ideally separates distinct groups (Kenderdine et al., 2008).

Folk art is a type of art that is specific to each region of India. India's folk and tribal arts are ethnic and simple, but vibrant and dynamic enough to convey the country's rich history. Indian folk art appears to have a lot of potential in the global market because of its innate aesthetic sensibility and authenticity (Sharma & Paul, 2015).

Yakshagana is one of India's most well-known art forms. Yakshagana is a one-of-a-kind art form that has been dubbed "folk art," but research has discovered that it also includes a classical component. Many more elements include Hindu mythology, traditional dance, musical effect, Natyashatra, and Sanskrit foundation. The literary works of Yakshagana contain a great number of Shlokas and Prosody (fluency) not seen in folk art (Upadhaya, 2008).

As a detailed study, referenced through the Emotion Wheel (Geoffrey Roberts) (Fig.-1), these categorized seven types were further divided into sub divisions with further sub groupings:

| | |
|--|---|
| 1. Happy was divided into: | |
| a. Happy – Peaceful – Thankful | |
| b. Happy – Proud – Confident | |
| c. Happy – Content – Joyful | |
| d. Happy – Content – Absorbed | |
| e. Happy – Interested – Inquisitive | |
| f. Happy – Interested – Curious | |
| g. Happy – Accepted – Respected | |
| h. Happy – Optimistic – Hopeful | |
| 2. Angry was divided into: | 3. Sad was divided into: |
| a. Angry – Frustrated – Infuriated | a. Sad – Hurt – Disappointed |
| b. Angry – Frustrated – Annoyed | b. Sad – Lonely – Abandoned |
| c. Angry – Mad – Furious | c. Sad – Despair – Grief |
| 4. Bad was divided into: | 5. Surprised was divided into: |
| a. Bad – Stressed – Overwhelmed | a. Surprised – Amazed – Astonished |
| b. Bad – Bored – Indifferent | b. Surprised – Amazed – Awe |
| c. Bad – Stressed – Out of Control | c. Surprised – Confused – Disillusioned |
| 6. Disgusted was divided into: | 7. Fearful was divided into: |
| a. Disgusted – Repelled – Horrified | a. Fearful – Threatened – Nervous |
| b. Disgusted – Disappointed – Revolted | b. Fearful – Anxious – Worried |
| c. Disgusted – Disapproving – Judgmental | c. Fearful – Scared – Frightened |

2. Adaptation of Yakshagana images into contemporary form

Cartoon forms were designed based on the collected photos of facial expressions representing emotions, in which the fundamental structure or contour was sketched by hand on paper and then digitized through the scanning process. Coloring, basic formatting, editing, and other tasks were completed using Adobe Photoshop 2020 and Corel Draw 2020 software after the digitizing process. This resulted into a complete adaptation of the basic Yakshagana pictures into their digitized format of the facial expressions.

In order to contemporize the selected motifs for suiting the taste of modern-day consumers, these facial-emotional expressions were tweaked and adapted to produce modified motifs (Table-1). It was done with an eye toward not only the emotions but also the basic colour notions of the Yakshagana art-form.

The emotions, according to the emotion wheel, are divided into seven major categories. Similarly, pop-art adaptations were made in accordance, such as for emotion happy, eight different feelings were adapted whereas for the rest of the six emotions (angry, bad, sad, disgusted, surprised

& fearful) three different feelings were adapted and a total of twenty-six motifs were created for digital printing on T-Shirt.

3. Evaluation of the developed designs

For the evaluations of these developed designs, a panel of fifty-five people, including professionals (both textile and non-textile backgrounds), students (textiles), and boutique owners was selected. The preference was determined on a scale of one to five, with one being the least chosen motif and five being the most desired.

A structured questionnaire was prepared and it was divided into four sections for systematized analysis. The questionnaire was created using Google Forms and distributed to the selected respondents for data collection.

Section I: Dealt with the respondents' personal information.

Section II: Dealt with the information & knowledge of Indian traditional art forms specifically Yakshagana art styles.

Section-III: Dealt with the preference of the respondents for the digitized cartoon pop-art designs portraying the facial expressions of the Yakshagana art-form through ranking (1-5).

Table-1: Original & Modified Yakshagana Images based on Emotions

| Inspiration from Yakshagana Facial Expression | Motif Modification into Digital Form | Inspiration from Yakshagana Facial Expression | Motif Modification into Digital Form |
|---|---|--|---|
|  |  |  |  |
| H₁: Happy – Peaceful – Thankful | | H₂: Happy – Proud – Confident | |
|  |  |  |  |
| H₃: Happy – Content – Joyful | | H₄: Happy – Content – Absorbed | |
|  |  |  |  |
| H₅: Happy – Interested – Inquisitive | | H₆: Happy – Interested – Curious | |
|  |  |  |  |
| H₇: Happy – Accepted – Respected | | H₈: Happy – Optimistic – Hopeful | |
| | | | |

| | | | |
|---|---|---|--|
|  |  |  |  |
| A₁: Angry – Frustrated – Infuriated | | A₂: Angry – Frustrated – Annoyed | |
|  |  |  |  |
| A₃: Angry – Mad – Furious | | S₁: Sad – Hurt – Disappointed | |
|  |  |  |  |
| S₂: Sad – Lonely – Abandoned | | S₃: Sad – Despair – Grief | |

| Inspiration from Yakshagana Facial Expression | Motif Modification into Digital Form | Inspiration from Yakshagana Facial Expression | Motif Modification into Digital Form |
|---|---|--|---|
|  |  |  |  |
| B₁: Bad – Stressed – Overwhelmed | | B₂: Bad – Bored – Indifferent | |
|  |  |  |  |
| B₃: Bad – Stressed – Out of Control | | SP₁: Surprised – Amazed – Astonished | |
|  |  |  |  |
| SP₂: Surprised – Amazed – Awe | | SP₃: Surprised – Confused – Disillusioned | |

| | | | |
|---|---|--|---|
|  |  |  |  |
| D₁: Disgusted – Repelled – Horrified | | D₂: Disgusted – Disappointed – Revolted | |
|  |  |  |  |
| D₃: Disgusted – Disapproving – Judgmental | | F₁: Fearful – Threatened – Nervous | |
|  |  |  |  |
| F₂: Fearful – Anxious – Worried | | F₃: Fearful – Scared – Frightened | |

4. Arrangement of preferred cartoon pop-art design in different layouts

After analysing the data, four different t-shirt layouts were created using one of the most popular cartoon pop-art designs from each (seven) category. Using the Corel Draw software (Version X-8), four distinct arrangements were created for each updated design (Table- 2). For the t-shirt, a total of twenty-eight (28) layouts were created (four different layouts for seven distinct designs)

The prepared designs were examined from a panel of twenty judges (representation from the same panel of fifty-five judges) through Google Forms. The five-point ranking system was based on the design's arrangement/placement, appropriateness or suitability of designs for a certain product, and overall aesthetic appeal.

5. Product development and acceptability of the developed product

The eight selected design layouts were applied on t-shirt using digital printing and the prepared women's t-shirts (Table- 3) was again evaluated through a panel of twenty judges who had earlier judged the arrangements of layout with the developed design. The acceptability of the generated products was assessed using a five-point ranking system. Colour appeal, neatness, clarity of design, suitability of design, and overall aesthetic appeal were all factors in the ranking.

6. Analysis of data

The data collected was analysed through ranking, weighted scores and analysis of variance. The 2-way ANOVA technique was utilised in the analysis to see if there was any significant

difference between the different layouts of the design generated and the specified attributes on different layouts with the following test hypothesis:

A: For comparing the different layouts of a cartoon pop-art design, the following hypothesis is formulated

H₀: There is no significant difference in different layouts ($\mu_1 = \mu_2 = \mu_3$)

H₁: There is a significant difference in different layouts ($\mu_1 \neq \mu_2 \neq \mu_3$)

B: For comparing the different attributes, the following hypothesis is formulated

H₀: There is no significant difference among different attributes of a layout

($\mu'_1 = \mu'_2 = \mu'_3$)

H₁: There is a significant difference among different attributes of a layout

($\mu'_1 \neq \mu'_2 \neq \mu'_3$)

Table-2: Layouts for Selected Motifs

| Layout 1 | Layout 2 | Layout 3 | Layout 4 |
|---|---|--|---|
|  |  |  |  |
| H₅L₁ | H₅L₂ | H₅L₃ | H₅L₄ |
| HAPPY (Happy – Interested – Inquisitive) - H₅ | | | |
|  |  |  |  |
| H₆L₁ | H₆L₂ | H₆L₃ | H₆L₄ |
| HAPPY (Happy – Interested – Curious) -H₆ | | | |

| | | | |
|---|---|--|---|
|  |  |  |  |
| A₃L₁ | A₃L₂ | A₃L₃ | A₃L₄ |
| ANGRY (Angry – Mad – Furious) - A₃ | | | |
|  |  |  |  |
| S₃L₁ | S₃L₂ | S₃L₃ | S₃L₄ |
| SAD (Sad – Despair – Grief) - S₃ | | | |
|  |  |  |  |
| B₁L₁ | B₁L₂ | B₁L₃ | B₁L₄ |
| BAD (Bad – Stressed – Overwhelmed) - B₁ | | | |
|  |  |  |  |
| SP₁L₁ | SP₁L₂ | SP₁L₃ | SP₁L₄ |
| SURPRISED (Surprised – Amazed – Astonished) - SP₁ | | | |

| | | | |
|--|--|---|--|
|  |  |  |  |
| D₁L₁ | D₁L₂ | D₁L₃ | D₁L₄ |
| DISGUSTED (Disgusted – Repelled – Horrified) - D₁ | | | |
|  |  |  |  |
| F₃L₁ | F₃L₂ | F₃L₃ | F₃L₄ |
| FEARFUL (Fearful – Scared – Frightened) - F₃ | | | |

Table- 3: Final Printed T-Shirt for Selected Layouts

| | | | |
|---|---|--|---|
|  |  |  |  |
| H₅L₄ (HAPPY) | H₆L₃ (HAPPY) | A₃L₃ (ANGRY) | S₃L₄ (SAD) |



FINDINGS AND DISCUSSION

The researcher found several appropriate photographs for the happy emotion during the secondary survey; thus, eight pop art motifs were developed from this emotion, with two of the most preferred ones being considered. Similarly, for each of the remaining six emotions (angry, bad, sad, disgusted, surprised & fearful), three pop art motifs were developed with one most preferred in each category being selected. The respondents' preferences are tabulated in Table- 4.

The table depicts the ranking modes of all the design categories according to emotions. Ranks are assigned to each category with the help of weighted mean score and average mean.

Table-4: Visual Evaluation Scores of Developed Digital Cartoon Pop-Art Motif from the Yakshagana Art-Form

| Motif No. | Design Details | Weighted Mean score | \bar{X} | Rank |
|-------------------------------|----------------------------------|---------------------|-----------|------|
| Design Category- HAPPY | | | | |
| H ₁ | Happy – Peaceful – Thankful | 164 | 2.98 | V |
| H ₂ | Happy – Proud – Confident | 158 | 2.87 | VII |
| H ₃ | Happy – Content – Joyful | 174 | 3.16 | III |
| H ₄ | Happy – Content – Absorbed | 159 | 2.89 | VI |
| H ₅ | Happy – Interested – Inquisitive | 175 | 3.18 | I |
| H ₆ | Happy – Interested – Curious | 175 | 3.18 | I |
| H ₇ | Happy – Accepted – Respected | 156 | 2.83 | VIII |
| H ₈ | Happy – Optimistic – Hopeful | 171 | 3.10 | IV |
| Design Category- ANGRY | | | | |

| | | | | |
|-----------------------------------|---------------------------------------|-----|------|-----|
| A ₁ | Angry – Frustrated – Infuriated | 165 | 3.00 | II |
| A ₂ | Angry – Frustrated – Annoyed | 160 | 2.90 | III |
| A ₃ | Angry – Mad – Furious | 168 | 3.05 | I |
| Design Category- SAD | | | | |
| S ₁ | Sad – Hurt – Disappointed | 155 | 2.81 | III |
| S ₂ | Sad – Lonely – Abandoned | 156 | 2.83 | II |
| S ₃ | Sad – Despair – Grief | 158 | 2.87 | I |
| Design Category- BAD | | | | |
| B ₁ | Bad – Stressed – Overwhelmed | 161 | 2.92 | I |
| B ₂ | Bad – Bored – Indifferent | 156 | 2.83 | III |
| B ₃ | Bad – Stressed – Out of Control | 160 | 2.90 | II |
| Design Category- SURPRISED | | | | |
| SP ₁ | Surprised – Amazed – Astonished | 168 | 3.05 | I |
| SP ₂ | Surprised – Amazed – Awe | 163 | 2.96 | II |
| SP ₃ | Surprised – Confused – Disillusioned | 159 | 2.89 | III |
| Design Category- DISGUSTED | | | | |
| D ₁ | Disgusted – Repelled – Horrified | 165 | 3.00 | I |
| D ₂ | Disgusted – Disappointed – Revolted | 163 | 2.96 | II |
| D ₃ | Disgusted – Disapproving – Judgmental | 162 | 2.94 | III |
| Design Category- FEARFUL | | | | |
| F ₁ | Fearful – Threatened – Nervous | 158 | 2.87 | II |
| F ₂ | Fearful – Anxious – Worried | 150 | 2.72 | III |
| F ₃ | Fearful – Scared – Frightened | 164 | 2.98 | I |

Perusal of the Table- 4 reveals that for the emotion happy, design H₅ & H₆ are the most preferred pop art motif with the mean of 3.18 each. Similarly, for the angry emotion, design A₃ secured Rank I (3.05); S₃ (2.87) was the most preferred motif in the sad emotion category. B₁ (2.92) & SP₁ (3.05) was the selected pop art motif for the emotions, bad and surprised respectively. Lastly, rank I was secured by D₁ (3.00) and F₃ (2.98) by the remaining two emotions i.e. disgusted and fearful respectively.

Table- 5: Visual Evaluation Scores of Developed Layout using Digital Cartoon Pop-Art Motif Adapted from the Yakshagana Art-Form

| Design No. | Arrangement of the Design (AX) | | Appropriateness/ suitability of design for T-shirt (AY) | | Overall Aesthetic Appeal (AZ) | | Average Mean | Rank |
|------------------------------------|--------------------------------|-----------|---|-----------|-------------------------------|-----------|--------------|------|
| | <i>Weighted Mean score</i> | \bar{X} | <i>Weighted Mean score</i> | \bar{X} | <i>Weighted Mean score</i> | \bar{X} | | |
| Design Category (HAPPY-1) | | | | | | | | |
| H ₅ L ₁ | 57 | 2.85 | 55 | 2.75 | 58 | 2.9 | 2.12 | III |
| H ₅ L ₂ | 53 | 2.65 | 49 | 2.45 | 49 | 2.45 | 1.88 | IV |
| H ₅ L ₃ | 60 | 3.00 | 59 | 2.95 | 57 | 2.85 | 2.20 | II |
| H ₅ L ₄ | 68 | 3.40 | 66 | 3.30 | 65 | 3.25 | 2.48 | I |
| Design Category (HAPPY-2) | | | | | | | | |
| H ₆ L ₁ | 65 | 3.25 | 67 | 3.35 | 68 | 3.40 | 2.50 | II |
| H ₆ L ₂ | 56 | 2.80 | 57 | 2.85 | 60 | 3.00 | 2.16 | IV |
| H ₆ L ₃ | 66 | 3.30 | 69 | 3.45 | 72 | 3.60 | 2.55 | I |
| H ₆ L ₄ | 61 | 3.05 | 63 | 3.15 | 67 | 3.35 | 2.38 | III |
| Design Category (ANGRY) | | | | | | | | |
| A ₃ L ₁ | 65 | 3.25 | 63 | 3.15 | 67 | 3.35 | 2.43 | II |
| A ₃ L ₂ | 51 | 2.55 | 49 | 2.45 | 46 | 2.30 | 1.82 | IV |
| A ₃ L ₃ | 67 | 3.35 | 66 | 3.30 | 64 | 3.20 | 2.46 | I |
| A ₃ L ₄ | 54 | 2.70 | 53 | 2.65 | 52 | 2.60 | 1.98 | III |
| Design Category (SAD) | | | | | | | | |
| S ₃ L ₁ | 57 | 2.85 | 57 | 2.85 | 60 | 3.00 | 2.17 | II |
| S ₃ L ₂ | 36 | 1.80 | 43 | 2.15 | 41 | 2.05 | 1.50 | IV |
| S ₃ L ₃ | 66 | 3.30 | 65 | 3.25 | 64 | 3.20 | 1.62 | III |
| S ₃ L ₄ | 65 | 3.25 | 61 | 3.05 | 61 | 3.05 | 2.33 | I |
| Design Category (BAD) | | | | | | | | |
| B ₁ L ₁ | 62 | 3.10 | 61 | 3.05 | 63 | 3.15 | 2.32 | I |
| B ₁ L ₂ | 39 | 1.95 | 38 | 1.9 | 41 | 2.05 | 1.47 | IV |
| B ₁ L ₃ | 56 | 2.80 | 63 | 3.15 | 62 | 3.10 | 2.26 | II |
| B ₁ L ₄ | 58 | 2.90 | 61 | 3.05 | 60 | 3.00 | 2.23 | III |
| Design Category (SURPRISED) | | | | | | | | |
| SP ₁ L ₁ | 53 | 2.65 | 56 | 2.80 | 56 | 2.80 | 2.06 | IV |
| SP ₁ L ₂ | 60 | 3.00 | 60 | 3.00 | 59 | 2.95 | 2.23 | II |
| SP ₁ L ₃ | 59 | 2.95 | 59 | 2.95 | 57 | 2.85 | 2.43 | I |
| SP ₁ L ₄ | 54 | 2.70 | 57 | 2.85 | 58 | 2.90 | 2.11 | III |

| Design Category (DISGUSTED) | | | | | | | | |
|-------------------------------|----|------|----|------|----|------|------|-----|
| D ₁ L ₁ | 53 | 2.65 | 48 | 2.40 | 51 | 2.55 | 1.90 | III |
| D ₁ L ₂ | 54 | 2.70 | 55 | 2.75 | 58 | 2.90 | 2.08 | II |
| D ₁ L ₃ | 63 | 3.15 | 64 | 3.20 | 64 | 3.20 | 2.38 | I |
| D ₁ L ₄ | 38 | 1.90 | 42 | 2.10 | 41 | 2.05 | 1.51 | IV |
| Design Category-8 (FEARFUL) | | | | | | | | |
| F ₃ L ₁ | 32 | 1.60 | 38 | 1.90 | 33 | 1.65 | 1.28 | IV |
| F ₃ L ₂ | 43 | 2.15 | 48 | 2.40 | 45 | 2.25 | 1.70 | III |
| F ₃ L ₃ | 59 | 2.95 | 58 | 2.90 | 63 | 3.15 | 2.25 | II |
| F ₃ L ₄ | 65 | 3.25 | 65 | 3.25 | 64 | 3.20 | 2.42 | I |

Where;

AX: Arrangement of the Design

AY: Appropriateness/ suitability of design for T-shirt

AZ: Overall Aesthetic Appeal

With all these selected eight pop art motifs from the seven emotion categories, four layouts were created and judged for preferences with a panel of judges based on three attributes namely, arrangement of the design, appropriateness/suitability of design for t-shirt, and overall aesthetic appeal. The results are depicted in Table- 5 and rank was assigned to each layout based on calculations of weighted mean score and mean.

From the above table, it is clearly seen that in the happy category, H₅L₄ & H₆L₃ received the maximum votes (Rank I) with an average mean of 2.48 and 2.55 respectively. Results indicate that calculated F value for four alternative layouts is equal to 9.88 (H₅L₄) & 8.65 (H₆L₃) which is more than the critical value for F 0.05; 3, 6 (= 4.76) and for the three different attributes is equal to 9.00 (H₅L₄) & 9.01 (H₆L₃) which is more than the critical value for F 0.05; 2, 6 (= 5.14) and so, H₁ [there is significant difference between different layouts and different attributes of a layout.

Perusal of Table- 5 shows that for the angry emotion, layout A₃L₃ secured an average mean of 2.46 (Rank I). The statistical analysis proved the significant difference among the four different layouts (F calculated = 8.23) and difference on the layouts in relation to the attributes for motif A3 (F calculated = 9.00).

The most desired layout, based on the average mean for the emotion category, sad is S₃L₄ (Rank I), with an average mean of 2.33. This is well demonstrated in table 5. The statistical study revealed a significant difference between the four distinct layouts, as well as three different attributes on the Motif S₃ layout with the calculated value for F is 9.81 & 9.00 respectively.

According to the average mean, for the bad emotion category, the most preferred layout is B₁ with the average mean of 2.32. Statistically it was found that the four different layouts and three different attributes of Motif B₁ (Bad) had a significant difference with F calculated as 9.56 and 9.01 respectively.

Layout SP₁L₃ received Rank I with an average mean of 2.43, as shown in table 6 for the emotion category, surprised. The statistical analysis revealed a significant difference between the four distinct layouts (F calculated = 8.55) and difference on the layouts in relation to the attributes for motif SP1 ((F calculated = 9.00).

As evident from the table above, the most preferred layout was D₁L₃ (2.38) for disgusted emotion and F₃L₄ (2.42) for fearful emotion. For both the emotions, the statistical study indicate

that calculated F value for four alternative layouts is equal to 7.42 (D₁L₃) & 11.55 (F₃L₄) and for the three different attributes is equal to 9.00 (D₁L₃) & 9.01 (F₃L₄) and so, H₁ [there is significant difference between different layouts and different attributes of a layout.

Table- 6: Acceptability of the Digitally Printed T-Shirt

| Design No. | Colour Appeal | | Neatness | | Clarity of Design | | Suitability of design | | Overall Aesthetic Appeal | | Average Mean | Rank |
|--------------------------------|---------------|-----------|----------|-----------|-------------------|-----------|-----------------------|-----------|--------------------------|-----------|--------------|------|
| | W MS | \bar{X} | W MS | \bar{X} | W MS | \bar{X} | W MS | \bar{X} | W MS | \bar{X} | | |
| H ₅ L ₄ | 66 | 3.30 | 67 | 3.35 | 66 | 3.30 | 64 | 3.20 | 67 | 3.35 | 4.12 | III |
| H ₆ L ₃ | 67 | 3.35 | 70 | 3.50 | 70 | 3.50 | 69 | 3.45 | 71 | 3.55 | 4.33 | II |
| A ₃ L ₃ | 58 | 2.90 | 57 | 2.85 | 55 | 2.75 | 52 | 2.60 | 57 | 2.85 | 3.48 | VI |
| S ₃ L ₄ | 60 | 3.00 | 61 | 3.05 | 66 | 3.30 | 64 | 3.20 | 64 | 3.20 | 3.93 | IV |
| B ₁ L ₁ | 45 | 2.25 | 56 | 2.80 | 57 | 2.85 | 55 | 2.75 | 53 | 2.65 | 3.32 | VI |
| SP ₁ L ₃ | 75 | 3.75 | 72 | 3.60 | 73 | 3.65 | 71 | 3.55 | 73 | 3.65 | 4.55 | I |
| D ₁ L ₃ | 49 | 2.45 | 55 | 2.75 | 52 | 2.60 | 54 | 2.70 | 56 | 2.80 | 3.32 | VII |
| F ₃ L ₄ | 52 | 2.60 | 59 | 2.95 | 56 | 2.80 | 57 | 2.85 | 59 | 2.95 | 3.53 | V |

The data in Table- 6 reveals the mean and scores of eight different designs on the basis of five different attributes and it was found that among all the designs, SP₁L₃ (surprised category) ranked I (4.55) and the design D₁L₃ (disgusted category) being the lowest (3.32).

Results indicate that calculated F value for eight developed digital printed designs on t-shirt is equal to 16.27 which is more than the critical value for F 0.05; 7, 28 (= 1.94) and for the five different attributes is equal to 49.02 which is more than the critical value for F 0.05; 4, 28 (= 2.16) and so, H₁ [there is significant difference between different developed digital printed t-shirt and different attributes of acceptability].

Table- 7 shows the costs of the prepared women's digital printed t-shirt. Because of the usage of similar fabric and the digital printing expenses, which are charged per piece, it is obvious that the cost of all eight T-shirts is the same. Taking the 25 per cent profit margin into consideration, the sale price of each T-shirt was Rs. 1375.00/-, according to the table. Because the number of colours in each design was around seven to eight, the cost of preparing a single product in each category was found to be somewhat expensive. If the number of colours is limited to three to four and a minimum of twenty-five pieces are printed in a lot, the charges can be reduced. Furthermore, the design conversion expenses would be divided by the entire number of products prepared, lowering the cost to almost nothing.

Table- 7: Cost of Digitally Printed Women’s T-Shirt

| Items | Consumption (pcs.) | Rate (Rs.) | Value (Rs.) |
|---------------------------------------|--------------------|------------|-------------|
| T-shirt (procured from the market) | 1 | 500/pc. | 500/- |
| Design Conversion Charges | --- | 50/ pc. | 50/- |
| Digital Printing Charges | --- | 550/pc. | 550/- |

| | |
|--------------|-----------|
| Actual Cost | 1100.00/- |
| Profit (25%) | 275.00/- |
| Sale Price | 1375.00/- |

SUMMARY

The study was inspired by the face and emotional expressions, which are by far the most distinctive features of this art form. Happy, sad, angry, surprised, bad, disguised, and fearful were some of the prominent motifs represented in Yakshagana facial and emotional expressions.

From the analysis, it was found that the most popular motif in the design category (happy, angry, sad, bad, surprised, disgusted and fearful) was H5, H6, A3, S3, B1, SP1, D1 & F3. The selected eight motifs on the basis of arrangement of the motif, appropriateness/suitability of design for women's t-shirt and overall aesthetic appeal were H5L4, H6L3, A3L3, S3L4, B1L1, SP1L3, D1L3 & F3L4.

According to the average mean of all the attributes of eight different designs, the most preferred design in the descending order was SP1L3 > H6L3 > H5L4 > S3L4 > F3L4 > A3L3 > B1L1 > D1L3. However, all the digitally printed products were appreciated and well accepted with regard to neatness, clarity and overall aesthetic appeal.

CONCLUSION

The modified version of Yakshagana art, specifically the emotions portrayed by this art form and their application as digitized prints on t-shirts, evoked positive response for this art form. The face forms were successfully used to develop pop art designs that can enhance the design palette for t-shirts and increase the acceptability and marketability of the garments besides promoting this dying art. Furthermore, the study has provided an opportunity to portray the art form in a new light. Yakshagana, one of the most prominent art forms, is now in its dying stage due to less of acceptability and promotion. This research work has been an earnest effort to bring back the art form in a new and more acceptable light.

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A STUDY ON COVID-19 PREPAREDNESS AMONG UNIVERSITY STUDENTS OF ASSAM

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ABSTRACT

The current COVID-19 pandemic has made people in critical need of effective health promoting adaptive behaviours and form health strategies to develop preventive measures against the disease, and to induce the already existing measures. The objective of the study was to find the overall knowledge and practices of the students towards COVID-19, and to study the use of media for COVID-19. The study was conducted among the UG/PG students of the Assam Agricultural University, Jorhat, Assam. Data was collected using Google form, administered among the selected students through various social media platforms such as WhatsApp, Instagram and Messenger. Out of approximately 500 students, 142 students participated in the study through purposive and snowball sampling techniques. Frequency-percentage, intensity indices, t-test, and ANOVA were used for statistical analysis. The students mostly relied on internet, social media, and television to gain knowledge about COVID-19. Little more than fifty percent (52.8%) of the university students had lower level of knowledge about COVID-19, whereas less than fifty percent (47.2%) of the students had higher level of knowledge on COVID-19. Significant difference was found in the knowledge about COVID-19 among the students in relation to their subject of study, which indicates that the students of College of Agriculture had higher level of knowledge than the students of College of Community Science. 49.3% of students had adapted COVID-19 prevention practices to a great extent, whereas 50.7% had adapted only to some extent. In this situation of emergencies, there is a need to comprehend the gap between what people believe and what they actually do and thus, effective strategies need to be developed by the government as well as the university to bring appropriate COVID-19 behavioural changes among the students in fighting the pandemic.

Keywords: COVID-19, knowledge, practices, role of media, University students

INTRODUCTION

Adaptation is fundamental to fulfilling the multiple demands of current COVID-19 standard. (World Health Organisation, 2020). Pandemics, in general, are not only a major public health concern; they also cause disastrous socio-economic and political problems in the affected countries. COVID-19, in addition to being the biggest danger to global public health of the century, is being seen as a symbol of inequity and a lack of socio-economic progress. About all countries are attempting to delay the spread of the disease by testing and treating victims, quarantining suspicious individuals by touch tracing, banning big crowds, enforcing full or partial lock down, and so on (Chakraborty and Maity, 2020). In reaction to the serious situation of COVID-19 outbreak, the World Health Organization (WHO) declared COVID-19 a pandemic on March 11, 2020, citing over 118,000 cases of coronavirus disease in over 110 countries and territories worldwide, as well as the ongoing possibility of global spread. The infectious diseases'

transmission and time course are concerning, and it is clear that this pandemic will continue for the near future (Prakash, Reddy et al., 2020).

Corona virus is a vast zoonotic infection family that causes sicknesses going from the normal cold to extreme respiratory issues. COVID-19 is highly infectious, and the most common symptoms are fever, dry cough, nausea, myalgia, and dyspnoea. Patients with co-morbid diseases move to the severe stage, which includes acute respiratory distress syndrome, septic shock, difficult-to-treat metabolic acidosis, and bleeding and coagulation failure (Prakash, Reddy, et al., 2020).

India is a country with a wide range of socio-cultural variety; health inequities and economic inequities are exacerbated by the increasing COVID-19 pandemic. On January 30, 2020, the first case of COVID-19 in India was identified in Kerala, originating in China. To contain COVID-19's spread and keep infections at control, international border and airport entry monitoring started, citizens who have returned from COVID-19 impacted countries were requested to go into isolation or quarantine (Singh & Singh, 2020). A nation-wide 21-day lockdown was announced with effect from 23 March 2020 to 14 April 2020. Later the second phase of lockdown was continued from 15 April 2020 to 03 May 2020. With cases spiking up across the country, the third phase of national lockdown was extended from 04 May 2020 to 17 May 2020. The outbreak of second wave in India began in mid-March and spread rapidly, peaking at more than 400,000 cases per day on Friday, April 30, 2021.

On March 31, a week into the national lockdown, the first COVID-19 case was recorded in the state. And, two months after the lockdown, on May 24, 2020, the number of recorded cases in Assam stood at 392 while numerous other states began reporting thousands of cases per day.

Various information on the ill effects of the infection makes the public panic and forces them to seek help from the most accessible and available ways. For most people, internet is the best and the convenient medium of searching up information about the symptoms, treatment and preventive measures. Media reports on one hand could possibly help the people adapt the required safety measures, and on the other hand could trigger in developing various myths, stigmas, in their minds.

It was an instinctive need to study how the infected as well as non-infected young people of the country are dealing and reacting towards the pandemic. The present investigation studies the knowledge level of the students of The Assam Agricultural University, Jorhat, Assam, in terms of the emergence of Corona virus, its causes, symptoms and treatment they have gained from various sources and the various practices related to daily habits, home care, health and hygiene to be followed to curb the disease to the maximum extent. People tend to adapt the right practices and behaviour when they receive the accurate information at the precise time of need. Therefore, it was necessary to study about how much knowledge the students of India possess regarding the global pandemic, how correct and authentic information they were getting and how they were making changes in their practices through the right methods and contributing towards controlling the spread of the novel Corona Virus.

OBJECTIVES

1. To assess the knowledge regarding COVID-19 among selected students in relation to:
 - COVID-19 emergence
 - Spread and Symptoms
 - Treatment and Preventive measures
2. To study the practices towards COVID-19 adapted by the selected students in relation to:
 - Health and hygiene
 - Food habits and daily life
 - Social activities

HYPOTHESES

1. There will be no significant differences in the level of knowledge regarding COVID-19 among the students in relation to subject of study, level of study, personality type, use of media and educational qualification of parents.
2. There will be no significant differences in the extent of practices towards COVID-19 adapted by the students in relation to subject of study, level of study, personality type, use of media, educational qualification of parents, and overall knowledge regarding COVID-19.

DELIMITATIONS OF THE STUDY

The study was limited to the students studying Under Graduation and Post-Graduation programmes at the College of Agriculture and College of Community Science, The Assam Agricultural University, Jorhat, Assam.

METHODOLOGY

Population and Sampling

The population of the study comprised of students studying at the College of Community Science and College of Agriculture of The Assam Agricultural University, Jorhat, Assam, in the year 2020-21. Prior permission was taken from the Assam Agricultural University, Jorhat, Assam, to conduct the study. Out of approximately 500 students, 142 students were selected as sample using purposive and snowball sampling techniques.

Data collection

A structured web-based questionnaire was designed on Google forms as the research tool. Various authentic and trusted web sources such as The World Health Organisation, MyGov, Centers for Disease Control and Prevention along with several reviews were referred for preparing the questions. The tool was administered among the students using various social media platforms such as WhatsApp, Messenger and Instagram. The questionnaire was formulated with four segments which were bifurcated as per the objectives of the study.

Statistical Analysis

Various statistical measures were used to analyse the responses of the study such as frequency-percentage, intensity indices, t-test, and ANOVA. M.S. Excel and SPSS (Version 23) were few programming software used to code and analyse the data. The formulated hypotheses were tested using t-test and ANOVA. A scoring method was used to determine the correct knowledge level, with each accurate response earning the participant one point. Three-point rating scale was used to assess the extent of practices adapted towards COVID-19.

Ethical Consideration

The ethical approval for the study was obtained from The Institutional Ethics Committee for Human Research (IECHR), Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara. The submission of a completed questionnaire was regarded as a consent to participate in the study considering students' participation is entirely voluntary, anonymous, and consensual.

RESULTS

Profile of the students

Table 1 shows the frequency and percentage distribution of the student's profile. Slightly more than fifty percent (52.8%) of the university students were in the 18–22 years age range. An almost equal percentage belonged to Community Science (50.7%) and Agriculture (49.3%). In contrast, nearly sixty percent (57%) of the students' mothers had greater education levels than their fathers, who made up nearly two third (67.6%) of the student body. In terms of personality type, the majority of students (61.3%) were ambiverts, compared to one-fourth of students (25.3%) who were extroverts and less than fifteen percent of students (13.4%), were introverts.

Table 1: Profile of the students (n=142)

| Variables | Categories | Frequency | Percentage |
|--|------------------------------|------------------|-------------------|
| Age | 18-22 years | 75 | 52.8 |
| | 23-29 years | 67 | 47.2 |
| Level of study | Post-graduation | 73 | 52.1 |
| | Under graduation | 69 | 48.5 |
| Subject of study | College of Community Science | 72 | 50.7 |
| | College of Agriculture | 70 | 49.3 |
| Educational qualification of father | Higher level of education | 96 | 67.6 |
| | Lower level of education | 46 | 32.4 |
| Educational qualification of mother | Higher level of education | 81 | 57.0 |
| | Lower level of education | 61 | 43.0 |
| Personality Type | Extrovert | 36 | 25.3 |

| | | | |
|--|-----------|----|------|
| | Introvert | 19 | 13.4 |
| | Ambivert | 87 | 61.3 |

Media Usage for COVID-19

The intensity indices for the various medium to access the COVID-19 information ranged from 2.9 to 1.3. According to Table 2, the students heavily resorted to the internet (2.9), social media (2.8), and television (2.4) to learn about COVID-19. A lesser degree of radio (1.3) was utilised for the purpose.

Table 2: Medium to Access Information Regarding COVID-19 (n=142)

| Medium | II |
|---------------------------------|-----|
| Internet | 2.9 |
| Social Media | 2.8 |
| Television | 2.4 |
| Friends/ Families and Relatives | 2.2 |
| Newspaper/Magazines | 2.1 |
| Radio | 1.3 |

Knowledge Regarding COVID-19 in Relation to the Selected Aspects

The findings of knowledge on COVID-19 in relation to various aspects of the disease are shown in Figure 1. It indicates that less than half of the students (44.7%) had a greater level of knowledge on the emergence and history of the virus. A little over 40% of the students (43.7%) had slightly more advanced understanding of the disease's treatment and prevention. Less than a quarter of the students (24.6%) had higher level of knowledge of the disease's symptoms and spread.

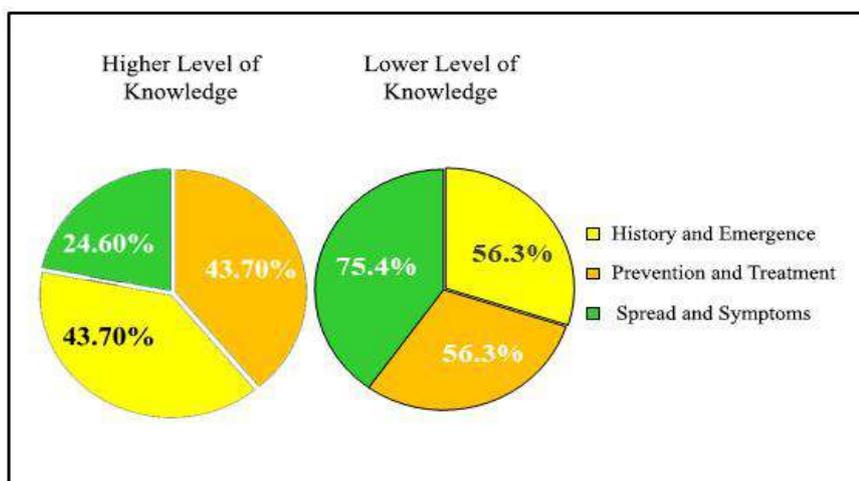


Fig 1: Percentage Distribution of Respondents According to their Knowledge Regarding COVID-19 in Relation to the Selected Aspects (n=142)

Knowledge Regarding History and Emergence of COVID-19

None of the students could accurately answer the questions regarding history and emergence of COVID-19. Although the term "19" in COVID-19 was known by a high majority of students (86.6%). The majority of students (78.8%) were aware of the virus incubation period and that DNA is the virus' genetic material. Surprisingly, only one fourth of the students gave correct response for official name of the virus (25.4%).

Knowledge Regarding Spread and Symptoms of COVID-19

A very high majority of the students (95.1%) were aware about the common symptoms of COVID-19. High majority of the students knew the name of COVID-19 positive patients without symptoms (85.3%) and also identified the categories of people who were at risk of getting infected (79.6%).

Knowledge Regarding Prevention and Treatment of COVID-19

A high majority of the students were aware of the distance of close contact with sick person (86.6%) and name for clinical trial of blood transfusion to treat critical COVID-19 patient, i.e., plasma therapy (81.7%). Only one fifth of the students were aware about the effective way of removing the virus and the reason of washing hands with soap. Only 8.5% of students were aware of the first-line treatment for Corona virus.

Practices adapted towards COVID-19 in Relation to the Selected Aspects

Given that the students were required to abide by the rules set forth by the government, Figure 2 shows a good trend towards adaption of practises in terms of social activities (52.8%) among the students. Less than fifty percent (41.5%) of the students had their health and hygiene practises to a great extent, whilst only 34% had practised their daily routines and eating habits throughout COVID-19 to a great extent.

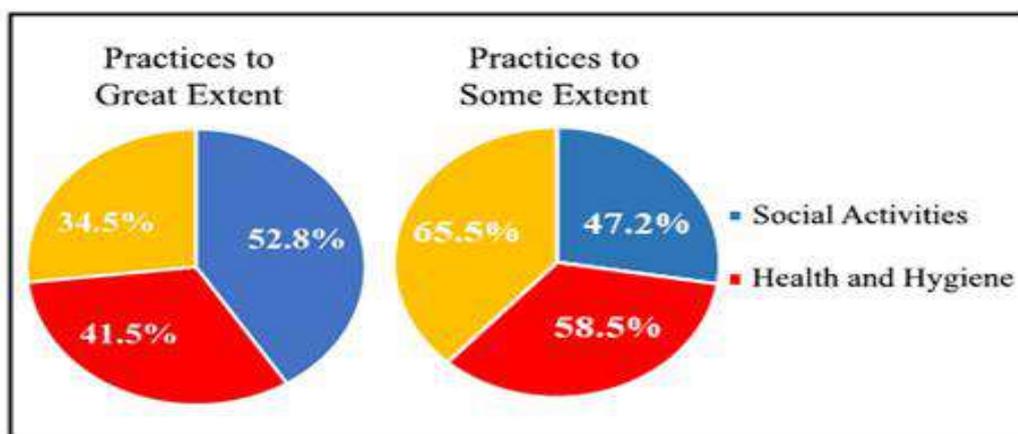


Fig 2: Percentage Distribution of Respondents According to their Practices adapted towards COVID-19 in Relation to the Selected Aspects (n=142)

Practices Adapted towards COVID-19 regarding Health and Hygiene

With intensity indices ranging from 2.8 -2.5, practices of using face masks while going out, using of handkerchief/ tissue during coughing or sneezing was to a great extent among the students (2.8). Similarly, washing or sanitizing of hands frequently was also practiced among the students to a great extent. Moreover, avoiding touching of eyes, face, and nose with unwashed hands, and disinfecting frequently touched objects was also practiced to some extent among the students (2.5).

Practices Adapted towards COVID-19 regarding Food habits and Daily Life

With intensity indices ranging from 2.6 -2.05, the practice of using warm water for drinking or bathing was practised to a great extent among the students (2.6). Whereas practice of avoiding outside food (2.3), taking a balanced diet (2.3), use of herbal and traditional products (2.1) was seen to some extent. Further, practice of routine exercise among the students was also seen to some extent (2.05).

Practices Adapted towards COVID-19 regarding Social Activities

With intensity indices ranging from 2.6 -2.0, findings revealed that the students shared valuable and trustworthy information with friends and families to a great extent (2.6). Practice of avoiding going out when not urgent (2.6) and avoiding handshaking and hugging (2.6) was to a great extent. Practice of avoiding public transportation by the students was to some extent (2.4). Moreover, the students explored and utilized the Aarogya Setu App to some extent (2.0).

Significant differences in Knowledge regarding COVID-19

Table 3 & 4 reveals the significant differences calculated in the knowledge regarding COVID-19. It shows that there was significant difference in the knowledge on COVID-19 among the students in relation to their subject of study. The mean scores indicate that students of College of Agriculture had higher level of knowledge than the students of College of Community Science. The table moreover shows that there were no significant differences in the knowledge about COVID-19 among the students in relation to their level of study, educational qualification, educational qualification of parents and personality type of the students.

Table 3: Differences in Knowledge Regarding COVID-19 among the Selected Students in Relation to the Selected Variables. (n=142)

| Variables | Categories | N | Mean | S.D | t-value |
|---|------------------------------|----|-------|------|---------|
| Level of study | Under Graduation | 69 | 15.42 | 3.64 | -1.442 |
| | Post-Graduation | 73 | 16.29 | 3.52 | |
| Subject of study | College of Agriculture | 70 | 16.69 | 3.0 | 2.739* |
| | College of Community Science | 72 | 15.07 | 3.95 | |
| Media usage pattern | High Exposure | 50 | 15.52 | 4.37 | 0.845 |
| | Low Exposure | 92 | 16.05 | 3.10 | |
| Educational qualification of parents (Father) | Higher level of education | 96 | 16.21 | 3.49 | -1.648 |
| | Lower level of Education | 46 | 15.15 | 3.73 | |
| Educational qualification of parents (Mother) | Higher level of education | 81 | 15.90 | 3.52 | -0.133 |
| | Lower level of Education | 61 | 15.82 | 3.71 | |

*Significant at level 0.05

Table 4: Analysis of Variance (ANOVA) Showing Differences in the Knowledge Regarding COVID-19 in Relation to Personality Type. (n=142)

| Variables | Source of variable | Sum of Squares | df | Mean Square | F | Sig |
|------------------|--------------------|----------------|-----|-------------|------|-----------|
| Personality Type | Between groups | 40.75 | 2 | 20.37 | 1.59 | 0.20 (NS) |
| | Within groups | 1781.7 | 139 | 12.81 | | |

NS= Not Significant

Significant differences in Practices adapted towards COVID-19

Table 5 & 6 show no significant differences in the practices adapted towards COVID-19 in relation to the selected variables.

Table 5: Differences in Practices Adapted towards COVID-19 among the Selected Students in Relation to the Selected Variables (n=142)

| Variables | Categories | N | Mean | S.D | t-value |
|---|------------------------------|----|-------|------|---------|
| Level of study | Under Graduation | 69 | 37.61 | 5.20 | -0.355 |
| | Post-Graduation | 73 | 37.89 | 4.80 | |
| Subject of study | College of Agriculture | 70 | 37.74 | 4.15 | -0.025 |
| | College of Community Science | 72 | 37.76 | 5.71 | |
| Media usage pattern | High Exposure | 50 | 38.72 | 4.94 | -1.714 |
| | Low Exposure | 92 | 37.23 | 4.95 | |
| Educational qualification of parents (Father) | Higher level of education | 96 | 37.88 | 5.12 | -0.418 |
| | Lower level of Education | 46 | 37.50 | 4.72 | |
| Educational qualification of parents (Mother) | Higher level of education | 81 | 37.73 | 5.59 | 0.069 |
| | Lower level of Education | 61 | 37.79 | 4.09 | |
| Overall Knowledge regarding COVID-19 | Higher knowledge | 70 | 15.59 | 3.02 | 0.916 |
| | Lower knowledge | 72 | 16.14 | 4.06 | |

Table 6: Analysis of Variance (ANOVA) Showing Differences in the Practices Adapted towards COVID-19 in Relation to Personality Type (n=142)

| Variables | Source of variable | Sum of Squares | df | Mean Square | F | Sig |
|------------------|--------------------|----------------|-----|-------------|-----|----------|
| Personality Type | Between groups | 25.02 | 2 | 12.51 | 0.5 | 0.6 (NS) |
| | Within groups | 3481.35 | 139 | 25.04 | | |

NS= Not Significant

DISCUSSION

The study was undertaken with an aim to study the knowledge on the subject of COVID-19 of the students of the Assam Agricultural University, Jorhat, and the practices they have adapted towards the disease. Internet and social media were extensively used by the students. According to Singh, Sewda, and Gupta's study (2020), which supported a similar conclusion, social media and television were the primary information sources for COVID-19. During the epidemic, more individuals had access to the internet, and during the lockdown, television and the internet were the only informational resources available to them. As a result, usage was evidently widespread. Looking into the responses it was comprehensible that majority of the students were surrounded by the vast and strong swathe of myths and misconceptions about the virus. Such findings were also supported by Kamran A and Naeim M (2020) in their study.

The findings of the study revealed that majority of the students had average knowledge on COVID-19. Students were lacking comprehensive knowledge about the virus in terms of its scientific subject matter. Similar findings of students having moderate level of knowledge regarding the virus was found in the study by Alqrache, Mostafa et.al (2020). The findings highlight significant differences in knowledge about COVID-19 in relation to the subject of study among the students. Similar findings was found in the study by Hasan, Raigangar, et.al (2020) which showed significant difference in the knowledge in relation to the study majors and gender. Higher knowledge in the students of Agriculture might be the inclusion of more information about viruses in their curriculum for which they might be more curious and interested in learning about the new virus. It is positive indication that almost all of the students are adapting proper practices, although when such measures are to be practiced frequently, the students are bound to feel tired and annoyed as it is to be followed on a regular basis. Very high majority of students followed personal sanitation and hygiene practices to a great extent indicating that the students have taken the messages and guidelines of the government and the health organisations in all seriousness. Also, the students might be afraid of spreading the virus among the family members especially to the elders and also infecting themselves. Though awareness is at the heart of learning, a disparity in information transmitted and obtained is to be observed considering human characteristics.

CONCLUSION AND IMPLICATIONS

With the students having average level of knowledge about COVID-19, there is a need to comprehend the gap between what people believe and what they actually do. As such, more of behaviour change communication messages are to be enforced and disseminated through the most prevalent media network that would help in bringing COVID-19 appropriate behavioural changes among the people to adapt the right practices and fight the pandemic.

Recommendations for Further Studies

- A similar study can be carried out with the parents and among the students of other universities and colleges in the geographical location.
- A comparative study can be carried out among the health-related major students and non-health related major students in the geographical location.

Other variables such as attitude towards the COVID-19 pandemic, awareness activities of the university, gender, socio-economic status and health status can be studied with similar research objectives.

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IMPACT OF ONLINE EDUCATION ON ACADEMIC PERFORMANCE OF CHILDREN (6 TO 10 YEARS) DURING COVID-19 IN PATNA TOWN, BIHAR

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ABSTRACT

Sudden emergence of pandemic caused many unexpected changes in all spheres of human life and education sector didn't remain unaffected. Complete closures of schools and colleges was a setback for the students and created a big gap between actual and expected teaching learning outcomes. To overcome this loss, classroom teaching had been transformed into online teaching mode. This study was conducted to assess the impact of online education on academic performance of children aged between 6 years to 10 years and challenges faced by the parents during online education. 150 children aged between 6 to 10 years studying in schools of Patna town having online education facilities had been selected randomly and studied. Sample size comprised of boys and girls both. Half of the sample size belonged to backward caste followed by forward caste and scheduled caste. Out of 150, 60.0 per cent children were more than 9 years. Father's educational qualification displayed that 70.0 per cent were graduate and above while 60.0 per cent mothers were either graduate and above. Occupation related data showed that 84.0 per cent fathers were in job either in government or private. Out of the total studied sample 60.0 per cent children didn't have any problem in understanding while writing quality of 74.0 per cent children became bad during online mode of education. Further, writing speed of about 80.0 per cent children slowed down and 78.67 per cent parents complained about reduced habit of book reading during online education. Findings also reveal that 70.0 per cent parents reported about difficulty of children in memorizing descriptive answer while 75.0 per cent parents said that spelling mistakes increased during online education. Majority of parents faced difficulty in controlling over-use of mobiles by the children.

Keywords: Covid-19, Emergence, education, impact, on-line, performance, outcomes.

INTRODUCTION

The pandemic COVID- 19 impacted every section of the population and effects have been seen in every sphere of life. It caused a big loss not only in economy but disturbed social and psychological life of human beings too. The education sector remained one of the worst affected area. The most tender section of the population i.e. children didn't remain unaffected during Corona. Children remained at home for more than one and half years. To save the lives of children, it was very essential to close all the schools and colleges completely because educational loss can be compensated but loss of life cannot be revived. Undoubtedly the worldwide closure of schools protected their lives from virus but badly affected their all round development. Many children didn't see the new world for almost two years because of complete lockdown. They didn't have any interaction with the outer world. During outbreak of pandemic, 88 countries have imposed country-wide closures, affecting more than 1.5 billion children and youth.

India had been one of the hardest-hit countries by COVID-19. Beyond the staggering impact on human life, COVID-19 had greatly disrupted education system. In India, with 247 million primary and secondary school students out of school! While school systems in India and across the world have made efforts to reach students at home through various means, recent estimates of the impact on learning and socio-emotional well-being suggest that the poorest children will be hurt the most by the pandemic-related school closures (Vegas et al., 2021). The potential losses that may accrue in learning for today's young generation, and for the development of their human capital, are hard to fathom. To minimize these losses, many schools are offering distance learning to their pupils.

However, benefits of online education facility couldn't become available to all, this may be due to unavailability of basic infrastructure and other resources required. More than two-thirds of countries have introduced a national distance learning platform but only 30 percent of low-income countries have done so. Certainly, online mode of education remained helpful in minimizing losses accrued due to closure of schools all over the world but it cannot be the right substitute of off line education.

The present study was conducted to assess the impacts of online education on academic performance of children (6 to 10 years) residing in Patna town, Bihar.

NEED OF THE STUDY

Emergence of pandemic brought unprecedented changes in education system which resulted in many positive and negative effects. Shifting of classroom teaching to online mode of education has certainly affected educational development of children all over the world. Though online mode of education minimized educational loss of children but adverse effects can't be ignored.

Therefore, this study has been conducted to assess the impact of online education on academic performance of children during COVID-19 as well as challenges faced by the parents during online education.

OBJECTIVES OF THE STUDY

1. To study socio economic profile of the children under study.
2. To assess academic performance of the sample during online education.
3. To identify different challenges faced by the parents during online education.

REVIEW OF LITERATURE

Bloomberg (2021) published a report of survey which was conducted to assess impact of COVID on Indian education system. The report revealed that reading ability of children was affected. Further, it was also documented that a student who was in Grade 3 before pandemic now in Grade 5, and would soon enter middle school, but with reading abilities of a Grade 1 pupil.

Vegas et al. (2021) made investigation on Impact of Technology on Student's Learning in India During COVID – 19 and discovered that India had been one of the hardest-hit countries by

COVID-19. Beyond the staggering impact on human life, COVID-19 had greatly disrupted access to education in India, with 247 million primary and secondary school students out of school. While school systems in India and across the world made efforts to reach students at home through various means but recent estimates of the impact on learning and socio-emotional well-being suggested that the poorest children got hurt the most by the pandemic-related school closures.

Pokhre et al. (2021) reviewed many studies based on impact of COVID – 19 pandemics on teaching and learning behaviour of children and arrived at this conclusion that pandemic had created the largest disruption of education systems in human history, affecting nearly 1.6 billion learners in more than 200 countries.

The findings also revealed that closures of schools, institutions and other learning spaces had impacted more than 94% of the world's student population.

Donnelly et al. (2021) in their study on the Impact of COVID – 19 on Education Recommendations and Opportunities in Ukraine revealed that school closures due to COVID-19 had brought significant disruptions to education across Europe. Further, Emerging evidence from some of the region's highest-income countries indicated that the pandemic was giving rise to learning losses and increases in inequality.

Suresh (2021) in his study on impact of COVID – 19 on School Education in India mentioned that no one would have guessed that a virus-like Covid-19 would come and without differentiating pandemic would alter the lifestyle of people. Due to Covid-19, many changes came to our world and it took some time for everyone to adopt the new normal. The Covid-19 impact was everywhere, which resulted in the closure of Schools and other educational institutions. Though schools were closed, students were attending their classes through various education initiatives like online classrooms, radio programs. Though it was good thing happening but on the other side, there are lots of adverse effects on students had been observed.

METHODOLOGY

The present study was conducted in Patna town of Bihar. The locale of study was purposively selected to carry out the investigation. Sample size comprised of 150 children aged between 6 to 10 years who were studying in schools conducting online classes. Three schools from Patna town namely; Loyola school, St. Michael's School and Prambhika school have been selected for collecting the Sample. 50 students from each school aged between six to ten years from each school were randomly selected. Thus, total sample size comprised of 150 students of both sexes. All the required information was collected through pretested schedule.

The schedule had three parts which included questions related to socioeconomic profile, various components of academic development affected during online education and challenges faced by the parents. All the information collected through schedule were tabulated and analysed to arrive at some useful findings. Percentage, frequency and bar diagram have been used to interpret the results.

**Table -1: distribution of children according to their socio-economic profile
N=150**

| Gender | Frequency | Percentage |
|------------------------------|-----------|------------|
| Boy | 60 | 40 |
| Girl | 90 | 60 |
| Age group(years) | | |
| 6 to 7 | 15 | 10.00 |
| 7 to 8 | 20 | 13.33 |
| 8 to 9 | 25 | 16.67 |
| 9 to 10 | 50 | 33.33 |
| 10 | 40 | 26.67 |
| Caste | | |
| General | 60 | 40 |
| Backward | 75 | 50 |
| SC | 15 | 10 |
| Educational level of fathers | | |
| Graduate and above | 105 | 70 |
| Intermediate | 45 | 30 |
| Matric | - | - |
| Educational level of mothers | | |
| Graduate and above | 90 | 60 |
| Intermediate | 45 | 30 |
| Matric | 15 | 10 |
| Occupation of fathers | | |
| Occupation of fathers | | |
| Business | 24 | 16 |
| Government job | 66 | 44 |
| Private job | 60 | 40 |
| Family monthly income (Rs) | | |
| Up to 30,000 | 15 | 10 |
| 30,001-40,000 | 15 | 10 |
| 40,001-50,000 | 30 | 20 |
| 50,000and above | 90 | 60 |

Perusal of table1 depicts that out of 150 sample 40 per cent children were boys while girls comprised of 60 per cent of the total. Majority of sample were girls.

Age wise distribution of children displays that 10 per cent children belonged to 6 to 7 years followed by 13.33 per cent,16.67 per cent,33.33 per cent and 26.67 per cent who belonged to 7 to 8 years,8 to 9 years,9 to 10 years and 10 years respectively.

Cast structure of sample indicates that 50.0 per cent cast children belonged to backward caste followed by 40.0 per cent and 10.0 per cent who fell under general and schedule caste respectively.

Father’s educational qualification discloses that out of 150, 70.0 per cent fathers were graduate and above while 30.0 per cent had intermediate level education. Further, not a single father was reported as either matric pass or illiterate. This shows that majority of fathers were educated.

Data pertaining to mother’s educational level shows that 60.0 per cent mothers were either graduate and above while 30.0 per cent mothers had intermediate level education and only 10.0 per cent mothers were matric pass.

Occupational information of fathers reveals that 44.0 per cent were government employees while 40.0 per cent were working in private organizations and rest 16.0 per cent were doing business.

Data related to monthly income of the family shows that 60.0 per cent families had monthly income of Rs50,000 or more while 10.0 per cent families had monthly income more than Rs 40,000 but less than 50,000. Again, data also reveals that families having monthly income of more than Rs30,000 but less than 40,000 and monthly income less than 30,000 each comprised 10.0 per cent.

Thus, about 60.0 per cent family’s monthly income was Rs 50,000 or more.

Table- 2: Distribution of respondents according to their Academic performance observed during online education N=150

| Understanding problem | frequency | Percentage (%) |
|---|------------------|-----------------------|
| Yes | 60 | 40 |
| No | 90 | 60 |
| Writing Quality | | |
| Didn’t give attention | 21 | 14 |
| Didn’t get affected | 18 | 12 |
| Became bad | 111 | 74 |
| Writing speed | | |
| Didn’t give attention | 18 | 12.0 |
| Didn’t get affected | 12 | 8.0 |
| Became slow | 120 | 80.0 |
| Reading habit from book | | |
| Didn’t give attention | 20 | 13.33 |
| Didn’t get affected | 12 | 8.00 |
| Reduced | 118 | 78.67 |
| Ability to memorize descriptive answer | | |
| Didn’t give attention | | |
| Didn’t get affected | 24 | 16 |
| Reduced | 21 | 14 |

| | | |
|-------------------------------------|-----|----|
| | 105 | 70 |
| Spelling mistakes in writing | | |
| Didn't give attention | 23 | 15 |
| Didn't get affected | 15 | 10 |
| Increased | 112 | 75 |

Table 2 shows changes in academic performance of children observed during online education and data shown in table indicates that 60 per cent children reported that they didn't have any problem in understanding during online education but 40 per cent children admitted that they had difficulties in understanding the teaching materials.

Data pertaining to writing quality showed that writing quality of 74.0 per cent children became bad during online education while 14.0 per cent parents didn't give any attention and only 12.0 per cent parents said that writing didn't get affected during online mode of education. This might have been due to less writing practice during online classes as disclosed by the parents.

Further, results regarding writing speed of the children displayed that 80.0 per cent children became slow in writing while 12.0 per cent parents didn't notice this thing.

Again, only 8.0 per cent parents reported that writing speed of their wards didn't get affected which may be due to the fact that some parents were more conscious and regularly guided their children in their study.

Data related to reading habit from book showed that 78.67 per cent parents accepted that reading habit of their wards reduced while 13.33 per cent parents didn't give any attention to this aspect. However, only 8.0 per cent parents said that reading habit of their kids remained unchanged during online mode of education.

Again, 70.0 per cent parents noted that their children didn't want to memorize descriptive answers. However, 14.0 per cent parents observed no change regarding this but at the same time 16.0 per cent parents admitted that they didn't give any attention to their children. Further, Parents also disclosed that children always insisted that there were multiple answers in the examination so no use of memorizing descriptive answers.

Data related to spelling mistakes discloses that 75.0 per cent parents admitted that their children did more spelling mistakes in writing while 10.0 per cent parents didn't give any attention to this aspect and only 15.0 per cent parents reported that there was no change regarding spelling mistakes behaviour was found in their wards.

Table -3: Challenges faced by parents during online education
N=150

| Challenges | Frequency | Percentage |
|--|-----------|------------|
| Difficult to control overuse of mobile | 120 | 80 |
| Financial | 24 | 16 |
| Technical problem in handling mobile | 21 | 14 |
| Network issue | 60 | 40 |

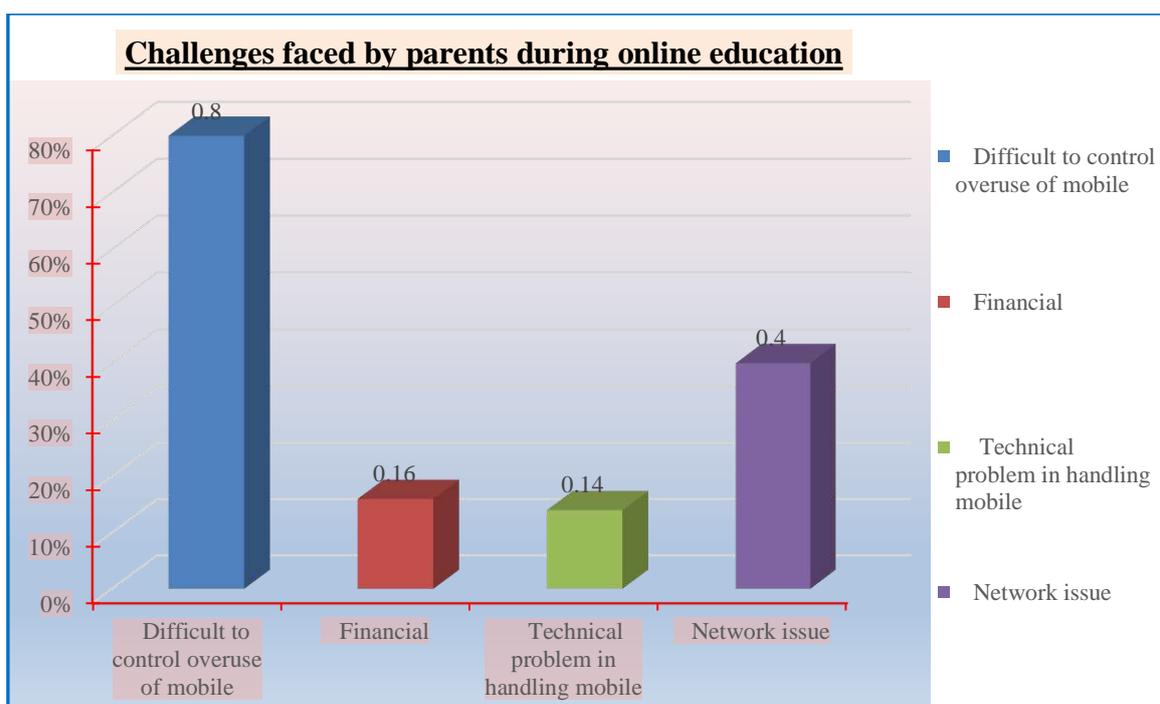


Figure:1-Challenges faced by parents during online education

Table 3 depicts the challenges faced by the parents during online education and shows that 80.0 per cent parents admitted that it was difficult to control over use of mobile by their kids. However, parents faced network issues, financial problem and technical problem in handling mobile constituted 40.0 per cent, 16.0 per cent and 14.0 per cent respectively.

Thus, most observable challenge of parents found during online education was difficult to control over use of mobile by their wards.

Different challenges faced by the parents have been also depicted through the bar diagram which revealed that majority of the parents found difficulty in controlling overuse of mobile by their children. However, technical problem got last place among challenges.

SUMMARY AND CONCLUSION

Out of 150 sample, 60.0 per cent were girls while 40 per cent children were boys. Age wise data revealed that nearly 60.0 per cent children were more than 9 years old. Social structure based data depicts that 50.0 per cent children belonged to backward caste followed by forward caste who constituted 40.0 per cent and rest 10.0 per cent belonged to schedule caste.

Educational level of fathers and mothers of children under study shows that 70.0 per cent fathers and 60.0 per cent mothers had graduation or higher-level qualification. Occupation related information showed that nearly 84.0 per cent fathers were in job either government or private employees. Data related to monthly income of the family shows that 60 per cent family had monthly income of Rs 50,000 or more.

Thus, majority of fathers were in job either in government or private sector and the families having 50,000 /more monthly income constituted more than half of the total.

Findings regarding academic performance disclosed that 60 per cent children had no understanding problem during online education and 74 per cent parents observed that writing quality of their kids became bad.

Further, research again documented that writing speed of 80 per cent children reduced and 78.67 per cent parents told that book reading habit of their kids also got reduced. This was also very surprised to know that 75.0 per cent parents agreed that spelling mistakes increased during online education. About 70 per cent parents reported that there was memorizing problem among their kids. This might have been due to lack of writing practice, changed pattern of assessment which mainly included Multiple Choice Questions, and excessive use of electronic media for learning by the children.

Data related to different challenges faced by the parents shows that 80.0 per cent parents reported difficulty in controlling over use of mobile by their kids. However, among other challenges network issues, financial problem and technical problem in handling mobile were important which were reported by 40.0 per cent, 16.0 per cent and 14.0 per cent parents respectively.

Thus, the most observable challenge of parents found during online education was difficult to control over use of mobile by their wards.

IMPLICATIONS OF THE STUDY

Present investigation is about impacts of online education on academic performance of children (aged between six to ten years) during- 19 .Since online education have been started to minimize educational losses of children due to complete closure of schools and this purpose has been fulfilled to a great extent but some adverse effects have also been observed as evident from the findings. Online mode of education may be used to enrich the knowledge but classroom teaching cannot be replaced by this mode .Further the study has been done for a small sample size which needs

to be increased for more concrete and better results and domain of such kind of study may be extended like effects of online mode of education on duration of memory of learned subjects, cares taken if children are using online mode of education etc.

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USE OF SMARTPHONES AMONG THE ELDERLY RESIDING IN VADODARA CITY

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ABSTRACT

According to predictions, the main anthropological trend of the late 21st century will be old age. At this age, people due to chronic diseases face physical, psychological, and social issues. The use of smartphones which is easily accessible and portable helps them with increased health literacy, safe care, and independence. The present study was conducted to determine elder people's use of smartphones and the barriers to their use. The present study was conducted on a sample population of 95 individuals older than 60 years from Vadodara city. The data collection tool used included a questionnaire on the use of smartphones and problems with the use of a smartphone. The results of the study revealed that the majority of the elderly use their smartphone to perform their daily task. Many of them use inbuilt applications more frequently than downloaded applications. The majority of them faced problems in using online applications such as booking applications, online payment, and shopping applications.

Keywords: applications Elderly, Smartphone, problems, uses

INTRODUCTION

A Smartphone is a mobile phone that allows one to do more than just make and receive phone calls and text messages. Smartphones are computer-like in that they can access the Internet and run software programmes. Users interact with smartphones via a touch screen. Thousands of smartphone apps are available, including games, personal-use apps, and business-use apps.

Smartphone technology offers the potential to improve efficiency and productivity, reduce cost, improve users' satisfaction and enhance their experience in several related industries including, healthcare, finance, e-commerce, education, entertainment, and tourism. Over the last few years, Information and Communication Technologies (ICTs) have significantly advanced. Admittedly, ICTs such as laptops, tablets, and smartphones, have an important role in personal life (Anderson, 2017). A smartphone is considered one of the ubiquitous technologies in this present time as it allows users to connect socially.

Besides voice calls and text messaging; smart phones can be used for personal, educational, business, entertainment, and a plethora of other purposes. One of the features that make smartphones very popular amongst people is the ability to use them for social media such as Facebook, Instagram, Youtube, Twitter, etc. Smartphones have many features and capabilities that enable users to perform many functions such as emailing, chatting, internet banking, photograph taking, and audio and video recording, among other uses. This makes the use of smartphones prevalent among people (Key ideas, 2017).

The elderly have always had a lot of difficulties adopting new technology. However, as the world's population grows, seniors are increasingly adopting more digitally connected lifestyles. According to American research, over half of older persons who own cell phones now have a Smartphone, compared to only 23% in 2013. The percentage of seniors who own a smartphone varies greatly depending on their age. Smartphones are owned by 59 percent of 65–69-year-olds and 49 percent of 70–74-year-olds. In the mid-70s and beyond, this decreases significantly. Previously, mobile phone applications were limited to making and receiving calls and text messages. Modern phones, on the other hand, go well beyond traditional purposes and offer a wide range of applications. It could be linked to self-management, such as instrumental daily living activities, increasing social contacts among older individuals to reduce loneliness, and broadening access to knowledge. It has recently been used as a means of communicating with health experts, as well as enhancing autonomy and self-care. However, the above-mentioned hobbies continue to be the most popular among the elderly (Subramanyam, 2018).

According to the YouGov survey report, 67% of India's urban population couldn't live without their smartphone, and the majority of them are aged between 60 to 65. 11% of internet users are from the age group 55+ in India. Within six months of the pandemic though, the data suggest that the growth of digital users for the age bracket of 55+ is in the range of 25%-30% for various categories like communication, medicine, commerce, entertainment, etc. Technologies and services are essential for the elderly, to improve their quality of life. (Westermeyer, 2020).

Barriers faced by the Elderly while Using Smartphones

New technology is different from the previous technology. Smart phones are very different from normal phones. The elderly generally use keypad phones and are friendly with them. But Smartphones are very difficult to understand for the elderly. They face many barriers related to personal devices.

These include the following barriers:

- Two out of five older adults have physical conditions and health issues that aggravate the difficulties for seniors using technology (Carevision, 2017).
- Many older adults respond to technological change with skepticism and being intimidated. This attitude is often accompanied by self-doubt and anxiety which inhibits them from trying out new technology. (Carevision, 2017).
- Aside from the physical and health-related factors that hinder the success of seniors using technology, they will also need help in adapting to a new behaviour of using gadgets and digital tools. (Carevision, 2017).
- Considering the extensive variety of administrations offered by most recent telephones, the elderly think that it is exceptionally complex to comprehend and recall its operations which dissuades them to shift to smartphones (Weebly, 2016).
- Many seniors prefer to use a mobile phone with features like big font size and big display

size that are missing in the more sophisticated smartphone models (Weebly, 2016).

Justification of the Study

The benefit of technology for seniors is evident today and hence increased number of seniors adapting this technology to communicate and stay connected with family, friends, and the world. Smartphones, however, can be quite useful for elders. Typically, these are created with the younger generation in mind, who are already tech-savvy and have grown up playing high-tech games and surfing the Internet. Phone function discovery and use are intuitive for such younger users; however, the senior population has several challenges when utilizing such devices. The small size of the device makes it difficult to grasp, and the text on the screen is too small and difficult to see. Furthermore, smaller keys and navigation controls make it difficult for them to use software interfaces, thus they may not find them appealing. The backlight time tends to be too short for their reflex time. The other issue was the intricacy of function operations, as well as a lack of comfort with touch sensitivity. As a result, there are a lot of errors (also, because of failing to lock the keyboard) in the use of a smartphone. Furthermore, the interface has many keys with distinct functionalities, which are confusing and difficult to memorize. Many of them find the devices to be annoying and even terrifying" (Subramanyam, 2018).

The present study proposes to know about the number of elderly who use smartphones and the barriers faced by them in the use of smartphones fully for various purposes. This information throws light on various purposes for which the elderly use smartphone services. It allows the researcher to know the extent of their utilization of the smartphone facility. The present study on barriers faced by the elderly is essential to understand the usage and barriers faced in the operation of smartphones among the elderly. In this sense, the outcome of the study will further enable extension workers or researchers to work towards fulfilling the needs of the elderly more effectively by organizing training programmes for them. The findings of the study will also help in designing smartphone training modules and self explanatory learning module for the elderly.

OBJECTIVES OF THE STUDY

1. To prepare the demographic profile of the elderly using smartphones.
2. To study the overall use of smartphones among the selected elderly.
3. To study the purpose of using smartphones among the selected elderly.
4. To study the personal barriers faced by the elderly in the use of smartphones.
5. To study the technical barriers faced by the elderly in the use of smartphones.

METHODOLOGY

Research Design

The survey approach was used to gather quantitative data for the study.

Population and Sample of the Study

The population of the study comprised elderly having smartphones and residing in Vadodara city. The survey approach was used to gather quantitative data for this study. The

study's sample consisted 95 elderly from Vadodara. The sample was selected using purposive sampling and snowball sampling techniques.

Research Tool and Procedure of Data Collection

A structured questionnaire was developed by the investigator to study the use of smartphones among the elderly. The questionnaire was shared among the respondents personally. The respondents returned the questionnaire within two to four days. The respondents took twenty-five minutes to fill out the questionnaire. For data collection, one hundred and ten questionnaires were distributed to the elderly. Out of which hundred questionnaires were received back whereas ninety-five were found appropriate for this study.

Scoring and Categorization of Data

Table 1: Score Provided for Different Responses of the Purpose of Using Smartphones by Elderly

| Responses | Scores | Range Intensity Indices |
|------------------|---------------|--------------------------------|
| Most of the Time | 3 | 2.61 – 3.00 |
| Some Time | 2 | 1.31 – 2.60 |
| Rarely or Never | 1 | 1.0 – 1.30 |

The Barriers Faced in the Use of Smartphones

Barriers faced by the elderly while using smartphones were studied with a three-point rating scale. Barriers were categorized into two categories:

- 1) Personal / Individual Barriers
- 2) Technical / Device related Barriers

Table 2: Categorization of Personal Barriers and Technical Barriers

| Base | Category |
|-------------------|-----------------|
| Mean & Above Mean | More Barriers |
| Below Mean | Less Barriers |

Table 3: Score Provided for Different Responses of the Barriers to Use of Smartphones by Elderly

| Response | Score | Range of Intensity Indices |
|-----------------|--------------|-----------------------------------|
| Great Extent | 3 | 2.61 – 3.00 |
| Some Extent | 2 | 1.31 – 2.60 |
| Less Extent | 1 | 1.00 – 1.30 |

FINDINGS

Profile of the Elderly

Table 4: Frequency and Percentage Distribution of the Elderly According to their Personal Information

| | | (n=95) | |
|----------------------------------|------------------------|--------|-------|
| Profile of Elderly | Category | f | % |
| Age | 60-70 | 68 | 71.58 |
| | 71-80 | 24 | 25.26 |
| | 81-90 | 3 | 3.16 |
| Gender | Male | 50 | 52.63 |
| | Female | 45 | 47.37 |
| Educational Qualification | Primary | 28 | 29.47 |
| | Secondary | 20 | 21.05 |
| | Graduate | 27 | 28.42 |
| | Post Graduate | 17 | 17.89 |
| | Ph. D | 3 | 3.16 |
| Occupation | Retired | 57 | 60 |
| | Working | 38 | 40 |
| Monthly Income | Below Rs. 5,000 | 1 | 1.03 |
| | Rs. 5,000 – Rs. 10,000 | 13 | 13.68 |
| | Above Rs. 10,000 | 26 | 27.36 |
| | Not Mentioned | 55 | 57.89 |

The findings of the study reveal that the majority of the elderly (71.58%) were from the 60 to 70 age group, whereas twenty-five percent of the elderly were from the 71 to 80 age group. This indicates that the majority of the elderly were in their early older age group. Little more than half of the (52.63%) elderly were male whereas forty-seven percent of them were female. It indicates more participation of the male elderly in the present study. The findings also show that twenty-nine percent of the elderly were having primary education, whereas more than one-fourth (28.42%) of them were graduates. It further provides a picture that the majority (60%) of the elderly were retired whereas forty percent of them were still working though they crossed their age of retirement. The data regarding income shows that twenty-seven percent of the elderly have a monthly income above 10,000.

The majority of the elderly could read, write and speak the Gujarati language. The majority of the elderly could read (78.95%), and write (75.79%) Hindi. The majority of the elderly could read (74.74%) and write (63.16%) English language whereas an equal percent

of them could read, write and speak Marathi (21.05%), Tamil (1.05%), Malayalam (1.05%), Sindhi (1.05%) and Sanskrit (1.05%). A smartphone could be operated in various languages. The majority of the elderly had a primary level of educational qualification but the majority could read, write and speak English also this might help them to operate or learn the use of smartphones easily.

Smartphone Related Information

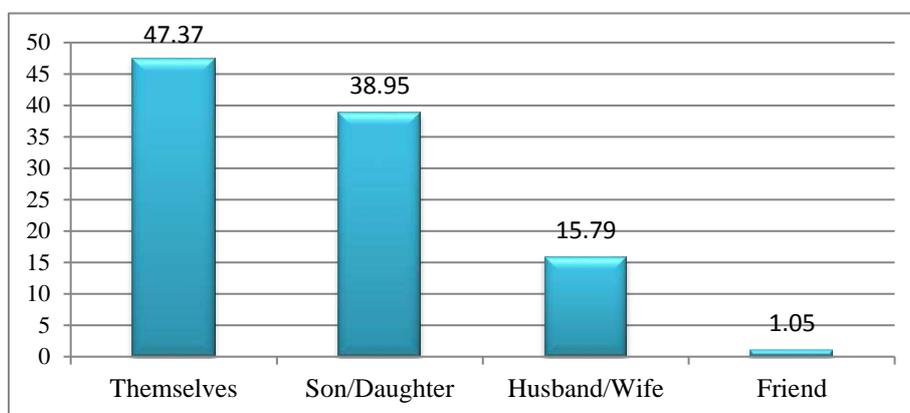


Figure 1: Percentage Distribution of the Elderly According to Purchasing of Smartphones for them

Forty-seven percent of the elderly purchased smart phones by themselves, whereas thirty-eight percent reported that their son or daughter purchased a smartphone for them. It is a good indication that a higher percentage of the elderly purchased smart phones for themselves. It shows that they could decide on purchasing a smartphone for themselves. Forty-seven percent of the elderly owned smart phones for more than three years. Forty-one percent of them owned smart phones from 1 to 3 years. It was good to note that higher percentages of the elderly have more than 3 years of experience in operating smartphones.

Table 5: Frequency and Percentage Distribution of the Elderly According to the Use of Inbuilt Application Features of Smartphone (n=95)

| Features | Use | | Do not Use | |
|-----------------------|-----|-------|------------|-------|
| | f | % | f | % |
| Calling | 93 | 97.89 | 2 | 2.11 |
| Camera | 83 | 87.37 | 10 | 10.53 |
| Video | 81 | 85.26 | 14 | 14.74 |
| Video Calling | 81 | 85.26 | 14 | 14.74 |
| Flashlight | 77 | 81.05 | 18 | 18.95 |
| Calendar | 73 | 76.84 | 22 | 23.16 |
| Alarm | 71 | 74.74 | 24 | 25.26 |
| Sending text messages | 68 | 71.58 | 27 | 28.42 |

| | | | | |
|---------------------------------------|----|-------|----|-------|
| Ring setting | 68 | 71.58 | 27 | 28.42 |
| Calendar | 66 | 69.47 | 29 | 30.53 |
| Music | 65 | 68.42 | 30 | 31.58 |
| Sending picture messages (MMS) | 49 | 51.58 | 46 | 48.42 |
| Radio | 49 | 48.42 | 49 | 51.58 |
| Search tool like | 46 | 48.42 | 49 | 51.58 |
| Address Book | 40 | 42.1 | 55 | 57.58 |
| Games | 33 | 34.74 | 62 | 65.26 |

Table -5 shows that calling (97.89%), camera (87.37%), video (85.26%), video calling (85.26%), and flashlight (81.05%) are the features that a majority of the elderly was using in their smartphone. The majority of the elderly were also using features on their smartphone such as calendar (76.84%), alarm (74.74%), sending text messages, ring setting (71.58%), calendar (69.47%), and music (68.42%). Similar findings were reported by (Omolayo, 2018) in his study that voice calling, text messaging, taking photographs, and listening to the radio are the major activities theelders used their smartphones to perform.

William and Murugesh (2018) found 100% use for making phone calls, 100% for sending and reading SMS (short message service), 80% for checking the time, 76% for calculating, and 68% for setting alarms among the elderly.

It indicates that the elderly were using inbuilt applications of smartphones such as calling, cameras, video, video calling, and flashlights. The findings of the study also highlighted that the elderly do not use Games (65.26%), Address Books (57.89%), Search Tools (48.42%), sending picture messages (51.58%), and Radio (51.58%) features.

Table 6: Frequency and Percentage Distribution of the Elderly According to the Use of Downloaded Application (n=95)

| Applications | Use | | Do not Use | |
|--|-----|-------|------------|-------|
| | f | % | f | % |
| WhatsApp | 90 | 94.74 | 5 | 5.26 |
| YouTube | 73 | 76.84 | 22 | 23.16 |
| Facebook | 57 | 60 | 38 | 40 |
| Health-related applications | 40 | 42.11 | 55 | 57.89 |
| Google pay (G-pay) | 28 | 29.47 | 67 | 70.53 |
| Instagram | 26 | 27.37 | 69 | 72.63 |
| Music Applications like Spotify, Amazon, and ganna. | 26 | 27.37 | 69 | 72.63 |
| Amazon | 25 | 26.32 | 70 | 73.68 |
| Paytm | 19 | 20 | 76 | 80 |

| | | | | |
|------------------------------------|----|-------|----|-------|
| Flipkart | 18 | 18.95 | 77 | 81.05 |
| Online booking applications | 17 | 17.89 | 78 | 82.1 |
| Telegram | 15 | 15.79 | 80 | 84.21 |
| Phone pay | 13 | 13.68 | 82 | 86.32 |
| Twitter | 12 | 12.63 | 83 | 87.37 |
| Myntra | 9 | 9.47 | 86 | 90.52 |
| Bharat pay | 5 | 5.26 | 90 | 94.73 |
| Big basket | 5 | 5.26 | 90 | 94.74 |
| BHIM | 3 | 3.16 | 92 | 96.84 |

Table number 6 reveals that the majority (94.74%) of the elderly were using WhatsApp, YouTube (76.84%), and Facebook (60%). It indicates that the majority of them use social media.

Omolayo (2018) revealed in his study that the majority of the elders also used their smartphones for social networking such as Facebook, Instagram, and YouTube so they became more informed about their friends “activities, news, and status. Also, they could make sure their friends were informed about them. Some of the elders described that the use of Facebook had become part of their life and their smartphones provided the opportunity to “stay connected”. William & Murugesh (2018) identify in their study that 64% for reading and sending emails, 64% of the respondents for social media, 48% for surfing the internet, and 36% for making video calls.

Table 6 also shows that the majority of the elderly were not using an application such as BHIM (96.84%), Bharat pay (94.73%), Big basket (94.74%), Myntra (90.52%), Twitter (87.37%), Phone pay (86.32%), Telegram (84.21%), Online booking application like Redbus, Make my trip, IRCTC, Uber, GSRTC, etc. (82.10%), Flipkart (81.05%) and Paytm (80%). It indicates that payment and shopping applications were not used by the elderly. A probable reason could be that they do not have proper knowledge of how to use it and maybe they do not need to use it.

The majority (67.37%) of the elderly needed help to operate their smartphone whereas thirty-two percent of them didn’t need help to operate their smartphone. Elderly needed help to save their contact number (20.65%), download applications (18.78%), browse the internet (18.78%), edit their number (15.69%), and check their SMS (15.49%). Very few of them needed help to make a call (7.98%). The table-6 indicates that fifty-three percent of the elderly took help from their children;thirteen percent of them took help from their friends, whereas twelve percent of them took help from relatives, Neighbors (6.25%), themselves (5.36%), Caretakers/ helpers (4.46%). Few elderlies took help from their Grand Daughters whereas some were using YouTube to learn smartphones by themselves.

Purpose of Using Smartphone

The item-wise intensity indices for the elderly purpose of using smartphones ranged from 1.07 to 2.83. It indicated that the elderly were using smartphones most of the time for the

following purposes. The higher intensity indices were found for the following items:

- To make a call
- To receive a call

The basic purpose of the phone is to remain connected with others. Hence, the elderly mostly used their smart-phone most of the time to make a call and receive a call.

The findings also revealed that the elderly were using smartphones sometimes for watching videos on YouTube, making and receiving video calls on WhatsApp, communicating with family members who live abroad through WhatsApp chats, listening to music on YouTube, and Radio, and remaining updated with local, national and international news and so on.

Rosales and Ardevol (2019) in their study concluded that older people might consider the camera, gallery, and set features more relevant than the younger generation do. Basic users mainly use smartphones for making calls and taking pictures.

Tang, et. al. (n.d) found in their study that most participants only used their mobile phones for basic functionality such as making calls. Another reason for not exploring beyond basic features was the lack of knowledge about what services were included in the mobile service plan.

The findings of the present study revealed that the elderly were using smartphones with less proposes to upload pictures on Instagram, play online games, search diagnosis centers (CT scan, sonography, x-ray, pathology lab, etc.), and activities for the elderly in their local area, do online booking and shopping, download picture editing software, to make a video call on google meet, skype, Instagram and Twitter.

Barriers to the Use of Smartphones

More than half of the senior citizens (51.58%) faced more personal barriers while using smartphones whereas forty-eight percent of them faced fewer barriers while using a smartphone. A higher percentage of the elderly were having more than 3 years of experience in operating smart phones, hence, probably, they faced fewer personal barriers. The finding of the present study also revealed that the majority (67.39%) of senior citizens needed help in operating a smartphone. This indicates that they might have lack of knowledge and skills in the operation of smartphones. Therefore, half of them might have reported more personal barriers.

The following personal barriers were reported by the elderly who use smartphones:

- Unable to understand how to make video calls on Facebook.
- Lack of knowledge to use online Booking applications. (Redbus, Make my trip, IRCTC, GSRTC, and Uber).
- Unable to update smartphone Application.
- Unable to understand new features of the smartphone.
- Lack of knowledge to use online Healthcare applications. (Arogyasetu, Medkart, and Apollo 24/7).
- Lack of opportunities for learning a smartphone.
- Not aware of the proper use of a smartphone.

The findings of the study portray that half of the senior citizens (50.53%) faced more technical barriers whereas forty-nine percent of them faced less technical barriers while using a smartphone. It indicates that senior citizens faced personal barriers related to the lack of knowledge

and skill in the operation of smartphones. The following barriers were faced by the elderly at a higher level:

- Mistake in choosing the key or written and tactile commands for the smartphone on the touch screen.
- Lack of detailed instructions.
- Complicated instructions arise during the use of applications.
- Cannot locate buttons on smartphone screens. (Like the back button and home button)
- Difficulty in reading due to the small font size of the content of the smartphone.
- Use of touch screens is difficult.
- Cannot tap properly due to leathery fingers.

It indicates that the elderly faced technical barriers related to the use of a smartphone as a device. Navabi (2016) also reveals that older people have a generally negative attitude toward the use of mobile phones due to technology anxiety and the fear of working with new devices aging tends to make the selection of a specific button on the mobile phone difficult or make the use of mobile applications confusing and thus creates anxiety in the older adult.

CONCLUSION AND SUGGESTIONS OF THE STUDY

The present study was conducted to highlight the use of smartphones among the selected elderly and to study the purpose of using smartphones among the elderly residing in Vadodara city.

The role of the smartphone in elderly life is to remove loneliness, make them independent, provide information, and improve communication. The main difficulties for the elderly in the use of smartphones are financial limitations, limited sight, lack of interest, and lack of knowledge about how to use technological devices and their advanced functionalities (Westermeye, 2020).

The present study throws light on various purposes for which the elderly use smartphones. The most frequently used applications by the elderly were in-built applications of smartphones such as calling, cameras, video, video calling, and flashlights. The findings of the study also highlighted that the elderly did not use games, address books, search tools, sending picture messages, or radio features. The data also shows that the majority of the elderly were not using an application such as BHIM, Bharat pay, Big basket, Myntra, Twitter, Phone pay, Telegram, Online booking applications like Redbus, Make my trip, IRCTC, Uber, GSRTC, etc., Flip-kart and Paytm. It indicates that payment and shopping applications were not used by the elderly. It can be concluded from the findings of the present study that the overall purpose of using a smartphone by the elderly was more. As a result, if they are inspired and encouraged to learn online applications, they are more likely to use them in their life.

It also indicates that the elderly faced more personal/individual as well as technical/device-related barriers. They faced personal barriers related to a lack of knowledge to use online applications like payment, shopping, and booking applications. Mistakes in choosing the key or written and tactile commands for smartphones on the touch screen, use of touch screens, and lack of detailed instructions were the major technical barriers they faced while using a smartphone. It indicates that lack of knowledge and skills in the use of smartphones was the major personal barrier faced by the elderly.

The elderly suggested a training programme to learn about smartphones. They wanted to

learn how to send messages on WhatsApp. They wanted to learn how to use online applications like payment applications, shopping applications, and Booking applications. They also wanted to learn the basic features of the smartphone. The elderly wanted to learn how to delete unnecessary messages, photos, and videos. Hence, if the elderly were provided with a learning module and training they may have higher usage of the smartphone.

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ASSESSMENT OF THE PERCEPTION AMONG YOUTH ABOUT GENDER STEREOTYPING IN START-UPS

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ABSTRACT

Entrepreneurship is a gender neutral endeavour; or it should be. However, the trend of participation of women in Start-up businesses says otherwise. The present study was undertaken to assess any gender biases in Start-up businesses, gender difference in challenges expected by youth, variation in motivation and opinion about suitability of start fields. Total 223 youth from the age group of 18-30 years from all over the country were selected through snowball method. Data was collected through a structured interview schedule shared in form of google forms shared via emails and social media. Results on perceived challenges showed men to be expecting lesser hurdles as compared to women in pursuing Start-ups. Women expected a variety of challenges if they opt for Start-ups like financial issues, fear of risk and failure. There was gender difference in motivation behind Start-ups as well. Men were motivated by financial needs of family and income generation whereas for women, need to feel independent was a far bigger motivation. Stereotypical mindset was evident in males who reported that beauty and wellness, food industry and education sector were more suitable for Start-ups in women, whereas women felt no such field based restrictions for themselves. The study also identified certain apprehensions in men about the ability of women to handle Start-up businesses efficiently, especially field work, accounts and staff management. The study concludes that there are gender biases in the start-up ecosystem that create hurdles for women to opt and run their own businesses successfully. The study will help in realizing efforts to be made for addressing gender based challenges and encouraging women to take up multifarious businesses, irrespective of the stereotypes.

Key Words: gender bias, stereotypes, start-up, entrepreneurship, youth, motivation.

INTRODUCTION

Entrepreneurs are the life and blood any country's economy. "Entrepreneur" - a gender neutral word and yet there's a certain image etched in our minds when we try to imagine one- A confident, innovative, skilled man. And if it is a woman, then, what does really come to mind? Are there any stereotypical businesses that pop up which are "gender appropriate"? We need to find some answers.

Due to steady growth in Indian economy in the last decade the parallel growth in terms of numbers of new business and start-ups is being observed in country. India is the third largest nation in terms of start-ups as we are having 27000 Start-ups, but 95% of the them are founded by men. This highlights the difference of the journey between men and women along with the challenges encountered by female while choosing the path of entrepreneurship (Gupta, 2020).

Data from Your story Research (2021) indicates that during pandemic women were struggling more to manage work life balance which is supported by the fact that funding for women led start-ups showed decline of 24 percent (\$280) in the first of 2020 as compared to first six months in

2019 i.e. \$368. The field of entrepreneurship is undoubtedly challenging but are these challenges same for both genders? While many Indian women are inclining towards Start-ups but there are certain challenges waiting for them that sadly are gender based, be it cultural biases, lack of resources like finance, training, capital etc. (Mastercard Index of Women Entrepreneurs, 2018). A study by McKinsey Global Institute (2015) estimated that advancing women's equality in India could boost its GDP by \$0.7 trillion in 2025 or 16 percent as compared to the 'business as usual' scenario. Closing the gender gap in India could increase the GDP by 6.8 percent (Khera, 2018). That means women entrepreneurs in not just select fields, rather, their participation in as many fields as possible. However, in a diverse country like India, the options for Start-ups are immense but 98 percent of businesses owned by women are micro-enterprises and belong to informal sector (Khera, 2018).

The field of start ups have many layers and aspects which creates an ecosystem formed by people, stages of start-up and its interaction with the other areas of the system including universities, funding organizations, research organizations, support organizations (like incubators, co-working spaces, accelerators etc.), service provider organizations (like legal, financial services etc.) and large corporations. These parts determine how this ecosystem functions and moves further.

Hearing from the horse's mouth, a number of women entrepreneurs are coming forward and sharing the flaws of the system. Soumya Kant, Founding Member and Growth Head, Purple Panda Fashions, talked about the flawed mindset of the society where women are expected to have different priorities than men. Ms Kant said "women need to work twice as hard in order to make any investor believe in their goals and ideas". Upasna Dash, Founder & CEO, Jajabor Brand Consultancy, talked about the stereotyped questions of risk-taking abilities, financial decisions, family priorities posed at women Start-up aspirants by investors. These stereotypes, in her opinion, act as barriers for women entrepreneurs (economictimes.indiatimes.com). Women entrepreneurs in India are found more in fashion and food tech sectors, than in tech, automobile, Software as a Service (SaaS) or gaming. But even in those two sectors, 70 percent are men, says Usha Amin, co-founder of SAHA Fund, a VC firm exclusively for women. Except Limeroad, founded by Suchi Mukherjee, all leading online fashion portals are founded by men – whether it is Voonik, Wooplr, Roposo, as well as veterans like Myntra and Jabong.

Although engineering colleges are no longer examples of vast gender disparity, entrepreneurship is still a different ballgame, from an IT job, and women hesitate to enter untested waters. Meena Ganesh, Co-founder, Portea, says, "we need more women in finance and technology sectors. Women not being there discourage investors to trust women's intellectual capabilities. Women have not grabbed the authority over finance yet."

Like any other start-up aspirant, women too have to enter this start-up ecosystem but the journey and interaction with various aspects of this ecosystem could be different. There is a trend in the participation of women in Start-up. Whether it originates from an innate sense of gender bias, is left to be seen.

Justification: There is need for more and more women entrepreneurs as it will directly translate into higher start-up generation in the country. But for that to happen, there is also need for identification of the causative factors, and obstructions in the path of women start-up aspirants. The present study endeavours the same.

OBJECTIVES

The present study was conducted with the objective to identify gender-based differences in:

- challenges perceived by the youth about starting up an enterprise,
- Choice of Start-ups and
- Gender stereotypes in suitability of fields for women in Start-ups.

METHODOLOGY

Youth from all over the country in the age range of 18-30 years were contacted through a structured interview schedule shared via Google Forms as physical data collection was not possible due to COVID. Data was collected through Snowball method. Total sample size was 223. Data collection tool was divided in sections of background information, perceived challenges, motivating factors, suitable fields and opinion based questions. Major areas for Start-up were taken from the list of Sector Skill Council on the National Skill Development Council website.

RESULTS AND DISCUSSION

Background information of respondents – Respondents were youth and fell in the age group of 18-30 years. Higher numbers of respondents were under graduate (52.91%) as compared to Post Graduate (36.77%). Majority of respondents were male (61.43%) and 38.56 percent were female. About 61 percent of the respondents were urbanite and the parents of maximum number of subjects worked in private jobs (32.73%), followed by government servants (23.76%), agriculturists (21.97%) and business owners (20.62%).

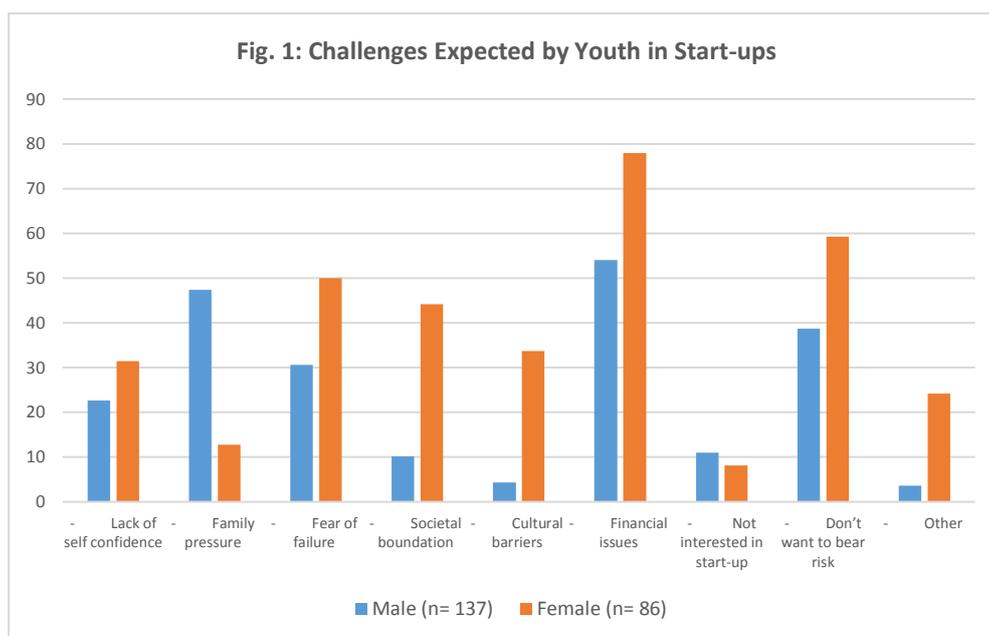


Fig. 1 Challenges Expected by Youth in Start - ups

Figure 1 shows that financial issues was found to be the most realised obstacle for youth in opting for a start-up-based career. Overall, women were found be expecting a wide array of challenges in

the field of Start-ups, especially financial issues (77.90%), high risk (59.30%) and fear of failure (50%). Men expected less hurdles comparatively with only one exception of family pressure (47.44%) which was felt more by men as compared to women. According to Kumar and Singh (2021), the causes of low female-start-up participation are difficult in access to finance and networks, responsibilities towards family and child-care, low level of confidence in business in women’s skills.

Motivation behind Start-ups

Table 1: Motivation Behind Start-ups

| Motivation Behind Start-ups | Male (n=137) | Female (n=86) |
|---|---------------------|----------------------|
| To meet financial requirement of family | 55.47% | 24.42% |
| To be self-dependent | 64.96% | 66.28% |
| Interesting in doing something new | 51.82% | 45.35% |
| To live with passion | 31.39% | 22.09% |
| Family support | 48.91% | 44.19% |
| Social prestige | 9.49% | 13.95% |
| Dreams | 41.61% | 45.35% |
| Fight against poverty | 81.75% | 47.675 |
| Independence | 28.47% | 41.86% |
| Meet family needs | 46.72% | 80.23% |
| Extra income generation | 63.50% | 39.53% |
| Idealizing other person | 64.96% | 59.30% |

It is interesting to note that there are gender based differences in the motivation behind Start-ups. The study found that men wanted to have a Start-up business primarily for meeting financial requirements of the family (55%), for financial independence (65%), meeting family needs (64%) and extra income generation (65%). Women on the other hand were motivated by the need to be independent (80%) and earn some extra income (59%). Less percentage of both genders were motivated by social prestige and passion. It was found that practical reasons like income and independence were more prominent motivating factors.

Suitability of Fields for Women in Start-ups

Table 2: Suitability of Fields for Women in Start-ups

| Suitable Fields | Male (n=137) | Female (n=86) |
|--------------------------|---------------------|----------------------|
| Beauty & wellness sector | 94.16% | 82.55 % |
| Food industry sector | 78.83% | 83.72% |
| Healthcare sector | 54.74% | 65.11% |

| | | |
|---|--------|--------|
| Handicraft & carpet sector | 60.58% | 52.23% |
| Textile sector | 51.82% | 72.09% |
| Apparel & home furnishing sector | 68.61% | 82.55% |
| Sports, physical education, fitness & leisure | 33.57% | 58.13% |
| Tourism and hospitality sector | 55.47% | 72.09% |
| Educational sector | 83.94% | 69.76% |
| Media & entertainment sector | 38.68% | 82.55% |

Stereotypical approach was evident among male respondents when they were inquired about fields they felt were suitable for women. According to men, fields like beauty and wellness (94.16%), education (83.94%) and food industries (78.83%) were more suitable for Start-up businesses for women. They felt that sectors like sports and physical education, tourism and textile sectors were less suitable for women. Women however felt no such restriction about suitability of fields. Less inclination was seen towards handicraft and sports sector.

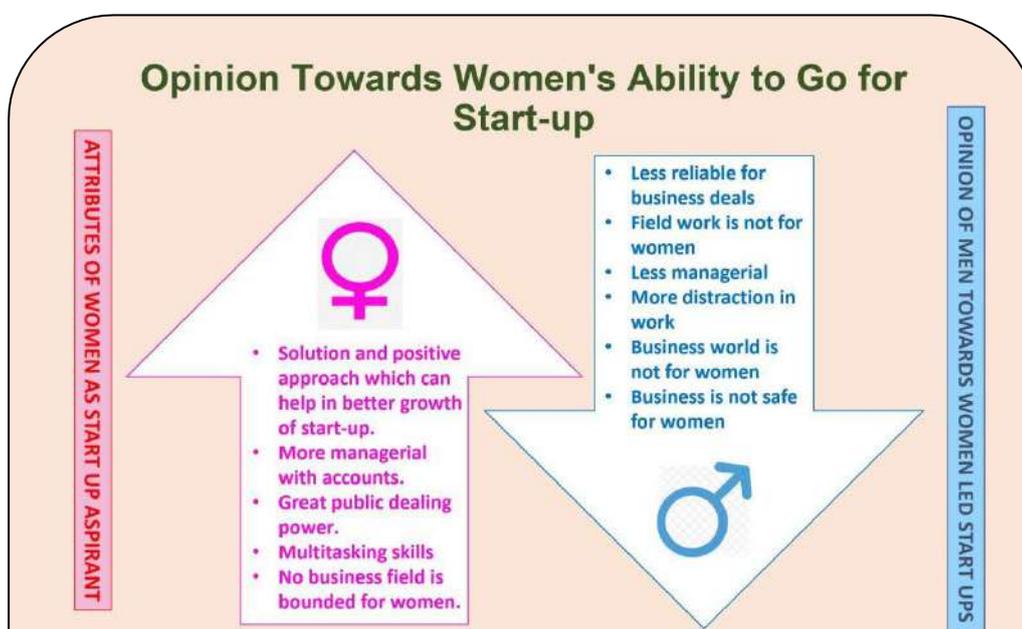


Fig. 2: Opinion towards Women's Ability to go for Start-up

Respondents were inquired about their opinions about various abilities and attributes of women pertaining to Start-ups. There was a considerable difference between the opinions of men and women regarding this (fig. 2). Men recorded apprehension about women’s ability to handle field work (18.98%), manage negative cash flow (12.41%), management of accounts and profit making (10.95%) and staff management (20.44%) as very less number of subjects believed women to be capable of these attributes. A large percentage of men also believed that women are comparatively more distracted (57.66%), found business to be unsafe for women (25.55%), believed them to be less reliable and more emotional in business deals (50.36%), and doubted the longevity of women

led businesses (50.36%). Stereotypical mindset was also visible in the responses of men as nearly 65 percent of respondents felt that only Beauty and personal care, boutique, home based businesses are for women, no other.

On the contrary, women showed more belief in their abilities, especially multitasking (82.56%), solution-based approach (75.58%), public dealing ability (60.47%) and field work (80.23%). Women didn't show any stereotypical mindset about specific fields suitable for business (77.91%). Few of the responses were alarming as 45.35 percent women felt that women led business have more chances to shut within few year of establishment than men led start-up. Also, one-third of the women respondents felt women seems to make less profit in business world comparatively and 45.35 percent of women respondents doubted the longevity of women led businesses and believed that they shut down within two-three years of establishment. However, there is a silver lining. Nearly 68.60 percent men and 91.86 percent women felt women should contribute more to the business world.

In a Harvard Business Review by King and Jones (2016), it was found that younger women or female owners of fresh Start-ups reported no discrimination based on gender, whereas older women did face unequal treatment based on their gender. The study further reports that this discrepancy in perception could be an indicator of unnoticed bias i.e. unconscious gender bias.

CONCLUSION

Entrepreneurship can make or break the country's economy. The need isn't just for more enterprises or Start-ups but successful Start-ups. Both of these requirements can only be fulfilled via equal participation of men and women in this ecosystem. Currently, it seems like a farfetched goal as the present study found a deep rooted gender bias especially in the minds of men about the abilities of women to handle Start-ups and the suitability of stereotypical fields like beauty and food sector for women Start-up aspirants. The study highlights gender specific issues which are going unnoticed in the efforts made to encourage our youth towards entrepreneurship. The study also brings into notice the specific obstructive issues that women start-up aspirants face. The results of this paper also indicate that the challenges for our youth in the path of start-ups isn't only financial or skill based, rather the gender aspect of it is equally serious. The issues highlighted in the paper can serve as a foundation for framing effective policies for attracting women into the start-up ecosystem. The decision makers, financiers, investors etc. will have to sensitize themselves for a gender neutral start-up ecosystem. Efforts will have to be made to address gender specific challenges and attract and encourage women to opt varied fields for businesses.

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CONSUMPTION OF ETHNIC FOODS BY NATIVE TRIBES OF NICOBAR ISLANDS

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ABSTRACT

Nicobar tribes place greater emphasis on their own cultural values and traditional agricultural practices, such as agriculture, fisheries, and livestock. Currently, they are not engaged in agricultural activities on a commercial scale, but they are meeting some or all of their own needs by utilizing the resources available in their region. The present study recommends that the Nicobar tribes of this island be incentivized by the local government to engage in farming and other activities associated with their traditional culture and way of life. Since very few researches have been conducted on the topic, the results of this might shed light on the Nicobarian's distinctive and unique ethnic dishes for people all over the world.

Key words: cultural values, traditional practices, resources, incentives, agricultural activities, ethnic food

INTRODUCTION

The Nicobar Islands are a group of smaller islands in the eastern Indian Ocean. The Nicobar Islands are historically and culturally significant. The majority of Nicobar's population is comprised of indigenous tribal people and outside settlers. Both groups have distinct traditions and cultures, which creates an intriguing contrast. The indigenous tribes are predominantly hunters or horticulturists and have little contact with outsiders (Mishra,2022).

Carpenter (2001), opine that there has always been a strong desire among tribal cultures to preserve their ancestral ways of living. Their cultures are changing in accordance with the principles of social progress. Tribes are groups of primitive people who reside in backward regions of remote forests and hill regions.

The majority of Nicobar cuisine consists of non-vegetarian items such as meat, fish etc. The sea is teeming with fish, so the Andamanese prefer to consume more and more fish in their diet. They also consume a great deal of fruits, which are abundant in the Nicobar jungles. Mango, papaya, banana, orange, pineapple, and guava are some of the most common fruits found on Nicobar Island (Bohra and Waman, 2022).According to (www.unesco.org), the Nicobar tribes have a traditional horticultural economy based on the cultivation of coconuts, pandanus, areca nut palms, yam, and citrus fruits. In addition, they hunt, fish, raise pigs, create pottery, crafts, and canoes. Coconut palm is essential to the economic activities of Nicobar tribes. Inhabitants of the Andaman and Nicobar Islands rely heavily on coconut for their daily survival. Consequently, coconut oil extraction is one of their traditional occupations. It is a socially and economically significant resource for the indigenous community (Sahan,2004). Extracted coconut oil is used both for personal consumption and for sale at the trade fair and exhibition. They produce copra using traditional techniques and sell it through tribal cooperatives to meet their other needs. Several

of them have mastered the process of extracting virgin coconut oil. Currently, Nicobaris are highly developed among all Andaman and Nicobar island tribes. They are farmers who practice natural farming and occupy a higher economic tier.

Foods that are derived from the cultural traditions of specific ethnic groups are considered ethnic. These foods contribute to the local food system, which impacts the environment and economy. Families' home gardens are an important land use system that contributes to the revitalization of ethnic cuisines (Singh and Raha 2022). Almost every home in Nicobar has a garden where banana, jackfruit, ladies' finger, brinjal, coconut, and Nicobari Aloo are grown. In order to maintain and attain a healthy lifestyle, it is necessary to increase household food security through the consumption of locally grown food.

Scope of the Study

The purpose of this research is to catalogue the traditional tribal diets of various age groups, including the specific foods eaten at each stage of life, as well as additional distinctive cuisines made from readily accessible native components. This research will also provide novel insight into the management skills utilised by the Nicobaria's in the creation of their traditional cuisine using locally sourced ingredients.

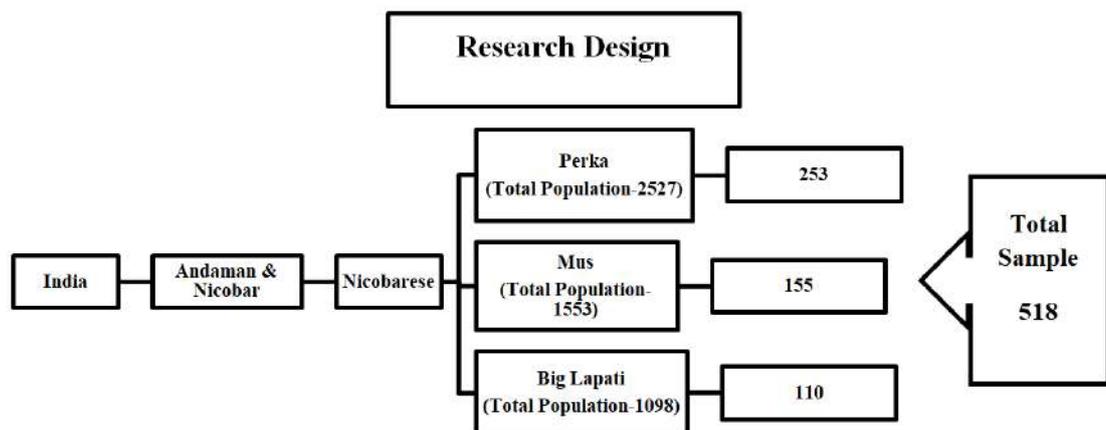
OBJECTIVES OF THE STUDY

On the basis of these contexts, the objectives of the study entitled "Consumption of Ethnic Foods by Native Tribes of the Nicobar Islands" are as follows: To

- understand the socio-demographic profile of specific Nicobar tribes.
- investigate the specific ethnic foods consumed by various age groups among tribes
- comprehend the dietary habits of the selected tribal families
- evaluate the costs associated with food preparation

METHODOLOGY

Methodology refers to the overall strategy for integrating the various components in a consistent and logical manner. In addition, it is considered the heart of any study (Sharma 2017).



As household survey is essential to all research, three tribal villages, namely Mus(155) Big Lapathi (110) and Perka(253) were chosen from 15 villages in Car Nicobar for this research.

As part of his research, the investigator surveyed these households to learn more about the individuals and their families. This research was conducted after the event and was mostly descriptive. This study's goal is to collect information on the respondents' demographics, ethnic cuisine preferences, dietary routines, and cooking expenses. Simple random sampling was utilized to collect 518 samples from three villages in Nicobar. Utilizing a well-structured interview schedule, an interview method was implemented. Only after obtaining permission from the village captain was the researcher permitted to enter and conduct the survey. The survey data was compiled and presented in the results and discussion. As part of his research, the investigator surveyed these households to learn more about the individuals and their families.

RESULTS AND DISCUSSION

Socio-Demographic Profile of the Selected Tribal Women

The socio demographic profile brings out the information on age, gender, marital status, occupation, traditional occupation and income from main occupation and other traditional occupation. Table 1 shows the socio demographic profile of the selected households.

Table 1: Socio-Demographic Profile of the Selected Tribal Women

| Variables | | Number(n=518) | Per centage |
|------------------|---------------|----------------------|--------------------|
| Age | 20 – 30 years | 226 | 43.63 |
| | 31 – 40 years | 158 | 30.50 |
| | 41 – 50 years | 134 | 25.87 |
| Religion | Christian | 432 | 83.40 |
| | Muslim | 86 | 16.60 |
| Community | ST | 518 | 100.0 |
| Type of Family | Joint | 349 | 67.37 |
| | Nuclear | 169 | 32.63 |
| Education | Illiterate | 215 | 41.51 |
| | High School | 169 | 32.63 |
| | Graduate | 66 | 12.74 |
| | Post-Graduate | 54 | 10.42 |
| | Diploma | 14 | 2.70 |
| Occupation | Teacher | 50 | 9.65 |
| | Doctor | 2 | 0.39 |
| | Police | 59 | 11.39 |
| | Nurse | 24 | 4.63 |
| | Musician | 14 | 2.70 |
| | Mechanic | 14 | 2.70 |
| | LGC | 18 | 3.45 |

| | | | |
|--|------------------|-----|-------|
| | Lab Assistant | 9 | 1.74 |
| | ANM | 19 | 3.67 |
| | Traditional | 309 | 59.65 |
| Income (In ₹ / Month) | 10,000 – 20,000 | 213 | 41.12 |
| | 20,001 – 30,000 | 91 | 17.56 |
| | 30,001 - 40,000 | 88 | 16.99 |
| | 40,001 – 50,000 | 74 | 14.29 |
| | 50,001 and above | 52 | 10.04 |
| Traditional Occupation | Agriculture | 28 | 9.06 |
| | Fishery | 118 | 38.19 |
| | Handicraft | 80 | 25.89 |
| | Poultry | 25 | 8.09 |
| | Animal Husbandry | 59 | 19.09 |
| Income from traditional occupation | 10,000 – 20,000 | 44 | 14.24 |
| | 20,001 – 30,000 | 150 | 48.54 |
| | 30,001 - 40,000 | 115 | 37.22 |

Age distribution of tribal women revealed that 44 per cent were between the age of 20 and 30 years, followed by 31 per cent between the ages of 31 and 40 years, and 26 per cent between the ages of 41 and 50 years.

Regarding religious background of their families 83 per cent were Christians and 17 per cent were Muslims, according to the data. All of them belonged to the Scheduled Tribes community. Even though they were educated and highly civilized in modern times, they preferred the culture of the joint family because they considered it to be their custom. Only 32 per cent of individuals had nuclear family backgrounds.

Forty-one per cent of women were functionally illiterate, 33 per cent of the literate had completed high school, 13 per cent had completed their bachelor's degree, 10 per cent had completed their master's degree, and only three per cent had completed diploma courses. When approximately 60 per cent of total of the population was engaged in traditional occupations, 11 per cent of total and 10 per cent were employed as police and teachers, respectively, while only five per cent and four per cent were employed as nurse and Andaman Nicobar Midwifery (ANM), in addition to musician, mechanic, lab assistant, and Lower Grade Clerk (LGC). Due to education and employment preferences accorded to the tribes, the survey revealed that educated women are positioned favourably within society.

Sixty per cent of the population engaged in traditional occupations, with 38 per cent involved in fishing and 26 per cent in handicraft. The most popular handicrafts include the Nicobari hut, ship, handcrafted coconut shell items and coconut fibre mats, as well as hand embroidery on soft furnishings, particularly pillow covers. Nineteen per cent had animal husbandry in which pig rearing played a significant role in all social gatherings. The pigs were raised and

regarded as family assets by the tribes of Nicobar. Nine per cent of the population was engaged in agriculture, the primary economic activity of tribal society on the Nicobar Islands, and coconut occupied 80 per cent of the agricultural land. Only eight per cent of the population traditionally raised poultry for their own consumption.

Forty-one per cent of respondents earned between Rs.10,001 and Rs.20,000 per month, while 18 per cent earned between Rs.20,001 and Rs.30,000 and 17 per cent earned between Rs.30,001 and Rs.40,000. Fourteen per cent and 10 per cent were fortunate enough to earn between Rs.40,000 and Rs.50,000. In addition to income from the primary occupation, there are additional traditional sources of income. From these traditional occupation sources, 48 per cent earned between Rs.20, 001 and Rs.30, 000, 37 per cent earned between Rs.30,001 and Rs.40,000, and 14 per cent earned between Rs.10,000 and Rs.20,000. This demonstrates that the selected samples are in a better economic position, which may be a result of the consistent efforts made by the government to elevate the standard of living of the tribal population.

Dietary practices adopted by tribal families

The information presented below pertains to ethnic dietary patterns, the consumption of fundamental foods, the cost of these items, and the number of meals consumed per day.

a. Ethnic Foods for Various Age Groups

Food system of tribes adds to the ethnic and cultural heritage of the region. They are basically non vegetarians. Their staple food includes fish, pig, crab shell fish and tubers. They continue to eat their traditional cuisines, which are primarily determined by the type of food that are available in their locations. The following Table provides in-depth information regarding the types of traditional cuisines eaten by people of varying ages:

Table 2: Ethnic Foods Consumed by Various Age Groups

| Age groups | Foods consumed |
|---------------------------|--|
| Infants | Boiled Banana, Boiled Potato, Coconut Milk and Water, Cow Milk, Egg, Fish Soup, Grinds, Kernels, Mother Milk, Pandanus/Kevadi , Vegetable soup |
| Preschool children | Boiled Banana, Boiled Potato, Boiled Banana and vegetable soup, Coconut Milk and Water, Cow Milk, Egg, Grinds , Pandanus/ Kevadi, Mutton Soup, Pork Meat, Pork Soup, Raw Fish, Veg soup, Roti and tea |
| Adolescent | Boiled Banana, Boiled Potato, Boiled Banana and vegetable soup, Coconut Milk and Water, Egg, Fish Soup, Pandanus/ Kevadi, Toddy, Mutton Soup, Pork Meat, Pork Soup, Raw Fish, Sea Cucumber, Sea Shell Fish, Beef soup, Nicobarealoo , Red crab, Veg soup, White alcohol/ Jangli , Bamboo leaf , Beef meat, Roti and tea |
| Adult | Boiled Banana, Coconut Milk and Egg, Fish Soup, Pandanus/ Kevadi, Toddy, Mutton Soup, Pork Meat, Pork Soup, Raw Fish, Sea Cucumber, Sea Shell Fish, Beef soup, Nicobarealoo, Red crab, Veg |

| | |
|------------------|---|
| | soup, White alcohol/ Jangli, Bamboo leaf, Beef meat, Roti and tea |
| Pregnancy | Boiled Banana, Boiled Potato, Boiled Banana and vegetable soup, Coconut Milk and Water, Cow Milk, Egg, Fish Soup, Pandanus/ Kevadi, Toddy, Mutton Soup, Pork Meat, Pork Soup, Raw Fish, Sea Cucumber, Sea Shell Fish, Beef soup, Nicobarealoo, Red crab, Veg soup, White alcohol/ Jangli, Bamboo leaf, Beef meat, Rice and soup, Roti and tea |
| Lactation | Boiled Banana, Coconut Milk and Water, Cow Milk, Egg, Fish Soup, Pandanus/ Kevadi, Toddy, Mutton Soup, Pork Meat, Pork Soup, Raw Fish, Sea Cucumber , Sea Shell Fish, Beef soup, Nicobarealoo, Red crab, Veg soup, White alcohol/ Jangli, Bamboo leaf, Beef meat, Roti and tea |
| Old age | Boiled Banana, Boiled Potato, Boiled Banana and vegetable soup, Coconut Milk and Water, Cow Milk, Egg, Fish Soup, Pandanus/ Kevadi, Toddy, Mutton Soup, Pork Meat, Pork Soup, Raw Fish, Sea Cucumber, Sea Shell Fish, Beef soup, Nicobarealoo, Red crab, Veg soup, White alcohol/ Jangli, Bamboo leaf, Beef meat, Rice and soup, Roti and tea |

In addition to catering to children of varying ages, the majority of the **coconut milk and tender coconut water** was distributed to toddlers and pre-schoolers. The tribes of Nicobar Island have stated that the reason for feeding them coconut is because it is beneficial to their health. Coconut is an indigenous crop on Nicobar Island, thus it is freely accessible

Banana and potato were both boiled, and the preparation for both of these dishes involved adding coconut milk. The only people who received vegetable soup in addition to the cooked banana were preschool adolescents, pregnant women, and elderly people; new born did not receive the soup.



Pandanus/Kevadi



Jangli



White alcohol/ Sea cucumber + Fish



Raw plant + Coconut milk

Red crab

Sea cucumber

Plate1: Food Commonly Consumed by Nicobar Tribes

Jaggery is added to delicate coconut valukkai, which is then used to make a unique food called **kernels**. This food is solely intended for use with infants.

Pandanus, is also known as **Kevadi** in the Hindi language. It is one of the staple foods of Nicobari these fruits are often found in large bunches that are reminiscent of the fruits of palm trees. They are then steamed, after which the yellow pulp is removed. In order to complete the preparation of a dish, sugar is combined with the pulp. This is something that practically all age groups, even very young children, will ingest.

Fruits that are readily available in their households are ground up to make pulp and are referred to as **grinds**. In addition to this, wheat flour and sugar are added. Dosa-style preparation is planned for this so that younger children, including infants and pre-schoolers, can eat it.

Everyone, regardless of age, consumes **fish soup**, although pre-schoolers were only given a very small amount of it. They stated that these youngsters were provided with egg, kichadi, rajma, rice, and sweet pongal in their schools, all of which are considered to be nutritional options.

Toddies are consumed by a wide range of age groups, with the exception of infants and preschool-aged children.

Consumption of **raw fish, mutton soup, pork meat, and pork soup** was likewise observed across all age categories, with the exception of babies; nevertheless, consumption of vegetable soup was observed throughout practically all age groups. Persons in age groups other than infants and pre-schoolers consumed white beer, bamboo leaf, and beef meat. These foods were not consumed by people in the younger age brackets.

In accordance with the recommendations of the PHC, pregnant women were encouraged to consume as much **rice soup** as they could. After the soup had been heated, some delicate drumstick leaves were added and the lid was kept on for fifteen more minutes. Following this step, the tribal members season the food with mustard and cumin seeds before serving it to their guests.

This combination, consisting of **roti and tea**, is what the majority of household's regard as their breakfast. No matter what age group they belong to, members of these tribes have the custom of drinking tea along roti, biscuits, bread, buns, or **gholi** (sweet bonda).

Nicobari Aloo- It is otherwise called as greater yam. Bigger in size weighing upto 10-15kgs and is a staple food of Nicobarese. They prepare different dishes like boiled mixed vegetables, fry and chutney, boil it along coconut milk and have as evening snack. Almost consume this dish daily using any one cooking method.

Sea cucumber- It is a sea food, looks like cucumber but black in colour. They prepare in the form of fish fry and gravy. This the Nicobari tribes have it along liquor and with chappathi.

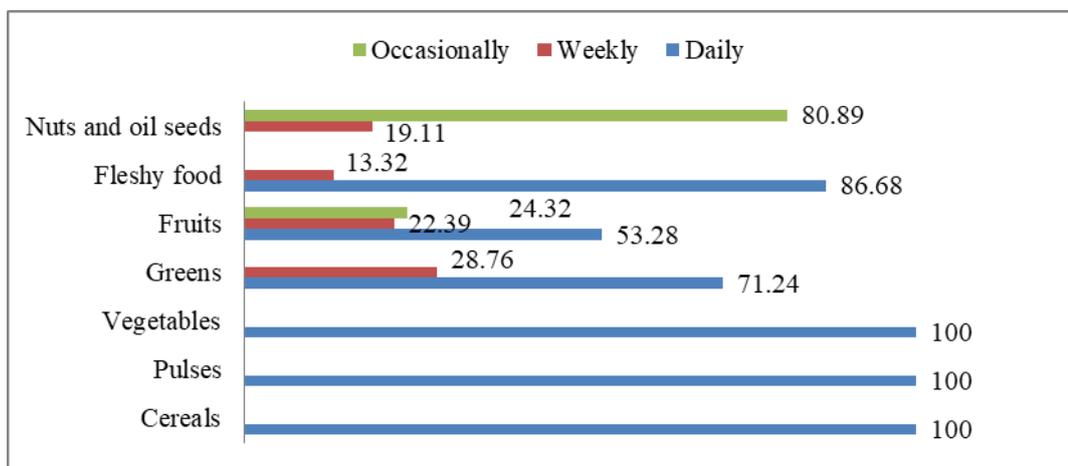
White alcohol/Toddy -obtained from coconut trees. These are consumed by a wide range of age groups, with the exception of infants and preschool-aged children.

Jangli - It is a type of alcohol prepared by the Nicobar community for their own consumption and also for sale

Red crab- They catch from their own garden where they planted coconut trees, banana and palm trees. After collecting 5-6 kgs they prepare at once and consume along rice, chappathi, alcohol and roti in the form of fry or gravy.

b. Consumption of basic foods and its expenditure

Basic foods when consumed in correct proportion would help in building up the immune systems and also provide nutrients to carry out bodily functions. Hence it is observed that all the respondents included cereals, pulses and vegetables in their everyday consumption in addition to fleshy food, fruits daily or weekly once. Nuts and oil seeds consumption was made occasionally by them which is shown below in Figure 1.



*N=518

Fig 1: Frequency of Basic Food Consumed by the Tribal Families

Cent per cent of the families consumed cereals, pulses and vegetables daily in their diet. Regarding consumption of greens 71 per cent preferred it daily and 29 per cent were consuming it on weekly basis. In case of fruits more than 50 per cent were consuming daily followed by 22 per cent and 24 per cent weekly and occasionally. The intake of fleshy food among these tribes were found to be high (87 per cent) but the remaining 13 per cent were consuming weekly once. In case of nuts and oil seeds majority of 81 per cent were eating occasionally and 19 per cent on weekly basis. Whereas ethnic foods were included daily in the form of tender coconut, coconut milk for cooking, fish from their own coastal regions was also included in the diet.

c. Expenditure on Food by the Selected Tribal Families

Although at first these groups would have spent very little, if any money at all, on food because they would have consumed what was readily available in their environment. Over the course of time, as a result of the influence of other people who moved there and established there, the locals' eating habits changed, and their spending on food also rose. The amount of money spent on food by a selected Nicobarese tribes was analysed, and the results are presented in Table 3 below.

Table 3: Expenditure Incurred on Food by the Selected Tribal Families

(N=518)

| Expenditure (Rs) | Amount spent on selected food items (Rs.) | | | | | | |
|---------------------|---|----------------|----------------|----------------|----------------|----------------|--------------------|
| | Cereals | Pulses | Vegetables | Greens | Fruits | Fleshy food | Nuts and oil seeds |
| <1000 | - | 49 (9.46) | 108 (20.85) | 268 (51.74) | 272 (52.51) | 91 (17.57) | 338 (65.25) |
| 1001 - 2000 | - | 258 (49.81) | 257 (49.61) | 219 (42.28) | 122 (23.55) | 168 (32.43) | 119 (22.97) |
| 2001 – 3000 | 139 (26.83) | 176 (33.98) | 131 (25.29) | 31 (5.98) | 72 (13.90) | 109 (21.04) | 40 (7.72) |
| 3001 – 4000 | 62 (11.97) | 35 (6.76) | 22 (4.25) | - | 38 (7.34) | 67 (12.93) | 21 (4.05) |
| 4001 – 5000 | 58 (11.20) | - | - | - | 14 (2.70) | 83 (16.02) | - |
| > 5000 | 259 (50.0) | - | - | - | - | - | - |

Estimated during the year 2020

The meat of fish and pig was the primary source of nutrition for the Nicobar people. A significant portion of the chosen indigenous families' daily activities consisted of fishing. In addition to this, they raise pigs, and the slaughter of pigs is a significant part of the celebration of any important event (except among Muslims). Following the slaughter, especially during celebrations, the meat will be distributed evenly to everyone. It is possible that the people will not spend money on these non-vegetarian foods because the vast majority of them fish and only a small percentage of those who do not fish will have their neighbours distribute their food to them.

In addition to rice, wheat flour and maida were also utilized in the cooking process in order to make chapatti, roti, and goli. In terms of the money spent on pulses, just seven per cent of people were able to spend between three thousand and four thousand rupees, while the vast majority of people (83 per cent) spent between one thousand and three thousand rupees. None of them were willing to spend more than 4,000 rupees each month.

d. Frequency and Timing of Meal Consumption

Figure2 shows the frequency of meals that were consumed by the selected tribes as well as the time of intake of these meals.

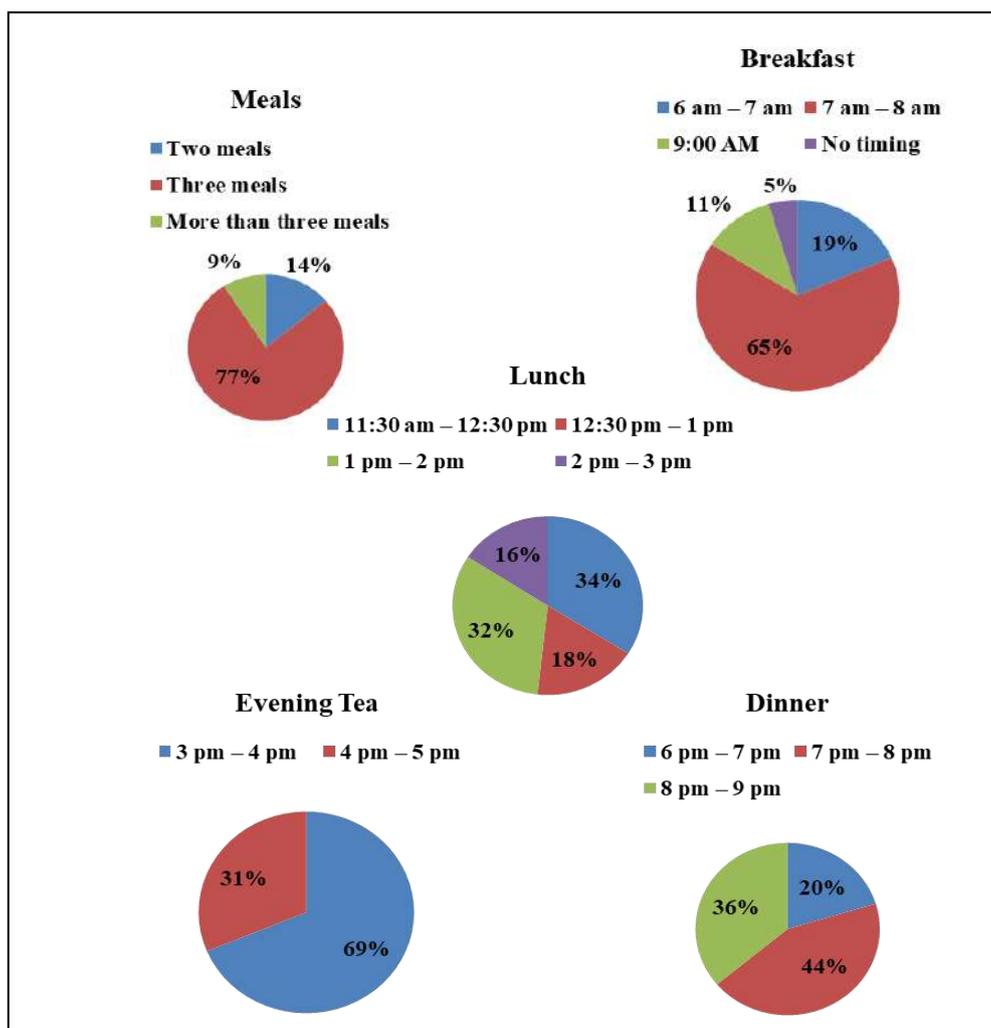


Figure 2: Number of Meals Consumed by the Tribal Families and the Time of Intak

The information gathered regarding the number of meals consumed by these tribes revealed that the vast majority of them (77 per cent) consumed three meals on a daily basis. Furthermore, the majority of them (65 per cent) ate breakfast between the hours of 7:00 and 8:00 a.m., whereas the majority of them (84 per cent) had lunch between the hours of 11:00 and 2:00 p.m., dinner was consumed between the hours of 7:00 and 9:00 p.m., and their tea time was between 3.00 and 5.00 pm. In general, this is how the vast majority of non-tribal people live their lives. This proves that later settlers had an impact on the indigenous population already present in the area.

CONCLUSION

As a consequence of contact with people from other cultures, people's eating habits have altered. The people who live in the Nicobar Islands now have access to just about every type of cutting-edge food imaginable. Their cuisine is composed of mostly rice, lentils, and veggies (both

leafy and non-leafy). An important component of their diet consists of meat. Coconut oil, obtained from native trees, remains the most popular cooking fat. Every Nicobar resident tends a backyard garden filled with native plants and produce. Therefore, shellfish, coconut, nicobarie aloo, and other fruits and vegetables are staples in their diet. There has to be more research done on the possible health advantages of traditional cuisines, and more attention brought to this topic, so that regular people may reap its rewards.

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DESIGN DEVELOPMENT AND FABRICATION OF A WALL MOUNTED CLASSIC MEMORY GAME FOR CHILDREN

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ABSTRACT

A classic memory game helps in improving child's memory. This game helps in improving the brain functions such as attention, concentration, focus and also gives space for critical thinking. There are various classic memory games available in the market and each game has its own advantages and disadvantages. In the present work, the investigator has conducted a market survey by observing and studying the market availability of classic memory games such as shape, size, colour, theme, materials used and the age of children. A wall mounted classic memory game was designed and developed for the children based on the above observations with the consideration to safety features. The developed game was fabricated using locally available materials such as plywood, plastic boxes, cycle spokes and wooden beads. The developed wall mounted classic memory game was assessed by 14 experts and their acceptance was evaluated using Content Validity Index. The salient features of the developed design are budget friendly, minimum space requirement and can be used by children of all age group were taken into consideration.

Key words: Classic Memory Game, Design, Fabrication, Wall Mount, Play

INTRODUCTION

Play is an important activity in child's life which promotes good physical and mental health. Play is an exercise enjoyed by all age group of children which can be considered as good recreation. Children foster their imagination, strengthen their listening skills and build essential cognitive skills that will benefit their future development through games. A classic memory game is one such play that aid in developing these qualities in children. A classic memory game comes under the category of card game. It is a simple match-up or a pairing game that requires the player to use their memory, concentration and focus to complete the game. It contains a deck of cards in which each object is represented in a pair of cards. All the cards are faced down on a surface and the players are supposed to flip two cards on their turn. If both the cards carry the same images, then the player can own the cards. Otherwise, the cards are turned over and left back in their place as such. Now the player is expected to register the image and the position of the card that holds that image in his memory. In the next turn, the player repeats the same procedure by flipping one card first and then trying to figure out the position of its identical pair by recollecting it from his memory. If the pair of cards are flipped correctly the player can take it from that scattered deck of cards. The game is continued until all the pairs of cards are identified and taken back by the players. The individual who first collects a majority of pairs of cards will be considered as the winner of the game.

The memory game can be played by any age group of children. It helps in improving brain functions such as attention, concentration, and focus. Memory card game also helps in enhancing

child's visual recognition (Schlagman and Kvavilashvili, 2008). It uses the child's short-term memory by allowing them to recall which cards were on the table in the hunt to locate all the matching pairs. This may be improved by playing the game frequently. Building the child's short-term memory can help them to do well in school and will aid in the development of their long-term memory (Mullet et al., 2013). A person's long-term memory can be improved by having an excellent short-term memory (Sivakumar, 2022). Both are related and being able to transfer information from one's short-term memory to one's long-term memory. This can increase learning in other areas. Memory games provide a short-term boost and the players are expected to plan their movements as they go. Children may learn the significance of planning ahead of time by exposing a card and strategizing their next action. Further playing a classic memory card game stimulates cognitive skills and builds the groundwork for future STEM learning which skills for children's growth, even when the game is played as a simple matching game with all the cards being placed with the images facing upward (Mangahaset et al., 2022).

There are various types of memory card games available in the market, but not much research has been made on their quality, the materials used and its impact on children. After evaluating the various available memory games in the market, it was observed that the cards get lost easily in the households, each set of memory game purchased can be used for only one particular age of children and if the child requires a different them game, then another set has to be bought. Further, most of the game units were manufactured using cardboards which could be easily damaged by the children who keep using them roughly.

All these factors of the available memory games triggered a keen interest in the investigator to take up the study on "Design Development and Fabrication of a Wall Mounted Classic Memory Game for Children". This was taken up with a view to understand the availability of classic memory game in the selected market and to fabricate the new wall mounted classic memory game for children

OBJECTIVES OF THE STUDY

The study has been undertaken with the following objectives to -

1. Analyze various classic memory games available in the market
2. Study the materials suitable for wall mounted classic memory game
3. Design a wall mounted classic memory game
4. Fabricate the designed wall mounted classic memory game

METHODOLOGY

The methodology pertaining to project kind of research study entitled "Design Development and Fabrication of a Wall Mounted Classic Memory Game for Children" comprised the two phases:

- A.** Analyzing the Availability of Classic Memory Games in the Market
- B.** Designing and Fabrication of a Wall Mounted Classic Memory Game for Children
- C.** Assessing the Fabricated Wall Mounted Classic Memory Game with Experts

A. Analyzing the Availability of Classic Memory Games in the Market

There is a huge range of classic memory games available in the market and they come in various sizes, shapes, concepts and at varied cost. To study the details of the available classic memory games in the market, they were observed by setting various parameters.

A market survey was conducted in 15 shops that dealt with play equipment for children by purposive sampling method. The survey was conducted through various modes by selecting five common online platforms like Amazon, Flipkart, First cry, Hamleys and Meesho. Online mode is a type of electronic marketing in which the investigator had observed the classic memory games by observing the product description given and the review was read to understand the feedback of the users. These sites were selected because of large number of people purchase from these sites due to various advantages such as no pressure shopping, saves time by avoid standing in queues for paying bills in cash counter, available of wide range of product (brands, cost), no open and close time (356x24x7 service) and sometimes online shopping saves money.

In Offline mode the investigator visited ten shops and every available classic memory-based games were examined. The area selected for the study was Chennai where both wholesale and retail stores that dealt especially children play equipment were available. Toy Story- Chennai, JS Traders, VS Trading Company, Muhammad Ali Trading Company, Hamley, SM Toys- Chennai, Good Luck Plastic Trading Company, Ganesh Toys, SangeethaToyz, OM Toys and Toys World were the shops chosen for offline shopping. The available classic memory games were analyzed based on the various safety parameters set by the American Academy of Pediatrics (2021). Among the various parameters, the few parameters considered were size, shape, colour, material, brand, multipurpose use and cost.

B. Designing and Fabrication of a Wall Mounted Classic Memory Game for Children

The designing and fabrication of a wall mounted classic memory game for children was a great challenge. The design was developed using 3ds max software. It is a 3d software which gives a clear view on how the wall mounted classic memory game is going to be and it shows the details on the dimensions.

The best materials were identified based on the cost, durability, safety, flexibility and easy availability of materials. The design developed for wall mounted classic memory game was fabricated by purchasing the required raw materials and was assembled with the help of a carpenter.

C. Assessing the Fabricated Wall Mounted Classic Memory Game

The fabricated wall mounted classic memory game was assessed by 14 experts including two general physicians, two child specialists (pediatricians), two preschool teachers, two child psychiatrists, two interior designers, two architects and two parents with 2-5-year-old children. All the selected experts were allowed to touch and feel the developed wall mounted classic memory game. Likert scale was prepared based on the parameters set by the American Academy of Pediatrics (2021) and evaluated by these 14 experts related to the development of children. This scale includes 16 parameters such as age appropriate, child friendly colours, user friendly, game efficiency, educational value, promotes creativity, improves logical thinking, enhances fine and gross motor skills, aesthetic, no sharp edges, no small parts, ease in installation, easy maintenance, child safety materials, cost effective and fixed at appropriate height. The CVI (Content Validity Index) equation was used to assess the developed memory game.

FINDINGS AND DISCUSSION

The results of the study on “Design Development and Fabrication of a Wall Mounted Classic Memory Game for Children” are discussed under the following headings:

A. Details on the Availability of Classic Memory Games in the Market

The details on the availability of classic memory games in the market are given in Table1.

Table 1: Details on the Availability of Classic Memory Games in the Market

| Brand | Material used | Theme | Recommended age group | Cost Range (Rs) | Online Shop Detail N=5 | Offline Shop Detail N=10 | Total N=15 |
|---------------------|---------------------------|--|-----------------------|-----------------|------------------------|--------------------------|------------|
| | | | | | Percentage | | |
| Funskool | Card board | Animal Transport Colours Cartoon characters (Dora the explorer) | 3 years- 6 years | 150-500 | 100 | 60 | 73.3 |
| Creatives | Card board | Mixed | 3 years + | 250-500 | 100 | 80 | 86.7 |
| Frank | Paper Cardboard | Numbers Alphabets African safari Cartoon characters Opposites | 5 years + | 250-600 | 100 | 70 | 80 |
| Butterfly edufields | Foam Laminated moodboard | Flowers Smiley Farm animals Vegetables Musical instrument (16 different themes) | 3years + | 350-600 | 80 | 90 | 86.7 |
| Skola | Wood Mood board | Sports Household equipment | 3 years + | 800-1000 | 80 | 70 | 73.3 |
| Babyhug | Plastic Mood board | Mixed | 5 years + | 500-700 | 100 | 40 | 60 |
| Skillmatics | Paper cardboard | Cartoon Animals Tools | 3years + | 300-500 | 60 | 40 | 46.7 |
| Zephyr | Plastic, Mood board | Mixed | 3years + | 400-800 | 40 | 50 | 46.7 |
| Desi toys | Paper Cardboard | Jungle | 3 years + | 200-300 | 60 | 40 | 46.7 |
| Chalk And Chuckles | Wood Recycled paper board | Animals | 3-7 years | 500-800 | 40 | 30 | 33.3 |

A majority (86.7 per cent) of the shops dealt with Creative and Butterfly Edufields brands of classic memory game and 80 per cent of them were selling Frank brand. This is followed by Funskool (73.3 per cent) and Skola (73.3 per cent) brands. The other commonly available brands were Babyhug (60 percent), Skillmatics (46.7 percent) Zephyr (46.7 percent), Desitoys (46.7 percent) and Chalk and Chuckles (33.3 percent).

The age recommended by the brands was 3 years and above and the concepts commonly used were animals (farm and wild animals), cartoon characters (Dora, finding Nemo, little Krishna, Pj masks), fruits and vegetables.

Most brands offered 52 -56 sets of cards in one pack, and each card was square shaped having 5 cm on all sides. Its cost ranged from Rs.200 to Rs.800. The cost was based on the quality of the

materials used and its workmanship.

From Table 1, it can be observed that the common material used in making classic memory game was paper board (cardboard) which was not waterproof and could be easily damaged due to the rough handling. Due to the small size and light weight of the cards, the chances of losing the cards by the children were high. Each pack of classic memory game was based on one concept and if the children wanted to try another concept, then they had to buy another pack.

B. Designing and Standardizing Materials for Wall Mounted Classic Memory Game

(a) Designing Wall Mounted Classic Memory Game

A wall mounted classic memory game was developed after analyzing all the parameters especially keeping children's safety by using 3ds max software and it is shown in Figure1.

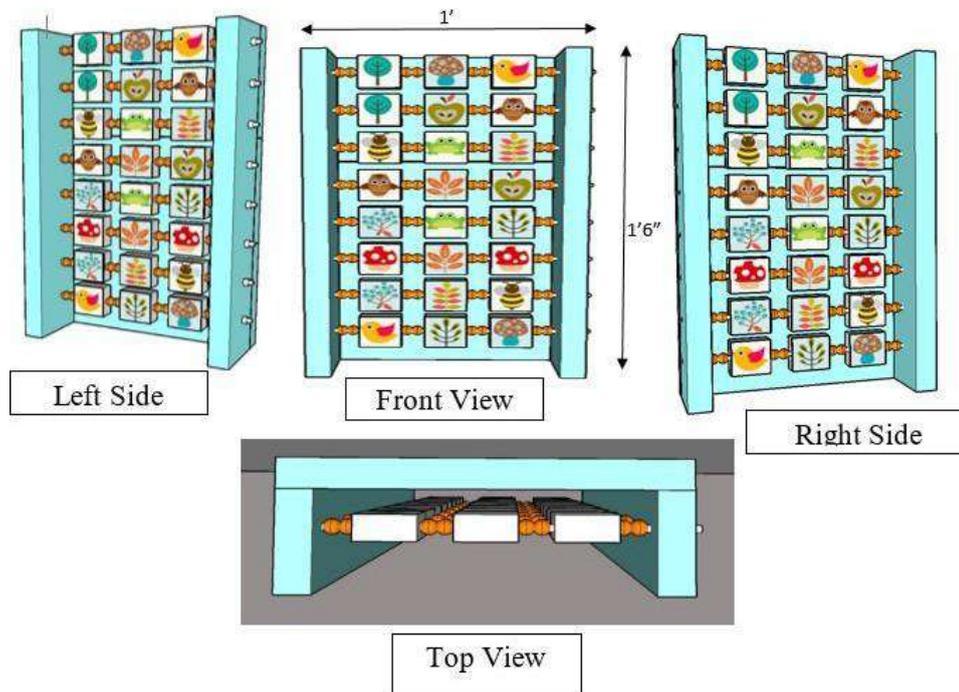


Figure 1: 3D View on the Developed Wall Mounted Classic Memory Game

The design was planned in such a way that it has 8 rows with 3 flip cards in each row. There were totally 24 flip cards in the ply wood frame which can be rotated towards the x-axis. Only one single theme was available in a pack of existing classic memory game in the market, if the child needs to explore another theme the new pack need to be purchased. Unlike the available classic memory game, 15 different themes were provided in a single unit in the designed game. Fifteen themes consisting of fruit, vegetable, flower, animal (water, farm, and wild), transport, colour, shape, social helper, Indian freedom fighter, flag, pattern, space and opposite, based on these theme stickers were made.

For example, fruit theme had 12 different fruit images and the same set of another 12 fruit stickers were prepared and placed inside each plastic box with each fruit sticker, so totally 12 pairs of fruit images placed in the available 24 flip boxes. First set of 12 fruit images can be shuffled and placed in first 12 plastic boxes and the same way second set of same pair of 12 fruit images can be shuffled and placed in the next 12 plastic boxes. Likewise, the set of remaining images of 15 themes

were placed in 24 boxes. Each theme has 12 pairs of images and placed in 24 boxes so each contained 15 images representing 15 themes.

It was also designed in such a way that it can be played solo or with multiple numbers of participants. The main features of the developed design were that it can be hung on the wall, occupies very less space (1'6"x1'), easily movable, low in cost, multifunctional, easy to install and no worry of the cards getting lost, unlike in the case of the available classic memory games in loose cards as packs existing in the market.

(b) Details on the Materials used for Fabricating Wall Mounted Classic Memory Game:

The materials chosen for developing the wall mounted classic memory game is given in Table 2.

Table 2: Materials Used for Fabricating the Wall Mounted Classic Memory Game

| Materials | quantity(N) | Dimension (feet/inches /cm/mm) | | |
|-------------------------------|-------------|--------------------------------|-------|-----------|
| | | Length | Width | Thickness |
| Ply wood | | | | |
| Side panel | 2 | 1'6" | 3" | 9mm |
| Back panel | 3 | 1' | 5" | 9mm |
| Cycle Spokes (J- Bend) | 8 | 1'3" | | |
| Plastic box | 24 | 4cm | 4.5cm | 2cm |
| Beads | 72 | | | 8mm |

Plywood consisted of two side panels (each 1'6"x 3"), three back panels (each 1'x5") having 9" thickness for fabricating frame in which 8 lines of cycle spokes filled with two beads alternated with rectangular plastic box (4 cm x 4.5 cm). Again, the process is repeated in the same manner to accommodate four sets of beads and three plastic boxes in one row.

Eight cycle spokes were arranged in the same pattern and fixed on inner side of the plywood frame as given in Figure 1.

(C) Fabrication Process of Designing Wall Mounted Classic Memory Game

The wall mounted classic memory game was designed after standardizing the materials and measurements with the six selected children of three age groups (2-5 years). Each age group consisted of one boy and one girl. The necessary materials were obtained and a single set of Wall Mounted Classic Memory game was meticulously fabricated. The steps involved in the fabrication of Wall Mounted Classic Memory Game are shown in Figure-2

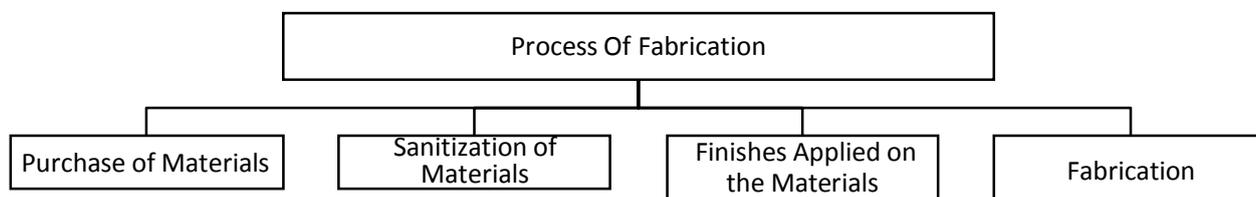


Figure 2: Process of Fabricating a Wall Mounted Classic Memory Game

1. Purchase of Materials

The raw materials required for fabricating the Wall Mounted Classic Memory game were purchased with utmost care. All the required materials were not available at a single place. The investigator visited various retail and wholesale shops at Chennai and examined the quality and the cost of each product and purchased for fabrication.

2. Sanitization of Materials

The investigator sterilized all the purchased items with disinfectants to disinfect the surfaces. The disinfectants were sprayed on the items and allowed for 48 hours (2 days) in a room with proper ventilation and sufficient air circulation. Disinfecting the materials and equipment aided in the prevention of germ transmission.

3. Finishes Applied on the Materials

□ **Plywood-** The surface is very rough, so finishing was done to make it smooth. The plywood pieces were cut to the required shape and size and then the process of filling, sanding, applying primer, painting and sealing were done to plywood to make it look attractive and child friendly. The ply was painted with blue colour so it pops up the other embellishments. Once the paint completely dried, the mark for putting holes on the side panel (1'6" x 3") were marked evenly (6.1 cm) by dividing into 8 even parts on vertical line and holes are drilled on it. The detailed drawing is given below in Figure 3.

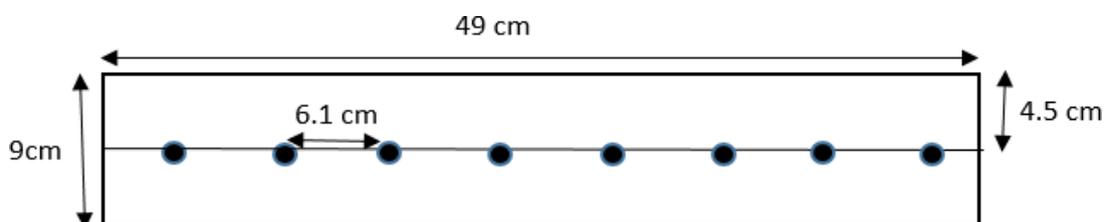


Figure 3: Side Panel Drawing of Plywood Frame

□ **Sticker -** The selected images for the classic memory game are resized into 4 cm x 4cm. using Photoshop so it can fit the plastic box (4x 4.5 cm) that was chosen as a flipping card and they are printed on the sticker sheet in printout shop. It was made sure the print of the image has a pair.

□ **Plastic box-** The hole was pierced on the side (center) of the plastic box for the cyclespokes to easily pass through with the help of iron rod.

□ **Beads-**The orange colour wooden beads were chosen as an embellishment for

the developed wall mounted classic memory game.

4. Fabrication

The side and back panels of plywood were attached to bring out the desired design. The cycle spoke was sent through the hole of one end of the side panel and beads and the boxes were passed through the spoke and the other end of the spoke was attached to the other side of the panel. The printed stickers were pasted on the plastic box as required and spare stickers were stored in all 24 boxes. Fabricated Wall Mounted Classic Memory Game is shown in Plate 1.



Plate 1: Fabricated Wall Mounted Classic Memory Game

5. Expenditure Incurred to Fabricate Wall Mounted Classic Memory Game

The amount spent on developing a single unit of the Classic Wall Mounted Memory Game is presented in Table 3.

Table 3: Expenditure Incurred to Fabricate Wall Mounted Classic Memory Game

| Materials | Quantity (Number) | Dimension (feet/inches /cm/mm) | | | Cost (Rs) |
|------------------------|-------------------|--------------------------------|--------|-----------|-----------|
| | | Length | Width | Thickness | |
| Plywood | 2 | 1'6" | 3" | 9mm | 120 |
| Side Panel | | | | | |
| Back Panel | 3 | 1' | 5" | 9mm | |
| Cycle Spokes (J- Bend) | 8 | 1'3" | | | 20 |
| Plastic box | 24 | 4cm | 4.5cm | 2cm | 50 |
| Wooden beads | 72 | | | 8mm | 50 |
| Sticker printing | 1 | 42cm | 29.7cm | | 30 |
| Material Charge | | | | | 270 |
| Labour charge | | | | | 100 |
| Total | | | | | 370 |

The expenditure incurred to fabricate one classic wall mounted memory game was around Rs.370. If this play equipment is fabricated in large quantity 1000 numbers and above the cost of each of the play equipment would be much less than the fabrication cost of a single unit. If this game is

accepted by all the households and the production can be in large quantity and then the cost can be considerably very low.

D. Assessment of the Fabricated Wall Mounted Classic Memory Game

The Fabricated wall mounted classic memory game was assessed with sixteen parameters. The details of the parameters chosen and their level of acceptance is shown in Table 4.

Table 4: Acceptance Validity of the Fabricated Wall Mounted Classic Memory Game by Experts

| Parameters | Average Acceptance N=14 | I-CVI | Acceptance/ Rejection |
|---|----------------------------|-------|--------------------------|
| Age | 14 | 1 | Accepted |
| Child friendly colours | 13 | 0.93 | Accepted |
| User friendly | 14 | 1 | Accepted |
| Game efficiency | 14 | 1 | Accepted |
| Educational value | 14 | 1 | Accepted |
| Promotes creativity | 12 | 0.86 | Accepted |
| Improves logical thinking | 14 | 1 | Accepted |
| Enhances fine and gross motor skills | 14 | 1 | Accepted |
| Aesthetic | 14 | 1 | Accepted |
| No sharp edges | 14 | 1 | Accepted |
| No small parts | 13 | 0.93 | Accepted |
| Ease in installation | 14 | 1 | Accepted |
| Maintenance | 12 | 0.86 | Accepted |
| Child safety materials | 13 | 0.93 | Accepted |
| Cost effective | 14 | 1 | Accepted |
| Fixed at appropriate height | 14 | 1 | Accepted |
| S-CVI Average | | | 0.97 |
| Total Highly Accepted Parameters | | | 11 |
| S-CVI/UA | | | 0.65 |

All the selected 16 parameters were highly accepted by the selected experts. Though the S-CVI/UA average is 0.65 the S-CVI average value is 0.97, from which it is clear that the acceptance of the developed wall mounted classic memory game was high.

SUMMARY AND CONCLUSION

A new design of a wall mounted classic memory game for children was developed and fabricated by the Researcher. Availability of classic memory games were analyzed through an online and offline market survey. This survey revealed that ten common brands of various types of classic memory games were available and the main four themes of the game included animals, flowers, fruits, and cartoon characters which are very much essential for children to know about the things around them in the world. Children have the habit of losing the cards in the other brands and

each brand deals with one theme only, the cost of each set ranged between Rs.200 and Rs.800.

Hence, the investigator developed a fixed wall mounted classic memory game which can be mounted on the wall according to the height of the child. In that 15 different themes were incorporated in one single unit necessary for children. Children will learn to identify the name of each of the objects through this game and the world around them. The cost incurred on developing and fabricating a single unit memory game was approximately Rs.370 and commercial production of the same would reduce the cost of the product significantly. The developed wall mounted classic memory game has other benefits include budget friendly, easy and quick customization depending upon the learning ability and age of the children, child friendly, minimum space requirement, and ease in maintenance. The developed classic wall mounted memory game was accepted by the experts with the S-CVI average value of 0.97. Further research can be undertaken to study its acceptability among a large number of children.

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APPLICATION OF MANDALA ART FOR SUITABILITY ON HOME FURNISHING PRODUCTS

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ABSTRACT

India is a land of diverse religions; variant art flourish here, one of them is Mandala art. Mandala is an old Buddhist art. A Mandala is a spiritual and ritual symbol in an Asian culture. The meaning of Mandala comes from Sanskrit meaning “circle”. Even though it may be dominated by squares or triangles, a Mandala has a concentric structure. Mandala art is also used as an art therapy for reducing stress and anxiety. Mandala have become a popular symbol of meditation, which aids in enhancing focus, silencing thoughts while meditating, combating stress and anxiety, appreciating the beauty of nature, and forming a greater connection with oneself. The aim of this research is to reduce stress using Mandala art by developing home furnishing product. Nowadays stress and anxiety has become a usual part of life. The home furnishings using Mandala art could be a better way of providing relaxation to human beings. The study content was based on secondary source data such as books, journal article and research papers. To fulfill the aim of research motifs were designed using CAD software for home furnishing products. On a total of one product was developed using digital printing. The motifs and products were evaluated. The final product was highly accepted in the evaluation.

KEYWORDS: Anxiety, CAD Software, Digital printing, Home furnishing, Mandala, Stress,

INTRODUCTION

The experience of anxiety and stress is common to all humans; nowadays it has become a usual part of life. It is important to develop a variety of effective means to help people decrease anxiety (**Curry and Kasser, 2005**). Mandala art therapy is a method, which has been successfully used in decreasing anxiety and stress (**Belchamber, 1997**). It is also considered as a way of calming the mind and body (**Barber, 2002**). According to (**Vennet and Serice 2012**), “the act of coloring as well as the focus on the Mandala design can be useful to reduce anxiety”.

It is an old Buddhist art. The meaning of Mandala comes from Sanskrit meaning “circle”. It has a concentric structure, even though it may be dominated by squares or triangles (**Shrivastava, Goel & Rani, 2019**). These are very detailed and are created in rich vibrant colors. It has become a popular symbol of meditation, which aids in enhancing focus, silencing thoughts while meditating, combating stress and anxiety, appreciating the beauty of nature, and forming a greater connection with oneself.

In the year 2020, due to COVID-19 Pandemic, the stress level has increase rapidly in humans. Development of the home furnishings using Mandala art could be one of the ways of providing relaxation to human beings. Home furnishings are mainly used for their functional and aesthetic properties which provide one the mood and also give mental relaxation to the people.

OBJECTIVES

1. Application of Mandala art on home furnishing products
2. To find out preference for suitability of the Mandala design adopted, developed and applied through digital printing on selected home furnishing product

METHODOLOGY

The presented research aimed to use Mandala art on home furnishing product through digital printing. The motifs were collected from internet for inspiration and they were modified by using Corel Draw software. All the motifs were coded and got evaluated by a panel of thirty members including fifteen teachers and fifteen students of the Department of Family and Community Sciences (Home Science), University of Allahabad, Prayagraj, Uttar Pradesh.

The preferences were taken on a three-point scale.

Weighted Mean Score (W.M.S.) was calculated for each motif with this formula:

$$W.M.S = \frac{No. \text{ of respondent (MP)} \times 3 + No. \text{ of respondent (P)} \times 2 + No. \text{ of respondent (LP)} \times 1}{Total \text{ No. of respondent}}$$

Suitability level was decided as in the following range of preference:

- **Most Preferred (MP):** 2.34-3.00***

- **Preferred (P):** 1.67-2.33**

- **Least Preferred (LP):** 0.0-1.66*

The motifs which scored highest weighted mean score were assigned a rank. Data was collected by online mode with the help of Google form. A total of five highly scored motifs were selected for developing home furnishing products namely cushion cover, sofa covers and curtains. Placements of selected motif on products were designed and a total of three products were selected for the color combination of the product. After that the selected products were again evaluated by a same panel of members and finally one most preferred product was selected for further production. This reflected the suitability of the product for the purpose.

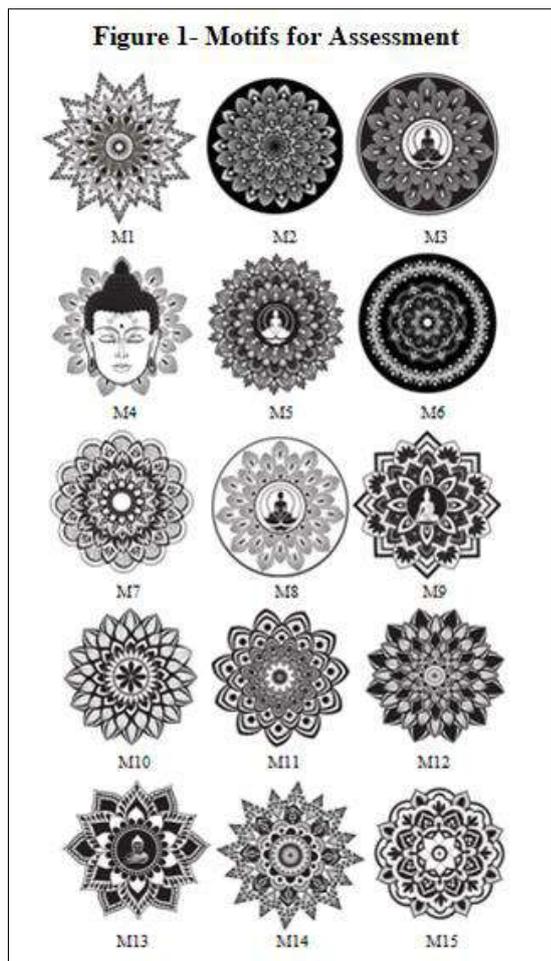


Table 1- Visual evaluation of developed motifs

| Motif | Frequency | | | W.M.S. | Rank |
|-------|-----------|----|----|---------|------|
| | MP | P | LP | | |
| M1 | 16 | 14 | 0 | 2.53*** | VI |
| M2 | 21 | 7 | 2 | 2.6*** | III |
| M3 | 21 | 9 | 0 | 2.7*** | II |
| M4 | 21 | 6 | 3 | 2.6*** | IV |
| M5 | 23 | 7 | 0 | 2.76*** | I |
| M6 | 13 | 15 | 2 | 2.36*** | VIII |
| M7 | 13 | 14 | 3 | 2.33** | IX |
| M8 | 16 | 9 | 5 | 2.36*** | VII |
| M9 | 10 | 17 | 3 | 2.23** | X |
| M10 | 19 | 10 | 1 | 2.6*** | V |
| M11 | 9 | 17 | 4 | 2.16** | XIII |
| M12 | 9 | 15 | 6 | 2.1** | XIV |
| M13 | 12 | 14 | 4 | 2.26** | XII |
| M14 | 13 | 13 | 4 | 2.3** | XI |
| M15 | 6 | 15 | 9 | 1.9** | XV |

RESULT AND DISCUSSION

Findings of the result are as follows:

A total of fifteen motifs were developed by using CAD software. The developed motifs are presented in figure: 1(M1-M15). All motifs were coded and evaluated by a panel of members. Weighted mean score was calculated for each motif. Their preferences were taken on a three-point scale as most preferred, preferred and least preferred. Results related to respondents of developed motif are given in table 1. As per preferences of panel, table 1 revealed that, motif M5 with 2.76 W.M.S got first rank followed by M3 with 2.7 W.M.S got second rank, M2 with 2.6 W.M.S got third rank, M4 with 2.6 W.M.S got fourth rank, M10 with 2.6 W.M.S got fifth rank. The motifs were given a rank as per their weighted mean score. These top five motifs were used to create placement of motif in home furnishing products namely cushion cover, sofa cover and curtain.

The preferred motifs were used to create each product, thus total fifteen placements were developed. The placements of motif were presented in figure 2. These placements were again evaluated by a same panel of members. The result is given in table 2. As per preferences, table 2 revealed that CC1, S2 and C1 was ranked first with 2.8, 2.33, 2.66 W.M.S., respectively. First rank holder for each product was selected for further development.

Figure 2- Placement of motifs

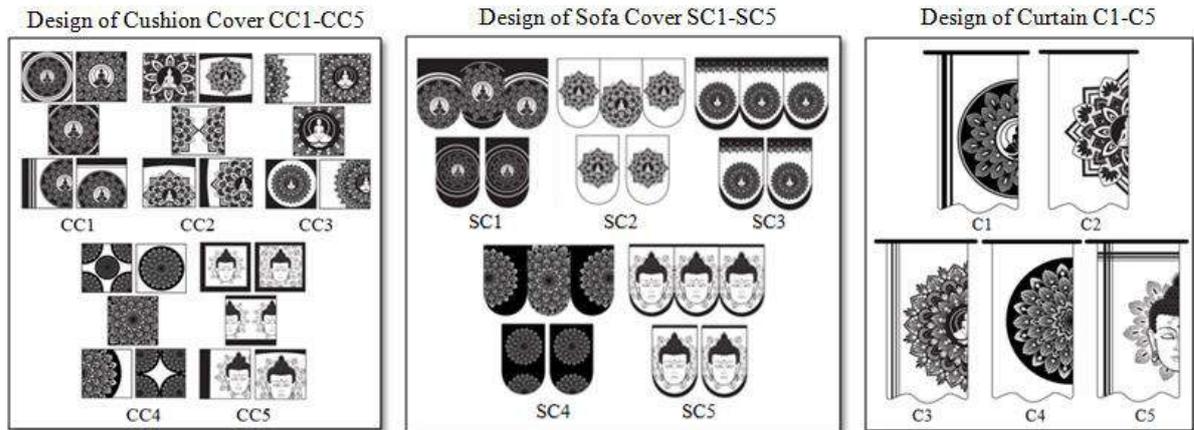


Figure 3- Color combination of product



After that, each product was developed in three different color combinations. Developed products were presented in figure 3. These were again evaluated by a same panel of members and the result is given in table 3. As per preferences, table 3 revealed that CC1 was most preferred with 2.66 W.M.S. Only one product with highest ranking was selected for further production.

Table 2- Visual evaluation of product on the basis of motif placement

| Product | Code | Frequency | | | W.M.S. | Rank |
|---------|------|-----------|----|----|---------|------|
| | | MP | P | LP | | |
| P1 | CC1 | 25 | 4 | 1 | 2.8*** | I |
| | CC2 | 12 | 17 | 0 | 2.33** | IV |
| | CC3 | 22 | 7 | 1 | 2.66*** | II |
| | CC4 | 14 | 11 | 5 | 2.3** | V |
| | CC5 | 17 | 8 | 5 | 2.4*** | III |
| P2 | SC1 | 8 | 18 | 4 | 2.13** | III |
| | SC2 | 14 | 12 | 4 | 2.33** | I |
| | SC3 | 6 | 14 | 10 | 1.86** | V |
| | SC4 | 12 | 13 | 5 | 2.23** | II |
| | SC5 | 9 | 10 | 11 | 1.93** | IV |
| P3 | C1 | 20 | 8 | 2 | 2.6*** | II |
| | C2 | 7 | 21 | 2 | 2.16** | IV |
| | C3 | 21 | 8 | 1 | 2.66*** | I |
| | C4 | 10 | 14 | 6 | 2.13** | V |
| | C5 | 17 | 11 | 2 | 2.5*** | III |

Table 3- Visual evaluation of product on the basis of motif placement

| Product | Code | Frequency | | | W.M.S. | Rank |
|---------|------|-----------|----|----|---------|------|
| | | MP | P | LP | | |
| P1 | CC1 | 22 | 6 | 2 | 2.66*** | I |
| | CC2 | 16 | 14 | 0 | 2.53*** | III |
| | CC3 | 16 | 11 | 3 | 2.43*** | IV |
| P2 | SC1 | 11 | 15 | 4 | 2.23** | VI |
| | SC2 | 12 | 14 | 4 | 1.86** | VIII |
| | SC3 | 9 | 10 | 11 | 1.8** | IX |
| P3 | C1 | 20 | 8 | 2 | 2.6*** | II |
| | C2 | 13 | 15 | 2 | 2.36*** | V |
| | C3 | 11 | 12 | 7 | 2.13** | VII |

Thereafter one set of cushion cover design number CC1 was developed which included five pieces of cushion covers. The selected designs were printed with digital printing. The picture of the developed product (design no. CC1) is shown in figure 4.

Figure 4- Cushion Cover, Design No. CC1



The developed product was subjected to evaluation by the same panel of members to access the acceptability of the developed product. The acceptability of the product was evaluated on various parameters; Suitability of fabric used, Neatness and clarity of design, Economic feasibility and Overall appearance. The result of acceptability of the developed product is shown in the

Table

4.

Table 4- Acceptability of the developed products

| Design No. | Suitability of fabric used | Neatness and clarity of the design | Economic feasibility | Overall appearance |
|------------|----------------------------|------------------------------------|----------------------|--------------------|
| CC1 | 2.83*** | 2.86*** | 2.1** | 2.73*** |

Suitability level as in the following ranges: Most Preferred (MP); 2.34-3.00***, Preferred (P); 1.67-2.33**, Least Preferred (LP); .00-1.66*

It is evident from table 4 that the design number CC1 was highly acceptable in the parameters such as suitability of the fabric used, neatness and clarity of the design, and overall appearance but product was acceptable in the parameter of economic feasibility. The sale price of this product was little high but mass production of this product can reduce its cost to a greater extent.

CONCLUSION

It can be concluded from the result that Mandala art motifs were suited well in-home furnishing products. The prepared cushion cover (design number CC1) was highly acceptable by the respondents because the design was transferred by the digital printing on home furnishing product which looks very stylish, beautiful and attractive. Mandala motifs also have a spiritual touch therefore, people will like to make this product as a part of their homes as well as it also helps to reduce stress and anxiety by focusing on Mandala designs.

RECOMMENDATION

Application of Mandala art on other article like apparels, home décor etc. can be tried.

Motif of Mandala art can be applied on textile by other printing methods.

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Frequency of Buying Convenience Food and Factors Accountable for its Consumption during COVID-19 Pandemic

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ABSTRACT

Convenience food is a commercially prepared food designed for ease of consumption which were available at doorstep for convenience of people. In pandemic situation all the restaurant outlets and paid services were closed thus creating an extra workload on people for cooking along with managing working from home. In order to study the factors accountable, frequency of utilization and extent of satisfaction among selected consumers with Convenience foods during Pandemic, the present study was formulated. The research design was descriptive in nature. The data were collected through Questionnaire distributed via Google Form from a sample of 75 respondents selected through purposively random sampling method. The questionnaire had three sections; the first section comprised of background information of the respondents. The second section covered information regarding various factors accountable which may have motivated the respondents in purchasing Convenience foods. The third section dealt with the data regarding the frequency of use of Convenience foods under the categories namely "Soups", "Snacks", and "Gravies-Premix", "Meals" Ready to make Desserts. The findings concluded that there was an increase in the use and consumption of Convenience food during Lockdown. Majority of the respondents were satisfied with the Convenience foods available in the Market. The study will be helpful to understand the consumption behaviour during the pandemic by various age groups. The study will also be beneficial to the consumer goods companies in understanding the consumption pattern and the satisfaction level of the consumers for offering more variety and better products in the future.

Keywords: Consumers, Convenience foods, Covid-19, factors accountable, Frequency of utilization.

INTRODUCTION

Food is key to personal health (Hu FB, 2002), as well as to the health of the planet given that current patterns of food production and consumption have considerable environmental impacts (Rockström et al., 2009). Conversely, disasters such as the COVID-19 pandemic can disrupt food system (Galanakis, 2020) and change relationship with food. For instance, in an effort to reduce the spread of infection, border and other logistic restrictions limiting the flow of goods and people increased the risk of food shortages due to impaired supply chains, including those related to labour shortages (Guarascio, 2020; Nature Plants, 2020).

Risk perception associated with COVID-19 may influence people's food purchase and consumption behaviours. Additionally, people's concern about possible food shortages may have influenced purchasing behaviour, e.g., stocking up on certain foods (Bracaleand Vaccaro, 2020). The limitation of social interaction and, consequently, the self-isolation, changed the daily routines

and, accordingly, the eating habits of many people. Indeed, on the consumer side, during the period of confinement, the limited access to daily grocery shopping caused a reduction in the consumption of fresh foods, especially fruit, vegetables, and fish (ISMEA, 2020).

The first lockdown period caused changes in people's consumption habits and in the quality of their diet due to an orientation towards the consumption of processed food such as convenience foods, junk foods, snacks, and ready-to-eat cereals (IPES-Food, 2020), and on the other, to a reduction in availability of some products such as fruits and vegetables (FAO, 2020).

Convenience Foods

'Convenience' has multiple meanings and can refer to spatial proximity, product choice, ease of use (saving time or labour), fit with daily routines (Jackson and Viehoff 2016). The definition of convenience food is "any fully or partially prepared foods in which significant preparation time, culinary skills or energy inputs have been transferred from the home kitchen to the food processor and distributor" (Traub and Ödland, 1979). 'Convenience foods' refer to industrially produced, portioned and packaged food that allow customers to skip many stages of food preparation (such as chopping up raw ingredients etc.). 'Convenient food' refers to foods that can be conveniently adapted and integrated into busy schedules and daily routines (Jackson et al. 2018).

Convenience foods cover many kinds of products from bulk to premium products, and from semi-processed foodstuffs, prepared and easy-to-prepare, frozen and instant products, to fast food, snacks and take-away meals (Carrigan and Szmigin, 2005; Celnik et al., 2012). They may be defined as foods that transfer the time and activities of preparation from the household to the food processor (Carrigan et al., 2006; Buckley et al., 2007).

Motivating Factors or determinants Leading to Purchase of Convenience Food

Convenience orientation plays a significant and important role in motivating and driving consumers towards purchase intention and consumption of convenience food. Due to busy and hectic work schedules, a competitive environment, lack of cooking skills and motivation, desire for higher leisure time, multiple responsibilities, and significant change in food-related lifestyle, consumers in both developed and emerging economies seek convenience meal solutions, which in turn drive them towards purchase and consumption of convenience food (Muller and Szolnoki, 2012; Musaiger, 2014; Ting et al., 2017; Contini et al., 2018). Olsen et al. (2007) revealed that convenience orientation was the key determinant influencing convenience food choice in Poland, followed by Spain and Netherlands. Januszewska et al. (2011) indicated that convenience orientation, sensory appeal, health, price, and mood were the key determinants influencing convenience food choice in Belgium, Hungary, and Romania.

Busy and hectic lifestyles, increase in working population and urbanization, increase in per capita and disposable incomes, diminishing trend of cooking skills and motivation, the rapid expansion of convenience food retail chains, significant improvements in food processing and packaging technologies, and significant change in food-related lifestyles have increased the demand and consumption of convenience food (Business Wire, 2016; Research and Market, 2020). The key market players of convenience food in India are Nestle, ITC, MTR, Capital Foods, CG Food, Haldiram, Bambino, GITS, Kohinoor, Kitchens of India, Maiyas, and Vshodaya (Business Wire, 2016). Apart from social, cultural, and economic determinants, convenience food

consumption is also influenced by convenience, sensory appeal, nutritional quality attributes, safety attributes, healthiness, and price (Geeroms et al., 2008; Thong and Solgaard, 2017).

JUSTIFICATION

From the studies, it can be deduced that the convenience of food is one of the most influential factors when it comes to food choices by consumers, and that packaging technologies and substantial changes in food-related lifestyles have increased the demand for and consumption of convenience foods. The Covid-19 pandemic altered the food-related expectations of consumers, resulting in a new regime. The researchers also observed that the food industry is adapting and transforming in response to changing tastes, food habits, and covid-19-related effects on the health of consumers nationwide. In this field, the researcher discovered a dearth of research on the factors accountable for purchase purchasing habits and frequency of utilizing convenience food during Covid-19 pandemic. With this framework, the study was conducted with the following objectives.

OBJECTIVES

1. To ascertain the factors accountable for purchase of convenience food
2. To find out the frequency of utilization of convenience food during pandemic period

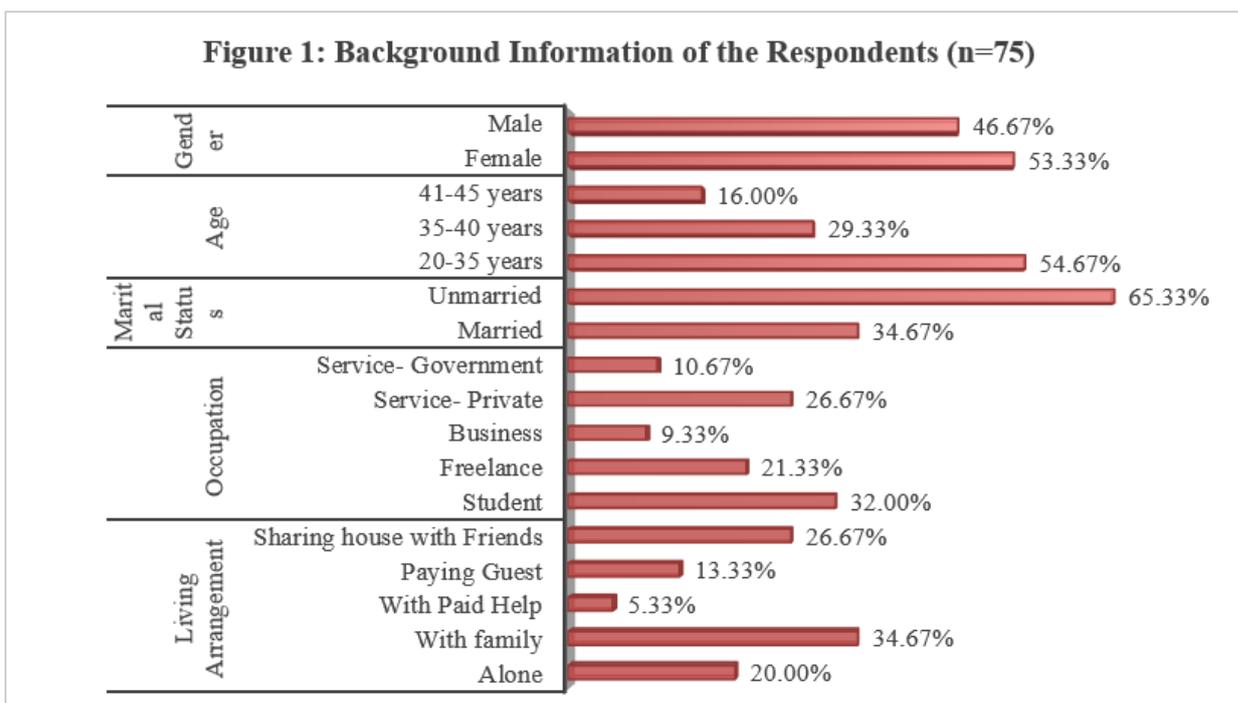
METHODOLOGY

A descriptive reasearch design was adopted to conduct the present study. The data were gathered from 75 consumers of Vadodara city selected through snowball sampling method. The questionnaire method was used which was distributed online via Google form link. The pandemic period for the present study comprised from April 2020 to December 2021. The questionnaire consisting of three section, where, the first section comprised of background information of the respondents. The second section covered information regarding various motivating factors which may have motivated the respondents in purchasing Convenience foods. The third section dealt with the data regarding the frequency of use of Convenience foods under the categories namely “Soups”, “Snacks”, “Gravies-Premix”, “Meals” “Ready to make Desserts” during pandemic period. The reliability of the scale was 0.91 computed via Cronbach’s Alpha test. The tool prepared was also validated by giving to the experts in the respective fields. The data were collected, codes were assigned for the respective categories and then tabulation was conducted. Descriptive Statistics was used for data analysis.

MAJOR FINDINGS

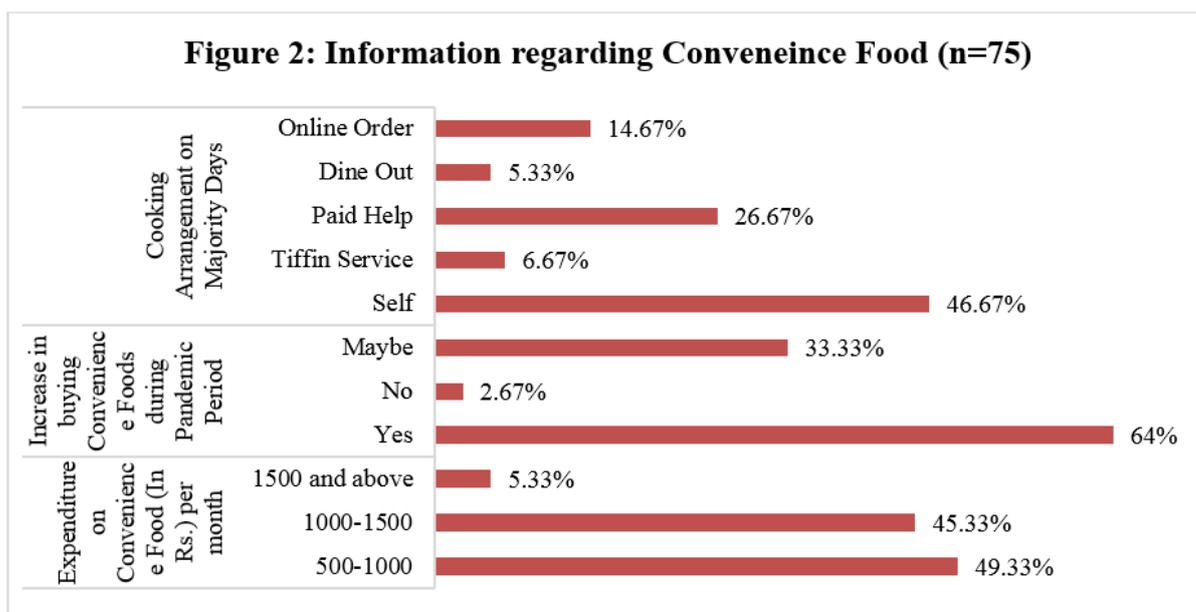
The findings obtained on the basis of the responses gathered from the respondents are discussed in details here.

- i. **Background Information:** The background information comprised of age (in years), Gender, Marital Status, Occupation of the respondents and Living arrangements of the respondent.



The data on gender revealed that more than one-half of the respondents (53.33 per cent) were females whereas 46.67 per cent respondents were males. The data on the age of the respondents revealed that more than one-half of the respondents were aged between 20-35 years whereas 29.33 per cent of the respondents were aged between 35-40 years of age. The data in figure 1 revealed that slightly less than two-third of the respondents (65.33 per cent) were unmarried whereas 34.67 per cent of the respondents were married. The data on the occupation of the respondents showed that 32 per cent of them were pursuing Studies. The data also revealed that 21.33 per cent of the respondents were freelancers. Slightly more than one-fourth of the respondents were working in Private Sector followed by 10.67 per cent of the respondents who were working in Government Sector. The data on living arrangement of respondents highlighted that 34.67 per cent of the respondents resided with their family whereas 26.67 per cent of the respondents shared their house with friends or colleagues. The figure 1 revealed that 20 per cent of the respondents were residing alone and independently. Slightly more than one-tenth (13.33 per cent) of the respondents were found to be residing as a Paying Guest. Out of the 10 respondents who were residing as a Paying Guest, only 3 respondents had food arrangement in their PG whereas 70 per cent of the respondents did not have any food facility in their PG (Fig 1).

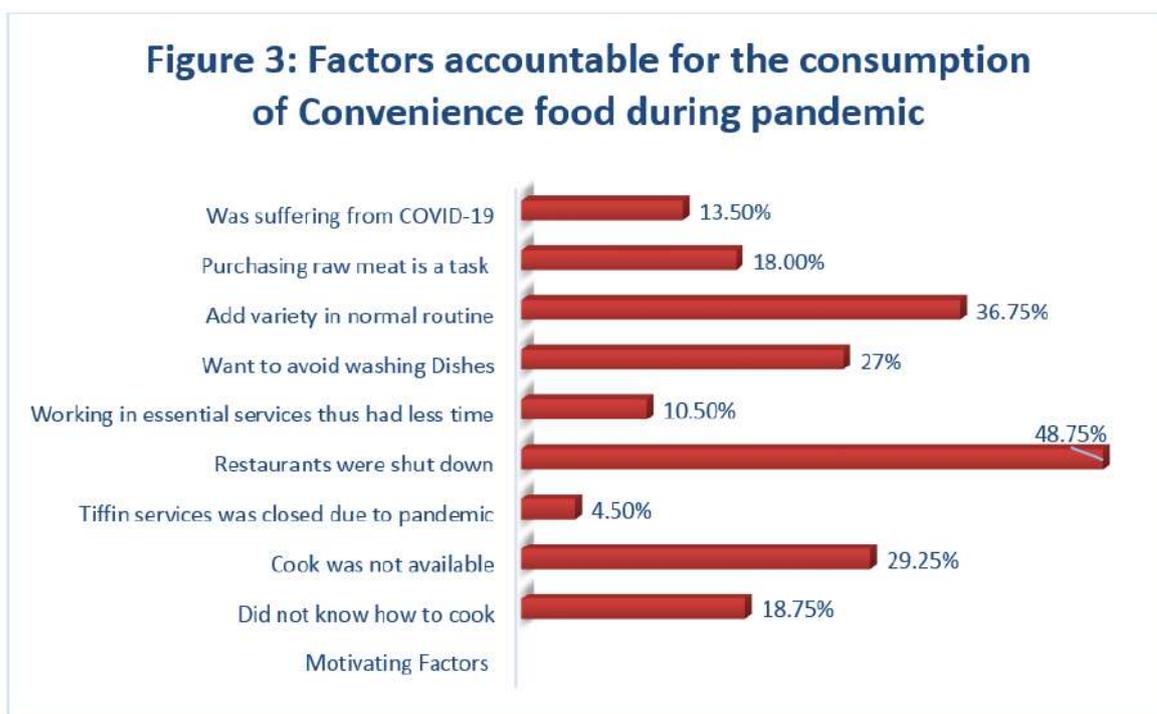
ii. Information regarding Convenience Food: This section covered information related to expenditure on convenience, increase in buying convenience foods during Pandemic Period and cooking arrangements of the respondents on majority days.



The data regarding cooking arrangement revealed that slightly less than one-half of the respondents (46.67 per cent) cooked their meals themselves followed by 26.67 per cent of the respondents who hired paid help for cooking meals. The data also revealed that 14.67 per cent of the respondents ordered food online. Very few (6.67 per cent) of the respondents had opted for Tiffin services for arranging their meals. A higher percentage of the respondents (64 per cent) opined that there was an increase in buying convenience food. The data also revealed that 33.33 per cent of the respondents were uncertain whether there was an increase in purchase of Convenience Food during the Pandemic period. It was also revealed that nearly one-half of the respondents (49.33 per cent) spent Rs. 500 – Rs. 1000 per month on buying Convenience foods. Rs. 1000 – Rs. 1500 was found to be being spent by 45.33 per cent of the respondents per month. Very few respondents (5.33 per cent) spent Rs. 1500 and above per month on purchasing Convenience food during pandemic period (Fig 2).

iii. Factors accountable for consumption of Convenience Food:

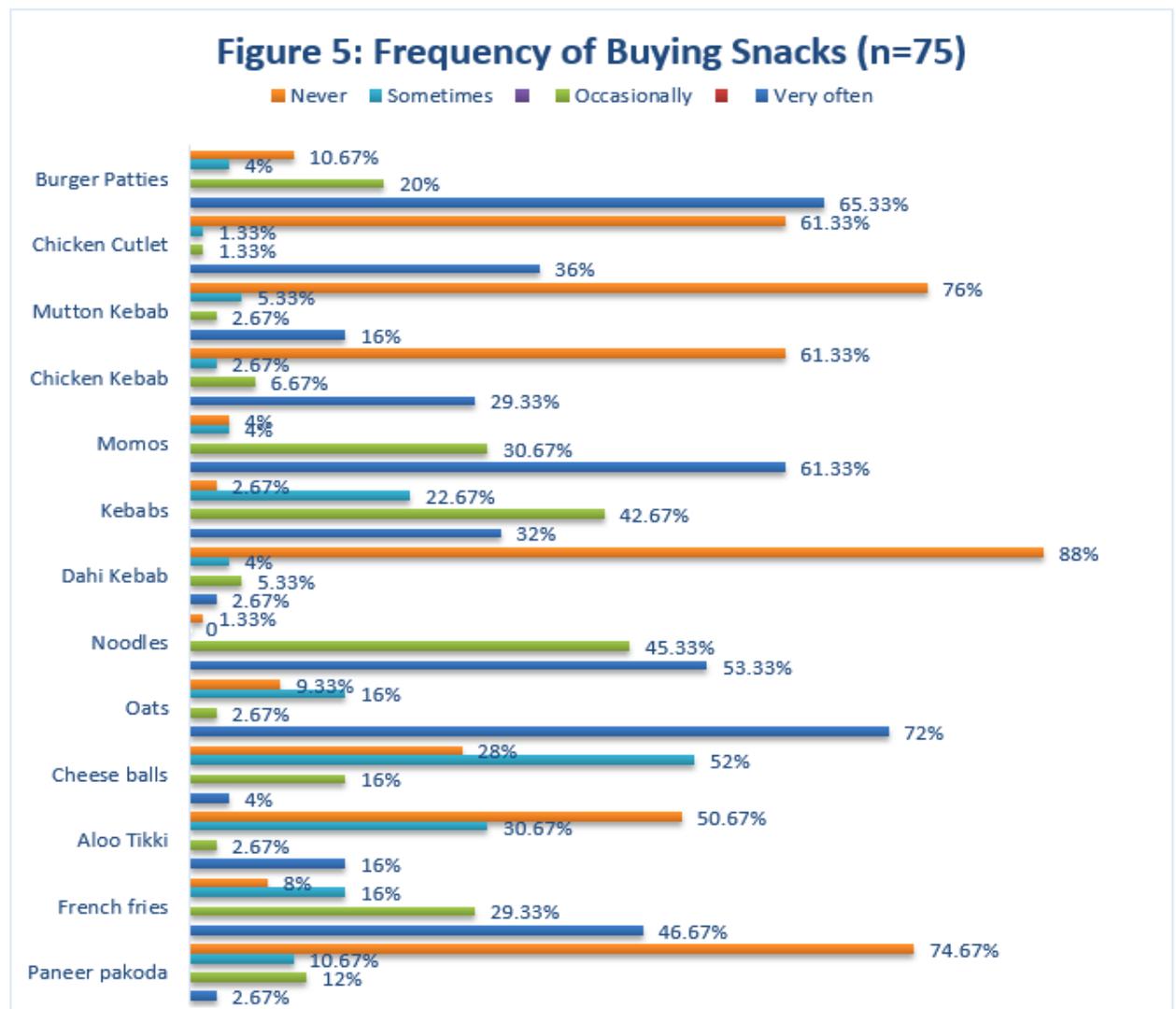
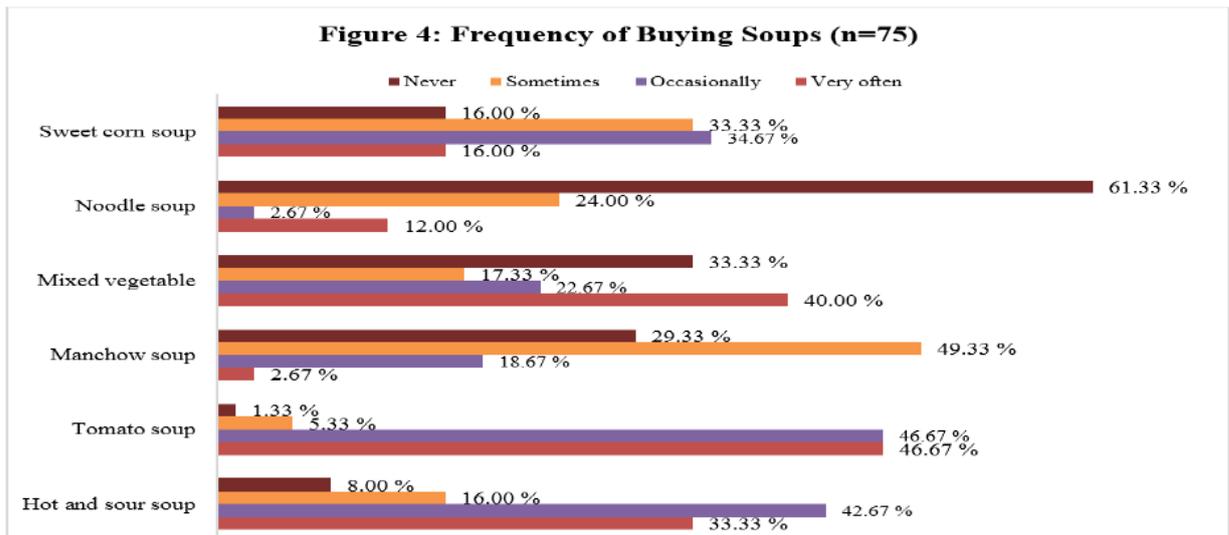
Various factors for consumption of Convenience foods during Pandemic period were identified and listed. The data in the figure 3 revealed that majority of the respondents (86.67 per cent) consumed Convenience food because “Restaurants were closed” as they would have got bored of home cooked meals. About two third (65.33 per cent) of the respondents consumed Convenience food to “add variety in the normal routine”. Slightly less than one-half (48 per cent) of the respondents also consumed Convenience food because they wanted to avoid too cleaning of utensils used in cooking and thus to save time and effort, they were motivated to choose convenience foods (Fig 3).



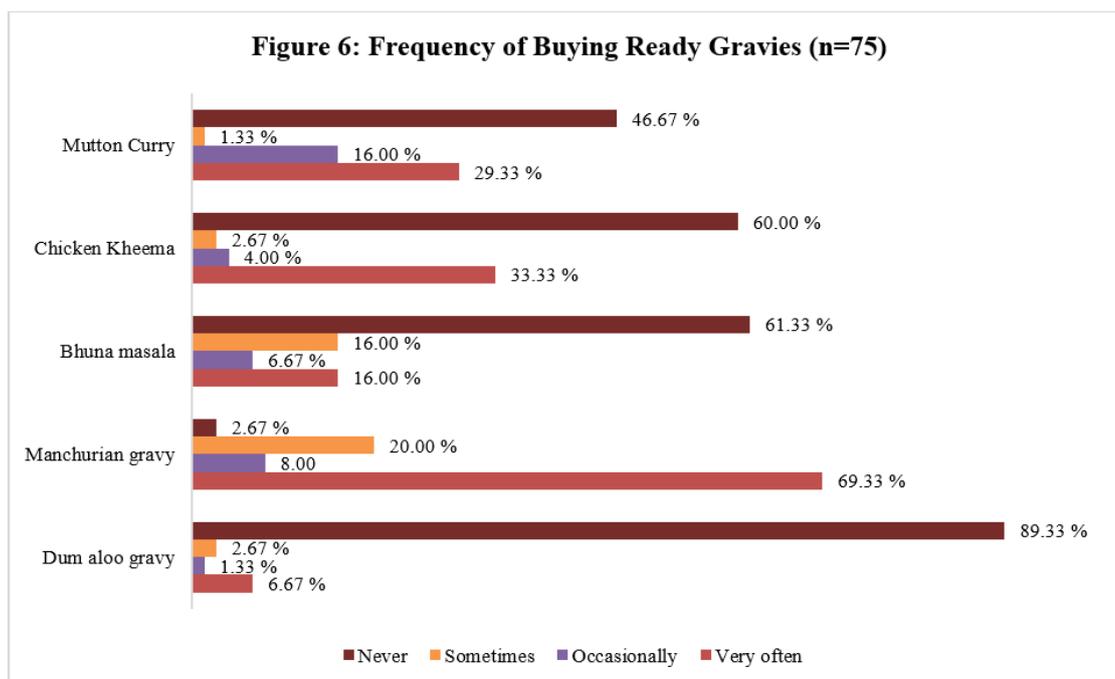
iv. Frequency of buying Convenience Foods by the Respondents:

This section comprised of the information wherein how often (Very Often, Occasionally, Sometimes and Never) the respondents purchased convenience foods. The convenience foods were categorized under categories namely Soups, Snacks, Meals, Gravies and Desserts during the Pandemic Period.

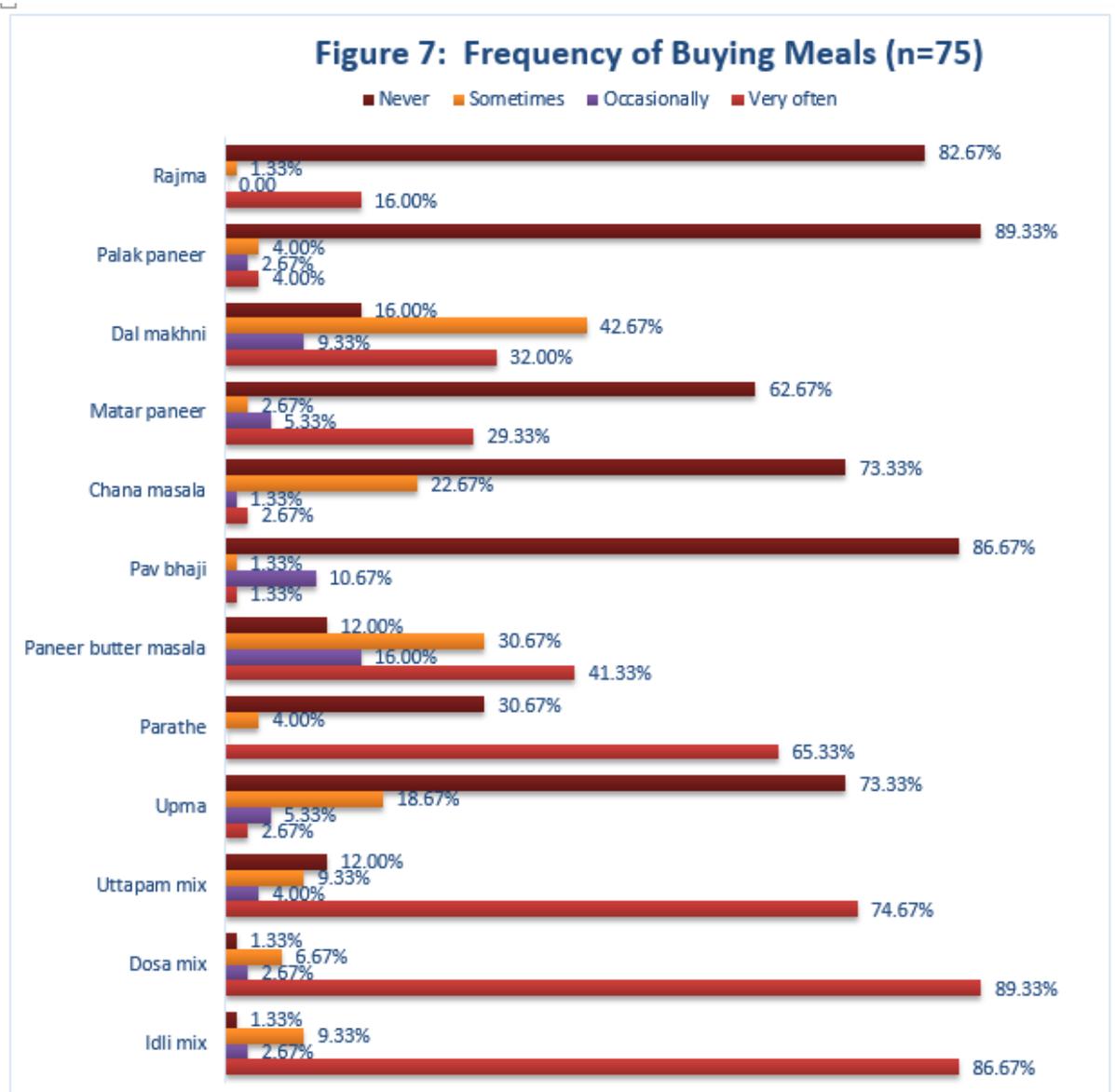
- Soup:** The data highlighted that slightly less than one-half of the respondents (46.67 per cent) bought Tomato Soup “Very Often” and “Occasionally”. It was also found that 42.67 per cent of the respondents purchased Hot and Sour Soup “Occasionally”. Manchow Soup was found to be purchased “Sometimes” by 49.33 per cent of the respondents. The findings also reflected that 61.33 per cent of the respondents “Never” bought Noodle Soup (Fig. 4).



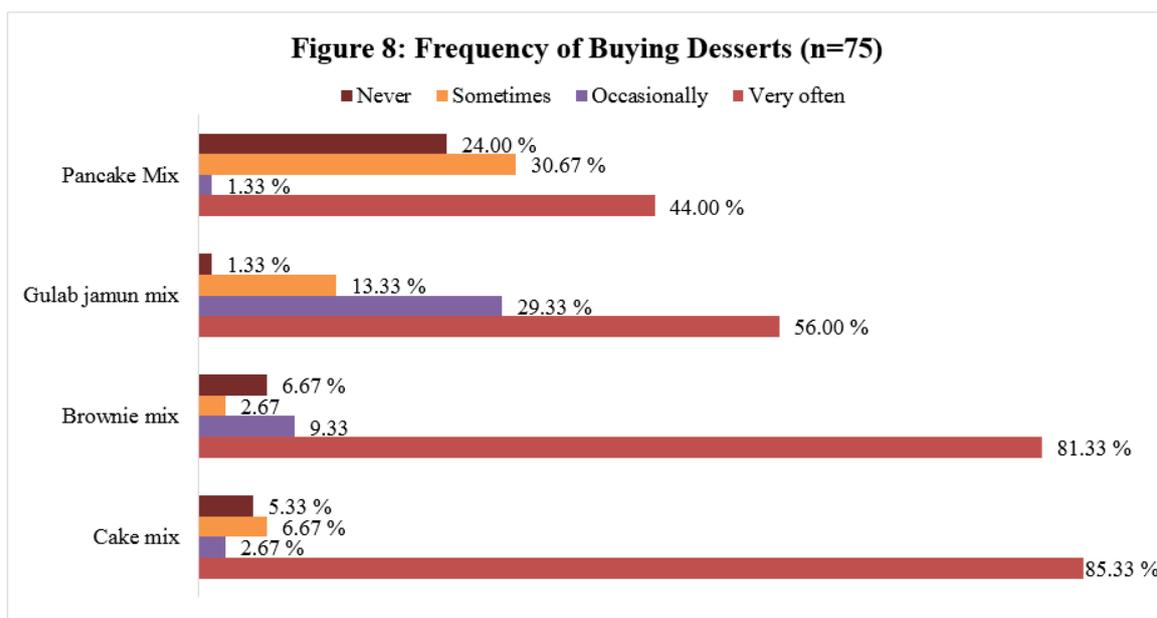
- **Snacks:** While looking at the findings of Snacks, it was found that majority of the respondents (72 per cent) used Oats “Very Often”. Burger Patties were found to be purchased “Very Often” by 65.33 per cent of the respondents followed by Momos which was purchased by 61.33 per cent of the respondents. It was also found that majority of the respondents (88 per cent) “Never” bought Dahi Kebabs followed by 76 per cent of the respondents who “Never” purchased Momos (Fig 5).
- **Ready Gravies:** The data in fig 6 regarding the frequency of buying Ready gravies revealed that majority of the respondents (89.33 per cent) “Never” bought Dum aloo gravy followed by 61.33 per cent of the respondents who “Never” bought Bhuna masala. It was also found that 69.33 per cent of the respondents purchased Manchurian Gravy Very Often”.



- **Meals:** The data in the figure 7 highlighted that majority of the respondents (89.33 per cent) bought Dosa Mix “Very Often” followed by 86.67 per cent of the respondents who purchased Idli mix “Very Often”. Parathe was also purchased “Very Often” by 65.33 per cent of the respondents. The data also revealed that majority of the respondents (89.33 (per cent) “Never” purchased Palak Paneer gravy followed by 86.67 per cent of the respondents who “Never” bought Pavbhaji (Fig 7).



- Desserts:** The findings regarding Desserts highlighted that majority of the respondents (85.33 per cent) bought Cake Mix “Very often” followed by 81.33 per cent of the respondents who purchased Brownie Mix “Very often”. Very few respondents (1.33 per cent) “Never” bought Gulab Jamun Mix (Fig 8).



CONCLUSION

The study concluded that the users of convenience food were young and unmarried. The users also comprised of students and those who were doing private jobs who were working in online mode during pandemic period. During pandemic period most of the respondents were staying with their family or friends. Respondents were cooking themselves during this period. There was an increase in the use and consumption of Convenience food during Lockdown where they spent Rs. 500 to Rs. 1000 in a month for buying convenience food. The factors which were responsible for the purchase of convenience food were “Restaurants were closed”, “It added variety in normal routine, Cooks were not available and “Wanted to avoid washing utensils”. It was found that respondents very often purchased “Tomato Soup”, “Oats”, “Manchurian gravy”, “Dosa and Idli mix”, “Cake and Brownie mix”.

Consumers have developed patterns in their day-to-day lives, which tend to be stable. This means that some people may buy the convenience option in one context and not rely on convenience in other situations. Given the ever-increasing demand by consumers for convenience, the focus of food manufacturers should not just be confined to the time and effort saving dimensions of a convenience food product, but should also focus on the other convenience factors. Indeed, the integration of these other factors into the marketing mix could serve as a means of differentiation. The information provided by this study is thus useful for those manufacturers who seek to use ‘convenience’ as a means of gaining a competitive advantage or for differentiation. The findings of this study indicate that consumers vary not only in their food-related choices but also more specifically in relation to their convenience choices. This implies that marketing managers should take into account these differences in consumption values when communicating with the various consumer segments. Convenience foods should be promoted as products that are easy to prepare, can be cooked very simply, do not take long to prepare and save on washing up. For example, for a manufacturer of ready meals, the major benefit of these products should be emphasized as the speed and ease with which these products can be cooked. There were certain

food items purchased by the consumers very often, efforts can be made to identify lacuna in other food products. In order to popularize other food items, equal considerations can be undertaken.

The study would provide useful information for the manufacturers in food industry about the motivation factors which attracted consumers during troubled times. Those consumers can become permanent customers. The efforts can be made to attract all the cadre of the population as it was found that most of the respondents were either students or middle-aged people who are also potential purchasers of convenience food products. In terms of contribution to the academic literature, this paper presents a useful extension to the segmentation literature available, particularly in relation to convenience food choices, motivation to purchase and frequency of purchasing.

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EFFECT OF DIETARY PRACTICES AND NUTRITIONAL STATUS ON SEVERITY OF MENOPAUSAL COMPLICATIONS -A STUDY IN URBAN AREAS OF DELHI

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ABSTRACT

An increase in the menopausal population and associated comorbid conditions, necessitates the need to understand factors associated with the severity of menopausal complications. While evidence suggests sub-optimal diet and nutritional status aggravates the risk of menopausal complications, there is a need to extensively explore their effect on its severity. Thus, this study explores the effect of dietary practices and nutritional status on the severity of menopausal complications. This is an exploratory cross-sectional study conducted in the urban slums of Delhi. One-point time data has been collected from the respondents on sociodemographic profile. Data on menopausal complications have been collected using a structured questionnaire adapted from the Menopause-specific Quality of Life (MENQOL) questionnaire. Dietary data has been obtained using two-day 24-hours dietary recall and the nutritional status of the respondents been assessed in terms of body mass index (BMI). Independent t-test, ANOVA, and Chi-square tests have been applied as appropriate for achieving the objectives of the study. The results indicate the mean age of subjects at menopause was 48.2 years and all had experienced at least one menopausal symptom with varying degrees of severity. Mostly reported menopausal problems were of moderate-intensity and predominantly psychosocial and physical in nature. The severity of complications was lower in women consuming adequate amounts of energy, protein, and calcium ($p < 0.05$). Among obese women, 80 percent had reported moderate to severe menopausal symptoms ($p > 0.05$). It is thus concluded that with better dietary intake and nutritional status, the severity of menopausal complications can be reduced thereby improving the health and well-being of women during post-menopausal life.

Keywords: dietary practices, Menopausal complications, nutritional status, severity symptoms of menopause

INTRODUCTION

The women's life expectancy in India has undergone a significant change from 49 years in 1970-75 to 70.4 years in 2013-18, registering an increase of about 21.4 years in the last four decades (SRS, 2020). Therefore, most women now live long enough to experience menopause and can expect to spend more than 30 percent of their lives in the post-menopause years. There is accumulating evidence that the hormonal and other biological changes of menopause have health consequences for some women that may extend beyond the classic reproductive tissues and functions (Kathryn and Karen, 2011).

Women may experience a range of complications during menopause as reflected in literature. Physical complications include joint pain, urinary tract infections, menstrual irregularities, vaginal dryness, as well as cardiovascular diseases, and diabetes (Al-Qutob, 2001). Besides, vasomotor changes may lead to hot flushes, night sweats, increased perspiration, and headache (Al-

Qutob,2001; Breheny and Stephens, 2003). Psychological complications are manifested by irritability, insomnia, mood changes, etc (Al-Qutob,2001; Avis et al., 2005). These menopausal complications vary in intensity, frequency, and severity from one woman to another, making it difficult to generalize results to all women in this age group. Also, complications of menopause vary in severity and occurrence from one culture to another (Avis et al., 2005; Kowalcek et al., 2005). The consequences of menopause complications are innumerable which include impaired work performance, limitations in physical functioning, and perceived decline in health status (Kumari, Stafford and Marmot, 2005). Besides these, obesity and high BMI contributes to morbidity and mortality, leading to some forms of cancer and chronic diseases, such as osteoarthritis, liver and kidney diseases, sleep apnea, and depression (Pi- Sunyer, 2009).

Diet which is an important aspect of lifestyle has a pivotal role in maintaining human health including menopausal complications (Lambrinoudaki et al., 2010). However, women entering menopause are mostly unprepared to cope with the changes in this period of life and insufficient knowledge of dietary habits can lead to imbalance of nutrients. Adequate nutrient intake in accordance to recommended dietary intake or standards can result in improved nutritional status of women during menopause, leading to a reduction in the occurrence of diseases and negative symptoms of menopause (Tursunović et al., 2014). For menopause management, it is recommended that lifestyle changes as a primary modality of care including adequate exercise, a diet rich in phytoestrogen, calcium, fibre, and low in fat, especially saturated fats (Unni, 2008).

Need for the Study

There is some evidence to show that dietary intervention can reduce the prevalence and severity of complications among postmenopausal women. However, despite a growing population of aging women in India, studies assessing the effect of dietary practices and nutritional status on the severity of menopausal complications among women are scarce. **Therefore, the study has been undertaken with the following specific objectives.**

OBJECTIVES

1. To assess the prevalence of type and duration of menopausal complications among post-menopausal women.
2. To determine the association of severity of menopausal complications with dietary practices and nutritional status and of the subjects.

HYPOTHESES

The data was collected to test the following hypotheses

Ho: There is no relationship between women's dietary practices and nutritional status with severity of menopausal complications

H_A: There is a positive relationship between women's dietary practices and nutritional status with severity of menopausal complications

METHODOLOGY

Study Setting: The study has been conducted in New Delhi from November 2018 to February 2019. New Delhi is the National Capital of India which is subdivided into 11 zones of which two zones were randomly selected for the present study. The Resident Welfare Association (RWA) and Self- Help Groups in urban areas of these two zones were then contacted to recruit the subjects.

Research Design: This is an exploratory cross- sectional study.

Sampling Design: A convenient sampling method has been used to select the subjects. The inclusion criteria included selecting those women who did not menstruate for the last 12 months and those who attained menopause in the last 5 years. Women who had received hormone replacement therapy or any other surgical therapy to induce menopause were excluded from the study. Considering these inclusion / exclusion criteria, the final sample comprised 100 women.

Instruments: Data has been collected from the respondents using a structured questionnaire to include information on the socio-demographic profile, menstrual complications, dietary practices, and nutritional status. For socio-demographic profile data has been collected on variables like age, education, employment, and marital status of the women as well as head of the family. The socio- economic status of the subjects has been computed using Kuppuswamy's Socio-economic Status Scale 2018 (Saleem, 2018). Data has been also collected for reproductive parameters such as age at menarche, the regularity of menses, age at menstruation, etc. Data on menopausal complications and their severity was assessed using Menopausal Specific Quality of Life (MENQOL) questionnaire which was adapted for the study population (Hilditch et al., 1996). The Cronbach' s alpha value ($\alpha=0.8$) indicated the presence of internal consistency between the components of the adapted MENQOL questionnaire. The final questionnaire consisted of 17 parameters capturing data on 4 domains of menstrual complications, namely, vasomotor complications -which included hot flushes and night sweat; psychosocial complication including depression, fatigue, and irritability; physical complications like joint pain, difficulty in sleep and decreased strength; and sexual complications related to avoiding intimacy and decrease d sexual desire. The intensity of menopausal complications was given a score range from 0 (no symptoms) to 5 (severe symptoms).A two- day 24-hour dietary recall (one working day and one holiday) was used to assess the dietary intake of subjects. Subsequently, using Diet Cal software, the nutrient intake of the subjects was assessed based on the Indian Food Composition Tables. The nutrient adequacy of important nutrients i.e., protein, and calcium were also computed corresponding to the RDAs (2010) for adult sedentary women. This helped to ascertain the relationship of nutrient adequacy with the severity of menopausal complications. Weight and height measurements of the subjects were obtained using standardized procedures based on which nutritional status of the subjects was determined based on body mass index. The BMI classification for Asians, as given by WHO, was used for the categorization of subjects.

Statistical analysis: Statistical Package for Social Sciences (SPSS) Version 21 was used for data analysis. Independent t-test, ANOVA, and chi- square tests were suitably applied for determining

the effect of nutrient adequacy and nutritional status on the severity of menopausal symptoms. A P-value of less than 0.05 was considered statistically significant.

Ethical Consideration: Permission to conduct the study was taken from the institutional ethical committee. Both written and oral information about the purpose of the study was given to women invited to participate in the present study. The participants were informed that their inclusion in the study would be voluntary and were given a guarantee of anonymity.

RESULTS AND FINDINGS

The age of the women having menopause enrolled in the study ranged from 44 to 59 years, the mean age being 51.5 years. The majority of women were married and more than half of them were not employed (Table-1).

Table 1: Sociodemographic and Gynaecological Characteristic of the Women (N=100)

| Characteristic | Sub-Category | Frequency/ percentage |
|--|-------------------------------|-----------------------|
| Socio-demographic characteristics | | |
| Age (years) | ≤45 | 3 |
| | 46-50 | 37 |
| | 51-55 | 49 |
| | >55 | 11 |
| Employment status | Employed | 42 |
| | Not employed | 58 |
| Civil status | Married | 71 |
| | Single or widowed or divorced | 29 |
| Educational Status | Secondary education | 43 |
| | Senior secondary education | 35 |
| | Degree/diploma | 22 |
| Total monthly income (Rupees) | 18,953 - 31,589 | 24 |
| | 31,591 - 47,262 | 68 |
| | 47,266 - 63,178 | 8 |
| Socio- economic status | Upper middle | 82 |
| | Middle | - |
| | Lower middle | 18 |
| Gynaecological characteristic | | |
| Age at onset of mensuration (Years) | ≤12 | 9 |
| | 13-14 | 56 |
| | >14 | 35 |
| Age at menopause | ≤45 | 9 |
| | 46-50 | 57 |
| | >50 | 34 |
| Regularity of mensuration | Regular | 59 |
| | Irregular | 41 |

Very few women were younger than 12 years when they started menstruating and the mean age at onset of menstruation was reported to be 14 years. The mean age of women at menopause was reported to be 48.2 years with not many women experiencing menopause earlier than 45 years.

Irregular menstrual cycles were reported by 41 percent of women. All women had experienced at-least one menopausal complication. Overall, 23 percent women reported experiencing complications of mild intensity whereas 73 percent and 4 percent women had experienced moderate and severe menopausal complications respectively.

The frequently reported menopausal problems with moderate to severe intensity were psychosocial and physical in nature. Among the psychosocial symptoms, all women reported experiencing poor memory of varying intensity followed by nervousness/anxiousness (75 %). A decrease in physical strength (97%) and pain in muscle/ joints (97%) were most common physical problems reported by the women. The decrease in sexual desire was reported by 77 percent of women with about two- third of them facing this problem with moderate to severe intensity. 66 percent women did not experience any vasomotor complications (Figure 1).

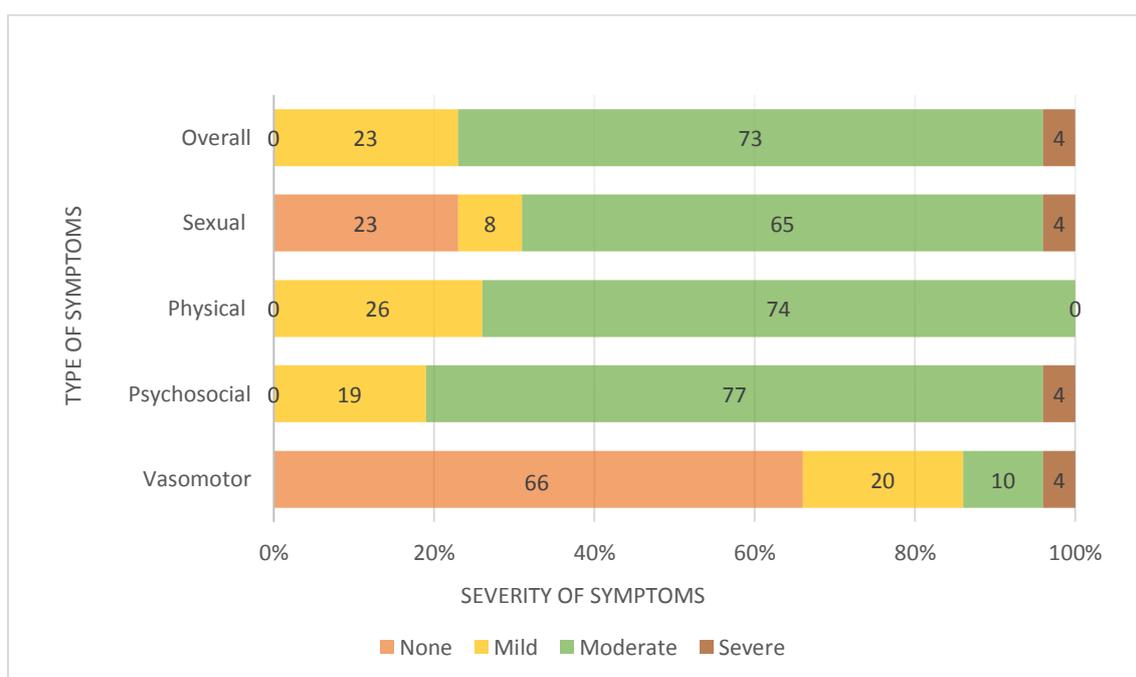


Figure 1: Prevalence and severity of menopausal symptoms in women (N=100)

Data on nutrient intake of women indicated a lower consumption of energy and other nutrients compared to recommended dietary allowances (RDA) except for vitamin C (Table 2). The mean energy consumption was statistically higher in women with moderate to severe menopausal complications as compared to women with none or mild menopausal complications ($p < 0.05$). A similar trend was noticed for the intake of fats ($p < 0.05$). The mean intake of protein and calcium was lower among women experiencing moderate to severe menopausal complications ($p < 0.05$). Data on energy adequacy indicated that 14 percent of women were consuming less than 60 percent of the required energy, 56 percent met 60 - 80 percent requirements for energy and in the case of 30 percent of mothers, the energy intake was higher than 80 percent of the recommendations.

Table 2: Mean Intake of Energy and Nutrients According to Severity of Menopausal Symptoms in Women (N=100)

| Nutrients | Nutrient Requirements (ICMR, 2010) | Women with none to mild symptoms (n=23) | Women with moderate to severe symptoms (n=77) | P Value |
|------------------|------------------------------------|---|---|---------|
| Energy (Kcal) | 1900 | 1319 ± 168 | 1425 ± 246 | 0.021 |
| Protein (g) | 55 | 48.71 ± 11.52 | 37.83 ± 5.76 | 0.000 |
| Fat (g) | 20 | 49.14 ± 12.43 | 56.93 ± 15.41 | 0.017 |
| Carbohydrate (g) | 1140 | 157.97 ± 40.82 | 169.34 ± 49.79 | 0.273 |
| Iron (mg) | 21 | 10.70 ± 4.66 | 10.16 ± 2.88 | 0.602 |
| Calcium (mg) | 600 | 689.72 ± 200 | 553.43 ± 312.75 | 0.016 |
| Zinc (mg) | 10 | 5.49 ± 1.56 | 5.75 ± 1.38 | 0.475 |
| Vitamin C (mg) | 40 | 193.12 ± 68.81 | 194.23 ± 74.66 | 0.947 |
| Vitamin D (mg) | 10 | 1.22 ± 1.16 | 1.19 ± 1.02 | 0.918 |
| Vitamin B9 (mcg) | 200 | 203.19 ± 82.53 | 195.69 ± 63.46 | 0.691 |

Effect of the adequacy of energy intake on the severity of menopausal complications indicated that women consuming between 60 to 80 percent of recommended calories (1900 kcal), experienced less severe menopausal complications and a lower and higher intake increased intensity of complications (Figure 2). As shown in Figure 3, the severity of menopausal complications was more evident among women consuming less than the recommended allowance for protein (n= 90). Similarly, complications were lower in women consuming an adequate amount of calcium (n= 43; Figure 4). One-half of women participating in the study were obese and 80 percent of them had reported moderate to severe menopausal complications (Table 3). This percentage was 72 among women who were having body mass index in a normal range. Therefore, even though not statistically associated, a better nutritional status is related to the menstrual problem of less severity ($p > 0.05$).

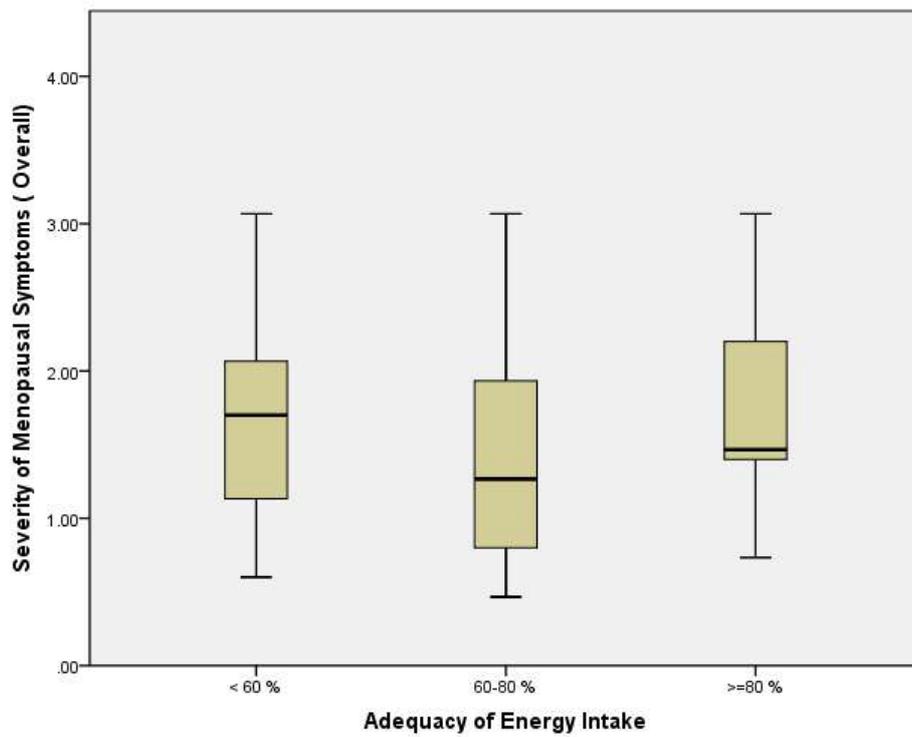


Figure 2: Effect of adequacy of energy intake on severity of menopausal symptoms (N=100)

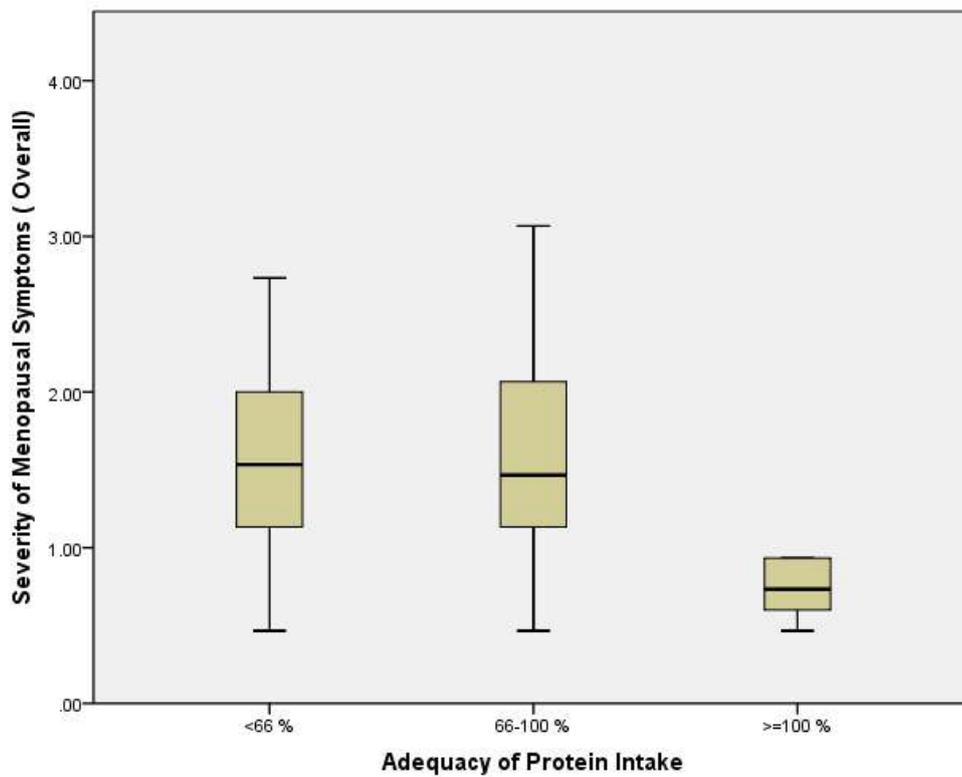


Figure 3: Effect of adequacy of protein intake on severity of menopausal symptoms(N=100)

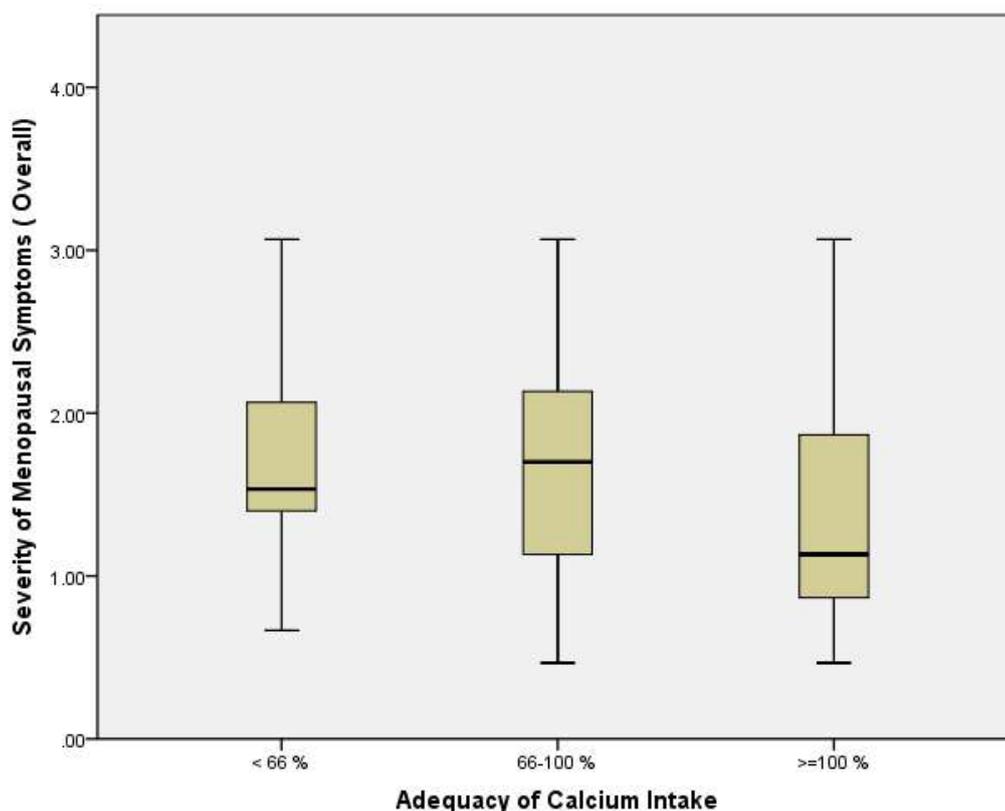


Figure 4: Effect of adequacy of calcium intake on severity of menopausal symptoms(N=100)

Table 3: Nutritional status of women and severity of menopausal symptoms (N=100)

| Nutritional Status | BMI Category | Women with none to mild symptoms (n=23) | Women with moderate to severe symptoms (n=77) | Pooled Data (N=100) |
|--------------------|--------------|---|---|---------------------|
| Underweight | <18.5 | 0 (0 %) | 0 (0 %) | 0 |
| Normal | 18.5-22.9 | 7 (28 %) | 18 (72 %) | 25 |
| Overweight | 23-24.9 | 6 (24 %) | 19 (76 %) | 25 |
| Obese | >=25 | 10 (20 %) | 40 (80 %) | 50 |

Pearson Chi Square Value = 0.621; p= 0.733

DISCUSSION

Interpretation

This cross- sectional exploratory study reveals that poor dietary practices and resultant nutritional status can aggravate the severity of menopausal complications among women.

The mean age of women at menopause was reported to be 48.2 years with not many women experiencing menopause earlier than 45 years. These results are consistent with earlier studies done on Indian women (Ahuja, 2016; Pallikadavath, 2016). In comparison to the developed

countries, women in India approach perimenopausal age earlier (McKinlay,1992). Few studies have established a correlation between the earlier menopausal age with the increased risk of osteoporosis and heart attack in Indian postmenopausal women (Dosi et al., 2014). This necessitates the need for accelerating efforts for improving the health and nutritional status of women approaching the menopausal stage which remains dismally neglected in India.

Prevalence and severity of menopausal complications:

In the present study prevalence of menopausal complications was not uncommon among women, however, its intensity varied with about three-fourth of subjects experiencing moderate to severe menopausal complications. For different domains of menopausal complications, most moderate to severe complications were psychosocial and physical in nature. On the other hand, vasomotor complications were less common among the study population. Several other studies from the literature have also reported that physical and psychological symptoms were highly significant in Asian women (Bairy et al., 2009; Durgan et al, 2006; Santosh and Ohashi, 2005; Sievect et al., 2005; Anderson et al., 2004). However, in high-income countries, the most commonly reported symptoms among women are vasomotor symptoms including hot flushes, vaginal dryness, insomnia, fatigue, and joint pain (Santoro et al., 2015; Ford et al., 2005; Li et al., 2005).

Effect of diet and nutritional status on menopausal complications:

The health and overall well- being of the postmenopausal women during this crucial period are associated with overall good health and a healthy lifestyle which includes balanced diet, non-smoking habits, and regular physical exercise as well as a positive outlook towards aging and menopause (Guthrie et al., 1994; Greene et al., 1992). Different lifestyle practices, particularly diet may delay the appearance of risk factors in this population group (Owens et al., 2003). Even though a healthy diet and optimal nutritional status are important for maintaining healthy menopause, the women in the present study were found to have a compromised dietary intake coupled with a high prevalence of obesity. Similar results were reported by other studies conducted in different parts of India (Raj et al., 2015). However, unlike the present study, few studies have reported dietary calcium intake significantly higher than the RDA (Simkin-Silverman et al., 2003).

The results of the present study further revealed that high consumption of energy and fat increases the severity of menopausal complications. On the other hand, the severity of menopausal complications increased with lower consumption of protein and calcium. An earlier study, also reported that adherence to a healthier dietary pattern may be associated with a lower risk of menopausal symptoms. Conversely, adopting an unhealthy diet may be associated with a higher prevalence of these symptoms during menopause (Mahshid et al., 2019). Findings from another cohort study done on British women, confirm the association of dietary practices with the age at natural menopause. Consumption of oily fish and fresh legumes were found to related with a delay in the onset of natural menopause. On the other hand, a higher intake of refined pasta and rice was associated with younger age at natural menopause (Dunneram et al., 2018).

The present study is among the first few studies which demonstrate the role of dietary practices in the severity of menopausal symptoms. Menopause can have an impact on the overall quality of life of women as one of the main causes of osteoporosis and cardiovascular diseases

(Ossewaarde et al, 2005). Besides these diseases, obesity and high BMI contributes to morbidity and mortality, leading to increased risk of cancer and chronic diseases like osteoarthritis, liver and kidney diseases, sleep apnea, and depression (Pi- Sunyer, 2009). Despite these known facts, the prevalence of overweight (50 %) and obesity (25 %) was found to be high among women in the present study. This can be possibly due to a high intake of dietary fat among these women coupled with low physical activity since most women in the study group were leading a sedentary lifestyle.

The results of the study further demonstrate that a better nutritional status in terms of BMI is related to the menstrual problem of less severity. A randomized clinical study carried out by Eliassen et al (2010) showed that increased waist circumference and weight gain during menopause could be reduced with long- term physical activity and dietary intervention. Therefore, there is a need for interventions to increase physical activity along with improved dietary practices preventing an increase in adiposity among mid- aged women.

CONCLUSIONS

Present study concluded that

- The prevalence of menopausal problems was of moderate to severe intensity and predominantly psychosocial and physical in nature.
- Severity of menopausal complications were lower in women consuming adequate amount of energy, protein and calcium. Among obese women 80 percent reported moderate to severe menopausal symptoms.

IMPLICATIONS OF THE STUDY

Need for intensive interventions

Compromised dietary intake and nutritional status of menopausal women in the present study aggravating the severity of menopausal complications warrants the need for immediate and intense interventions on promoting healthy eating and lifestyle practices among women for ensuring healthy aging. Furthermore, since age-related changes make women more vulnerable to nutrient deficiencies during this phase, it is recommended that the women should be reached early during adolescence and counselled for maintaining a healthy nutritional status and following optimal dietary practices. On approaching middle age, they should be imparted knowledge about possible changes and complications during the menopausal phase, and coping strategies. These measures can ensure that every woman enters the menopausal phase of life with better nutritional status and preparedness for facing menopausal complications, increasing the possibility of living a healthier post-menopausal life.

Need for future research

The initial results of this study provide an opportunity for expansion into further studies to enumerate the association of dietary practices and menopause complications indifferent urban and rural populations of India. Robust research studies should be conducted to better understand the unmet health and nutritional needs of Indian women entering or experiencing menopause.

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HEALTH PROFILE OF MIGRANT LABOURERS – AN OUTLOOK

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ABSTRACT

A large population of migrants work in sectors demanding heavy physical labour. Such exertion needs to be supplemented with good food, good hygiene, and rest. Since these factors are in short supply, migrant labourers are always under the shadow of health and nutritional problems. The objective of this study was to assess the socioeconomic aspects, the anthropometric data, the biochemical parameters, and the nutrient intake of migrant labourers. The study was conducted amongst the migrant labourers in the Thiruvananthapuram district situated on the southern end of the State of Kerala. Hundred respondents were selected using purposive random sampling method for this study. The data were obtained using a standardised interview schedule. The anthropometric data and biochemical data were collected using relevant tools. The nutrient intake of the respondents was recorded using a three-day 24-hour dietary recall method. The data was then analysed with SPSS Statistics. The descriptive analysis (mean and standard deviation) and inferential analysis (t-test, Karl Pearson's correlation coefficient) were performed, and the results were then interpreted. The study observed that the majority of the migrant labourers were from West Bengal, between the age group of 18 and 27 years (62 per cent). Among the respondents, 80 per cent had their BMI in the normal range. No significant association could be found between the nutrient intake and the BMI. The BMI of the migrant labourers were not directly affected by their food intake as their daily work was highly strenuous. The biochemical parameters assessed during the study came under the respective normal ranges. However, based on the analysis of their dietary pattern and lifestyle, it is highly likely that they would fall out of the normal range and become susceptible to ill-health. The macronutrient intake was found to be satisfactory, but the same could not be observed with the micronutrient intake. This shortage in the micronutrient intake would lead to deficiency diseases in a long run. Since migrant labourers are a significant economic force, their health and well-being would influence the local economy and people. By giving proper awareness on various nutritional aspects, positive changes could be brought up on the food consumption pattern, thereby improving their health.

Keywords: macronutrients, migrant labourers, micronutrients, nutrient intake

INTRODUCTION

The word 'migration' denotes a temporary or permanent shift from one location to another. Migration can either be an internal or an external one. There are many reasons for people to migrate, the main motivating factor being the desire for a better life. This means different things for different people – better education, better job, better living surroundings, etc. For underprivileged internal migrants, comparatively higher wage rates in unorganized sectors, continuous availability of jobs in the informal sector and relatively humane treatment of migrant workers by the host community made Kerala one of the most promising destinations in India (Peter & Narendran, 2017). A large population of migrants work in sectors demanding heavy physical labour. To make ends meet, they are willing to accept jobs that others could not, or rather would not. Some of the sectors that are the biggest employers of inter-state migrants are the construction sector, mines and quarries, factories, and brick kilns. In these work sectors, the most perilous and physically gruelling jobs, which the local workers are reluctant to partake in, are offered to

seasonal migrants. Naturally, such exertion needs to be supplemented with good food, good hygiene, and rest. Since these factors are almost always in short supply, migrant labourers are always under a cloud of health and nutritional problems. There are not enough researches that focus on the nutritional aspects and the nutritional problems faced by migrant workers.

OBJECTIVES

The objectives of this study were to assess

- the socio-economic background of the migrant labourers
- the anthropometric measurements to ascertain the general nutritional status of the migrant labourers
- the health status of the migrant labourers through biochemical examinations
- the adequacy of nutrient intake of the migrant labourers.

METHODOLOGY

The study was conducted on a section of migrant labourers in the Thiruvananthapuram district situated in the southern end of the State of Kerala. Thiruvananthapuram stands at the second position in the number of migrant labourers in Kerala. Hundred respondents were selected for this study using purposive random sampling method, and based on the following inclusion criteria - a) the subject was willing to participate in the study, b) the subject should be between the age of 18 years and 55 years and from a state other than Kerala, c) the subject had been staying in the district of Thiruvananthapuram for more than six months at the time of interview and employed in a sector that demanded strenuous physical labour, and d) the subject was willing to participate in the bio-chemical examination planned as part of the study.

Socioeconomic data: The data were obtained using a standardised interview schedule that included the questions regarding age, income, education, and native place. The modified Kuppaswamy scale (Saleem & Jan, 2021) was adopted for the assessment of the socio-economic status of the migrant labourers.

Anthropometric data: The measurements taken included the weight and the height of the samples, from which the Body Mass Index (BMI) was calculated. From the measured body-fat percentage, lean body mass was calculated.

Biochemical data: The different biochemical parameters analysed in the study were the blood sugar level (fasting) using Hexokinase method, the haemoglobin level using Cyanmethemoglobin (Spectrophotometry) method, and the total cholesterol level using Enzymatic Rate method. The researcher procured the services of a Phlebotomist from a NABH accredited lab in the geographical area selected for the study.

Nutrient data: The nutrient intake of the respondents was recorded using a three-day 24-hour dietary recall method. The 24-hour dietary recall is a structured dietary assessment interview tool that is used to capture detailed information about all the foods and the drinks consumed by each respondent in the previous 24 hours. The portion size of each food consumed was recorded using standardized utensils. The nutrient composition was computed using the database of 'Nutritive Value of Indian Foods' given by the National Institute of Nutrition (C Gopalan et al., 2016). The

mean nutrient intake for three days was computed and compared with the Recommended Dietary Allowance (RDA) 2020(ICMR-National Institute of Nutrition, 2020).

Stress level data: The study adopted a general stress index (Laiju S & Dr. H Sam Sananda Raj, 2002), which contained statements related to an individual's daily life experiences.

The data was then analysed with SPSS Statistics. The descriptive analysis (mean and standard deviation) and inferential analysis (t-test, Karl Pearson's correlation coefficient) were performed, and the results were then interpreted.

RESULT AND DISCUSSION

Socioeconomic aspects of the respondents

Table - 1: Native place, Age, monthly income and education of the respondents (n=100)

| Native Place | % | Age (in years) | % | Daily wage (₹) | % | Monthly Income (₹) | % | Education | % |
|---------------------|----------|-----------------------|----------|-----------------------|----------|---------------------------|----------|------------------|----------|
| Assam | 2 | 18 – 27 | 62 | 401 – 600 | 55 | 10001 - 15000 | 52 | High school | 44 |
| Bihar | 5 | 28 – 37 | 28 | 601 – 800 | 34 | 15001 – 20000 | 36 | Primary | 43 |
| Rajasthan | 3 | 38 – 47 | 9 | 801 – 1000 | 11 | Above 20000 | 12 | Illiterate | 13 |
| West Bengal | 90 | Above 48 | 1 | | | | | | |

The data in table 1 revealed that the majority of the migrant labourers were from West Bengal, between the age group of 18 and 27 years (62%). They received wages every week (₹400 – ₹600 per day), which accumulated to ₹10000 – ₹15000 per month (52%). About 43% of them had a primary-level education and 44% had high-school level education. Among the respondents, 52 per cent were smokers.

To ascertain the socio-economic status of the migrants, the modified Kuppuswami scale 2021 was used. This scale includes three parameters – a) occupation of the head of the family, b) education of the head of the family, and c) the total monthly income of the family. These parameters are further split in to sub-groups. Scores are given to each sub-group. Based on the score, a family is classified in to five groups. According to the scale, about 96 per cent of the migrant labourers belonged to the 'Upper Lower' socio-economic class – i.e., upper level of the lower socio-economic class.

Diesel was the preferred cooking fuel (49%). Popular cooking fuel like LPG was not readily accessible or affordable. Kerosene was also not easily available, forcing them to resort to crude alternatives like diesel as the cooking fuel. Only 13% of them had medical insurance.

Anthropometric data

The figure 1 shows that among the respondents, 80 per cent had their BMIs in the normal range, 12 per cent in the under-weight range, and 8 per cent in the pre-obese range.

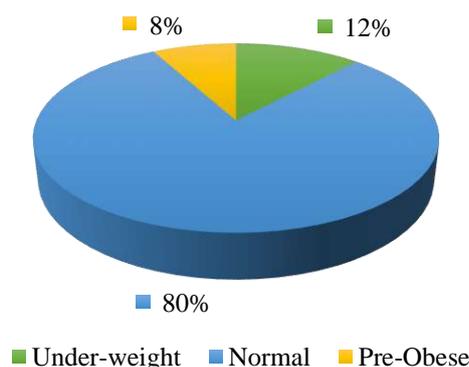


Fig. - 1: Percentage Distribution of migrants according to their BMI

The various anthropometric parameters collected in the study were the height and the weight of the respondents. From these factors, the Body Mass Index (BMI) was calculated. The body fat percentage was also assessed. From the body fat percentage, the lean body mass was calculated. The mean and the standard deviation are mentioned in table 2.

Table - 2: Anthropometric parameters of the respondents (n=100)

| | Mean | Standard Deviation |
|---------------------------|--------|--------------------|
| Height (cm) | 162.32 | 6.28 |
| Weight (Kg) | 55.60 | 7.64 |
| BMI (Kg /m ²) | 21.07 | 2.55 |
| Body fat (%) | 17.31 | 4.99 |
| Lean body mass | 45.74 | 5.04 |

Biochemical data

The results of the biochemical tests are given in the table below. The mean and the standard deviation of haemoglobin, fasting blood sugar and total cholesterol were calculated.

Table -3: Biochemical parameters of the respondents (n=100)

| Biochemical parameters | Mean ± Standard Deviation | Normal values |
|-------------------------------|---------------------------|-----------------------|
| Haemoglobin (g/dL) | 14.7 ± 1.66 | 13 – 17 ¹ |
| Blood sugar – fasting (mg/dL) | 86.97 ± 10.62 | 70 – 100 ¹ |
| Total Cholesterol (mg/dL) | 170.8 ± 37.31 | < 200 ² |

Sources:¹WHO, ²NCEP(“ATP III Guidelines,” 2001)

Table3 indicates that the mean value of the biochemical parameters assessed during the study came under the respective normal ranges. However, based on the analysis of the dietary pattern and lifestyle of the migrant labourers, it is highly likely that they would fall out of the normal range and become susceptible to ill-health in the long run.

Table-4: Biochemical parameters of the respondents in smokers vs non-smokers (n=100)

| Parameters | Smokers | | Non-smokers | | Independent t-test | |
|-----------------------|---------|-------|-------------|-------|--------------------|---------|
| | Mean | SD | Mean | SD | t-value | p-value |
| Haemoglobin | 14.75 | 1.81 | 14.64 | 1.50 | 0.318 | 0.751 |
| Blood sugar (fasting) | 86.38 | 7.65 | 87.60 | 13.26 | 0.569 | 0.571 |
| Total Cholesterol | 168.71 | 36.41 | 173.06 | 38.90 | 0.578 | 0.565 |

Table 4 shows the independent sample t-test results for the biochemical parameters in smoking and non-smoking respondents. It revealed no significant difference in the biochemical parameters for both categories. According to WHO studies, the normal reference range for Haemoglobin cannot be applied in smokers and an adjustment needs to be applied when evaluating the same for smokers(WHO, 2011). This directive from WHO indicates that the Haemoglobin levels could appear elevated in smokers. In the present study, no such significance was observed. One possible reason could be that majority of the respondents were relatively young and the effect of smoking has not yet been reflected on their Haemoglobin levels.

Nutrient intake of the respondents

To get a clear picture of the nutrient intake of the migrants, a 24-hour recall method was done. The nutrient composition of their diet was calculated. The below table shows the mean intake with a standard deviation of nutrients, RDA and the percentage of the RDA met by the respondents.

Table -5: Mean Nutrient intake of migrants (n=100, t-test)

| Nutrients | Mean nutrient intake ± SD | RDA ⁺ | Per cent of RDA met | t-value | p-value |
|-------------------------------|------------------------------|------------------|------------------------|---------|-----------------------|
| Energy (Kcal/d) ⁺⁺ | 2642.05 ± 391.05 | 3470 | 76.14 | -21.17 | < 0.001 ^{**} |
| Proteins (g/d) | 99.09 ± 15.56 | 54 | 183.5 | 28.98 | < 0.001 ^{**} |
| Fat (gm/d) ⁺⁺ | 61.25 ± 15.4 | 40 | 153.13 | 13.8 | < 0.001 ^{**} |
| Carbohydrates (g/d) | 422.5 ± 74.61 | 130 | 325 | 39.2 | < 0.001 ^{**} |
| Calcium (mg/d) | 546.65 ± 200.61 | 1000 | 54.67 | -22.6 | < 0.001 ^{**} |
| Zinc (mg/d) | 10.44 ± 2.2 | 17 | 61.41 | -29.89 | < 0.001 ^{**} |
| Thiamine (mg/d) | 1.74 ± 0.32 | 2.3 | 75.65 | -17.77 | < 0.001 ^{**} |
| Riboflavin (mg/d) | 1.06 ± 0.19 | 3.2 | 33.13 | -114.28 | < 0.001 ^{**} |
| Niacin (mg/d) | 24.43 ± 5.72 | 23 | 106.22 | 2.5 | 0.014 [*] |
| Vitamin C (mg/d) | 38.45 ± 9.65 | 80 | 48.06 | -43.06 | < 0.001 ^{**} |
| Iron (mg/d) | 18.96 ± 3.05 | 19 | 99.79 | -0.14 | 0.888 |
| Magnesium (mg/d) | 839.05 ± 179.27 | 385 | 217.94 | 25.33 | < 0.001 ^{**} |

⁺RDA ICMR 2020⁺⁺Estimated Average Requirement (EAR)

^{**} denotes significant at 1% level, ^{*} denotes significant at 5% level

Since the P-value was less than 0.01 in the case of Energy, Protein, Fat, Carbohydrates, Calcium, Zinc, Thiamine, Riboflavin, Vitamin C and Magnesium intake, it was significant at 1%

level, implying that the nutrient intake values did not match RDA. Based on the mean value score, the intake of Protein, Fat and Carbohydrates was above the RDA value.

Fig. -2: Percentage Distribution of migrants according to the intake of nutrients

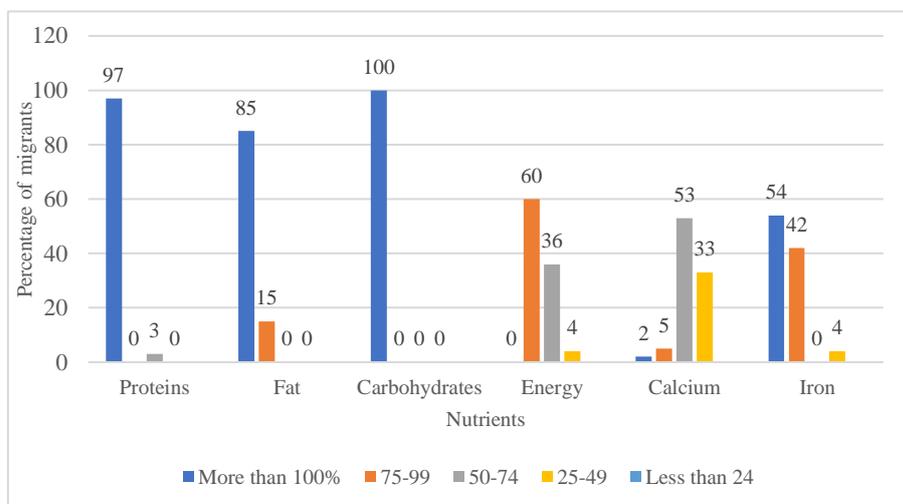


Figure 2 gives an idea about the per cent of migrant labourers consuming various nutrients with respect to the RDA. In the case of Proteins, 97 per cent of the subjects consumed more than 100 per cent of the RDA. For Fat, 85 per cent of subjects consumed more than 100 per cent of the RDA. All the subjects consumed more than 100 per cent of the RDA in the case of Carbohydrates. For Calcium, 53 per cent of the subjects consumed between 50 and 74 per cent of the RDA. For Iron, 54 per cent consumed more than 100 per cent of the RDA.

Stress levels

The study adopted a general stress index (Laiju S & Dr. H Sam Sananda Raj, 2002), which contained statements related to an individual’s daily life experiences. The results revealed that the majority (74 per cent) of the respondents had high stress levels.

Association of haemoglobin with BMI and Stress levels

Table -6: Karl Pearson Correlation Coefficient of Hb with BMI and Stress levels

| Variables | BMI | Stress | Hb |
|---------------|-------|--------|---------|
| BMI | 1.000 | -0.080 | 0.260** |
| Stress levels | | 1.000 | -0.165 |
| Hb | | | 1.000 |

** denotes significant at 1% level

Since the correlation coefficient between Haemoglobin levels and BMI was highly significant at a 1% level, there was a significant relationship between Haemoglobin and BMI. The correlation coefficient was 0.260** which indicated a positive association. A variation in Haemoglobin level indicated variation in the BMI values as well. So, the present study concluded that a malnourished person (with low BMI) had a lower level of Haemoglobin. A study conducted on students in a local university in Bangladesh indicated that underweight students had low Haemoglobin levels (Shill et al., 2014). A similar finding was done among the medical students in

a medical college in Chhattisgarh; low Haemoglobin levels were more common among the students who had a low BMI (Pandey & Singh, 2013).

Association of nutrient intake with BMI

To find the association of nutrient intake with BMI, the Karl Pearson Correlation Coefficient test was performed.

Table -7: Karl Pearson Correlation Coefficient of the nutrient intake and the BMI

| Variables | Energy | Proteins | Fat | Carbohydrates | BMI |
|---------------|--------|----------|---------|---------------|--------|
| Energy | 1.000 | 0.790** | 0.524** | 0.900** | -0.075 |
| Proteins | | 1.000 | 0.527** | 0.580** | -0.029 |
| Fat | | | 1.000 | 0.115 | 0.132 |
| Carbohydrates | | | | 1.000 | -0.152 |
| BMI | | | | | 1.000 |

** denotes significant at 1% level

The results showed that there was no significant association between the nutrient intake and the BMI, as the correlation coefficient between the two was not significant at 5% level. The data indicated that the BMI of the migrants were not directly affected by the food intake as their daily work was highly strenuous.

Association of nutrient intake with Biochemical parameters

Table - 8: Karl Pearson Correlation Coefficient of the nutrient intake and the biochemical parameters

| | Energy | Proteins | Fat | Carbohydrates | Calcium | Vitamin C | Iron | Haemo globin | FBS | Total Cholesterol |
|-------------------|--------|----------|---------|---------------|----------|-----------|---------|--------------|----------|-------------------|
| Energy | 1.000 | 0.790** | 0.524** | 0.900** | -0.040 | 0.093 | 0.974** | -0.121 | -0.039 | -0.020 |
| Proteins | | 1.000 | 0.527** | 0.580** | 0.093 | -0.082 | 0.717** | 0.164 | 0.057 | 0.095 |
| Fat | | | 1.000 | 0.115 | -0.326** | -0.330** | 0.343** | 0.034 | 0.233* | 0.059 |
| Carbohydrates | | | | 1.000 | 0.079 | 0.291** | 0.964** | -0.207* | -0.170 | -0.073 |
| Calcium | | | | | 1.000 | 0.731** | 0.029 | 0.113 | -0.153 | -0.034 |
| Vitamin C | | | | | | 1.000 | 0.184 | -0.156 | -0.273** | -0.104 |
| Iron | | | | | | | 1.000 | -0.176 | -0.076 | -0.074 |
| Haemoglobin | | | | | | | | 1.000 | 0.009 | 0.389** |
| FBS | | | | | | | | | 1.000 | 0.129 |
| Total Cholesterol | | | | | | | | | | 1.000 |

** denotes significant at 1% level, * denotes significant at 5% level

Table 8 shows the association of nutrient intake with different biochemical parameters.

Association of nutrient intake with Hb levels - The correlation coefficient between nutrients and Haemoglobin indicated that there was no significant relation except in the case of Carbohydrates. In the case of Carbohydrates and Haemoglobin, the correlation coefficient was -0.207* which indicated a negative association and this was significant at 5 per cent level.

Association of nutrient intake with FBS levels - The correlation coefficient between nutrients and FBS showed a significant relationship between vitamin C and FBS levels. In the case of Vitamin C and FBS, the correlation coefficient was -0.273^* , which indicated a negative association and this was significant at 5 per cent level. In the case of Fat and FBS, the correlation coefficient is -0.233^* which indicated a positive association and this was significant at 5 per cent level.

Association of nutrient intake with Total Cholesterol levels - The correlation coefficient between nutrients and cholesterol levels indicated that there was no significant relationship between the nutrients and total cholesterol levels.

CONCLUSION

Based on the socio-economic scale adopted for the study, it was seen that about 96 per cent of the migrant labourers belonged to the 'Upper Lower' socio-economic class – i.e., upper level of the lower socio-economic class. The study observed that the migrant labourers coming to work are of young age. All of them were able to get ample work and earn better than what they would have been able to, had they stayed back home. The living conditions, on the other hand, were not adequate. Most of the respondents stayed in batches in small rooms, which were almost always crowded. The basic amenities like electricity and water were available mostly throughout the day. Most of the respondents stuck to a routine that helped them keep their expenses to a minimum level. This helped them to save enough money to send back home.

The biochemical tests conducted during the study produced normal results. This was not surprising, as majority of the respondents were of young age involved in strenuous work daily and their daily energy expense was on a relatively higher side. However, based on the analysis of their dietary pattern and lifestyle, it is likely that they would fall out of the normal range and become susceptible to ill-health in the long run. The intake of macro-nutrients like Carbohydrates, fat and proteins were above the RDA value. This could be attributed to the dietary pattern followed by almost all the migrant labourers – high consumption of rice, with moderate intake of fish, meat and milk products. The intake of micro-nutrients like Calcium, Thiamine, Riboflavin, Vitamin C and Magnesium were below the RDA value. The intake of green leafy vegetables and fruits were on the lower side. The energy requirements were also not met. The macronutrient intake was found to be satisfactory, but the same could not be observed with the micronutrient intake. This shortage in the micronutrient intake would lead to deficiency diseases at a later stage.

Since migrant labourers are a significant economic force, their health and well-being would influence the local economy and people. By giving proper awareness on various nutritional aspects, positive changes could be brought up on their food consumption pattern, thereby improving their overall health.

RECOMMENDATIONS

Stakeholders should take necessary steps to provide nutritional awareness among the labourers, and monitor their health periodically. More in-depth studies should be conducted with respect to the health and hygiene of the labourers. Providing regular and continuous awareness sessions in matters related to health and hygiene would help instil good levels of knowledge, attitude and practice of the same among the migrant labourers.

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FACTORS AFFECT FAST FOOD CONSUMPTION AMONG COLLEGE GIRLS IN VARANASI

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ABSTRACT

Fast food is popular among the present generation however, its consumption has often been associated with a negative impact on nutrition and health people are concerned with the problems and side effects caused by increased fast food consumption particularly among college students. Excessive consumption of fast food has been associated with the overweight and obese epidemic. Several studies have assessed the problems of Fast Food consumption particularly weight gain and obesity and other diseases. However, only a few addresses the methods, strategies, and policies needed to reduce this issue. In this study, 100 respondents were selected as a sample for the present study. A random Sampling Design was used to select the sample. The in-depth semi-structured interview was conducted to explore the experience and perspective of respondents. The result revealed that a maximum (43%) number of respondents were eating fast food more than twice a week, 35% of respondents twice a week, 15% once in a week and 7 % never take fast food. Along with this, it was also observed that there is a close association between fast food consumption and celebration/meeting with friends. This research aim is to investigate factors that contribute the excess fast food consumption, as well as some recommendations, summarize that can help to reduce the consumption of fast food.

Keywords: College Girls, Consumption, Fast food, Factors, Obesity.

INTRODUCTION

After Sixty-three years of independence, the Indian lifestyle has undergone many changes. In human life, food plays a major role. It is needed to survive, share with family and friends. As we know "Eat healthy and live healthy" is one of the essential requirements for long life.

Eating habits (or food habits) refer to why and how people eat which foods they eat, and with whom they eat, as well as the ways people obtain, store, use, and discard food. Factors that influence people's eating habits include individual, social, cultural, religious, economic, environmental, and political.

Fast-food consumption has become more popular at the global level. India ranks 10th in the term of per capita spending on fast food figures with 2.1% of expenditure in annual total spending. The fast-food industry in India is expanding at the rate of 40% every year (Ashakiran et al., 2012).

The food corporations have been very successful in replacing fresh and healthy food from consumer's diets with fast food and processed food. In the Data Monitor's (2005) survey, the fast-food market is defined as the sale of food and drinks for immediate consumption either on the premises or in designated eating areas shared with other foodservice operators, or for consumption elsewhere. Fast food has become one of the fastest-growing industries in the world as well in India over the years. However, with rising global obesity, there has been a gradual demand for food that is neither processed nor produced using genetically modified organisms.

The labels attached to fast food are always low in nutritional value, have high calories, and include additives that increase the risk of obesity and other diseases. Fast food consumption is harmful to human health. Further specific, the local concentration of fast food outlets is associated with obesity, poor nutritional status (Kruger et al., 2014).

The current global adaptation to a structure of fast food consumption has resulted in numerous adverse effects on health. Fat and sugar in combination are capable of producing a dopamine-driven surge of intense pleasure in adolescence with a propensity for addictive behavior. On the other side, it must be noted that they are hazardous to health too. Fast food makes adolescence more likely to get food poisoning because it does not follow the standards of keeping, storing, and cooking food in the right way. It contains a high percentage of materials and chemical color that contribute to cancer in the long-term high fat, salt, and sugar content particularly cholesterol have their adverse effect on health. The energy density of fast foods is more than twice the recommended daily allowance for children (Printice 2003). Breast cancer risk is also associated with fast food and sugary drinks (Chandran et al., 2014).

Most of the fast-food restaurants provide different prices, but they are considered reasonable and cheap in their entirety. The prices of this food are handy, so everyone can buy fast food. The reason for the low prices of fast food could be because of made of poor-quality materials.

Teenager and adolescents are at a vulnerable age as their dietary patterns and food attitude is going to influence their health. It also dictates the food patterns of the next generation. Education means changes in behavior. Keeping this in view teenagers and adolescents are prime and challenging targets for Nutrition Education Programme.

OBJECTIVES

Present study was conducted in Banaras Hindu University, Varanasi

- 1) To find out frequency of eating fast food by college going girls of Varanasi
- 2) To examine various factors that influence fast food consumption among college girls.
- 3) To find out the influence of advertisement on the respondents for eating fast food

METHODOLOGY

The study was conducted out in the Banaras Hindu University, Varanasi. A total of 100 subjects were selected between the age group of 18 – 25 years. For data collection questionnaires and interviews, the method was used. A random sampling method was used to select respondents. The study was conducted from July 2018 to March 2019 over a period of 8 months.

A pre-tested questionnaire was formulated for the collocation of information. The questionnaire was simple and brief. A self-made questionnaire was developed.

The questionnaire was distributed among the respondents to collect the necessary information regarding the factors responsible for fast food consumption behavior. It contained the following sections.

(a) General information:- the schedule was used to collect the information on the general profile, name, age, education, family details, received pocket money among college-going girls.

(b) Anthropometric assessment: - the schedule was used for anthropometric assessment include body weight, body height.

(c) Dietary Intake: - The fast-food consumption frequency was recorded in terms of intake of Pizza, burgers, chocolate, ice cream, and cookies/cake, chowmein, and pasta, Maggi, etc.

The study was conducted over a period of 8 months. The questionnaires were physically distributed using the random Sampling method. The fast-food consumption pattern assesses by the fast-food frequency questionnaire in terms of daily, 5-6 times per week, 2-4 times per week, once per week, never. On the basis of 24 hours recall method.

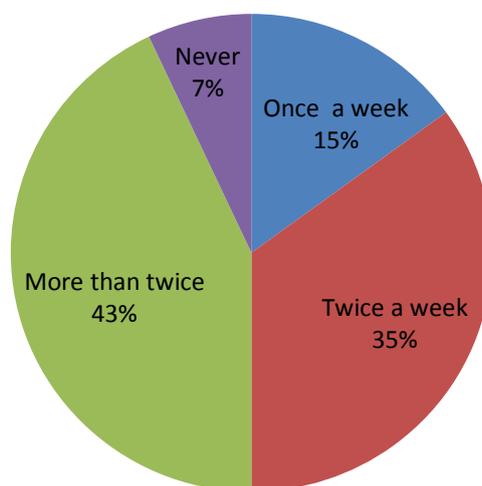
Statistical Analysis: The collected data were classified and tabulated as per objective to arrive at meaning and logical inference by frequency and percentage.

RESULT AND DISCUSSION

Table-1. Classification of respondents based on frequency of eating fast food in a week

| Fast food | Frequency | Percentage |
|-----------------|-----------|------------|
| Once a week | 15 | 15% |
| Twice a week | 35 | 35% |
| More than twice | 43 | 43% |
| Rarely | 7 | 7% |
| Total | 100 | 100% |

Figure 1. Respondents based on frequency of eating fast food

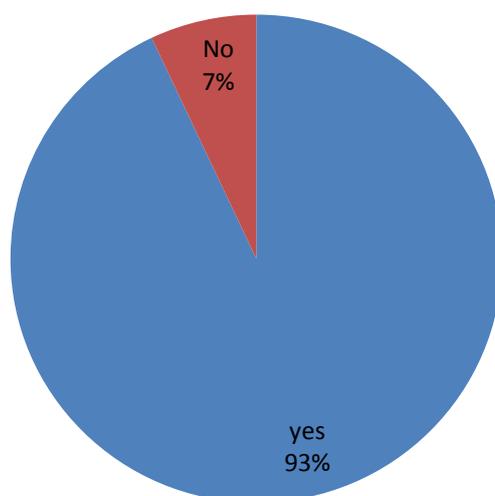


Analysis – It was found that a maximum (43%) number of respondents ate fast food more than twice, 35% of respondents ate fast food twice a week, 15% of respondents ate fast food once a week, and 7% of respondents rarely ate fast food.

Table no. 2 Classification of respondents based on their liking for fast food

| Liked fast food | Frequency | Percentage (%) |
|-----------------|-----------|----------------|
| Yes | 93 | 93% |
| No | 7 | 7% |
| Total | 100 | 100% |

Figure 2. Respondents based on their liking for fast food

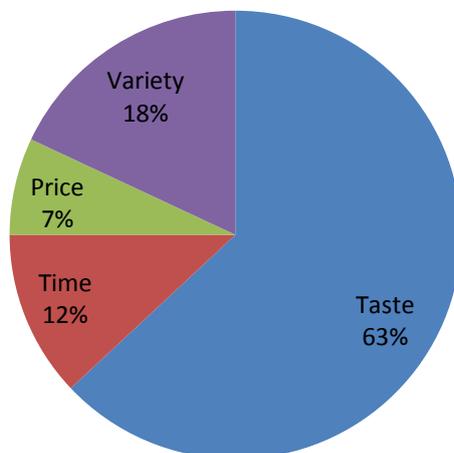


Analysis – It was discovered that the majority of respondents (93%) liked fast food, while 7% did not like it.

Table no.3 Classification of respondents based on the main factors for consuming fast food (F.F.)

| Factor for consuming F.F. | Frequency | Percentage (%) |
|---------------------------|-----------|----------------|
| Taste | 63 | 63% |
| Time | 12 | 12% |
| Price | 7 | 7% |
| Variety | 18 | 18% |
| Total | 100 | 100% |

Figure 3. Respondents based on the main factors for consuming fast food

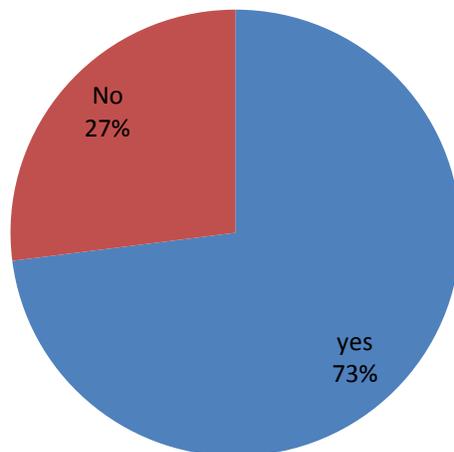


Analysis - It was found that a maximum (63%) number of respondents were consuming fast food because of taste; 18% of respondents consumed fast food because of variety; 12% of respondents ate fast food because it was convenient, and 7% ate fast food because it was inexpensive.

Table no. 4 Classification of respondents on the basis of whom advertisements attracted and influenced their fast food habit

| Preference | Frequency | Percentage (%) |
|------------|-----------|----------------|
| Yes | 73 | 73% |
| No | 27 | 27% |
| Total | 100 | 100% |

Figure 4. Respondents on the basis of whom advertisements attracted and influenced their fast food habit

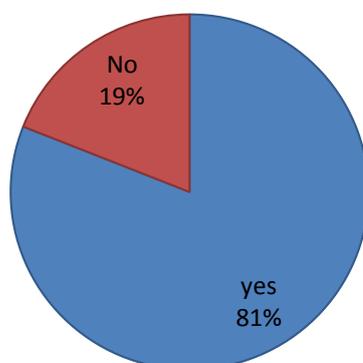


Analysis –It was found that a maximum (73%) number of respondents were influenced by their fast food habit with advertisement and 27% of respondents were not influenced by their fast food habit with advertisement.

Table no.5 Classification of respondents based on fast food consumption habits which increased after they left home

| Habit of fast food | Frequency | Percentage (%) |
|--------------------|-----------|----------------|
| Yes | 81 | 81% |
| No | 19 | 19% |
| Total | 100 | 100% |

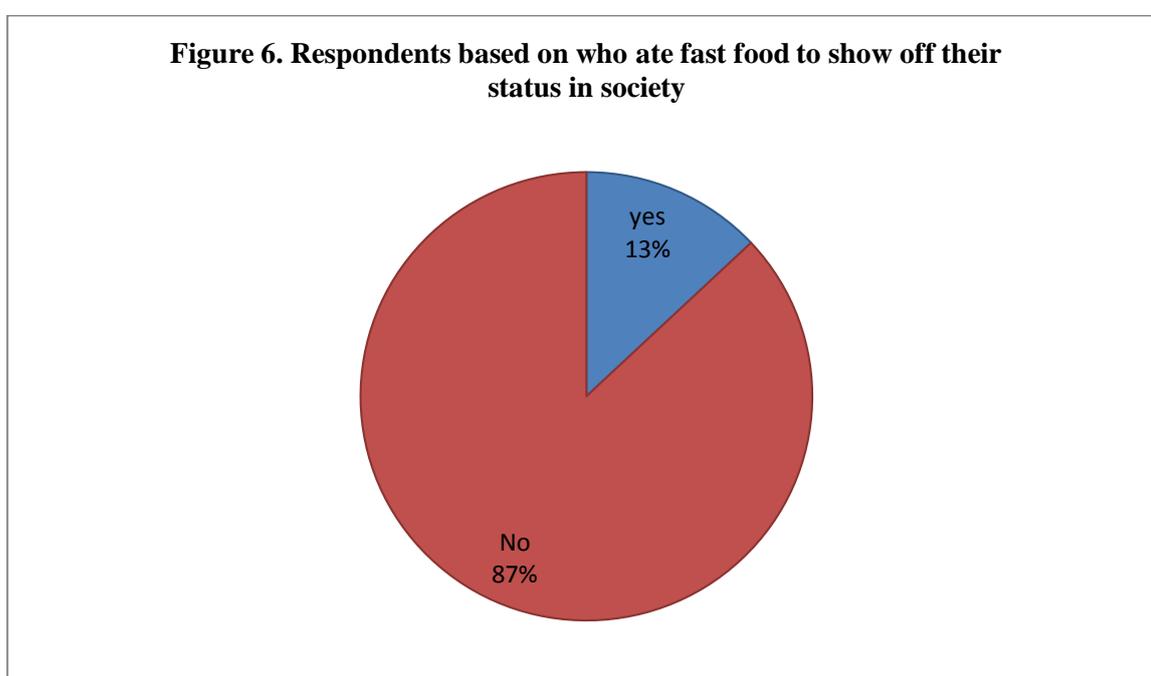
Figure 5. Respondents based on fast food consumption habits which increased after they left home



Analysis - It was found that a maximum (81%) number of respondents increased their fast consumption habit after they left home, and 19% of respondents did not increase their fast consumption habit after they left home.

Table no. – 6 Classification of respondents based on who ate fast food to show off their status in society

| Preference | Frequency | Percentage (%) |
|------------|-----------|----------------|
| Yes | 13 | 13% |
| No | 87 | 87% |
| Total | 100 | 100% |



Analysis - It was found that a maximum (87%) number of respondents did not eat fast food to show off their status in society, and 13% of respondents ate fast food to show off their status in society.

CONCLUSION

Though fast food is convenient and tasty food but prepared with unhealthy and low nourishing ingredients having greater side effects that ultimately lead to many chronic diseases. Fast food companies are targeting mainly the young generation through great promotion strategies and attractive advertisements. The results of the study along with the literature review indicate the influence of fast food consumption on health and analyzed the factors influencing the fast food consumption habits of respondents. The study indicated that although the younger generation is aware of the harmful effects of fast food its consumption among them is increasing day by day. The main identified criteria enhancing fast food intake among youth include the taste of the products, product freshness & consistency, advertisements influence, and social status among peers. These all contributes to mushrooming of fast-food restaurants in society.

SUGGESTIONS

Keeping all points in concern some recommendations are formulated to reduce fast food consumptions and to improve eating habits of younger generation due to different factors attract people's fast food consumption includes priority about health consciousness which is considered to offer a protective effect against adverse health effect:

- Create awareness in the younger generation about the hazards of fast food consumption.
- Government should ban unethical marketing strategies, through various media like television, newspaper, etc.
- Provide information regarding the hazards of fast food and the advantage of healthy eating habits, physical activities.
- Build a better local food environment by efforts in decreasing the local availability of unhealthy food, as well as increasing different programs to help customers identify strategies for obtaining healthy meals at fast food outlets.
- In the canteen, healthy foods like dhokla, idli, etc. can be sold instead of fast food.

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CLUSTERING OF NON-INVASIVE CARDIOMETABOLIC RISK FACTORS IN ADULT INDIAN WOMEN

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ABSTRACT

The prevalence of cardiometabolic disorders like hypertension, diabetes mellitus and cardiovascular disease continues to rise across India. Menopausal transition is associated with a clustering of cardiometabolic risk factors. In the present cross-sectional study, the prevalence of non-invasive cardiometabolic risk factors was assessed using a pretested questionnaire in 792 women aged 30-70 years enrolled from the cities of Vadodara and Surat (Gujarat, India). Around 51.1% of the subjects were found to be prehypertensive/hypertensive. The prevalence of obesity and overweight was found to be 61.5% and 15.5% respectively. Low levels of physical activity were reported in 96.7% of the subjects. Majority of the subjects (62.9%) had three or more risk factors. Such a multiple risk factor scenario was seen among women across all stages of menopausal status. Risk factor modifications targeting premenopausal women are worthwhile to prevent the development of cardiometabolic disorders in association with menopausal transition.

Key Words: Cardiometabolic risk factors, menopausal transition, Indian women, hypertension, obesity

INTRODUCTION

India's burden of cardio-metabolic disorders like hypertension, diabetes mellitus and cardiovascular disease (CVD) is escalating relentlessly. Exacerbating this burden are the problems of cardio-metabolic multi-morbidity and the fact that many people remain undiagnosed due to lack of awareness. Results from the great India blood pressure survey conducted across 24 states and union territories of India revealed that the overall prevalence of hypertension was 30.7% (Ramakrishnan et al., 2019). The proportion of adults with hypertension in India who are aware of their diagnosis, are treated, and achieve control is low (Prenissl et al., 2019). In adults aged 20 years or older in India, the crude prevalence of diabetes increased by 39.4% from 5.5% in 1990 to 7.7% in 2016 (Tandon et al., 2018). The prevalent cases of CVD in India increased from 25.7 million in 1990 to 54.5 million in 2016 (Prabhakaran et al., 2018). Behavioural and biological risk factors like use of alcohol and tobacco, overweight and obesity, physical inactivity, increased salt and saturated fat intake, low fruit and vegetable intake, raised blood pressure, blood glucose and total cholesterol (TC) levels are associated with the development of such non-communicable cardiometabolic disorders (World Health Organization, 2014).

Sex differences have a significant impact on the pathogenesis of metabolic disorders. Substantial increases in absolute risk of CVD occur in midlife, as women experience the cessation of menses and beyond (Matthews et al., 2001). Menopausal transition is also associated with

impairment of insulin secretion and insulin sensitivity and an increase in the risk of type 2 diabetes mellitus (T2DM) (Slopian et al., 2018). Such sex differences warrant a heightened focus on understanding the distribution and clustering of cardiometabolic risk factors in women that are closely linked to increasing trends in obesity and a sedentary lifestyle. In this context, the present study was planned with the following objective:

OBJECTIVE

To assess the prevalence of non-invasive cardiometabolic risk factors like abdominal obesity, physical inactivity, hypertension and low fruit and vegetable consumption in the free-living population of women aged 30-70 years from two cities of Gujarat state namely Vadodara and Surat.

HYPOTHESIS

Non-invasive cardiometabolic risk factors like abdominal obesity, physical inactivity, hypertension and low fruit and vegetable consumption are not present in women aged 30-70 years.

METHODOLOGY

In this cross-sectional study, 30-70 year old female subjects were enrolled from the free living population of two major cities, Vadodara and Surat (Gujarat, India). In all 792 subjects including 395 subjects from Vadodara and 397 subjects from Surat were enrolled for the study using snowball sampling method. Information regarding medical history, family history of diseases, lifestyle practices, dietary habits, physical activity and background information was collected using a semi-structured pre-tested questionnaire. Anthropometric measurements of height, weight, waist circumference (WC) and hip circumference were taken using standard methods. Body fat percentage was measured using an Omron body fat monitor (Model BF 306). Blood pressure measurements were made using an Omron SEM-1 automatic blood pressure monitor. Results are expressed as Mean \pm S.D and percentages. The statistical analysis was carried out using Microsoft® Office Excel 2003. The study was approved by the Institutional Medical Ethics Committee.

RESULTS AND DISCUSSION

The mean age of the subjects was 43.9 ± 9.6 years with majority of the subjects being in the 30-59 years age group. Majority of the subjects (54.2%) were found to be premenopausal, and 27% subjects were in the postmenopausal group (Table 1). The mean age for premenopausal, perimenopausal, postmenopausal and hysterectomised subjects was 37.2 years, 45.5 years, 54.5 years, and 50.4 years respectively.

Table 1: Distribution of Subjects Based on Menopausal Status (n = 792)

| Status | N (%) | Age in years (Mean \pm SD) |
|------------------------|--------------|--|
| Premenopausal | 430 (54.3) | 37.2 \pm 5.6 |
| Perimenopausal | 70 (8.8) | 45.5 \pm 5.1 |
| Postmenopausal | 214 (27) | 54.5 \pm 5.7 |
| Hysterectomised | 78 (9.8) | 50.4 \pm 6.9 |

In a cross-sectional study conducted to assess the prevalence of menopausal symptoms in postmenopausal women aged 40–60 years in urban Belagavi, Karnataka, the mean age among study participants was 52.04 years (Pathak & Shivaswamy, 2018).

Majority of the subjects reported having a family history for hypertension (53.2 %) followed by diabetes (45.2%) and coronary heart disease (CHD) (21.8%). In a cross-sectional survey conducted among 5000 Sri Lankan adults, the prevalence of hypertension was significantly higher in females with a family history of hypertension (52.2%) than those without a family history (47.8%) (Ranasinghe et al., 2015). A study by Das et al. (2012) found that adult Asian Indian females with a positive family history of T2DM had relatively higher prevalence of metabolic syndrome as compared to males. Parental CVD has been found to independently predict future offspring cardiovascular events in middle-aged men and women (Lloyd-Jones et al., 2004).

Self-reported medical history revealed the prevalence of hypertension to be 22% (Table 2). Based on the Joint National Committee 7 criteria (National High Blood Pressure Education Program, 2004), 15.3% and 13.8% subjects were newly diagnosed as prehypertensives and hypertensives respectively, taking the total tally to more than 50% signifying the need to monitor blood pressure regularly.

Table 2: Self-reported Medical History of the Subjects (n = 792)

| Medical Condition | N (%) |
|------------------------|----------|
| Hypertension | 174 (22) |
| Diabetes Mellitus | 65 (8.2) |
| Dyslipidemia | 24 (3) |
| Coronary Heart Disease | 6 (0.8) |

In the Korean Genome and Epidemiology Study, women with prehypertension and hypertension were at higher risk for diabetes than normotensive women (Kim et al., 2015). Self-reported prevalence of diabetes mellitus in the present study was 8.2%. Excess risk of heart failure associated with diabetes has been found to be significantly more in women with diabetes as compared to men with diabetes (Ohkuma et al., 2019).

A rising trend in the prevalence of diabetes and hypertension was observed across the physiological stages of menopausal status (Table 3). The prevalence of dyslipidemia was higher in perimenopausal, postmenopausal and hysterectomised subjects as compared to premenopausal subjects.

Table 3: Distribution of Self-reported Disease Profile According to Menopausal Status

| Disease Condition | Pre-menopausal (n = 430) N (%) | Peri-menopausal (n = 70) N (%) | Post-menopausal (n = 214) N (%) | Hysterectomised (n = 78) N (%) |
|-------------------|--------------------------------------|--------------------------------------|---------------------------------------|--------------------------------------|
| Hypertension | 53 (12.3) | 21 (30) | 74 (34.6) | 25 (32.1) |
| Diabetes Mellitus | 15 (3.5) | 4 (5.7) | 36 (16.8) | 8 (10.3) |
| Dyslipidemia | 3 (0.7) | 5 (7.1) | 13 (6.1) | 3 (3.8) |

A cross-sectional study among 245 women aged 20 to 65 years from North Delhi, India found that postmenopausal women had significantly higher blood pressure as compared to their premenopausal counterparts (Tyagi et al., 2015). In the Toranomon Hospital Health Management Center Study 17, compared with premenopausal women, women after natural menopause had an age-adjusted odds ratio of 1.40 for diabetes, and women after menopause by surgical or other causes had an age-adjusted odds ratio of 1.59 (Heianza et al., 2013). TC, low density lipoprotein (LDL) cholesterol, triglycerides, and lipoprotein(a) have been found to peak during late peri- and early postmenopause, with minimal changes in the early stages of menopause along with a two-fold risk of LDL cholesterol above recommended levels in early postmenopausal women compared with premenopausal women (Derby et al., 2009).

Based on the Asia Pacific classification (World Health Organization (WHO) Expert Consultation, 2004), 61.5% subjects were obese and 15.5% of the subjects were overweight. Around 87.7% subjects had WC values ≥ 80 cm and 86% subjects had waist-hip ratio values >0.85 indicating a high prevalence of abdominal obesity in both the cities. Based on the body fat cut-offs (30% for women) suggested for obesity (Position of the American Dietetic Association & the Canadian Dietetic Association, 1993), most of the women in Vadodara (86.1%) and Surat (82.1%) were in the obesity category. The change in the hormonal milieu at menopause is associated with increases in total body fat and abdominal fat (Davis et al., 2012). The prevalence of obesity was higher in postmenopausal subjects (70.1%) as compared to premenopausal subjects (57%) whereas the prevalence of overweight was higher in premenopausal subjects (15.6%) as compared to postmenopausal subjects (12.6%). A rising trend in the prevalence of abdominal obesity as assessed by WC values was observed across the physiological stages of menopausal status with the highest prevalence in hysterectomised subjects (96.1%) and the lowest in premenopausal subjects (83.9%). In a cross-sectional study on 646 rural women in China, postmenopausal women had a higher prevalence of general obesity and abdominal obesity than premenopausal women (Chen et al., 2021).

Data on self-reported physical activity pattern of the subjects revealed that majority (96.7%) of the subjects were involved in sub-optimal levels of physical activity i.e. less than three hours/week. These low levels of physical activity could be partly responsible for the high prevalence of obesity amongst the study subjects. Data from the national noncommunicable disease monitoring survey (NNMS) conducted among adults aged 18-69 years in India, revealed that 52.4% women were physically inactive in comparison to men (30.9%) (Mathur et al., 2021). In a prospective, population-based study on 21729 men and women aged 45-79 years with a 11.4-year follow-up, it was reported that in both sexes, active participants were less likely than inactive participants to have diabetes, to be obese and to have an elevated blood pressure. Active participants were also found to have the lowest TC, LDL cholesterol and triglyceride levels (Arsenault et al., 2010).

Fruit and green leafy vegetables (GLV) consumption data revealed that 33.1% subjects reported daily consumption of fruits, a practice that needs to be encouraged. Around 17.3% subjects reported that they never consumed fruits. The consumption of GLV was also sub-optimal with 28.9% subjects reporting twice/week consumption of GLV as opposed to the recommended daily consumption. Average reported consumption of fruits and/or vegetables as per the NNMS conducted in India was two servings per day which is much less than the WHO recommendations (Mathur et al., 2021). In the Women's Health Study, a significant inverse association between fruit and vegetable intake and CVD risk was observed (Liu et al., 2000). A meta-analysis of prospective

cohort studies indicated a 6% lower risk of T2DM per one serving/day increment of fruit intake and a 13% lower risk of T2DM per 0.2 serving/day increment of GLV intake (Liet al., 2014).

Eating out of home is associated with higher total energy intake, fat intake, and a lower micronutrient intake (Lachat et al., 2012). Around 27.1% subjects from Vadodara and Surat reported eating out 2-5 times in a 15-day period. In a case study of 128 urban Malaysian women, consuming meals outside was negatively correlated with healthy eating index (HEI) score with decreased vegetable intake being a key factor (Karupaiah et al., 2013). Results from a T2DM multi-ethnic cohort revealed that women who ate frequently outside the home significantly consumed 2.9% more energy from fat, 34% more total calories, and had an almost nine-point lower HEI-2010 score and four-point lower Dietary Approaches to Stop Hypertension score as compared to women who did not eat meals outside the home (Pachucki et al., 2018). In the Black Women's Health Study, positive associations were found between frequent consumption of certain types of restaurant meals and risk of T2DM (Krishnan et al., 2010). In a study by Mohamed et al. (2018) on adult female nurses, 75% nurses with a high Framingham risk score for CVD were reported to eat outside home one-two times weekly as compared to 24% and 12.9% of nurses with a moderate and low Framingham risk score respectively.

A greater burden of metabolic syndrome risk factors has been reported to be associated with greater risk of CVD and diabetes mellitus (Wilson & Meigs, 2008). The individual cardiometabolic risk factors considered in the present study were (1) family history of disease, (2) physical inactivity, (3) low fruit intake (\leq three times/week), (4) low intake of GLV (\leq three times/week), (5) eating out frequently (\geq two times/15 days), (6) body mass index (BMI) (\geq 23), (7) WC (\geq 80 cm) and (8) hypertension. A multiple risk factor scenario was found to be present in the study subjects (Figure 1). Disturbingly, majority of the subjects (62.9%) had three or more risk factors. Mean risk factor score among premenopausal, perimenopausal, postmenopausal and hysterectomised subjects was 3.03, 3.04, 2.80 and 2.96 respectively.

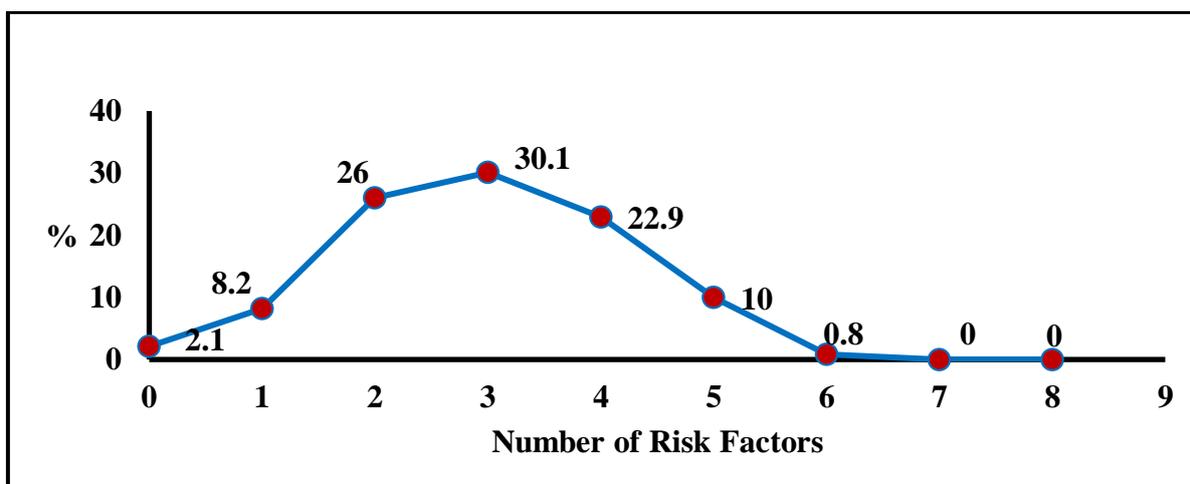


Figure 1: Multiple Risk Factor Scenario Among the Subjects

The presence of multiple risk factors among women across all stages of menopausal status is a cause for concern. A study on postmenopausal women where a sedentary lifestyle, hypertriglycerolaemia and a high level of abdominal fat were considered to be risk factors found that women with two risk factors or more had significantly higher mean levels of non-esterified fatty acids and homeostatic model assessment-insulin resistance (Diniz et al., 2015).

CONCLUSION

A high prevalence and clustering of multiple cardiometabolic risk factors like aberrated blood pressure, obesity and a sedentary lifestyle was found among adult Indian women in this study. With CVD appearing as the primary cause of death in all parts of India (Prabhakaran et al., 2016) and with India slated to become the diabetes capital of the world, it becomes imperative to prioritize the prevention, treatment, and control of cardiometabolic risk factors. Premenopausal women form an easily identifiable group at which risk factor modifications could be targeted in order to prevent the development of cardiometabolic disorders in the postmenopausal years. Frequent monitoring will be required for early detection of cardiometabolic risk during premenopausal years. Measures must be put in place to generate awareness regarding preventive strategies in order to reduce the burden of the considerable risk factor changes that occur during and after the menopausal transition. There is a need to focus on these cardiometabolic risk factors early on in life especially the adolescent stage and sustain it throughout the lifespan. Integrated healthful lifestyles need to be promoted as measures to combat early development and progression of cardiometabolic risk factors and to improve the quality of life.

Recommendations for Further Studies

Studies that include metabolic risk factors like blood glucose and total cholesterol levels in addition to the non-invasive risk factors need to be carried out for studying their association with menopausal transition and developing preventive strategies.

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YOUNG ADULTS WITH VISUAL IMPAIRMENT: THE CHALLENGES IN SOCIAL INCLUSION

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ABSTRACT

The study was undertaken to document the challenges that young adults with visual impairment (YAVI) face in getting socially included in their day-to-day life. For collecting the data, in-depth interviews and a self-constructed checklist were administered on 20 participants aged 18-35 years, the participants were residing in New Delhi (India), and were selected through purposive and snowball sampling techniques. The data was analysed descriptively using thematic analysis. Various themes emerged from the findings: attitudinal challenges at majorly three levels: self, familial and societal, discrimination and exclusion, infrastructural challenges, and perceived limited prospects.

Keywords: visual impairment, social inclusion, challenges, young adults, thematic analysis

INTRODUCTION

Strength lies in differences, not in similarities- it is how each unique individual can be valued. Their individualized unique experiences and strengths can prove beneficial for themselves and for the society they are a part of. Hence, the essence of mainstreaming individuals with visual impairment should be multi-tiered such as intrapersonal, interpersonal, infrastructural, and in terms of socio-cultural, political, and economic activities.

The focus of social inclusion is to create a better space emphasizing the persons with disability so they can make use of their abilities and feel like a part of society. Social inclusion can be looked upon as an approach which tries to put forward efforts that ensure equal opportunities to bring out the full potential of individuals. It is a kind of multi-dimensional process which aims to create accommodations for increasing participation and decision making in all spheres of life. As a consequence, enable individuals with disabilities to have an independent life ahead, a positive sense of self, more involvement, and interactions with others, benefits from support services for their betterment, and brings them from the verge of marginalization to mainstream society.

The inclusion of people with disabilities is increasingly prioritized in development programs and national agendas (UN Flagship Report on Disability and Development, 2018, p. 41).

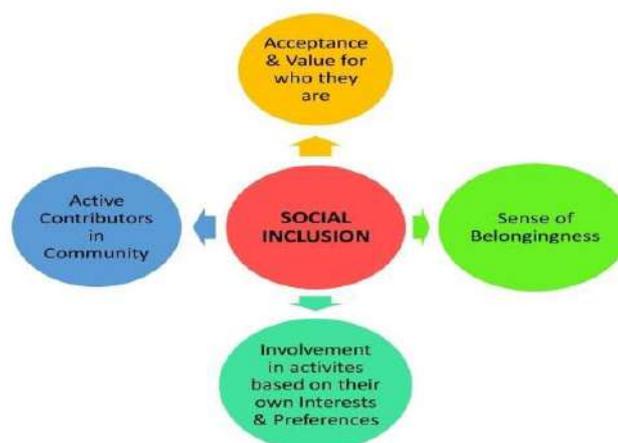


Figure 1: Elements of Social Inclusion

Social inclusion can be considered a dynamic and multifaceted concept presuming complex correspondence between individual pathology and environmental factors. To be included demands skills and attributes which can be flourished through experiences (Lemay, 2006 in Wadeaonkar, 2017). And regarding experiences to be brought forward, there must be various support systems like family, education, work setting, and social services through which they can perceive their importance and work on improving their abilities (Kumari, 2011); the findings are of the view that individuals have adjusted well in their lives with available support systems that society offers, positive behaviours by other members, their engagement in unskilled sectors due to rejection and negative attitudes of members of organizations made them think of facilities they need- financial support, more opportunities, family assistance, and more awareness so that there are no more barriers in their success. The opportunities directly depend on the quality of support they get. There can be different means of opportunity providers like family, peers or friends, mentors or teachers, and/or co-workers. Providers can keep in mind to embrace support rather than a caring role, which takes the side of sympathy.

The 2030 Agenda for Sustainable Development Goals (SDGs) were adopted at the United Nations Summit in New York, 25th – 27th September 2015. It highlights 17 SDGs and 169 associated targets. The SDGs aim to achieve and alter their outlook to be inclusive and people-focused thus 'leaving no one behind'. This aim 'Leaving no one behind' is built on the Millennium Development Goals and plans to complete what could not be achieved through them.

LITERATURE REVIEW

Research conducted by UN Support to Social Inclusion in Albania Programme (2015) qualitatively concluded some themes- changing realities, lack of physical access and adaptability, poor access to information and knowledge and rehabilitation services, treatment costs, vulnerable family circumstances, neighbourhood attitudes, poor law enforcement and limited political voice and

action and change, which hinder social inclusion and showed an inclination for the excluded population.

O'Donnell (2014) did a study to investigate if blind people are employed and the types of barriers they face while looking for employment, the findings revealed negative trends in employment, regardless of laws and provisions for the blind.

A UK-study conducted among 16–19-year-olds focused on analysing the quality of life among visually impaired individuals (Robertson et al., 2021). It brings forward daily life challenges and how these shape those persons' futures. One of the major themes was self-development reflecting Erikson's stages of development (the stage of identity versus identity crisis).

Kasiram and Subrayen (2013) in their exploratory South African-study mentioned about social inclusion of students with visual impairment at a tertiary institution and aspects affecting it include abuse of power, exclusionary practices, violation of human rights at university, sexual exploitation, lack of acknowledgement of differences by sighted students reflecting disrespect and absence of reasonable accommodation. It brings forward intertwined factors with disability such as poverty, being biased, confinement, right to voice and being heard, and discrimination in everyday settings like schools and community and high levels of intolerance.

OBJECTIVES

The study aimed to identify obstacles that YAVI encountered while getting socially involved in their day to day lives. It also tried to bring forward factors hindering active and inclusive participation in the mainstream activities of their immediate surrounding(s).

Hence, the objectives were:

- To gain insight into the lives and day-to-day experiences vis-à-vis notions of social inclusion of YAVI
- To document the challenges faced by YAVI in being socially included

METHODOLOGY

Aim

The study was designed to document the challenges faced by YAVI in getting socially included in their day-to-day life experiences.

Sample

The target participants included 20 YAVI between 18-35 years of age, of which 14 were men and six women participants. The participants were selected through purposive and snowball sampling techniques identified through non-government organizations located in New Delhi, India. The distribution of participants is depicted in the table below (Table1: Distribution of participants among institutions).

Table 1: Distribution of Participants among Institutions

| Sex of participant | School/College going | Working out of home | Stay at home |
|--------------------|----------------------|---------------------|--------------|
| Male | 11 | 2 | 1 |
| Female | 3 | 2 | 1 |

Tool(s)

An in-depth interview comprising subheads such as relationships, recreation, education & employment, and participation in socio-cultural, political, and/or economic activities and a self-constructed checklist with aspects like self-advocacy skills, orientation & mobility skills, physical environment, communication, participation, and support were administered.

Data analysis

The collected data was analysed descriptively keeping in mind the objectives of the study. Thematic analysis was used to emerge relevant themes. Individual responses were added verbatim to support the findings.

Ethical considerations

This study was done under the Department of Human Development and Childhood Studies, Lady Irwin College, University of Delhi, New Delhi, India, and the proposal was approved by the Institutional Ethics Committee (IEC). All the participants gave their informed and verbal consent, thus participating voluntarily.

RESEARCH FINDINGS AND DISCUSSION

Thematic network

Such networks are ways of visually representing data into themes or the idea of that particular study. It focuses on identifying relevant explanations which can be inferred from the data thus providing for better scope and direction for further investigations and implications. A thematic network can consist of hierarchical levels of themes identified from the data- basic theme, organizational theme, and global theme (Akinyode& Khan, 2018).

From the collected data, a thematic network (*Fig.2.*) has been created in line with objectives of the study. In figure 2., themes can be recognised as

- Global theme- Challenges faced by YAVI
- Organizational themes- Attitudinal Challenges, Infrastructural Challenges, Discrimination, and Exclusion and Limited Prospects
- Basic themes- Self, Familial, Societal; Public Places, Educational Institutions, Devices, and Facilities

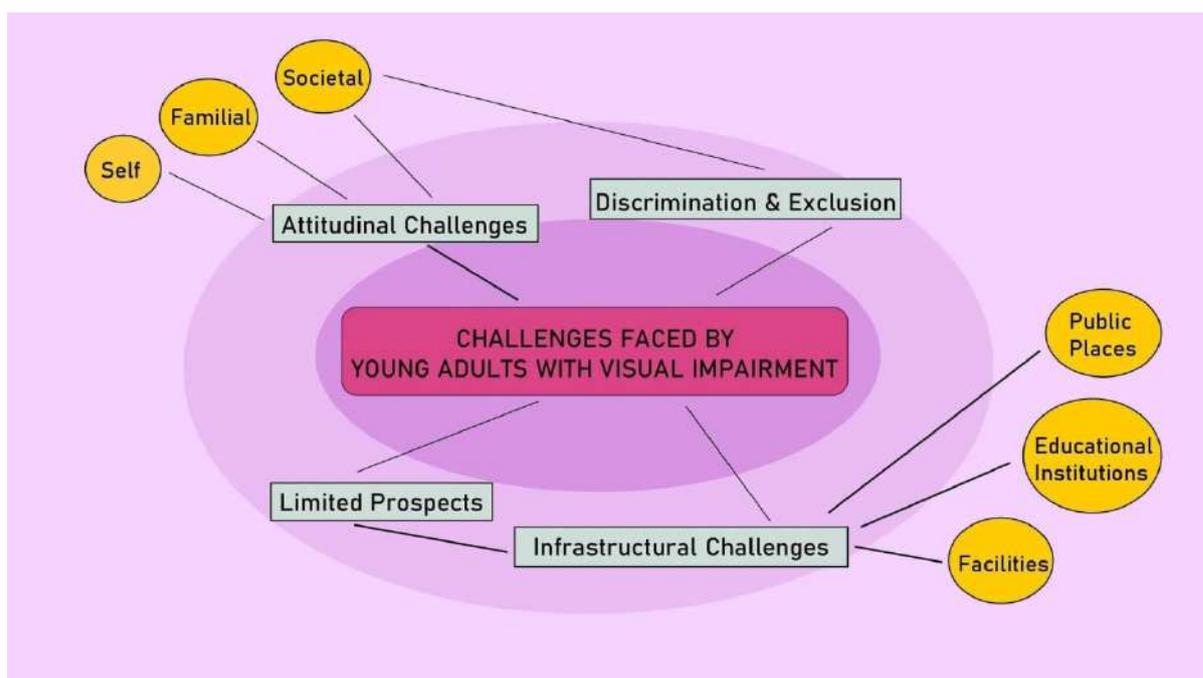


Figure 2 Challenges faced by YAVI

Attitudinal Challenges

Self. Findings revealed the negative impact of derogatory remarks on the self-esteem of participants and living with constant feelings of inferiority further leading to perceived inadequacy and weakness thus creating dependence and self-doubt. The negative connotation impacts YAVI's socio-emotional development and aspects of self thus restricting the 'strive for superiority' as Adler puts up (Shaw, 2012). YAVI shared instances where they have been taken to wrong places or been misguided & looted by some sighted fellows. They looked for support to help them move forward and not instances reflecting tasks they are unable to perform. Studies have shown that individuals with visual impairment have negative self-perceptions over sighted peers (Papadopoulos et al., 2009).

Familial. One of the participants mentioned his grandmother always used to complain to his parents since he is the only brother to his sisters, "एक ही बेटा है. दिखतातो कितना अच्छा होता, हम लोगों के बूढ़ापे का सहारा बनता, अब क्या ही कर सकते हैं इसका?" (We have only one brother and sister. If he could see it would have been good and he would have supported us, but now what can we do?). Kumari (2011) has shown that parents suffer due to the stigmas attached to their offspring (Goffman, 1963). Six participants reported that the attitude of neighbours and relatives is vexing-many times they are not allowed to attend family functions or religious events in their community and when they try, they are looked down upon. However, six of them reported that they had never felt ignored, criticised, demotivated, or abused by their parents.

Societal: “One pathetic experience I can never forget is people come and talk to us and become friends. They make our videos viral among media platforms, it becomes very shameful for us.” Such responses, which bring the sad reality of our society to the fore, were received from the checklist, the lack of respect and dignity from the members of the society. One of the participants expressed how the neighbour living adjacent to them, used to put pressure on her mother to send them to the hostel so that they are free to attend any social functions. Most of them complained about being judged just by their looks. When society is not ready to accept them for who they are, efforts extended to create an inclusive milieu will continue to get wasted. “We are not able to express ourselves; we are already underestimated, we want to interact with others and tell them we are like everyone else”. These feelings conveyed by YAVI are evident from the fact that there is still a long way to go to sensitize people. Even during their university period, they reported facing several difficulties like the negative attitude of the teachers, sighted students, and authorities.

Discrimination and Exclusion

Most of the participants had experienced discriminatory attitudes from neighbours and relatives. They usually faced negative comments and discriminatory acts like not letting them attend a family function. Some people call them “the result of karmas”, others call it black magic performed by parents’ enemies. This was generally when the issue was congenital or acquired; these instances have lessened post-migration to bigger cities and having known that they are studying or working. One participant shared an experience of travel, “Bus driver told me once when I asked thrice which stop it was, चढ़ताक्यूँहैजबनहींआताहैसमझमें?” (Why do you get on the bus when you know you will not understand anything). To this, the respondent also narrated, “बसमेंटॉकरहोताहैचलातेनहींहैयेलोग, स्टापकेबारेमेंलोगोंसेदसबारपूछोतोएकबारबतातेहैं।” (“There are talkers in the bus, but they don’t use them and then I ask people 10 times about the stop and they answer once”). Three of them narrated incidents of stabbing and snatching (phone and money) at the bus stop near Delhi Secretariat, on the bus, and while being taken on the wrong route. Another respondent added, “जबग्रूपमेंजाताहूँतोठीकरहताहै, अकेलेजानेमेंबहुतदिक्रतआतीहै।” (“When I go out with my group it is fine, but when alone, there arise a lot of issues”). They also reported facing neglect & instances of stereotypical behaviours from college teachers, thus, resulting in compelled exclusion like less involvement in outdoors activities, believing they are less than any other normal individual and putting them in a ‘minority category’ under unreasonable classification, not giving weight to their recommendations or ideas during discussions.

Limited Future Prospects

Major deficits in terms of accessibility & availability- lack of educational institutions, facilities relating to the visually impaired, infrastructural demands and opportunities. They reported lesser prioritization in mainstream classrooms. Also, they experienced very rarely or no leadership positions being provided in different social settings: educational, work, social, or public places. At work, they highlighted fewer or almost no experiences of promotion. For authoritative and/or supervision roles, they were not preferred as part of the organization as they felt they were underestimated and thought of as less competent in comparison to the sighted employees.

Infrastructural Challenges

Public Places- Commute. Issue arose while asking others about the bus stop & waiting to cross the roads reflecting dependence on others. One of the participants added that, when they are in a group and they cross roads, people stop by themselves, but when alone it gets almost impossible for them. It also came out from the checklist that YAVI visiting school/college preferred google maps and other travel applications rather than having a human guide with them. Also, as most of the participants were from other regions, they frequently visit their parents & families by train. Hence, they highlighted the importance of having separate buggies with talkers. For local travelling, the majority considered the metro a better option than bus but mentioned being expensive for daily commute due to money constraints. Over friendliness was not appreciated. However, getting a seat in public transport was not an issue due to the seat reservations.

Public Places- Work. Wagner et al. (1992) report that students with visual impairments spend the greatest amount of time in regular education classes, have higher graduation rates, have higher rates of post-secondary education, but lower rates of competitive employment and higher rates of life skills training post-graduation in Kumari (2011). Although not many challenges were reported by the four employed YAVI, one of them reported that working at the desk- “without ample light at my desk it is problematic to work”, to which they added that even after multiple complaints, the tube light has not been changed at her desk. Additionally, sometimes people feel hesitant to talk to us and ask queries. It poses a competitive situation concerning sighted peers. Moreover, a major hindrance in the employment sector is that there are no or very rare minimum chances of getting promoted. Kumari (2011) also argued that many did not get a promotion in their jobs due to their impairments. They, moreover, faced discrimination in salary, leadership and promotion avenues. They reported not being considered competent enough to handle any ‘major work’ responsibility.

Facilities. It came out that there is an urgent need for tech devices for attaining education. The majority reported that their home in their hometown did not have many such facilities and resources, limited finances, and kinship of lower middle socioeconomic status. If they wanted to see a doctor, they had to visit a nearby city as there was a dearth of qualified and trained doctors in their villages. They mentioned that there are better facilities, availability of resources, and opportunities in Delhi in comparison to the region they hailed from. One of crestfallen YAVI expressed, “करप्शन बहुत है यहाँ पे, हर लेवल पे है, इतने घपले होते हैं अंदर-अंदर सब पैसा खा जाते हैं और हमको कोई सुविधा नहीं मिलती, मिलती है तो आधा या बचा हुआ।” (“There is a lot of corruption at every level, a lot of mismanagement happens within the system. Everyone wants money only and no services to be given away to us; and even if we get any services, they are very few or left”). He added, “एक बार कैम्प लगा था जिसमें डिजिटल प्लेयर देना था हम लोगों को उसकी जगह स्टिक दे गए और जितने पैसे बचे होंगे सब खा गए पर्सनल कंप्यूटर की होती है हमको नहीं समझ आती, ब्रेल में नहीं होती ना हमको पागल बना देते हैं।” (“Once there was a camp organised in which we were to be given Digital players but they offered us sticks instead and had all the money which was left from the fund, slip is printed from the computer so we can’t read it because it is not in Braille and then they make us fool”). A participant who was fed up with the change of Aadhaar Card Centre without any prior information told, “मैं फोटो अपडेट करवाने गया था अब बिना बताए ऑफिस शिफ्ट कर लेते हैं फिर बहुत दिक्कत आती है।” (“I went to get my Aadhaar card photo updated they shifted the centre from Jhandewalan to some new place without any prior information; these matters are troublesome”).

Educational Institutions- School. Participants complained about the lack of facilities like recorders, Braille textbooks, overloaded syllabus, provisions and availability of resources. Besides, there is lack of hostels and dormitories. Moreover, four participants mentioned issues in completing their assignments and file work along with struggling with the syllabus. One of them expressed, “क्लासमें समझ नहीं आता कुछ, खुद ही पढ़ना पड़ता है यूट्यूब से।” (“I don’t understand anything in class, all I do is self-study with the help of YouTube”), another participant added, “टीचर इतना तेज़ बोलती है समझ नहीं आता टाइम लग जाता है।” (“Teacher speaks at a fast pace in the classroom and I don’t understand at that pace I need more time to understand”). Additionally, one said, “सिलेबस इतना ज्यादा है पूरा नहीं हो पाता और ब्रेल में मिलतान ही है।” (“Syllabus is vast. I am not able to complete it and it is not available in Braille too”). They conveyed the need for more special educators and visually impaired staff who may empathise with them. They also complained about recording for which although they have a resource room on the school premises, there were instances of noise as they got time to record only during break and they did not get time for lunch if they devote time for recording. For assignments, two participants mentioned the struggle when they have to make a greater number of pages file like that 20 or more. They also, sometimes, require extra time to complete. One of the participants reported, “एक बार इग्जैम के आसपास रिकॉर्डर खराब हो गया था और नयान ही मिल पाया मैंने बहुत मुश्किल से पढ़ा और इग्जैम दिया।” (“Once, during my exam, my recorder met with an issue and didn’t work & due to this unavailability of the recorder, I had to somehow prepare for my exam without recorder; it was a challenging situation”). Also arranging writers for exams stands to be their sole responsibility making it troublesome.

Educational Institutions- College. In higher education, they faced several difficulties: negative attitude of the teachers, sighted students and authorities, non-availability of textbooks in alternative formats like Braille, the problem of the scribe, and many times financial inability. Others include: speed of delivery of lectures and following blackboard writing & struggling with classroom instructions, absence of counselling services, lack of visual readers, adjustment issues with peers, and daily college life. Further, the noise of Braille machines made their presence disturbing for others due to which, at times, some teachers did not approve of using Braille.

CONCLUSION AND IMPLICATIONS

“Alone we can do so little; together we can do so much”. This line by Keller (n.d.) holds so true in the current study. The person-in-environment framework emphasises that the individual is the agent of change and the environment shapes his or her experiences highlighted in the report on the World Social Situation, 2016 (Department of Economic and Social Affairs, United Nations, 2016).

Along similar lines, social inclusion can be linked to the individual’s development to the surroundings he or she gets (Bronfenbrenner, 1979) in Rosa & Tugde (2013). The person and environment share a driving relationship, in which the former includes social networks, political and economic systems, services, and policies which act as facilitators and not barriers.

Some major challenges: at the home front (parental worries, the attitude of extended family members and neighbours, challenging belief systems, finances); school (attitude of teachers & peers, unavailability of special educators or assistive devices); college (lack of support from peers and teachers, curriculum adaptation); a lack of equal opportunities, issues in public commuting;

cases of theft, ill-treatment and of being misled. Moreover, a lack of understanding to acknowledge their needs, infrastructural demands, and attitudinal issues reminds them of their inabilities and hence, minimal interaction with others.

YAVI frequently found themselves limited in terms of opportunities, provisions, and services provided as a consequence of social rejection, exclusion, discriminatory practices, architectural or infrastructural barriers, inaccessibility to transport, and relationships (interpersonal barrier).

Erikson (1958, 1963) in Syed & McLean (2017) through the psychosocial theory mentions the stage of intimacy versus isolation, which can be related to discriminatory attitudes of people thus leaving YAVI in isolation and on contrary, how positive interactions can bring the stage to the other side 'intimacy'. Some of the strategies could be working for them and with them (the need for this current research study); awareness and sensitisation drive with school children as bullying and teasing was mostly reported during school years; meaningful engagement at different levels.

It creates an urgent need to spread more awareness & sensitize people. This can aid the pre-notion of associating 'disability as a hindrance'. The study tried to bring forward major challenges which could be inhibitors to the achievement of sustainable development goals, envisaged for the year 2030 and a 'society for all' in terms of social inclusion. The anticipatory idea of social inclusion in conclusionary sync with the study includes- an attempt to promote a sense of belongingness, identifying specific needs in adjusting to mainstream society, being welcomed wholeheartedly, given recognition for their uniqueness, and building & sustaining positive relationships.

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EMOTIONAL STABILITY AND SUBJECTIVE WELL-BEING OF PARTIALLY AND TOTALLY BLIND CHILDREN STUDYING IN SPECIAL SCHOOL

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ABSTRACT

Subjective well-being is experiencing life to the fullest and improving the experience, whereas emotional stability allows a child to develop an integrated and balanced manner of seeing life's challenges. In the case of visually impaired children studying in special schools, communication and social interaction with the normal peer groups, the two important factors for developing emotional stability and subjective well-being get restricted due to their exclusivity. The present study was undertaken to find out the emotional stability and subjective well-being of visually impaired students studying in special schools. The findings of this study would be very useful not only in drawing the guidelines for special education programs and practices based on empirical evidence but also in designing intervention programs to improve the emotional stability and subjective well-being of visually impaired children. Data were collected from 80 visually impaired students including 48 partially blind and 32 totally blind students, studying in a special senior secondary school in Ajmer, Rajasthan using purposive sampling techniques. The Emotional stability of visually impaired children was measured by the Emotional stability test for visually disabled children (ESTVDC), developed by Sen, Gupta & Singh (1985) and the subjective well-being was measured with the Subjective well-being inventory (SUBI), developed by the World Health Organization (WHO) in 1992. The findings of the study showed no significant difference in emotional stability and subjective well-being among partially blind and totally blind children studying in a special school. As far as the level of subjective well-being among visually impaired children was considered, they were found with neither very low nor very high but with a medium level of subjective well-being (75% among partially blind and 68.8 % among totally blind students). However, a positive correlation was found between emotional stability and the subjective well-being of visually impaired children.

Keywords: Emotional, Stability, Partially Blind, Subjective Well-being, Totally Blind, Visual Impairment.

INTRODUCTION

World Health Organization (WHO) defines blindness as visual acuity of less than 3/60 or a comparable visual loss of less than 10 degrees in the better eye with the best available correction (Jain et al., 2021). According to the World Health Organization (2021), globally, about 2.2 billion people have a near or distance vision impairment. In India, 2.21 percent of the total population (132 Cr) are disabled, and 19% of them are suffering from visual impairment. Blindness has been identified as a significant public health issue in India, and there are notable differences between the prevalence and its causes in various parts of the nation (Murthy et al.,

2005). Despite the fact that there are around 24.1 million blind persons in India, including 4 million blind children (Census, 2011), only a small percentage of them receive some level of learning (Saif et al., 2019) in inclusive or special school settings. According to the sixth education survey, there are 8633 visually challenged students engaged in integrated education programs. Approximately 15,000 visually impaired children are in schools for the blind and nearly half the causes are avoidable (Murthy, 2017; Wadhvani et al., 2020).

Vision is one of the most crucial human senses, and its loss or reduction can have serious effects on a child's life and impair their development, especially their social and psychological development (Meadows, 1980). In terms of the emotional sphere, even a minor loss of vision can have a substantial impact on one's mental stability (Komolafe, 2019). The development of visually impaired children is further shaped by a range of factors including the child's personality, family support, the ethos of the school and society, and the extent of the child's degree of impairment (Parua, 2015). Among these factors, family support is especially vital for special children who have been battling with their handicap since birth, since they begin their lives with the emotional set back of being different from others, which has a negative impact on their development (Tripathi, 2013). Visually impaired children provided with good family support feel more stable and secure in their outlook on life (Sophia & Pragathi, 2017). School is seen as an important developing system for children, after the family. Students with visual impairments frequently struggle with emotional issues at school and have trouble establishing and sustaining social connections (Manitsa & Doikou, 2020). These issues frequently serve as hurdles to school transition, negatively impacting their school performance (Komolafe, 2019) and their well-being. They must be pushed to adjust to their circumstances and experience life to the utmost (Chennaz et al., 2022). When compared to children in inclusive schools, visually impaired children in special schools are less emotionally secure (Pant & Joshi, 2016) and stable (Rani, 2011; Paura, 2015). It may be because of their interaction and self-adaptation in the environment with normal kids.

Emotional stability contributes to better subjective well-being. A person's cognitive and affective assessments of his or her life, which may include both emotional responses and cognitive judgments of satisfaction, are referred to as subjective well-being (Diener et al., 2002). The research evidence shows a relationship between subjective well-being and functional independence (Bazargan et al., 2001). Even in the case of visually impaired children, they are torn between their need for assistance from others and their desire for autonomy and independence. Also, their inability to resolve this conflict has a negative long-term impact on their subjective well-being (Nazari et al., 2020). Long-term impact results in lower levels of subjective well-being in children which is associated with negative peer relationships (Guhn et al., 2012). However, having positive relationships increases subjective well-being, which in turn promotes positive social interactions (Lyubomirsky et al., 2005; Myers, 2000). Several studies have emphasized the influence of a child's age, gender, familial history, peer relationships, economic status, education, and sight on their subjective well-being (Dinisman & Ben-Arieh, 2016; Klocke et al., 2014; Rees & Bradshaw, 2018; Strózik et al., 2016).

Additionally, on a social level, the COVID-19 lockdown restricted the interactions of children with special needs with friends, classmates, certain teachers, therapists, family members, and caretakers, which may have led to an increase in stress and behavioral issues (Altable et al., 2020; Simmons, 2020). On the backdrop of this, the present study was undertaken to find out the emotional stability and subjective well-being of visually impaired students studying in special schools. The findings of this study would be very useful not only in

drawing the guidelines for special education programs and practices based on empirical evidence but also in designing intervention programs to improve the emotional stability and subjective well-being of visually impaired children.

OBJECTIVES

1. To find out the emotional stability among visually impaired children
2. To find out the subjective well-being among the visually impaired children
3. To compare the emotional stability and subjective well-being among partially and totally blind children
4. To find the relationship between emotional stability and subjective well-being among visually impaired children

HYPOTHESES

- H1 There will be a significant difference in emotional stability among partially and totally blind children.
- H2 There will be a significant difference in subjective well-being among partially and totally blind children.
- H3 There will be a significant relationship between emotional stability and subjective well-being among visually impaired children.

METHODOLOGY

Research Design:

A 'Descriptive Research design' was followed to seek information on the current status of the respondents with regard to their emotional stability and subjective well-being.

Sample and Sampling Technique:

The study involved 80 visually impaired students studying in a special school of Ajmer, Rajasthan who were selected by using purposive sampling techniques. Out of 80 visually impaired students, 48 were partially blind and 32 were totally blind students.

Measure:

The Emotional stability of visually impaired children was measured by the Emotional stability test for visually disabled children (ESTVDC), developed by Sen Gupta & Singh (1985). Scripts of ESTVOG are developed in the Braille system. The Subjective Well-being of visually impaired children was measured by the Subjective well-being inventory (SUBI), developed by the World Health Organization (WHO) in 1992.

Procedure:

The purpose of the study and the tools to be used were explained to the school administrator and their consent was taken for data collection. Before completing the questionnaire, all of the visually impaired children were given all of the crucial and necessary instructions for filling up the questionnaires. Emotional stability tests for visually disabled children (ESTVDC) scripts were written in Braille, so it was easy for them to answer, but then all the filled responses were translated into English letters with the help of teachers of that special school as the researcher was not well-versed with reading and writing in Braille. Another test that is of subjective well-being was filled by the students verbally with the help of

their teachers and researcher as they were not in Braille form.

Statistical Analysis:

The finding was tabulated and statistical analysis was done on the basis of the mean, standard deviation, t-test, correlation, and other appropriate techniques by using SPSS 20.

RESULTS

Table1: Emotional stability among partially and totally blind children

| Type of Visual Impairment | Minimum | Maximum | Mean | Std. Deviation |
|----------------------------------|----------------|----------------|-------------|-----------------------|
| Partially Blind | 1.00 | 13.00 | 7.3542 | 3.19900 |
| TotallyBlind | 2.00 | 13.00 | 6.6250 | 2.95940 |

Table 1 shows a difference in emotional stability among partially and totally blind children. The mean value shows high emotional stability (mean=7.3) among partially blind as compared to totally blind (mean=6.6). The minimum score obtained by partially blind students on the emotional stability scale was 1 and the maximum score was 13, whereas the minimum score obtained by totally blind students on the emotional stability scale was 2 and the maximum score was 13.

Table2: Subjective Well-being among partially and totally blind children.

| Type of Visual Impairment | Minimum | Maximum | Mean | Std. Deviation |
|----------------------------------|----------------|----------------|-------------|-----------------------|
| Partially Blind | 48.00 | 98.00 | 71.2500 | 10.77329 |
| TotallyBlind | 34.00 | 90.00 | 67.7188 | 13.07111 |

Table 2 shows a difference in subjective well-being among partially and totally blind children. The mean value shows high subjective well-being(mean=71.2) among partially blind as compared to totally blind(mean=67.7). Both minimum and maximum score on the subjective well-being test was lower in totally blind children (Minimum =34, Maximum = 90) as compared to partially blind children.

Table 3: Percentile distribution of level of Subjective Well-being among partially and

totally blind children

| Type of Visual Impairment | Classification | Frequency | Percent |
|---------------------------|----------------|-----------|---------|
| Partially Blind | Low (40-60) | 1 | 2.1 |
| | Medium (61-80) | 36 | 75.0 |
| | High (81-120) | 11 | 22.9 |
| | Total | 48 | 100.0 |
| TotallyBlind | Low (40-60) | 4 | 12.5 |
| | Medium (61-80) | 22 | 68.8 |
| | High (81-120) | 6 | 18.8 |
| | Total | 32 | 100.0 |

Table 3 shows the percentile distribution of subjective well-being of partially blind and totally blind students. A majority of partially blind students, (75%) were found to have a medium level of subjective well-being whereas, 22.9 percent were having high and only 2.1percent of partially blind students were found with low subjective well-being score.

A more or less similar trend in subjective well-being of totally blind students was found. The majority of totally blind students, (68.8%) were found to have a medium level of subjective well-being whereas, 18.8 percent were having high and 12.5 percent of totally blind students were found to have low subjective well-being.

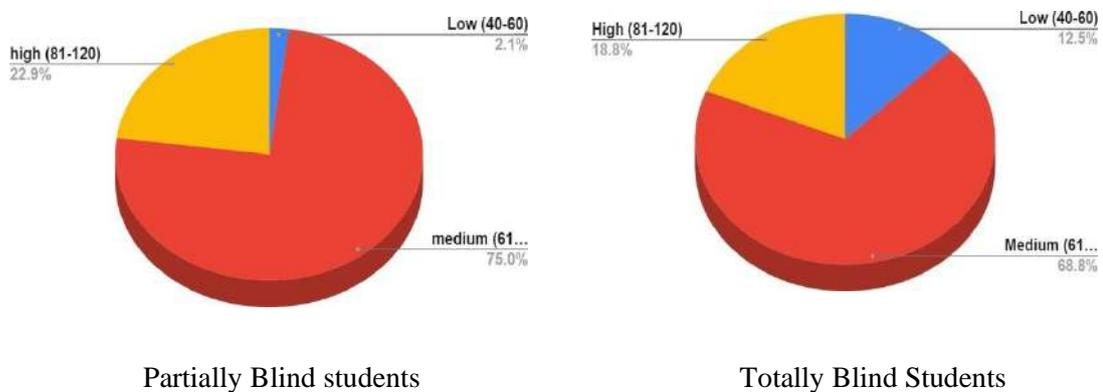


Figure1. Percentile distribution of level of Subjective Well-being among partially and totally blind children

Table 4: Mean, SD and t value of Emotional stability and subjective well-being among

partially and totally blind children

| | Type of Visual Impairment | Mean | Std. Deviation | t value | p value |
|------------------------------|---------------------------|---------|----------------|---------|-----------|
| Emotional Stability | Partially Blind | 7.3542 | 3.19900 | 1.027 | .307(NS*) |
| | Totally Blind | 6.6250 | 2.95940 | | |
| Subjective Well-being | Partially Blind | 71.2500 | 10.77329 | 1.318 | .191(NS*) |
| | Totally Blind | 67.7188 | 13.07111 | | |

*Not significant at 0.05 level of significance.

Table4 shows a non-significant difference in emotional stability ((t =1.027, p =.307), and subjective well-being (t = 1.318, p =.191) among partially and totally blind children. So, the research hypothesis which states that “there will be a significant difference in emotional stability of partially blind and totally blind students in special school” was rejected.

Table5: Correlation of Emotional stability and subjective well-being among visually impaired children

| Variables | | Total Emotional Stability | Total Subjective Well-Being |
|-----------------------------|---------------------|---------------------------|-----------------------------|
| Total Emotional Stability | Pearson Correlation | 1 | .662* |
| | Sig. (2-tailed) | | .000 |
| Total Subjective Well-Being | Pearson Correlation | .662* | 1 |
| | Sig. (2-tailed) | .000 | |

*Correlation is significant at the 0.01 level (2-tailed).

Table 5 shows a significant relationship between emotional stability and subjective well-being among visually impaired children (r=.662, p = .000). That means emotional stability is positively correlated with the subjective well-being of visually impaired children.

DISCUSSION

The purpose of this research is to look at the emotional stability and subjective well-being of partially and totally blind children studying in special schools. In personality study, emotional stability remains a fundamental issue. Behavior that reflects the outcomes of appropriate emotional development at any level is known as stable emotional conduct (Chaturvedi, 2010). The child's potential for development in terms of emotional aspects mainly depends on communication and social interaction (Parua, 2008). Relationships and emotional adjustment are fostered by effective communication and constructive social engagement, but for a visually impaired youngster, these channels are blocked, occasionally leading to emotional instability. (Pradhan, 2010). The communication and social interaction of visually impaired children with normal peer groups get more restricted in the special school setting due to their exclusivity (Pant & Joshi,2016). However, the emotional stability of partially blind children was

found higher than that of totally blind children. It may be because a partially sighted person has vision in one or both eyes, which means they can cope with a wide range of situations in their lives whereas, a totally blind children counters more difficulties and are completely reliant on others, and their interference in daily life may result in mood swings and emotional instability.

Subjective well-being was also found higher in partially blind children than in totally blind children in the current investigation. Totally blind children's limited mobility, ability to work, and reliance, contribute to their limited social interactions with others and may lead to dissatisfaction with their lives. The feeling of negative emotions such as sadness and hopelessness makes them less likely to be seen as having a high quality of life and has a negative impact on their self-concept also. According to Carmona, (2013), subjective well-being and self-esteem go hand in hand among visually impaired children. Besides this, mobility and activity constraints in the home are important mediators that explain a major amount of the impact of poor vision on well-being. Interventions that encourage successful accommodation may improve overall well-being in people who have low vision (Xiang et al., 2019).

Although the difference in emotional stability and subjective well-being among partially and totally blind children was found, but it was non-significant. The emotional stability of children is associated positively with their subjective well-being. The study of Ramos et al., (2019), found that children with higher emotional stability have higher overall life satisfaction and less worry and despair, resulting in higher subjective well-being. A child's emotional stability allows him or her to develop an integrated and balanced approach to life's difficulties.

In school, teachers should be aware of the emotionality of their students. They should aim to establish a friendly environment for the students so that they can grow emotionally stable (Kalita, 2016). The development of a sense of acceptance and belonging in the school environment, as well as the provision of practical and emotional support to these children from teachers and peers (essential components of social support), can improve the emotional stability and subjective well-being of visually impaired students in special schools (Pavri & Monda-Amaya, 2001). The development of peer relationships (West et al., 2004), the growth of feelings of acceptance (Bodaghi et al., 2017; Manyumwa, 2018), the problem-solving abilities of these kids in difficult social situations (Datta & Palmer, 2015), and the development of their social skills are all influenced by the social support that teachers and the support services that the school offers.

CONCLUSION

Subjective well-being is experiencing life to the fullest and improving the experience, whereas emotional stability allows a child to develop an integrated and balanced manner of seeing life's challenges. Visually impaired children's day-to-day challenges cause substantial disruptions in school and have a negative impact on their quality of life. They are also more likely to develop emotional and behavioral problems at school and in their home lives. Students with visual impairment are more likely to experience emotional difficulties, which can have a negative impact on their academic performance and other aspects of their development. Teachers and administrators can aid in increasing the sphere of their social interactions by organizing activities, and providing them the opportunities to interact with the outside world, and that ultimately will help in fostering their emotional stability and subjective well-being in all parts of their lives. School counselors can also play an important role in boosting their emotional stability and subjective well-being by implementing interventions at the classroom and family level. Visually impaired children should be provided with better conditions and environments at

school and at home, and the government should make a concerted effort to develop policies that provide a supportive school environment to allow them to express themselves so that they can develop better emotional stability and subjective well-being.

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DECISION MAKING IN THE CONTEXT OF ONLINE DATING: VOICES OF EMERGING ADULTS FROM VADODARA

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ABSTRACT

The present study aims to explore decision making processes among emerging adults in the context of online dating. The study followed a qualitative approach. Sixty emerging adults; 30 men and 30 women residing in Vadodara, Gujarat, India were interviewed. The study highlights perceptions about dating online, motivation for downloading dating applications, application features that attract the users' attention, preference of potential partners through online dating applications, the idea of self-presentation online, common areas for deception, safety and risks, evaluating information which altogether make the decision-making criteria. The results indicated that decision making is greatly influenced by trust. Presumptions associated with the decision are made through assessing detailed descriptions of the users as well as congenial interactions made online. The study discusses the over generalized beliefs attributed to online dating systems like the inappropriateness of online partner selection. The findings indicated that online dating applications offer a platform to judge one another, which engenders skepticism among the users. Therefore, the reconciliation between decision making and the use of technology pertaining to partner selection begins with how an individual gathers, extracts, and processes information. Hence, the study implies that emerging adults do not solely rely upon dating site matches, but decisions are driven by individual choices, expectations and compatible interactions.

Keywords: Decision Making, Online Dating, Romantic Relationships, Emerging Adults

INTRODUCTION

Emerging adulthood is a time for establishing enduring relationships. It is a time to explore and develop the important markers that guide adulthood for instance love and work (Gala & Kapadia, 2014). Decision making in romantic relationships may start from deciding whom to date, making commitments, readiness for marriage, or even breakups. The use of online dating or social media is perceived as a forum to acquaint oneself with others or explore potential romantic partners. A set of judgments are made through online interactions that guide the individuals to look into the expectations from the online dating system. Decisions are guided by several factors which may comprise impressions as well as intentions.

Emerging Adulthood

Emerging adulthood as mentioned by Arnett (2000) indicates the lengthening age span of 'adolescence' to include individuals in the age range of 18–25 years. Establishing romantic relationships and indulging in various forms of romantic acts have become an important part of emerging adulthood. The emerging adults are in a transition from adolescents to becoming adults,

such changes are perceptible. It is in this phase of life when answers to developing intimacy and looking for partners are pertinent to individuals (Gala & Kapadia, 2014).

Romantic Relationships

Romantic relationship choices are crucial during emerging adulthood, as this period marks the continuance of future relationships (Gibbons & Shurts, 2010). The nature and process of selecting and looking for potential partners have changed in recent years. People have more choices and alternatives for selecting partners through online mode. The goals, motives, and desires in selecting an intimate partner may vary from individual to individual depending on individual choices and backgrounds like gender, caste, or social class (Gala et al., 2020).

Decision Making and Online Dating

Decision making associated with romantic relationships holds a long-term impact on individuals. Online dating in recent times has become one of the most popular ways to initiate romantic relationships. Online dating, sometimes called Internet dating to refers to the practice of using dating sites to find a romantic partner (Hitch et al., 2010).

According to Wu & Chiou (2009), the availability of more options has led users to excessive searching. Considering availability of more options and search in the internet leads to hindrance in the ability to prevent inappropriate options. Lack of conscious decision making among young men and women leads to an increase in limitations to the approaches in a relationship (Stanley & Sparkman, 1992). Joel et al. (2013) have mentioned that motivations greatly influence decision making in romantic relationships. It is a false assumption that humans are in control of the decisions they make. Social and individual factors like norms, emotions and expectations have influences on the decision making (Gala et al., 2020).

Young people are highest users of social media and other online applications. Offline meetings have recently reduced to online interactions. Internet dating is a kind of intentional action that people take interest into and naturally get persuaded for the same (Chakraborty, 2019). Access to information is near at hand and making choices out of several information and responses guide users through the decision-making processes (Joel et al., 2013).

OBJECTIVES

The broad research objective of this study is to understand the effect of choice and control while using online dating.

The specific objectives are

- a) to know how emerging adults, view online dating
- b) to show how emerging adults portray themselves on online platforms,
- c) to discover the factors emerging adults look into while deciding to date and involving in related romantic behaviors,
- d) to study the features that emerging adults, find attractive about an app and how it affects their decisions.

METHODOLOGY

Participants

The participants for the study were emerging adults in the age range 18-25 years. A total of 60 participants were chosen equally from both the genders. The inclusion criteria of the participants were – emerging adults and a resident in Vadodara, a city in Gujarat, India. The participants were approached individually through telephonic calls and personal direct messaging.

Design and Procedure

The present study adopted a qualitative approach of research methods. An interview schedule was prepared which consisted of open-ended questions. The data collection process followed purposive snowball sampling. The telephonic interviews took almost 30 to 40 minutes.

Qualitative Tool

An interview schedule was prepared which included open ended questions and all the questions were related to the domains of perceptions of dating online, motivation for downloading dating apps, app features that attract their attention, preference of potential partners through online dating apps, idea of self-presentation online, common areas for deception, safety and risk concerns in dating online, evaluating information and finally making decisions for partner selection.

Analysis

After the initial indexing and organizing of the data, categories were generated through inductive coding and data was organized according to themes and categories. Frequency analysis of the themes was done, and the results are displayed using percentages and verbatims in the next section.

The study was approved by the Institutional Ethics Committee for Human Research (IECHR) at the Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda. The Ethics proposal number for the study is IECHR/FCSC/2020/7.

FINDINGS

Demographics

All the research participants were in the age group 18-25 years except for one young man aged 27 years. Eighty three percent of the participants were single in their current relationship status and only 15% were in a relationship. In the current study, 86.7% of the respondents were aware of the online dating system and applications.

Preference for Partner Selection Online

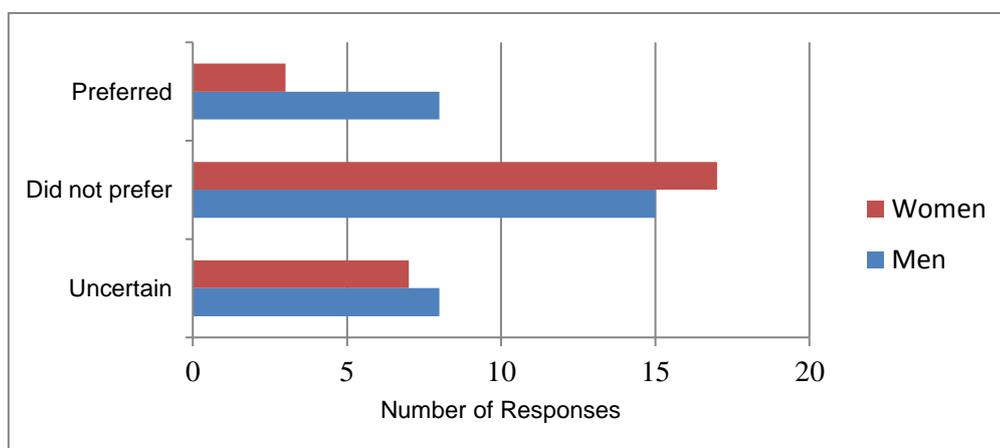


Figure 1 Preference for Partner Selection Online

Figure 1 displays that a great number of men than women preferred partner selection through online dating. Men were more open to all sources for finding a romantic partner. Sixty percent of women and 46.6% of men revealed that online dating and chatting is not satisfactory. Most men and women in the present context do not solely prefer partner selection or dating online mostly due to the over generalized beliefs and thoughts regarding online dating. Seventy two percent of men have used online dating applications and 28% of women admitted to having tried using any of the dating sites and applications. The main factors behind the development of the communication were interest in the potential partner, users are already known to each other, fun in communicating with each other or have decided to meet in person. Other factors included boredom, curiosity and influence from friends.

Concept and Opinions of Online Dating among Emerging Adults

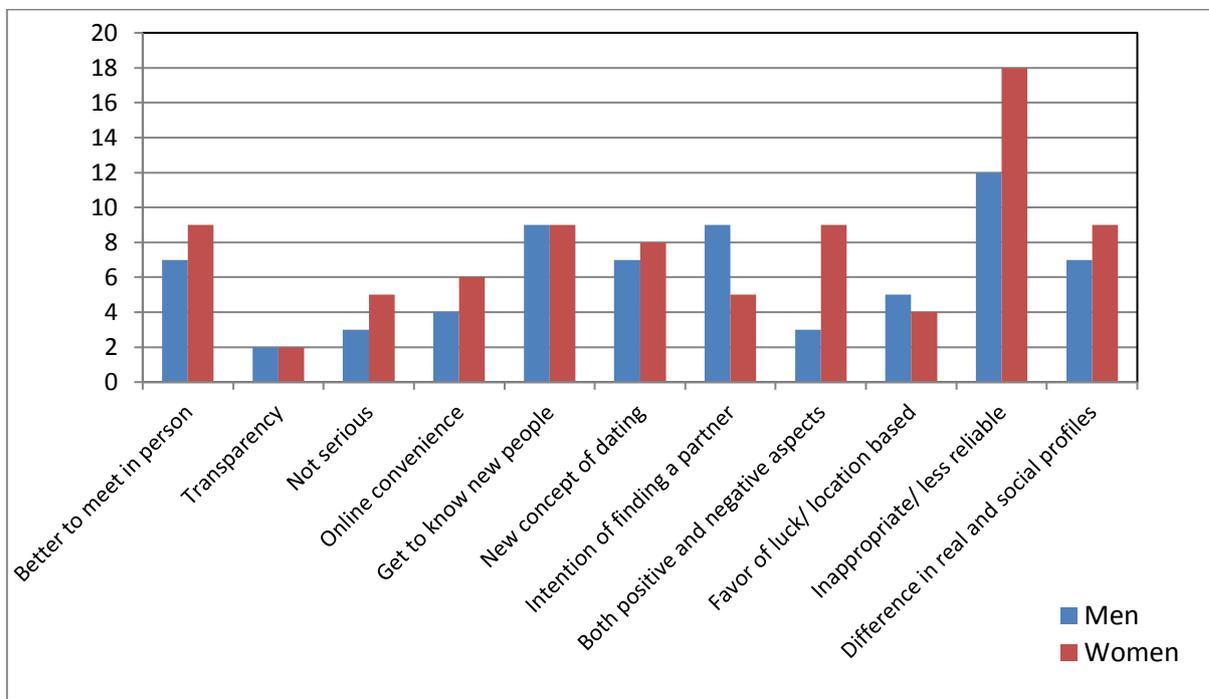


Figure 2 Concept and Opinions of Online Dating among Emerging Adults

Figure 2 displays that 60% of women believed online dating sites and applications are inappropriate and less reliable because of the lack of true identity of the users. Men and women equally attribute online dating as a platform to make friends and getting to know new people. In the words of a young man, “I guess it is a very good way to interact with different people not for the purpose of involving or being in a relationship, but you can always find new people there.” Young people are able to know each other better through online interactions. When it comes to online dating sites and applications, the major concern that guide an individual’s decision, revolved around the qualities and characteristics in a potential partner online, opening up in social and dating platforms, safety and risk concerns. More women supported the fact that there are both sides to dating online - having both positive and negative effects. Tinder is suggested as a popular dating app. The hook-up culture has been seen associated with Tinder and therefore many young people presumed that dating applications are made for hookups. The participants have also revealed that these apps and the style of dating are more popular and trendier in metropolitan cities like Delhi, Mumbai or Bangalore.

In words of a young man, “Well technology fulfills fantasies, but actual relationship needs sympathy and empathy plus shoulder. Technology would never give us a shoulder to cry on they can only give us fantasy and stress but cannot wipe our tears”. Another young woman added, “Technology is itself providing us with many options, it becomes difficult for us to decide which one to look for because at the back of your mind you certainly have so many options”. Technology involvement has been significant in creating chaos and misunderstanding during making decision.

Seven men and five women have shared that it totally depends upon the interest of the user in the application as well as in the potential partner if they chose to select romantic partners from online dating.

Preferable Features for Partner Selection

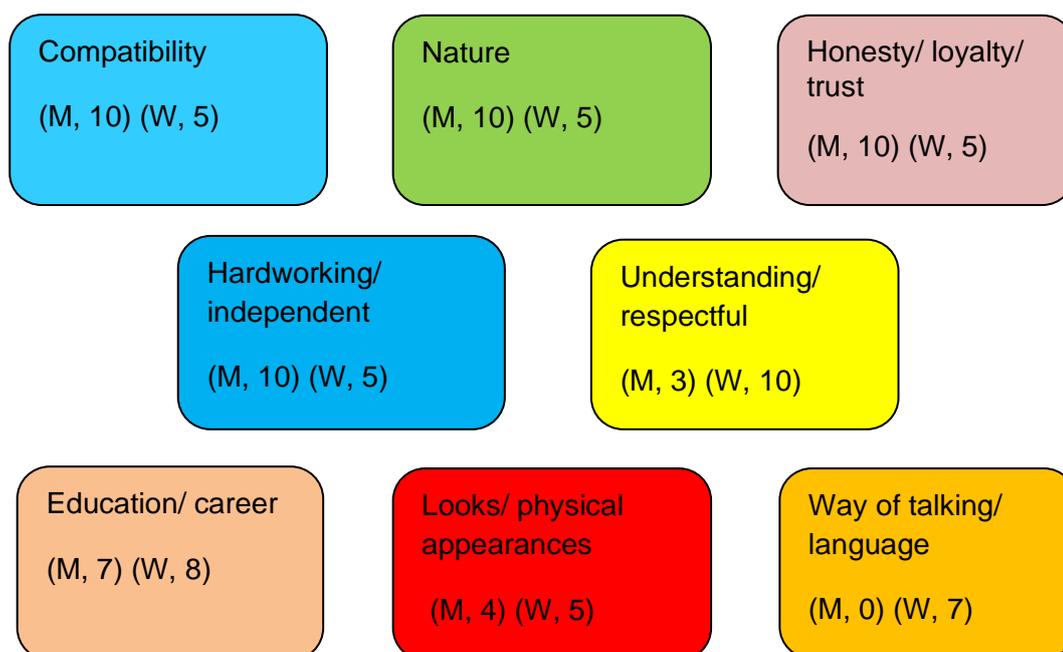


Figure 3 Preferable Features in a Potential Partner

Figure 3 displays factors like physical attributes, nature of the person and way of communication being the considerable aspects that men and women were likely to look upon in a potential partner. Men focused more on compatibility, hardworking and honesty of the partner for approving a relationship while women focused more on the partner being understanding and respectful, way of talking or approach that was made by the other person, also looking into education and career of a potential partner.

Correspondingly, 53% men and 43% women suggested that conversations are real when people meet in person which contribute for establishing romantic terms. One young woman added, *“I would like to know how the other person deals with their emotions, that would definitely give me an idea of the environment he is brought up”*. Moreover, men and women seemed to be equally interested in knowing a potential partner’s intentions if they are looking for a serious relationship or a casual date.

Social profiling

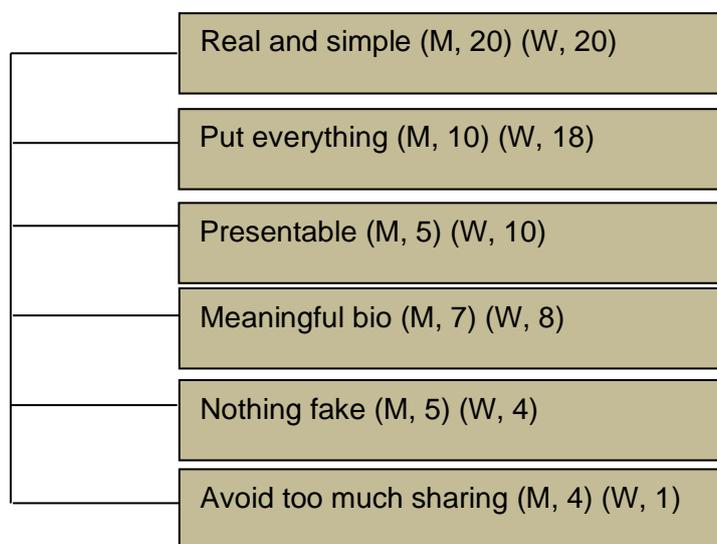


Figure 4 Social Profiling

Figure 4 shows 66.6% of men and women both equally favored keeping their social profiles simple, real and decent over any online dating app or any social media. Eight responses from women were obtained for putting everything through their social profiles. Additionally, 18 women and 10 men revealed that the bio in a social profile is more reliable in order to know about a person. Women tend to be more presentable in their social profiles than men.

Making Judgments of Other Profiles Online

Table 1: Judgment of Intentions Online

| Judgment over intentions | Responses | |
|---------------------------------|-----------|-------|
| | Men | Women |
| 1. Way of talking | 9 | 30 |
| 2. Tend to fantasize | 9 | 30 |
| 3. People know the purpose | 13 | 5 |
| 4. Difficult to figure out | 11 | 2 |
| 5. Sharing inappropriate images | 4 | 5 |
| 6. Dirty comments | 2 | 5 |
| 7. Desperate behaviors | 2 | 4 |

| | | |
|--|---|---|
| 8. Depend on location | 3 | 1 |
| 9. Easy to fake online | 2 | 2 |
| 10. Unusual meeting approaches | 1 | 2 |
| 11. Hesitant disclosing certain topics | 0 | 3 |

Table 1 shows 50% women strongly admitted that intentions are well figured out through way of talking. A young man shared, *“It can be seen easily by their inclination in the statements”*. Forty three percent of the responses from men suggested that people know the purpose of using the applications of online dating. Also 36.6% responses from men indicated that it is difficult to figure out a person’s intentions over online. A young man stated, *“If they are ready to go with casual relationships, or are they into something serious one, the person should be clear about what they want for, what they expect”*.

Seventy percent of responses from men and 60% of responses from women have admitted that they tend to put forward a false or impressive conversation in order to know a potential partner better online.

Safety and Risk Concerns of Online Dating

Ninety-six-point-six percent of responses from men have shared that there are fake accounts both over online media. Men and women equally support the fact that the identity of a person cannot be properly figured out from such applications. A young man stated, *“How we see them online, they are not like that in real, so that is a big disadvantage. And I expect if you are in a relationship then that type of transparency you do expect”*.

A young woman added her view that now there is provision of screenshots, *“Anyone can take screenshot from chats and display publicly, and people share pictures, they can take screenshots and share it”*. Hence, it was observed from the views that women are more prone to security issues while using such applications. Supporting to this, 33.3% responses from men and 43.3% responses from women shared the opinion that risks are involved in using online dating applications.

DISCUSSION

The discussions are based upon the findings on the perceptions of dating online among emerging adults, application features that attracted the user’s attention, preference of potential partners through online dating apps, idea of self-presentation online and deception, safety and risks concerns in dating online, evaluating information and finally making decisions of partner selection through a set of judgments that are made by the individuals.

Concepts and Opinions Among Emerging Adults

The experiences and indications by participants support that the online dating system can simply be a platform for meeting new people, establishing romantic relationships is not necessarily a preference among young men and women. A study conducted by Nayyar and Gala (2019) provides evidence that adolescents from Vadodara, India are not interested or involved in internet dating. The findings suggest that, influence from friends and watching advertisements over other social media make online dating applications popular and easy to explore because it is also convenient to use. The participants have also revealed that boredom and curiosity was one reason to have downloaded dating applications during the pandemic period. This was because after the imposition of lockdown in the country, young men and women could find it convenient as well as a good source to get in touch with people online.

The revelations support that decision for partner selection could be challenging through online dating. Young people have considered certain things for granted like online dating are not trustworthy, life partners could not be found through dating applications due to many inactive users and also the sole purpose of online dating applications is for hookups and casual relationships. These kinds of over generalized beliefs are leading young men and women not to go for partner selection through online dating. These experiences and indications by the participants are in sync with the writings of Ariely (2008). The author mentioned that expectations are carried by prior knowledge. And expectations are also responsible for the stereotypes which have an influence on the perceptions and behaviors.

Safety and Risk Concerns of Online Dating

The findings reveal that due to presence of lot many users and profiles on the dating sites it is quite unclear about the intentions of the people. The findings declared that both men and women either have experienced coming across fake accounts or have heard about fraud cases and troubles from social media or online dating. In the words of a young man, *“The major risk is that you are getting in touch with a fake profile, it is when you meet the person and they are completely different from what they showed on their profile”*.

Troubles could arise as a result of experiencing contacts with fake accounts. A young man shared, *“The person if you think you are going to meet comes out to be different from the one she would be in her display picture because it happened one time that my friend went to meet that person and the person in the display picture, their profile picture turned out to be very different from when met in actual on offline”*. Absence of photos are sign of a negative impression (Epstein, 2007). The users find it hard to decide to connect with profiles where the pictures don't seem related or real to the user profile.

The findings revealed that there is more trouble and threat to women than men. A certain kind of stereotype has been built which is revealed by most of the women participants that women and girls are prone to risks from meeting people from online platforms.

Social Profiling and Partner Preferences Online

Social profiling included opinions on sharing personal information online. From the study, it was found that men and women equally have kept their social media profiles real and simple. It

has been supported with the idea that keeping things real and decent over online profiles helps meet genuine people on social platforms.

The study also reveals that in order to know each other, few men and women tend to be deceptive over conversations just in order to know the other person better and develop a bond through communications. This is in sync with the findings from Kang and Hoffman (2011) which discussed that online daters tend to hide information about themselves which may seem to be negative for a relationship establishment.

It is seen that men tend to show off more about any possession or their lifestyle habits just too woo a potential partner. Young men and women also seem to be conscious in terms of deception that may be associated with disclosing someone's past or their relationship statuses.

Serious Relationships and Online Dating

It was interesting to find that the presumptions associated with the concept of a serious relationship were mostly derived from commitment followed by loyalty, honesty and trust in a relationship. None of the participants had developed a long-term relationship from online dating. A young man shared, *"We can meet our life partners from dating online but it is very important that the two person must have that feel for each other"*, another young man added, *"Chatting online or meeting someone from a social media is not a big thing, we only know each other better from the time and attention we put on one another and the relationship could be serious too, at some point you need to decide to see each other even over video calls"*. This revelation supported the trend of video calls where potential partners can see each other to build trust and develop attachment for a potential partner. The participants have reported associating secure attachment when they are able to see the other in real, through physically meeting.

Technology Only Helps in Getting Information, it is the Individual Who Takes the Decision.

Use of social media and online dating applications provides a chance with many options and a great deal of information about people but it is the individual himself/herself who makes a conscious decision of whether to get involved in romantic relationships through online dating. Although men and women have added that but there is no strong affirmation to a committed and serious romantic relationship that could be built and continued through online dating, a young woman shared, *"When you find them, I think then you should stop being on that that application anymore, personal messaging could be continued over other apps"*. In the words of another man, *"You only get to know more about the person with the help of these apps, then you decide to meet, see each other and then you decide you want to go for a relationship with the person or not"*. Technology has helped in only extracting information from all possible sources, they happen to figure and influence our decision.

The information obtained from interactions underlies the decision that men and women make from the choices. As supported from a study by Tong et al., (2016) it can be said that a dating website may guide the user through its features to influence a decision and the extent also raises their expectation of looking for a potential partner. And the users tend to develop a sense of control in online dating. The on-screen displays, matches generated by internet and the blend of different profiles in the applications create a kind of effect on the user's point of view. This provides a reason to individual's own motivations and determinations to make decisions.

CONCLUSION

The study shows that the participants from the present context are conscious about their expectations from using online dating system. In as much as emerging adulthood calls for the establishment of intimacy and romantic relationships, individuals give it a chance for exploring themselves through various sources of meeting a potential partner. The findings suggest that participants do not agree that enduring relationships happen over online dating applications. The decision for partner selection is carried by judgments that are made through personal opinions, expectations and the usefulness and reliability in the applications. The reconciliation between decision making and use of technology pertaining to partner selection begins with the individual extracting information and how gradual conscience of the individual guiding them to have the effect and get control of the system in the decision-making process.

IMPLICATIONS

The online dating systems and application usage surround user with choices that alter and direct a person's decision in terms of establishing a romantic relationship. The study can further bring into focus, questions of how application designs determine the decisions for approaching other users, initiating conversations, making terms and building trust for the genuineness in online dating.

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AN EXPLORATORY STUDY OF KNOWLEDGE ABOUT MODES OF HIV TRANSMISSION AMONG CHILDREN LIVING WITH HIV/AIDS

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ABSTRACT

HIV/AIDS is a severe public health challenge to healthcare worldwide. Although increased access to HIV prevention information, diagnosis, treatment, and care has empowered people living with HIV and AIDS to enjoy a long and healthy life. At the same time, due to the early onset of sexual activity among school children, and little or no knowledge about sexually transmitted diseases including HIV/AIDS, they remain vulnerable to the risk of contracting HIV/AIDS, especially during pre-adolescent and adolescent years. Keeping the above facts in mind, it was considered important to study the knowledge of children living with HIV/AIDS about modes of HIV transmission. Interview guides, narratives of children, focused group discussions, and observations were used to collect information from the children who were in the age group of 07-14 years of age. The research participants of the study were either HIV-affected or HIV-positive. A total of 60 children (30 living with families and 30 living in residential institutions) were made part of the study. The study concluded that although all children living with HIV/AIDS whether in families or in residential institutions had heard of HIV /AIDS but there were deficits and differences in the knowledge of HIV-positive and affected children about modes of transmission of HIV. Many misconceptions were prevalent among children about HIV transmission and precautions to be taken to avoid HIV infection. The study reflected the dire need to provide the correct information about modes of HIV transmission to children who are in pre-adolescent/ middle childhood years in a manner that is appropriate to their age and comprehension level so as to promote the prevention of HIV/AIDS among one of the most vulnerable groups.

Keywords: HIV/AIDS, residential institutions, children in families, knowledge, modes of transmission

INTRODUCTION

There are 37.9 million people globally who are living with HIV/AIDS. The rate of incidence of HIV/AIDS in India is only 0.20 percent of the total population, but because of a large population, the above percentage translates into a large number. It is praiseworthy, that India has made significant progress in reducing and treating HIV infection. A number of policies, programs, and legislation are in force to reduce the suffering of people living with HIV/AIDS and to sensitize the general public. Though the number of people suffering from HIV/AIDS has reduced to half still there are miles to go to achieve the Sustainable Developmental Goal related to HIV/AIDS which is to end it by 2030. The method to achieve that is to make ART available to all PLHIV who need it and those who are already on ART, they should be virally suppressed aim is to make U=U meaning undetectable levels lead to un-transmissibility The aim of WHO in relation to HIV/AIDS was that 90% of PLHIVs know their status, 90% of them should be on ART, and 90% of those who are presently on ART are virally suppressed before the end of 2020 but could not be achieved.

India has adopted the policy of the 'Test and Treat' strategy to achieve 90: 90:90 by 2020. But equally important is the need to intensify efforts in ensuring that information regarding HIV reaches everyone and all vulnerable sub-groups. It is also very pertinent to mobilize the available resources to target the less educated and poor pre-adolescents, and adolescents, who are either dropouts of school or college-going adolescents to penetrate information and prevention strategies about HIV infection on a war scale.

There is a lack of information from different strata of the population about their degree of awareness of HIV/AIDS, especially among in-school and out-of-school children. Srivastava, S., Chauhan, S., Patel, R. *et al*(2021) examined the factors affecting the change in the awareness level of adolescents aged 10–19 in Bihar and Uttar Pradesh on HIV-related information over the period. It was found that with the increase in age and years of schooling, HIV awareness increased among adolescent boys and girls. Secondly, adolescent boys having access to mass media were more likely to have an awareness of HIV. Similarly, the use of the internet among adolescent boys and girls was positively associated with HIV awareness with reference to their counterparts. But the adolescent boys' paid work status was inversely associated with HIV awareness.

The students of the tenth to twelfth standard in the intermediate schools of Lucknow, India, were examined by Gupta, P., Anjum, F., et al (2013). The study concluded that television was the main source of information about HIV/AIDS for the majority of the students (85%). As far as knowledge regarding modes of transmission of HIV/AIDS among girl students is concerned, 95.1% of them told that it is through unprotected sex. A total of 75.8% of students said that it was transmitted from mother to child.

Another study was conducted to assess the impact of IEC intervention on knowledge regarding AIDS amongst senior secondary school children of east Delhi. The study found a high prevalence of misconceptions regarding transmission through casual contact, drinking/sharing utensils, sneezing/ coughing, etc. Television, magazines, and newspapers were identified as the most important sources of getting information regarding HIV/AIDS (Bhasin, Pandit, Kannan & Dubey, 1999).

A study assessed the level of knowledge of students studying in IX-XI classes in schools in south Delhi. The results showed that although all the students have heard of AIDS, only 51.4% were able to write the full form of AIDS and only 19.9% were able to write the full form of HIV. Only 14.9% had knowledge about condoms as a means of protection and 28.6% knew about the availability of drugs for HIV/AIDS. The majority of students have a favorable attitude towards PLHIV stating that such patients should be allowed to pursue/ continue studies or allowed work in common workplaces (Lal, Nath, Bandhan & Ingle, 2008).

Keeping varying and inadequate knowledge of HIV/AIDS among school and college-going students, it was considered important to peep into the knowledge of HIV/AIDS among children who are living with HIV/AIDS where many day-to-day activities are related to it but no formal discussion about the disease has ever been made to children as part of the major study. Hence the present study was undertaken with the following objective.

OBJECTIVES

1. To assess the knowledge of children living with HIV/AIDS in families about the modes of transmission of HIV/AIDS
2. To know the knowledge of children living with HIV/AIDS in residential institutions about the modes of transmission of HIV/AIDS
3. To study their views about people having HIV/AIDS.

METHODOLOGY

Sample Selection and Size

The sample comprised children living with HIV/AIDS (CLHIV) in familial and institutional settings. These children were either affected by HIV/AIDS (The children themselves were not HIV positive but someone in the family is/was HIV positive) or children who were infected with HIV/AIDS. Thirty CLHIV were selected from the families who were also the beneficiaries of an NGO working in the field of HIV/AIDS. Only one child from 07-14 years qualified to be a part of the sample. This age range gave the researcher the opportunity to explore the narratives of children in the context of their illness and its impact on their lives. Besides this, children of this age range are articulate, less self-conscious, and hence less likely to give socially acceptable answers or false answers.

Four residential institutions in and around Delhi providing care and support to CLHIV were identified. Thirty (30) children (HIV-affected and HIV-positive children) were selected from these residential institutions. The selection of children was from the institutions providing residential care and support to affected children only or infected children only or both types of children.

Tool for Data collection:

- I. Interview guides were prepared for data collection from the following participants:
 - a. HIV-positive children in families
 - b. HIV-Affected children in families
 - c. HIV-positive children in the institutions
 - d. Affected children in the institutions
- II. Observations of Children
- III. Theme-based group discussions
- IV. Narratives of children

FINDINGS AND DISCUSSIONS

Out of thirty children living in families, seventeen were boys and thirteen were girls. The mode of transmission in all children was from parent to child. Eighteen children had lost their fathers to HIV/AIDS. There were eight HIV-positive children in thirty families. Seven HIV-positive children participated in the study. Table 1 depicts the demographic profile of the children living in families:

Table 1 : Demographic profile of selected children living with HIV/AIDS in families (CLF)

| Sample characteristics | Category | Boys | Girls | Total children (N=30) |
|------------------------|--------------------------------------|------|-------|-----------------------|
| Total children | Sex | 17 | 13 | 30 |
| HIV status | HIV positive children | 05 | 02 | 07 |
| | Children on ART | 04 | 02 | 06 |
| | Affected children | 12 | 11 | 23 |
| Age range | 07-10years old children | 05 | 04 | 09 |
| | 11-14 years old children | 12 | 09 | 21 |
| Orphan-hood | Paternal orphan children | 10 | 08 | 18 |
| Parental status | With both parents alive | 07 | 05 | 12 |
| Scholastic status | School going children | 16 | 13 | 29 |
| | Children at the primary school level | 11 | 10 | 22 |
| | Children at the middle school level | 5 | 3 | 07 |

The children living with HIV/AIDS in residential institutions were either maternal/paternal or double orphans. Only a few children had both parents. Table 2 shows the profile of children selected from residential institutions.

Table 2 Profile of children in the institutions (CLI)

| Variables | Category | Boys | Girls | Total |
|-----------------|---|------|-----------------|-------|
| No. of children | Total children in the sample | 14 | 16 | 30 |
| Institutions | Children in Institution I | 01 | 10 | 11 |
| | Children in Institution II | 02 | 05 | 07 |
| | Children in Institution III | 04 | - | 04 |
| | Children in Institution IV | 07 | 01 | 08 |
| HIV status | Number of HIV-positive children | 10 | 01 | 11 |
| | Number of children on ART | 07 | 01 | 08 |
| | Number of HIV-affected children | 04 | 15 | 19 |
| Age | Number of children in 07-10 years of age | 08 | 06 | 14 |
| | Number of children between 11-14 years of age | 06 | 10 | 16 |
| Parental status | Number of double orphans | 06 | 05 | 11 |
| | Number of paternal orphans | 04 | 05 | 09 |
| | Number of maternal orphans | 03 | 02 ^a | 05 |
| | Number of children with parents | - | 05 | 05 |

Level of information about HIV among children living in residential institutions (CLI) with HIV/AIDS:

It was found that there were deficits in their knowledge and many misconceptions were prevalent among them about HIV transmission and precautions to be taken to avoid HIV infection.

Knowledge about modes of transmission of HIV:

All HIV-positive children (100%) had heard of HIV and were partially aware of the causes of HIV/AIDS. Five HIV-positive children (45.4%) knew two modes of HIV transmission i.e. through blood and HIV-infected syringes. Three children (27.2) knew all the modes of transmission of HIV i.e. through unprotected sex with multiple partners and from mother to the child besides the above-mentioned modes. Though some children reported that they acquired the disease because they were fed on their mother's milk, they did not mention it as a cause of HIV acquisition when asked about the causes of HIV transmission. Three children (27.2%) didn't know or pretended not to know about the causes of HIV transmission.

Sonali (name changed) who didn't know the causes reported, 'Mujhe pata hai ye kaise failti hai. *'Jab kisi ko bukhaar, dast aur ulti hoti hai aur jab vo apna ilaaz nahin karvata to use HIV ho jaati hai'*. (I know how it spreads. When one has fever, diarrhea, and vomiting and if the person does not take the treatment, he develops HIV). Infection through blood was the most commonly mentioned cause of HIV infection and unprotected sexual relations with multiple partners were least reported by the children.

Milli explained the transmission of HIV from one person to another as, 'Agar hostel ke X bachche ka khoon kisi bina bimari wale bachche ko chada de to us bachche ko HIV ho jayegi'. (If the blood of X child of the hostel is transfused to a non-diseased child, then that child would develop HIV infection). One HIV-positive child also reported malaria as one of the causes of HIV transmission.

In the case of HIV-affected children, most (84.2%) except three had heard of HIV. One child knew about AIDS and not HIV. Another girl reported that her father used to campaign for HIV/ AIDS. She used to read it, so she knew its causes. Some of them reported the causes as

- 'Ladka, ladki mai hota hai'. (It is a disease of boys and girls).
- 'Jab pyar kisi aur se karte hai aur shadi kisi aur se karte hai to AIDS ho jata hai'. (When one loves somebody and marrying someone else, one gets AIDS)
- 'Khoon ki kami hone par jab khoon charate hai to AIDS ho jata hai'. (When blood is transfused to an anaemic).
- 'Gande kam karne se AIDS hoti hai'. (Indulgence in wrongful practices causes AIDS).

Ten HIV-affected children (52.6%) knew about all the modes of transmission of HIV, three (15.8%) knew only about blood and six (31.6%) did not know the causes of its transmission. Those who could not tell the causes were of the opinion that shaking hands and keeping hands on the shoulder can cause AIDS.

All the children knew that the disease is incurable, damages the body, and is very dangerous. The children of Institution II reported that they went to India Gate to create awareness about HIV/AIDS. Though they propagated about it, they did not know anything about it. They mentioned, 'Humne HIV/AIDS ke paper ke bundle mai se ek paper nikala aur logo ko de diya'.

(We just took out one paper from the bundle of printed papers on HIV/AIDS and gave it to people).

Table 3 shows the level of knowledge of HIV-positive and HIV-affected children:

Table 3: The level of knowledge of HIV-positive and HIV-affected children

| S. No. | Knowledge about HIV | HIV positive (N=11) | HIV negative (N=19) |
|--------|--------------------------------|---------------------|---------------------|
| 1. | Heard of HIV | 100% (11) | 84.2% (16) |
| 2. | Know all modes of transmission | 45.4% (5) | 52.6% (10) |
| 3. | Know two modes of transmission | 27.2% (3) | 15.8% (3) |
| 4. | Did not know about causes | 27.2% (3) | 31.6% (6) |

Knowledge about precautions:

The only valid precaution that HIV-positive children were able to give was that one should not reuse syringes. The precautions mentioned by the children were like one should get tested for HIV regularly, protect oneself from mosquitoes and dengue, and should not bite another person. Only six HIV-affected children (31.6%) were fully aware of the precautions to be taken to avoid HIV infection, and three (15.8%) were partially aware of it. Those who were partially aware knew that one should use disposable syringes and should break the syringe after use. They were not aware of the transmission of HIV from parent to child. Other children reported that one should test the blood before transfusion, maintain cleanliness, and should take care of the health.

It is not only the children who did not know about the precautions but even in the residential institution standard precautions were not followed. The gloves were reused in one of the Institutions. The gloves were put on the string for drying so that they can be reused. The reuse of gloves is a very harmful practice as it may spread many infections in PLHIV. Correct and complete knowledge about modes of HIV transmission is imperative to curb new HIV infection. UNAIDS, (2010) has recommended that discussions with children and very young adolescents (children who are in the age group of 10-14 years) should also have a component on biological, cognitive, sexual, emotional, and social changes that take place during pre-adolescent and adolescent years.

The literature on the global situation, however, reveals significant deficits in HIV knowledge among young people. Only three countries – Namibia, Swaziland, and Rwanda – had achieved over 50% in the level of comprehensive knowledge among both young men and young women by the end of 2008.

HIV awareness programs in schools and in institutions:

None of the government schools in which CLIs were studying organized any HIV awareness campaign in the school. The children of Institution-I reported that the awareness campaign was organized by the school. The school was run by the NGO itself. The children reported that during holidays and summer vacations ‘Everyday Skill Development Program’ was organized for both boys and girls. The awareness program about HIV/AIDS was organized on ‘World AIDS Day’ i.e. 1st December also.

Institution II also organized programs related to HIV/AIDS from time to time. The institution also displayed charts in the hostel. Institution III organized an awareness campaign for the nearby

communities but institutional children were not involved in these campaigns because the children were not aware of their HIV-positive status and the programs were organized on working days during the daytime when children were in school. The posters related to HIV/AIDS were displayed on the institution's premises.

The awareness campaigns were organized in all institutions from time to time but it was not clear how much knowledge was acquired by the CLI. For younger children, the organization of such campaigns was a matter of joy and fun. Sagar from Institution IV reported, '*Ek bar hamare yanha HIV ki party hui thi*' (Once a party was organized on the occasion of HIV).

Desire to help HIV-positive persons:

All HIV-positive children expressed their desire to help other HIV-positive persons except one who didn't like the wounds of HIV positive person. Their helping procedure in a way reflected what they themselves had gone through when they were diagnosed with HIV infection. The children of Institution IV reported that they would protect the individual from mosquitoes, would bring medicines and fruits for them, would bring them to their institution, and get them admitted to the institution and tested. They would be taken to an ART center and would be put on medicines. They would be asked to take medicines on time and if they faced any problem, they could come to the institution from where they would be taken to the hospital by one of the institutional caregivers. They also reported that their institution would also enhance/her knowledge about HIV.

Ten HIV-affected children reported that if they come across an HIV-positive person then, they would also help him. Their responses reflected their observation of care-giving practices that were adopted by their family members when somebody had HIV/AIDS in the family. One child categorically refused to help the HIV-positive person because she was of the opinion that she would not even go near him, otherwise, she would catch the infection. Others reported that they would call an ambulance, take him/her to the hospital, get blood tested, would check the needle before use, try to fulfill whatever his/her needs are, wash his/her clothes, and would take care of him/her. One girl from Institution 1 reported that earlier his HIV-positive father never used to share food with her. One day the girl showed him an advertisement on television spreading the message that HIV does not spread by sharing food. Afterward, her father started sharing food with her.

There is a need to create awareness among caregivers of children living with HIV/AIDS about its transmission. The institutional caregivers sought clarification on various occasions on HIV/AIDS as some of them were transferred/ promoted to care-giving tasks for children living with HIV/AIDS.

Knowledge about HIV/AIDS among children living with HIV/AIDS in families

Knowledge about modes of transmission:

All children had heard of HIV. Most children accompanied their mothers to various workshops organized by the NGOs. They also participated in the children's workshops, and Christmas celebrations organized by the NGOs. Most children were the beneficiaries of childcare programs of the NGOs. All children knew about the three causes of its transmission and only 08 children knew about all the modes of HIV transmission. The children did not mention either transmission of HIV from parent to child or unprotected sex with multiple partners. Transmission of HIV through blood was the only cause that was known to every child. The children also had misconceptions about contracting HIV infection. One of the children reported, '*Mai shaadi nahin karna chahati kyonki shaadi karne ke baad log bimar ho jaate hai*'. (I do not want to get married

because after marriage people fall sick). Two children felt that coughing and sharing food can also transmit HIV infection.

Information about precautions to be taken:

All children knew the precautions to be taken while undergoing blood transfusion. Fifty percent of the children did not know about the precautions to be taken to avoid other causes of HIV infection. All children expressed their desire to help HIV-positive people either by taking them to the hospital or by donating blood.

Organization of awareness campaigns in schools:

None of the schools organized any awareness campaigns on HIV. The children enhanced their knowledge of HIV/AIDS by attending programs organized by NGOs for them.

CONCLUSIONS

All children, whether living in families or in residential institutions, had heard of HIV/AIDS. There was a difference in the knowledge of HIV-positive and affected children about modes of transmission of HIV. Many misconceptions were prevalent among children about HIV transmission and precautions to be taken to avoid HIV infection. None of the government schools organized any awareness campaigns on HIV.

The present study showed that many children had inadequate knowledge about the modes of transmission of HIV infection and precautionary measures to be taken to avoid the infection though they were living with HIV/AIDS. It is important that life skills education should be given to all children irrespective of their HIV status in a manner that is appropriate to their age, needs, and cognitive maturity. Since connection with the outer world was only through the school in the case of institutional children living with HIV are concerned so, organization of structured activities like games, cultural activities, and sports for socially advantaged and disadvantaged children together and their active participation would help not only in awareness generation and sensitization but also in the inclusion of children living with HIV/AIDS.

RECOMMENDATIONS

Many children under study were not aware of all modes of HIV transmission and precautions to be taken to avoid the infection. They had misconceptions about its transmission. There is a need to update the knowledge of HIV-affected families about HIV/AIDS. Clear and candid information about how HIV is transmitted and how it is not transmitted should be given to all in general and to people and children living with HIV/AIDS in particular. It is also important to monitor the impact of interventions in order to identify the most effective approaches. Both qualitative and quantitative evaluations of the programs should be done with the involvement of the beneficiaries.

SUGGESTIONS FOR FUTURE RESEARCH

Creating awareness and enhancing knowledge among families and children from urban rural, tribal, and hard-to-reach areas and marginalized sections of society will greatly help in improving prevention strategies. At the same time, research on socio-economically well-off adolescents will immensely help in conceptualizing a realistic picture of the impact of HIV/AIDS in the country.

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PROMOTING GENDER EQUITY AND INCLUSION IN SCHOOL EDUCATION: EXAMINING MICRO-IMPLEMENTATION OF A GENDER-RESPONSIVE SCHEME (KGBV) FOR ADOLESCENT GIRLS

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ABSTRACT

To achieve Sustainable Development Goals 4 and 5, there is a need to build an education system that ensures equitable access regardless of socio-economic status of a child. The status quo calls for scrutiny of present efforts to understand the gaps in policy, design, and implementation of targeted policies at grassroots level. Introduced in 2004, Kasturba Gandhi Balika Vidyalayas (KGBVs) are one of the longest running national-level programs addressing the components of gender and equity in school education. These are government-run upper primary and secondary residential schools, functioning in Educationally Backward Blocks of the country. The study addressed the lacuna of informing policy and program through analysis of budget expenditures and outputs at micro-level, coupled with capturing the perspective of local implementers and effect on end-users. The analysis involved adaptation of Debbie Budlender's Gender Budgeting five-step framework that focused on: Situation analysis, Gender-responsive policy analysis, Budget analysis, Output analysis, and Outcome analysis. A mixed-method research design was adopted in 18 KGBVs across Rajasthan (state that poses least female literacy rate in India) to understand the disparity between budget allocation and expenditure, in accordance to the gender budget guidelines. The multi-stakeholder perspective, including 285 adolescent girls, exhaustive sample of KGBV teachers, hostel wardens and administrators, parents, and alumni students triangulated good practices while highlighting bottlenecks of implementation at the grassroots level. The study administered five tools to capture a holistic view of the implementation process: Satisfaction survey, Time-use survey, In-depth interviews, Benefit-incidence analysis, and financial norms and infrastructure checklists. KGBV as a gender-responsive scheme was found to decrease gender inequity in school education and promote inclusion through innovative strategies. While the low-aggregate of budgets was highlighted by the implementers, a paradox of under-utilization of funds was recorded at school-level. With more focus on learning outcomes, KGBV scheme needs to move beyond gender-responsive to a gender-transformative approach.

Keywords: Adolescent girls, Benefit-Incidence Analysis, Education, Gender Equity, Gender Budget, Inclusive, Time-Use

INTRODUCTION

A range of policy interventions have been adopted to bridge the gender and socio-cultural gaps in educational attainment in India (Bailwal & Paul, 2021). Caste has also been a strong determinant of school participation along with gender. Despite affirmative actions to safeguard the interest of socio-economically backward castes, educational disparities persist among SC, ST, and OBC populations (Desai et al., 2009). This gap worsens when we look at data through intersectional lens.

In terms of affirmative policy action, Indian government identified Educationally Backward Blocks (EBBs) based on twin composite criterion of Female Rural Literacy Rate below the national average of 46.1 percent and Gender Gap in Literacy Rate higher than the national average of 21.5 percent (Census data, 2011; Wadhwa & Anand, 2020). The national level data suggests a decline in enrolments of female children at higher levels of education. This decline gets steeper for female children belonging to socially disadvantaged groups. The table below depicts the enrolment rate of SC and ST girls in school education at three levels of schooling- upper primary, secondary, and senior secondary:

Table 1 Source: MHRD, 2018

| Level of Education | Total enrolment of female children | Caste-wise enrolment | |
|------------------------|------------------------------------|-----------------------|-----------------------|
| | | Enrolment of SC girls | Enrolment of ST girls |
| Upper primary level | 45.9% | 8.1% | 4.4% |
| Secondary level | 46.8% | 8.1% | 4.3% |
| Senior Secondary level | 47.3% | 8.0% | 4.2% |

India initiated several educational reforms to address the socio-economic disparities through introduction of Right to Education Act and Sarva Shiksha Abhiyan which envisaged universalization of primary education. However, educational credentials are deeply affected by patriarchal norms resulting in parents investing more in their sons' education over that of their daughters (Stash & Hannum, 2001). Girls are often disadvantaged by a rational cost-benefit analysis i.e., if parents feel that their daughters will be unable to capitalize on the education received, they will more likely depend on their sons in future (Stash & Hannum, 2001).

One of the revolutionary steps towards affirmative action was introduction of Kasturba Gandhi Balika Vidyalayas (KGBVs) that intended to build residential schools for adolescent girls from historically disadvantaged groups. 75 percent seats in KGBVs are reserved for girls belonging to SC, ST, and OBC communities while the remaining 25 percent seats are reserved for girls belonging to families residing Below Poverty Line. A total of 5970 KGBVs have been sanctioned by the Ministry of Education in 2018-19.

KGBV scheme is a prime example of gender sensitive public expenditure on education. It is a gender budget initiative that helps to ensure that gender equality commitments are translated to budgetary commitments at policy level (Ratho, 2020). India adopted a gender budget framework in 2005 wherein the established Gender Budgeting Cells were mandated to provide gender allocations in two parts:

Part A: Schemes under the ministry that specifically target women and girls with 100 percent budget allocation

Part B: Schemes under the ministry where a minimum of 30 percent budget allocation is targeted towards women and girls.

There has been a long-standing concern to sensitize output and outcome budgeting to gender, as government budget might reinforce gender-based disadvantages faced by women and girls unless

special measures are taken. It demands assessment of existing meanings of economy, efficiency, and effectiveness. Gender responsive budgeting plays an important role in redesigning mainstream budgetary processes.

Research Objectives

The general objective of the paper involves assessing the effectiveness of KGBV scheme as a gender budget initiative. The specific objectives included:

- i. To conduct gender budget analysis in terms of identifying expenditure patterns at micro-level
- ii. To carry out a benefit-incidence analysis to estimate the differential resource distribution among KGBV students
- iii. To assess the satisfaction of adolescent girls studying in KGBVs with respect to the personal life and quality of education at school.
- iv. To identify differentials in time-use pattern of adolescent girls while attending KGBV and being at home
- v. To document the stakeholders' perspective pertaining to implementation process of KGBVs at grassroots level

Relevance of the study

The existing studies on gender-responsive budgeting are macro in nature which majorly focus on financial inputs. Thus, the question of how much women and girls benefit from GB policies in different sectors still persists. To achieve Sustainable Development Goals 4 and 5, there is a need to build an education system that ensures equitable access and quality education, irrespective of socio-economic status of a child. This study addressed the lacuna of including assessment of budget expenditures and outputs at micro-level by capturing the effect on end-users as well as documenting the perspective of school-level implementers.

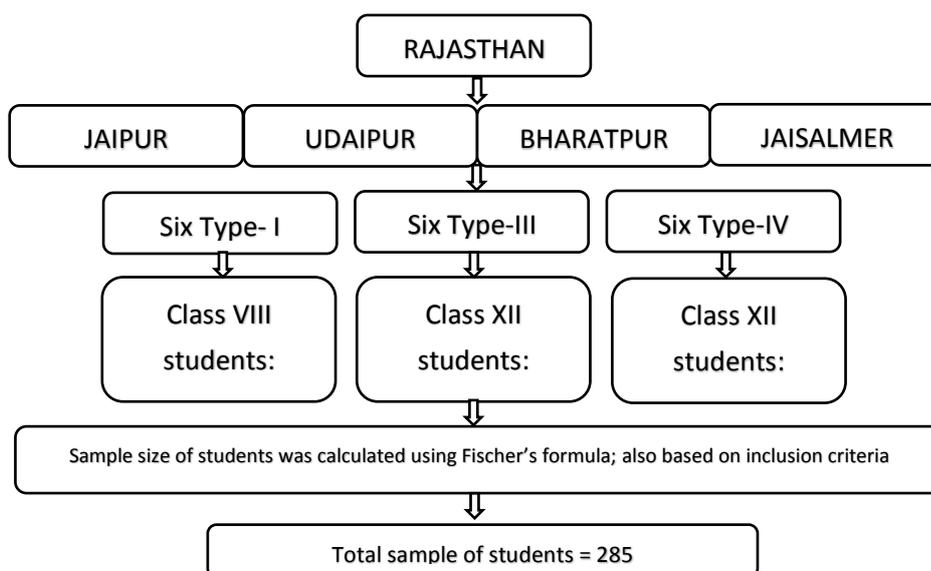
METHODOLOGY

The study involved assessment of micro-implementation of KGBV scheme in terms of budget allocation and expenditures, provision of education and infrastructure resources, and documenting perspective of relevant stakeholders. The policy and program implementation at ground level are crucial to fulfil the objective of providing access and quality education to out-of-school or never enrolled adolescent girls.

Sampling design

A multi-stage sampling design was adopted to select sampling units at different stages- state, districts, blocks, and KGBVs. KGBVs are functional in all states of India. The implementation process of the targeted scheme was conducted in Rajasthan as it holds the least Female Literacy Rate of 52.1 percent (Census data, 2011). Within Rajasthan, four districts were selected based on their female literacy rates. The blocks within districts were selected using purposive sampling based on types of KGBVs functional in these districts. The flowchart below depicts the selection criteria for KGBVs:

Table 2: Selection of sample



An exhaustive sample of students from senior-most class was selected which made cross-tabulations more detailed. The students of senior-most class held most experience of studying and staying in a KGBV.

Method of data collection

The research study was cross-sectional and descriptive in nature. The analysis followed a mixed-method approach. The quantitative data helped to identify budget discrepancies and quantify the provision of education and infrastructure resources. The qualitative data helped to dig deeper to the reasons of discrepancies and gaps in implementation process at micro-level. The triangulation of data was ensured by capturing insights through multiple sources.

Five set of tools were developed and utilized to assess the micro-implementation of KGBVs:

- i. **Resource checklists:** The access and use of education and infrastructure resources were assessed using two resource checklists, in terms of their availability, accessibility, and utilization
- ii. **Benefit-Incidence Analysis tool:** This tool helped to estimate the distributional impact of budget expenditure on adolescent girls belonging to different social groups in the KGBVs.
- iii. **Satisfaction survey tool:** It helped to quantify and assess the satisfaction of adolescent girls studying in KGBVs in terms of education and infrastructure resources, provision and quality of education, and potential for development.
- iv. **Time-use survey tool:** This tool was utilized to ascertain the role of residential schools through assessment of time-use pattern of adolescent girls studying in KGBVs.
- v. **In-depth interview schedules:** In-depth interview schedules were administered with students, teachers, parents, and alumni students to document their perspective and experiences as local implementers or end-users.

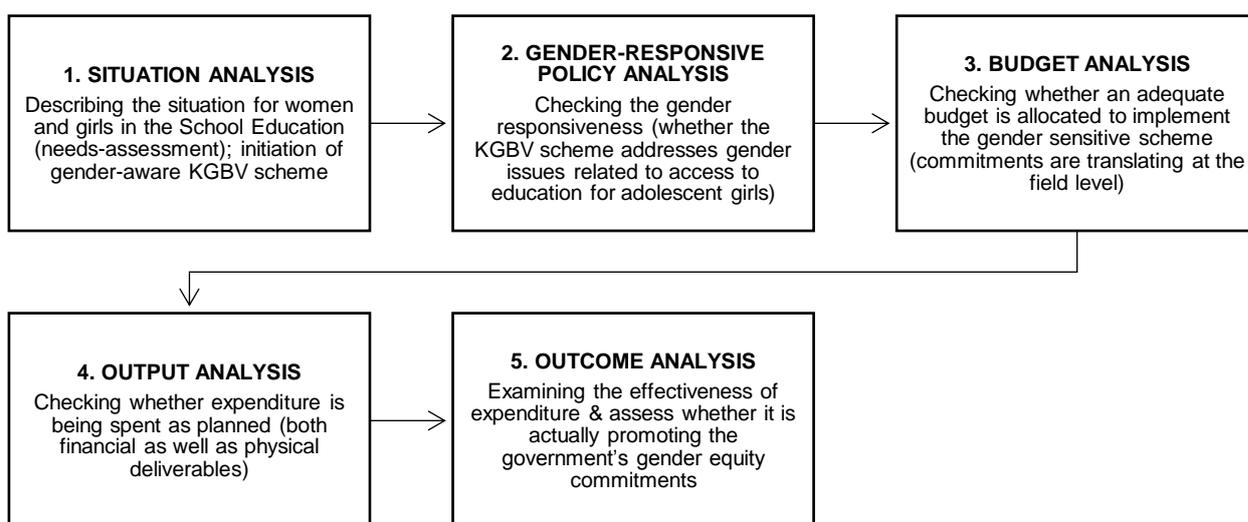
Analysis and interpretation of data: The quantitative data was analyzed using SPSS and qualitative data analysis was conducted using NVivo. All the descriptive statistics were facilitated using mean, frequency, and standard deviation. The statistical differences between three types of KGBVs was computed through one-way ANOVA tests.

RESULTS

Debbie Budlender’s Gender Budgeting Framework (Budlender et al., 1998) was adapted for analysis of selected KGBV schools. It is a five-step framework that involved including a gender perspective at all stages. Drawing on the five steps, the results have been divided under five sections:

Situation Analysis

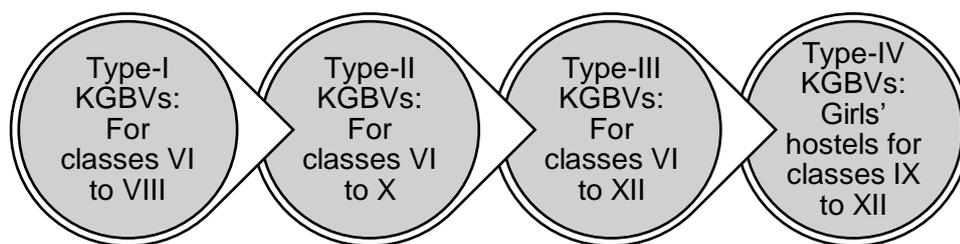
Table 3: Adaptation of Debbie Budlender's Framework



The Right to Education Act (RTE) made eight years of schooling a fundamental right of children, irrespective of their gender, caste, class, ethnicity, or geographical location. Though female literacy rate has shown significant improvement in the past decade, there still exists a gap of approximately 22 percentage points (Census data, 2011). The disparities widen among girls specifically belonging to underserved groups, which also make transition from primary to secondary levels of education more challenging (Ramachandran, 2004).

Functioning of KGBVs

The Kasturba Gandhi Balika Vidyalaya (KGBV) scheme was envisaged as a revolutionary step in bringing out-of-school girls back into formal schooling. The operational mechanism of KGBVs include four types of schools that function with separate financial norms:



In Union Budget 2018-19, Ministry of Education introduced Samagra Shiksha Abhiyan (SSA), which subsumed three flagship national-level programs: Sarva Shiksha Abhiyan (SSA), Rashtriya Madhyamik Shiksha Abhiyan (RMSA), and Teacher Education (TE). KGBV scheme was also subsumed under SSA as an integral component of SSA.

Macro-level budget allocations

The funding pattern of KGBVs is 60:40 among central and state governments respectively (Ministry of Education, 2018). The State Implementation Society opens a separate savings account for operating funds for KGBVs. The central government also releases its share of funds under a separate budget head to the SIS.

Gender-responsive policy analysis

The concept of gender-based power relations is as significant as other forms of power differentials such as caste, class, ethnicity, and geographical location. Thus, assessing the gender responsiveness of KGBV scheme was an effective approach to translate the government's budgetary commitments to gender equity objectives.

The gender-responsiveness of KGBV scheme was assessed through formulation and assessment of several indicators at micro-level:

Caste-disaggregated enrolment

| KGBV | TYPE OF KGBV | SC | ST | OBC | GEN | TOTAL |
|------|--------------|----|-----|-----|-----|-------|
| S1 | I | 73 | 0 | 28 | 5 | 106 |
| S2 | I | 61 | 5 | 31 | 5 | 102 |
| S3 | I | 0 | 110 | 2 | 0 | 112 |
| S4 | I | 9 | 85 | 3 | 6 | 103 |
| S5 | I | 28 | 1 | 66 | 0 | 95 |
| S6 | I | 29 | 1 | 39 | 5 | 74 |
| S7 | III | 47 | 11 | 17 | 1 | 76 |
| S8 | III | 5 | 37 | 13 | 44 | 92 |
| S9 | III | 37 | 27 | 17 | 7 | 88 |
| S10 | III | 46 | 37 | 15 | 2 | 100 |
| S11 | III | 30 | 21 | 1 | 2 | 54 |
| S12 | III | 29 | 15 | 14 | 4 | 62 |

| | | | | | | |
|--------------|----|------------|------------|------------|------------|-------------|
| S13 | IV | 58 | 2 | 25 | 25 | 105 |
| S14 | IV | 27 | 28 | 42 | 3 | 100 |
| S15 | IV | 1 | 100 | 1 | 0 | 102 |
| S16 | IV | 5 | 90 | 6 | 1 | 102 |
| S17 | IV | 28 | 1 | 39 | 4 | 101 |
| S18 | IV | 52 | 5 | 29 | 1 | 87 |
| Total | | 565 | 576 | 388 | 115 | 1661 |

In terms of caste-based distribution, majority of KGBV enrolments had girls from ST category followed by SC category. KGBVs witnessed only 6.9 percent enrolments from girls belonging to BPL families, as compared to 25 percent reservation.

Innovative enrolment strategies

The increased enrolments in KGBV schools involved targeted interventions. The foremost strategy of initiating residential facility addressed major challenges of girls' education including covering long distances to school, issues of safety and security, and losing time in doing household chores. At the pedagogical front, hiring only female teachers helped to overcome psychological barriers amongst parents. In terms of infrastructure, provision of water and sanitation facilities, menstrual hygiene, girl-friendly infrastructure like incinerators, and nutritious meals addressed several gaps in girls' education; resulting in higher enrolments in KGBVs.

Transition from upper primary to secondary level

The interaction with students, teachers, and parents revealed similar concerns around lack of facilities when students transitioned from type-I to type-III or type-IV KGBVs. While type-I KGBVs offered a myriad of resources including school fees, education and learning material, uniform, and monetary incentives; the secondary level KGBVs offered only infrastructure facility to students. The sudden introduction of direct costs to parents to educate their daughters at secondary levels resulted in lower enrolments in type-III and type-IV KGBVs.

Implicit discrimination

Multiple forms of discriminatory practices were reported towards girls from lowest among lower caste groups. The most inexplicable incident reported was singling out Dalit girls to clean toilets. Even in terms of serving food, girls belonging to higher castes were preferred by the teachers. This observation was triangulated with students' and teachers' interviews. The implicit discriminatory practices also affected the learning levels of girls who were not picked by teachers to participate in student clubs, sports competitions, and vocational training courses.

'Gendered' efforts

The underlying efforts to assess micro-level implementation of KGBV policy design failed to break gender stereotypes. The gendered efforts were confined to increasing female enrollment in school education. From the insights gained through interaction with students, it was revealed that girls were expected to conform to gender normative behavior within the school premises. The vocational courses offered in KGBVs included beautician, stitching, and embroidery courses; which also reinforced gender stereotypes. The girls in hostel were also discouraged to interact with boys in school. In some cases, girls also reported to get punished by hostel warden for interacting with boys.

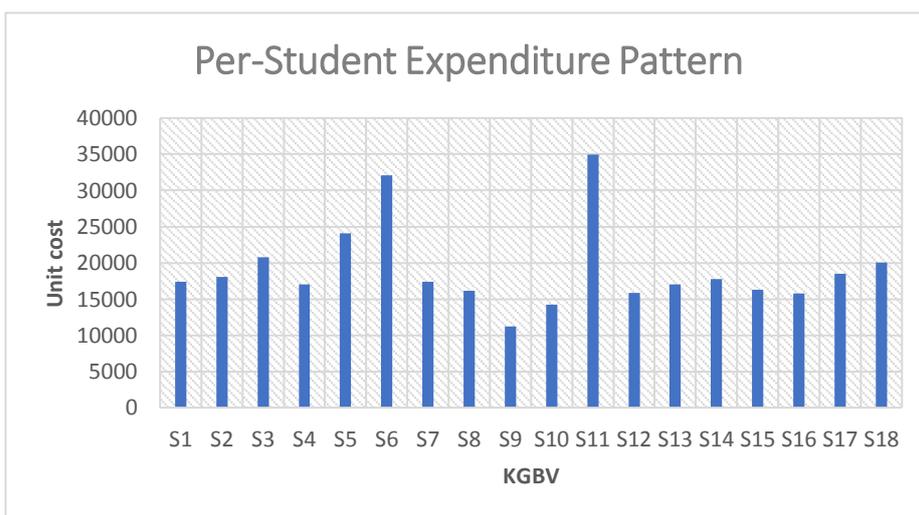
Sudarshan (2016) also highlighted that the expectations through formal education are mediated by underlying culture which shapes the personality, attitude, and values of the students. It is intensified in case of KGBV students, given the residential nature of their schooling.

Budget analysis

Budget is an indispensable factor that needs to be considered at policy level, which ascertains the need to assess budget at micro-level in a meaningful way. The planning and budgeting process of KGBV is integrated under SMSA. It is premised on decentralized approach of planning and implementation framework. As per the guidelines, the planning follows a bottom-up approach, involving School Management Committee (SMC) members, Block Education Officers (BEO) and Cluster Resource Persons (CRP).

At macro-level, the financial norms of KGBVs are specified by the government as follows:

| KGBV | Recurring cost (in lakhs INR) | Non-recurring cost (in lakhs INR) |
|----------|-------------------------------|-----------------------------------|
| Type-I | 45.4 | 8.0 |
| Type-III | 43.0 | 8.0 |
| Type-IV | 43.0 | 8.0 |

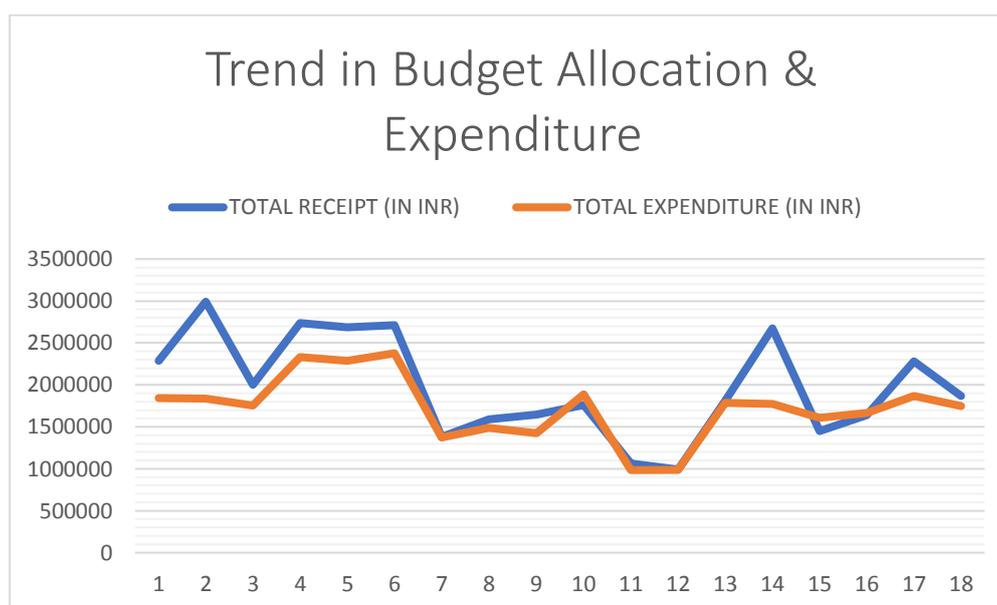


The unit-cost expenditure was calculated based on the budget received in the particular financial year. It was derived by dividing the total school budget allocation by total number of enrolments. Mean expenditure per-

student was found to be INR 19,152 which is quite close to the allocated per-student budget of INR 19,800. But, the unit costs in different KGBVs ranged from 11,000 to 35,000 INR.

Output analysis

The output analysis entailed analyzing budget expenditure in terms of assessing if the financial and physical deliverables were spent as planned. As the trend line suggests, 83.3 percent KGBVs underspent the budget received in the particular financial year. Each KGBV had its own set of challenges in optimally utilizing the budget, ranging from delayed receipt of funds to untimely book-keeping at school-level.



In type-I KGBVs, 100 percent schools underspent the budget received. All schools reported to receive the budget much later than the defined timeline which resulted in under-expenditure within the budget cycle. This led to existing budget to get spilled over to the next financial year. This did not only affect the total budget expenditure but also affected the optimum utilization of available funds. Another factor revealed for late receipt of funds was delayed submission of financial records by the school staff. Type-I KGBVs were most affected since the school and hostel functioned as a unit, leaving no option of fallback. In type-III and type-IV KGBVs, hostels reportedly borrowed money from school committees with no interest rate. The discrepancy in budget allocation and expenditure was reported much lesser than type-I KGBVs (66 percent each).

Bottlenecks in fund flows

The scheme implementers disclosed a range of factors that influenced the fund flow process from macro to micro-level:

- **Little association between expenditures and school-level needs:** Given the pre-decided financial norms and fixed unit costs, the local implementers had limited flexibility to synchronize the expenditure in accordance with the school-level needs. This resulted in making the entire fund flow process a mechanical exercise wherein local implementers spent the budget according to stated norms to avoid issues of accountability.
- **Low-aggregated budgets:** The ground realities were different from the static budget guidelines. At micro-level, implementers reported low budget aggregate for maintenance and miscellaneous components. In the residential setup, KGBVs reported several unforeseen cases of medical and security emergencies, which demanded liquid money to deal with.
- **Top-down approach:** The financial architecture gave KGBVs and SMCs minimal power over budget expenditure at micro-level. Thus, the school-level decision making bodies were reportedly unable to meet local-level needs.
- **Lack of trained implementers:** The effectiveness of fund flow process was deeply affected due to poor financial management at school-level. The school staff was primarily focused on administrative responsibilities but demanded specific training for budget management and financial record keeping.

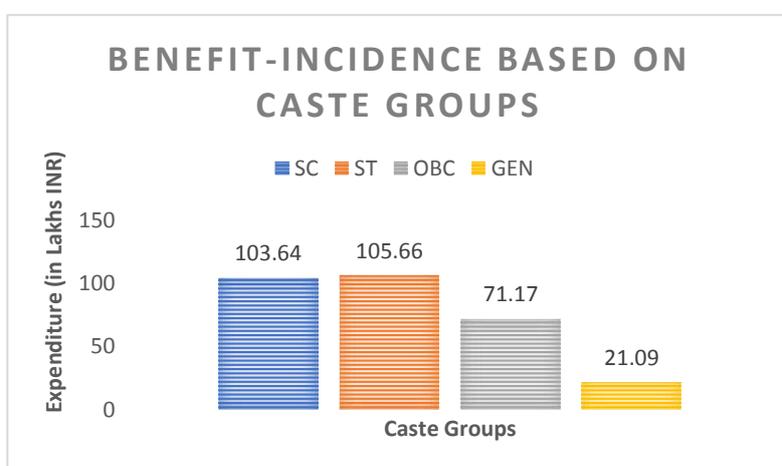
With more attention drawn towards meeting enrolment and financial management demands, learning and quality of education remained ignored aspects. The systemic issues of quality of infrastructure, dysfunctional schools, and lack of motivation of teachers created learning impediments for KGBV students.

Benefit-Incidence Analysis

Benefit-Incidence analysis estimated the distributional impact of budget expenditure across different social groups (Chakraborty et al., 2013). BIA involves allocating ‘unit cost’ according to the budget allocation to identify how well a particular service is targeted towards a certain group of population across gender, social group, income quintile, or geographic location.

The application of Benefit Incidence Analysis involved four basic steps: (i) Estimating unit cost, (ii) Identifying the users, (iii) Aggregating users into groups, and (iv) Calculating the benefit incidence as product of unit cost and unit utilized. The benefit incidence was computed on the basis of unit utilized and derived unit costs. Based on the caste-disaggregated enrolments and total budget expenditure in each type of KGBV, the benefit-incidence was computed as depicted in the table below:

| | SC | ST | OBC | GEN | TOTAL |
|-------------------------------------|--------|--------|-------|-------|--------|
| Type-I | 41.3 | 38.8 | 39.8 | 4.4 | 124.34 |
| Type-III | 35.09 | 23.99 | 11.77 | 9.67 | 80.52 |
| Type-IV | 31.18 | 36.99 | 25.8 | 5.86 | 99.83 |
| Total Expenditure | 107.57 | 99.78 | 77.37 | 19.93 | 304.69 |
| Total number of students | 565 | 576 | 388 | 115 | 1661 |
| Caste-wise benefit incidence | 103.64 | 105.66 | 71.17 | 21.09 | |



As the data suggests, benefit incidence was most progressive towards girls belonging to ST group, with a total allocation of over 105 lakhs INR in the 18 KGBVs. It was followed by benefit incidence of over 103 lakhs INR towards girls from SC group.

As the scheme is designed to be pro-marginalized, BIA estimates suggested that distributional impact of

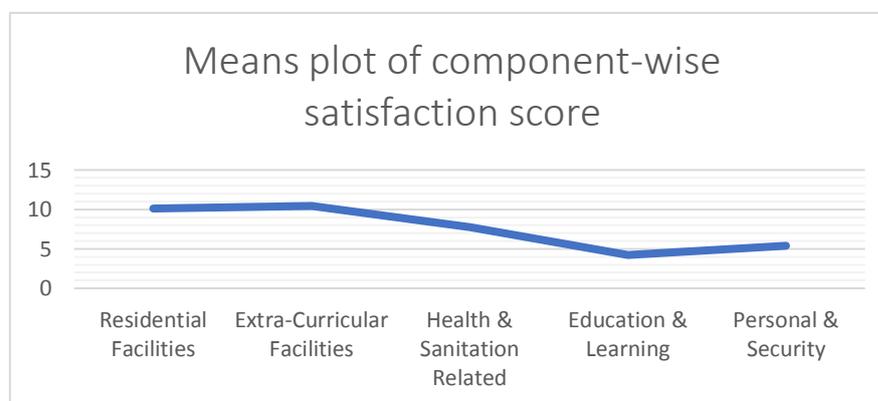
allocated funds are pro-ST and SC communities. It was found to be disproportionate for girls belonging to OBC and BPL groups.

Outcome Analysis

Satisfaction Analysis of KGBV students

The satisfaction of adolescent girls studying in the selected KGBVs was computed in terms of following indicators:

| Residential facilities | Education and learning | Health and Sanitation | Extra-curricular activities | Personal & security |
|--|---|--|--|--|
| <ul style="list-style-type: none"> • Food • Lodging • Water • Electricity • Medical | <ul style="list-style-type: none"> • Learning materials • Pedagogy • Treatment at school | <ul style="list-style-type: none"> • Toilets • Menstrual hygiene • Campus cleanliness • Playground | <ul style="list-style-type: none"> • Vocational courses • Computer training • Sports • Library | <ul style="list-style-type: none"> • Safety & security • Relationships • Family support |



The satisfaction of adolescent girls was computed highest for residential facilities and extra-curricular facilities. It is crucial to note that students were least satisfied with education and learning at KGBVs.

The satisfaction scores were also statistically analysed to understand their association with caste of the students and the type of KGBV they were studying in. No statistical significance was computed between caste and satisfaction of students with p-value=0.528 (greater than 0.05).

To test if there was any significant difference between type of KGBV and satisfaction of students, a one-way ANOVA test was conducted.

| Type of KGBV (Independent Variable) * Student Satisfaction Score (Dependent Variable) | | | | |
|--|-----|---------|----------------|------------|
| | N | Mean | Std. Deviation | Std. Error |
| KGBV Type-I | 161 | 34.3913 | 4.34910 | .34276 |
| KGBV Type-III | 49 | 42.3061 | 6.57078 | .93868 |
| KGBV Type-IV | 75 | 42.7733 | 5.96968 | .68932 |
| Total | 285 | 37.9579 | 6.62089 | .39219 |

Type of KGBV * Student Satisfaction Score

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|-----|-------------|--------|------|
| Between Groups | 4713.592 | 2 | 2356.796 | 85.913 | .000 |
| Within Groups | 7735.903 | 282 | 27.432 | | |
| Total | 12449.495 | 284 | | | |

Since, the p-value is 0.000 which is less than the significance level of 0.05, it was concluded that the differences between some of the means are statistically significant. Thus, the null hypothesis was rejected to conclude that type of KGBV had a significant influence on the satisfaction score of students.

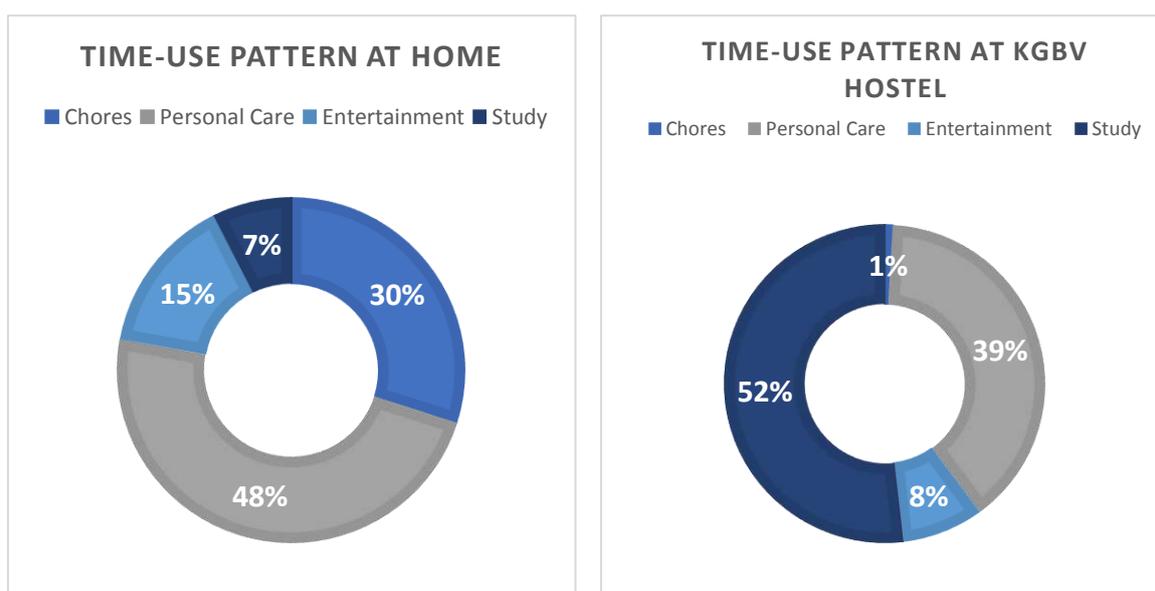
The post-hoc comparison using Scheffe test indicated that there was a significant difference between pairs of means of KGBV type-I and type-III (sig. = 0.000), and type-I and type-IV (sig. = 0.000). Satisfaction score was reported higher by students in KGBV type-III and IV than type-I. Contradictorily, the facilities and allocated resources and funds were higher for type-I KGBVs as compared to type-III and IV.

Impact of budget on time-use

With time-use survey, the time-use pattern of adolescent girls was scrutinized with respect to the utilization of time they stayed at home vis-à-vis when they stayed at KGBV. Time-use survey at micro-level was crucial for understanding and highlighting why schooling costs seem more expensive to parents for their girl children. It also helped highlight the gender differential effect of unpaid care economy on adolescent girls by scrutinizing their time-use pattern.

The average time was calculated by dividing the total number of hours spent in doing a particular activity by the total number of students doing the activity.

| Activity | At home | At KGBV Hostel |
|---------------|-------------|----------------|
| Chores | 7.18 hours | 0.20 hours |
| Personal Care | 11.49 hours | 9.37 hours |
| Entertainment | 3.55 hours | 1.99 hours |
| Study | 1.76 hours | 12.42 hours |



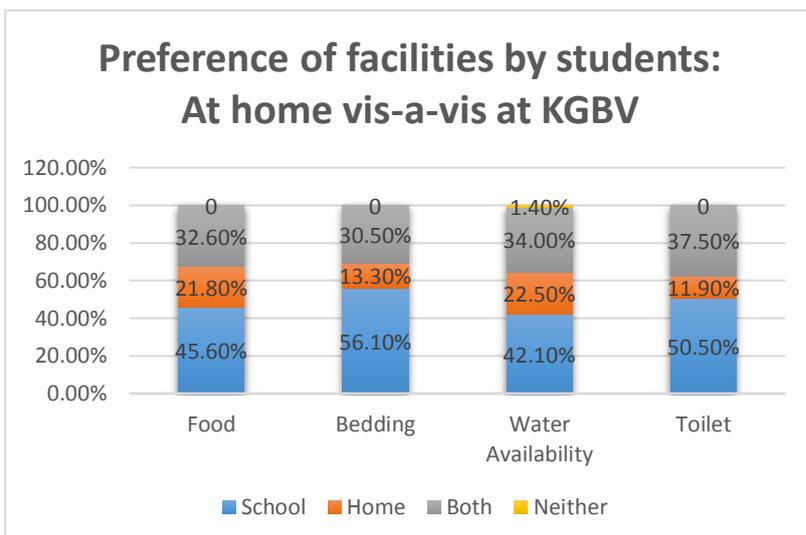
The average time spent doing chores was found to be more than **7 hours** as compared to negligible time spent (approximately **12 minutes** a day) doing chores at KGBV hostel. For educational activities, on the other hand, the girls reportedly spent an average of 1.5 hours at home as compared to more than 12 hours at hostel. It is evident from data that girls spent majority of their time in personal care and household chores; while invested majority of their time in learning activities in KGBVs.

Stakeholders' Perspective

i. Students attending KGBVs

Based on the student interviews, 74.7 percent students were informed about KGBV scheme through alumni students in their community. It was evident that community mobilization program run by respective KGBVs was not an effective medium to generate awareness about the scheme. Post enrolment, students shared their experiences of initial adjustment at the institutional environment. It was highlighted that 35 percent struggled living away from their families and 33 percent were able to navigate through initial days with the help of known peers.

The students in all three types of KGBVs were inquired about their preferences for facilities and resources provided at the hostel vis-à-vis back home.



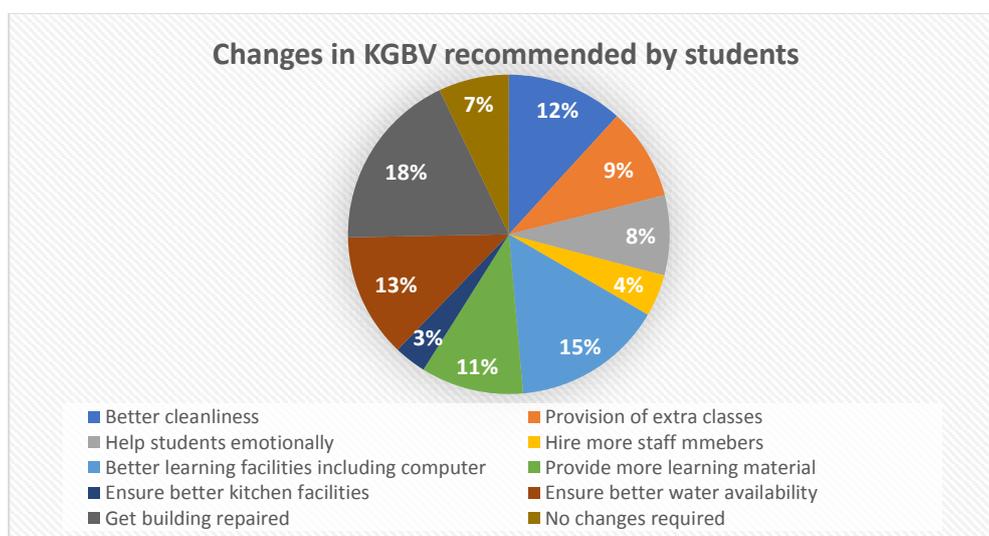
Though resource allocations for KGBVs were much lesser than other comparable schemes (Kowtal & Nafees, 2014), students preferred the facilities provided at KGBV hostel in comparison with the facilities at home.

Students were also inquired about the changes they observed in themselves during their stay at KGBV. Majority of students (33 percent) highlighted

observing personality changes in themselves including communicating better with people, ability to take decisions more confidently, and embracing physiological changes. The adolescents owed it to KGBVs for providing a platform to explore their self, learn new skills, and become better decision-makers.

When inquired about the difference in lives if the girls were not enrolled in a KGBV, 46 percent students envisaged being stuck in doing household chores. 27 percent students feared dropping out post primary level education. 10 percent students believed that they would have gotten married if they were staying at home. 12 percent students appreciated the exposure received at KGBVs to be able to make decisions for themselves and aspire for a better life.

The students recommended a plethora of changes that would make KGBV a better scheme in terms of access and quality.



Majority of students suggested revamping infrastructure. In terms of education, 15 percent students recommended installation of computers and creating a better learning environment at the KGBVs.

ii. Teachers and hostel wardens

The interaction with teachers, hostel wardens, and non-teaching school staff helped to identify the determinants of teacher motivation in KGBVs. The motivation of school-level implementers was determined at two levels- individual and institutional levels.

| Institutional level | Individual level |
|---|---|
| <ul style="list-style-type: none"> • School leadership • Nature of employment • Administrative responsibilities • Financial autonomy and decentralization • Issues and redressal | <ul style="list-style-type: none"> • Disadvantageous background of children • Security and safety • Dealing with parents • Remuneration • Handling emergencies |

i. Institutional level

Bridging gender and social category gaps is one of the primary objectives of KGBVs. Linkages to foster motivation and confidence in girls was found to be strongly influenced by the head teacher, given the residential schooling. A strong school leader did not only positively affect the students but also played a key role in optimally utilizing the available funds. The leadership at individual level was also found to be correlated with minimal decision-making autonomy provided by the policy, which determined teacher’s motivation.

Nature of appointment was also found to influence teacher’s motivation. 68.6 percent teachers were appointed on deputation, entailing they had no choice but to work in a KGBV. 74.3 percent teachers flagged administrative responsibilities as the most challenging role. Beyond ensuring smooth delivery of facilities and entitlements, teachers and wardens were responsible for overall safety, managing administration and finances, managing fellow staff members, parents and SMC members, and organizing audits. These administrative responsibilities on teaching staff did not only affect their motivation but also deeply affected the quality of education rendered at school. *“Quality pe dhyaan nai de paate, administration kaam me hi atke rehte hain” (We cannot focus on quality of education because we are delved so much into administrative tasks).*

The absence of grievance redressal mechanisms was pointed out by 86.8 percent teachers who were unable to raise issues with higher authorities. The monitoring mechanisms were also found to lay minimal inclination towards academic outputs.

ii. Individual level

The teachers raised concerns of dealing with parents on a regular basis, especially parents of disputed families. The daily negotiations of keeping the child in hostel was a major responsibility of teachers and wardens. On the remuneration front, high disparity was noted in salaries offered to government-appointed teachers and agency-appointed teachers. This affected the motivation of teachers who were getting only 5000 INR per month for similar job responsibilities.

The teachers were inquired about major suggestions that could improve the implementation of KGBV scheme and functioning of residential facilities. Table below reveals that the majority of teachers and wardens (51.4 percent) suggested recruitment of more staff members to run the schools

more efficiently. It is important to note that only 20 percent teachers focused on learning as an outcome from KGBV scheme.

| Suggestions for better implementation of scheme | Frequency | Frequency percentage |
|---|-----------|----------------------|
| Enrolment of more staff members | 18 | 51.4 |
| More focus on learning | 07 | 20 |
| In-campus schools | 04 | 11.4 |
| More facilities for teachers and wardens | 12 | 34.3 |
| Ensure timely receipt of funds | 07 | 20 |
| Commuting facilities for school-hostel travel | 02 | 5.7 |
| More subjects should be offered | 02 | 5.7 |
| <i>*Multiple Responses</i> | | |

CONCLUSION

To achieve gender equity in education, the policies need to address gender-specific vulnerabilities and structural disadvantages faced by girls belonging to most marginalized communities. KGBV is a multifaceted scheme that derives a mix of an infrastructure reform, a gender-equity reform, and an affirmative action. The strategies like residential schooling, gender budget allocations, and girl-friendly infrastructure have contributed to targeted measures in girls' education. But there is a need to address gaps in policy, design, and implementation perpetuated due to 'one-size fits all approach'. The findings of the study also suggested that the top-down delivery model has stemmed for resource limitations translating into a vapid learning environment.

RECOMMENDATIONS

In light of the findings, several recommendations have been highlighted to improve the implementation of KGBV scheme at micro-level:

- As the scheme is restricted to a limited number of out-of-school children, there is a need to expand KGBVs in the country.
- Micro-interventions introduced at school-level need to be strengthened including recruitment of more trained staff and provision of residential quarters, gender-sensitive learning material, better inclusive strategies for Children with Special Needs (CWSN), and effective grievance and monitoring mechanisms in each KGBV.
- A shift in focus from gender-specific to gender-transformative approach would help see the larger socio-cultural and economic context.
- The learning environment in KGBVs needs to be strengthened to lay focus on inputs, learning outcomes, and social learning outcomes.
- The planning process can be made more participatory and decentralized by inclusive participation. The bottom-up approach would help ensure strengthened community-government partnership.

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DEPRESSION, ANXIETY, AND STRESS (DAS) AMONG SCHOOL-GOING ADOLESCENTS AND EFFICACY OF INTERVENTION

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ABSTRACT

Prevalence of Depression, Anxiety, and Stress (DAS) among student population has an increased risk of psychiatric disorders, which may exert significant triggers having an adversative effect on their mental health. The increased competition among oneself to perform better than their counterparts in all aspects of life further adds to the risks. The aim of the study was to assess the association of DAS with socio-demographic factors and specific predictors among 12-15 years school-going adolescents and to evaluate the efficacy of CSIT - DAS (Comprehensive School-based Intervention Training- Depression, Anxiety, and stress) in alleviating DAS. School-based action research, one group Pretest, and Post-test design were adopted. The study was conducted among 1038 students by administering a standardized tool developed by Lovibond, DASS-42 (Depression, Anxiety, and Stress Scale), and a self-formulated questionnaire to determine the factors influencing DAS. The first tool along with a general profile tool was utilized to garner information about the level of DAS (Both pre and post-intervention) and its association with the socio-demographic determinants and the second tool was administered to assess the most influential factor triggering DAS. For the experimental phase of the study, 60 children from one particular school and 80 children from another school for the control group were randomly selected for the study and the DASS-42 tool was re-administered after the intervention, and after the stipulated follow-up cycles. The study alerts that out of 1038 school-going adolescents a total of 947 were found to be anxious, 847 were depressed and 778 were stressed between mild to extremely severe levels. Cross tabulation and Chi-square test for association were done to know the distribution of the students across the three domains with respect to socio-demographic variables, where the class of study and qualification of parents were found to influence DAS to varying degrees. Data were also analysed by using a Mann-Whitney U test and Friedman Test for the bunching effect of CSIT. The experimental group showed a tremendous decline in the post-intervention mean score on DAS when compared to the pre-evaluation mean score in all three mental issues with a significant difference between groups for DAS score ($p > 0.01$). These findings suggest that the program is efficacious in alleviating the onset of symptoms of DAS among the selected respondents. The follow-up cycles after the intervention clearly stated that the training should be a continuous one with periodic sessions of rejuvenation

Keywords: Depression, Anxiety, Stress, DAS, School-based Intervention

INTRODUCTION

Adolescence is often regarded as the developmental period which may be conservatively understood as the years between the onset of puberty as well as the establishment of social autonomy that occurs between ages 13 and 19 and is usually subjected to numerous exposures.

Several studies in recent years had manifestly demonstrated that this section of the population group is going through more levels of psychological distress which included Depression, Anxiety, and Stress (DAS) and that can lead to enormous problems in later years.

Patel V, *et al.*, (2007) stated that “mental disorders contribute to an enormous proportion of disease burden through all societies”. Among them, DAS is the foremost cause of illness as well as disability among young adolescents at present-day (Adolescent Mental Health, 2021). WHO, (2017) also mentioned that “the physical, emotional, and behavioural modifications that occur throughout adolescence predispose them to a diversity of mental health issues”. WHO, (2003) similarly has identified in their survey that “mental health and mental disorders are largely overlooked and not given the same significance as physical health”.

Merikangas, *et al.*, (2005) said that around, 20 percent of adolescents have been diagnosed with a mental health disorder. However, Rushton, *et al.*, (2002) found that may be about 20- 30 percent may have one major depressive occurrence before they reach adulthood whereas a quarter of them with a mood disorder like depression emerges during adolescence and nearly 50 -75 percent of adolescents are with anxiety disorders. Kapphahn CJ, *et al.*, (2006) points out that if this mental health remains untreated among adolescents, it may lead to poor school performance or school dropping out, strained family relationships as well as substance abuse, and engaging in some risky sexual behaviours.

Creed *et al.*, (2011) also stated in their research that “school-based programming has numerous unique qualities including, the ability to reach a large number of students simultaneously”, furthermore, it would help to identify students who are at high risk for clinical mental health-related issues. Lastly, Fletcher (2010) noticed that “there is evidence of a relationship between mental health and academic success; school-based mental health programs may also serve as a way to increase students’ academic performance for those experiencing mental health problems”.

Significance of the study: Adolescents are exposed to multiple factors which affect mental health. Factors that contribute to psychological urges during adolescence include exposure to adversity, pressure to conform to peers, and exploration of identity. The present study was carried out to assess the socio-demographic factors and specific predictors causing DAS among 12-15 years school-going adolescents and to evaluate the effectiveness of School-based Intervention to alleviate DAS among school-going adolescents as we know the magnitude and risk factors of symptoms of DAS due to limited access to psychological and psychiatric services in early adolescence often go undiagnosed and untreated.

OBJECTIVES

1. To assess the association of the socio-demographic factors (class and educational status of parents) with DAS among the respondent
2. To assess the most influential factor triggering DAS among the respondents
3. To evaluate the efficacy of School-based Intervention in alleviating DAS among them.

METHODOLOGY

School-based action research, one group Pretest, and Post-test design were adopted. The study was piloted among 1038 students by administering a standardized tool developed by Lovibond, DASS-42 (Depression, Anxiety, and Stress Scale), and a self-formulated questionnaire to determine the factors influencing DAS. The first tool along with a general profile tool was

utilized to garner information about the level of DAS (Both pre and post-intervention) and its association with the socio-demographic determinants and the second tool was administered to assess the most influential factor triggering DAS in the respondents.

Study setting and sample size: With certain inclusion and exclusion criteria sampling procedure adopted for the current study was Purposive sampling. The researcher selected schools following “Samacheer pattern” for the study. Overall, 1,038 students from 8th and 9th standard within the age realm of ‘12 to 15’ years were selected for study whereas a total of 60 (Experimental group) and 80 (Control group) children from two particular schools were randomly selected for the intervention programme.

Sample characteristics: The current study focused mainly on the 8th and 9th standards because throughout the entire stages of development it is during this phase, they are exposed to much psychological adversity which had a greater potential impact on their mental health and moreover due to lack of proper guidance and more pressure from school as well as home sometimes the situation gets very worsen.

Ethical Considerations - The approval number for the study was IHEC / 17-18HD/29.

Instruments used

1. **General Background Questionnaire:** A questionnaire to elicit the general and personal profile of the selected school-going children was framed.
2. **DASS (Depression, Anxiety, and Stress Scale):** A standardized tool developed by Lovibond DASS was used in order to access the levels of DAS to find out the association with the socio-demographic variables. The tool is a questionnaire comprising 42 items where three self-report scales were designed to measure the negative emotional state which was further divided into subscales of ‘2 to 5’ items with related content. The scores were categorized into five levels for each of the mental states - DAS. The standardized tool is a five-point rating scale where they were written off as (1 as always, 2 as often, 3 as sometimes, 4 as rarely, and 5 as never) and were categorised as “Normal (0-7), Mild (8-9), Moderate (10-14), Severe (15-19), and Extremely severe (20+)”. This tool along with the general profile tool was utilized to garner information about the level of DAS both in pre and post evaluation
3. **Depression Stress Anxiety Determinants Checklist (SF-DSAD):** After reviewing the whole literature a checklist was formulated to ascertain the factors influencing each mental state namely DAS. The checklist was subjected to face validity by sending it to experts. A self-formulated rating scale with seventy items under each of the three mental disturbances, namely DAS, was devised. The checklist is a five-point rating scale “1- always, 2- often, 3- sometimes, 4 – rarely, 5- never”. The scores were categorised under three levels namely “1-17 (severe), 18-35 (moderate), 36-50 (mild)”. The lower the score higher is the severity level.
4. **CSIT-DAS:** Structured on the results of the first phase of the study, where school children were found to be affected by DAS at moderate to extremely severe levels and with the help of collated literature a school-based intervention to combat DAS was proposed for the current research. As Cognitive behavioural therapy (CBT) focuses on anxiety and depression and School Stress Inoculation Training (SSIT- developed by Maraichelvi AK, 2016) on stress, these two techniques when combined together might be helpful for all the three major mental issues of adolescents was the basic assumption of the researcher. With this backdrop, the investigator made an attempt to customize CBT and SSIT together and formulated a pilot model, and tested among the school-going adolescents in such a way that the intervention equips them with repertoires of skills for alleviating the three major emotional disorders – DAS. Accordingly, a school-based intervention programme, planned for the student population as this section of the

population is recognized as being at risk of developing mental health issues. CSIT-DAS was conducted through four-stage training phases namely Rapport Building, Pre-Test Evaluation, Implementation, and lastly Follow-up sessions, tailored to the need of the students. The phases of implementation mainly comprise two techniques i.e., Psycho-Education and secondly Behavioural techniques and Cognitive techniques.

Method of analysis:

The Chi square test was conducted to see the significant association between socio-demographical factors (class and educational status of parents) with the levels of DAS. The ‘Non-Parametric’ - Whitney U test and Friedman test was performed to see the efficacy of CSIT-DAS in alleviating DAS among the selected experimental group of school-going adolescents in relation to the control participants.

RESULTS AND DISCUSSION

Objective 1: To assess the most influential factor triggering DAS among the respondents

- The study alerts that out of 1038 school-going adolescents a total of 947 were found to be anxious, followed by 847 (depressed) and 778 (stressed) between mild to extremely severe levels.
- Whilst, none of the seven determinants academic pressure, present/future life, physical and psychological concerns, attitudinal issues, social environment, family matters and Drastic change in life/traumatic event/ Romantic Relation chosen from collating literature were found to trigger depression among the selected sect of the population. Hence further analysis is recommended to reason out the causes of depression among these adolescents.
- For anxiety all seven determinants were found to be statistically significant – separation nervousness, phobias, social worry, generalized social disorder, generalized panic, academic anxiety and obsessive and compulsion with i.e., $p < 0.01$.
- Among all the seven determinants for stress –a statistically significant difference was found between the total stress mean score to the determinants namely social stress, family stress, and poor time management with $p < 0.05$.

Objective 2: To assess the association of DAS with socio-demographic factors among the school-going adolescents

Table 1 to 3 portrays the Non-parametric Test carried out to see the comparison between socio-demographic variables and levels of DAS

Table 1 Class of study and levels of DAS

| Class of study | Normal | Mild | Moderate | Severe | Extremely Severe | Total | X ² | Df | p-value |
|-------------------|----------------|----------------|----------------|----------------|------------------|-------|----------------|------|---------|
| DEPRESSION | | | | | | | | | |
| 8 th | 69 (13.3%) | 143 (27.7%) | 188 (36.4%) | 90 (17.4%) | 27 (5.2%) | 517 | 6.386 | 4.00 | 0.172 |
| 9 th | 94 (18%) | 123 (23.6%) | 175 (33.6%) | 100 (19.2%) | 29 (5.6%) | 521 | | | |
| Total | 163 (15.7%) | 266 (25.6%) | 363 (35%) | 190 (18.3%) | 56 (5.4%) | 1038 | | | |
| ANXIETY | | | | | | | | | |

| | | | | | | | | | |
|-----------------------|----------------|----------------|----------------|----------------|----------------|------|--------|---|--------|
| 8th | 28 (5.4%) | 77 (14.9%) | 201 (38.9%) | 133 (25.7%) | 78 (15.1%) | 517 | 17.784 | 5 | 0.003* |
| 9th | 62 (11.9%) | 70 (13.4%) | 164 (31.5%) | 140 (26.9%) | 85 (16.3%) | 521 | | | |
| Total | 90 (8.7%) | 147 (14.2%) | 365 (35.2%) | 273 (26.3%) | 163 (15.7%) | 1038 | | | |
| STRESS | | | | | | | | | |
| 8th | 152 (29.4%) | 126 (24.4%) | 147 (28.4%) | 77 (14.9%) | 15 (2.9%) | 517 | 16.578 | 4 | 0.020* |
| 9th | 104 (20%) | 129 (24.8%) | 195 (37.4%) | 73 (14%) | 20 (3.8%) | 521 | | | |
| Total | 256 (24.7%) | 255 (24.6%) | 342 (32.9%) | 150 (14.5%) | 35 (3.4%) | 1038 | | | |

The table authenticates that the class 8 respondents were found to be more at a moderate level of depression, whereas, at a severe level the class 9 respondents (19.2% against 17.4%) are more. However, the difference between the class of study and the depression domain was not statistically significant.

Students from class 8 perceived themselves to be affected by anxiety at a moderate level, wherein the distribution at a severe level was slightly on an increase among the respondents of class 9. The chi-square test for association reveals that there was a significant association (i.e., $\chi^2(5) = 17.784, p < 0.05$) between the class of study and the anxiety domain. A study conducted by Schmidt et al., (2010) even “cautioned that high levels of anxiety predict the development of fright attacks and anxiety symptoms, even when domineering for baseline anxiety symptoms”.

The difference in levels of stress shows that more of class 9 students were stressed at a moderate level (37.4%) and extremely severe (3.8%). Accordingly, the chi-square test for association cogently reveals to be significant at a five percent level. A study conducted by Geeta Jain and Singhai in the year (2018) also concluded that with “academics, the parents and the institutions want the students to participate in extracurricular activities too, and the current expectation from the students is to be an all-rounder”.

Table 2 Father's qualifications and levels of DAS

| DEPRESSION | | | | | | | | | |
|----------------------------|---------------|---------------|---------------|---------------|------------------|-------|----------------|--------|---------|
| | Normal | Mild | Moderate | Severe | Extremely Severe | Total | X ² | Df | p-value |
| No Formal education | 5 (10.2%) | 14 (28.6%) | 15 (30.6%) | 12 (24.5%) | 3 (6.1%) | 49 | 29.400 | 16.000 | 0.021** |
| Primary | 27 (13.5%) | 52 (26%) | 79 (39.5%) | 35 (17.5%) | 7 (3.5%) | 200 | | | |
| Secondary | 39 (10.6%) | 99 (26.9%) | 140 (38%) | 67 (18.2%) | 23 (6.3%) | 368 | | | |
| UG | 69 (22.7%) | 69 (22.7%) | 96 (31.6%) | 56 (18.4%) | 14 (4.6%) | 304 | | | |
| PG | 23 (19.7%) | 32 (27.4%) | 33 (28.2%) | 20 (17.1%) | 9 (7.7%) | 117 | | | |
| Total | 163 | 266 | 363 | 190 | 56 | 1038 | | | |

| | (15.7%) | (25.6%) | (35%) | (18.3%) | (5.4%) | | | | |
|----------------------------|----------------|----------------|----------------|----------------|----------------|------|--------|----|---------|
| ANXIETY | | | | | | | | | |
| No Formal education | 1 (2%) | 2 (4.1%) | 23 (46.9%) | 13 (26.5%) | 10 (20.4%) | 49 | 35.109 | 20 | 0.020** |
| Primary | 16 (8%) | 33 (16.5%) | 68 (34%) | 53 (26.5%) | 30 (15%) | 200 | | | |
| Secondary | 24 (6.5%) | 49 (13.3%) | 130 (35.3%) | 113 (30.7%) | 52 (14.1%) | 368 | | | |
| UG | 39 (12.8%) | 42 (13.8%) | 101 (33.2%) | 67 (22.1%) | 55 (18.1%) | 304 | | | |
| PG | 10 (8.5%) | 21 (17.9%) | 43 (36.8%) | 27 (23.1%) | 16 (13.7%) | 117 | | | |
| Total | 90 (8.7%) | 147 (14.2%) | 365 (35.2%) | 273 (26.3%) | 163 (15.7%) | 1038 | | | |
| STRESS | | | | | | | | | |
| No Formal education | 16 (32.7%) | 12 (24.5%) | 14 (28.6%) | 6 (12.2%) | 1 (2%) | 49 | 38.318 | 16 | 0.001** |
| Primary | 45 (22.5%) | 52 (26%) | 78 (39%) | 22 (11%) | 3 (1.5%) | 200 | | | |
| Secondary | 89 (24.2%) | 100 (27.2%) | 123 (33.4%) | 44 (12%) | 12 (3.3%) | 368 | | | |
| UG | 63 (20.7%) | 65 (21.4%) | 104 (34.2%) | 55 (18.1%) | 17 (5.6%) | 304 | | | |
| PG | 43 (36.8%) | 26 (22.2%) | 23 (19.7%) | 23 (19.7%) | 2 (1.7%) | 117 | | | |
| Total | 256 (24.7%) | 255 (24.6%) | 342 (32.9%) | 150 (14.5%) | 35 (3.4%) | 1038 | | | |

A high percentage of children whose fathers had ‘no formal education seemed to be depressed at a severe level and children of fathers with PG qualifications at an extremely severe level. However, the chi-square test for association reveals that there was a significant association (i.e., $\chi^2(16) = 29.4, p < 0.05$) between the father’s qualification and depression domain.

Whereas levels of anxiety based on their father’s educational status clearly shows an increased percentage of children of illiterate fathers being at risk in both moderate and extremely severe levels (46.9 % and 20.4 %). The remarkable difference in the percentages is evident with the chi-square test for association revealing a significant association (i.e., $\chi^2(20) = 35.109, p < 0.05$) between the father’s qualification and anxiety domain. Deb, S (2001) concluded that “In India, it was seen that the main documented cause of anxiety among school children and adolescents is parents’ high educational expectations and pressure for academic achievement”.

The percentage of children with a normal level of stress was found to be augmented among the fathers with PG educational status closely followed by fathers who had no formal education. A sizeable percentage of children of fathers with PG educational status were severely stressed (19.7%), whereas stress at an extremely severe level was found to be the highest among children whose fathers had completed UG (5.6%). On the whole, the qualitative analysis (chi-square test) for association reveals that there was a significant association (i.e., $\chi^2(16) = 38.318, p < 0.01$) between the father’s qualification and stress domain.

Table 3 Mother's qualifications and levels of DAS

| DEPRESSION | | | | | | | | | |
|--------------------------------|----------------|----------------|----------------|----------------|----------------------|-------|----------------|----------------|-------------|
| | Normal | Mild | Moderate | Severe | Extremel y Severe | Total | X ² | Df | p- value |
| No Formal education | 7 (7.6%) | 30 (32.6%) | 19 (20.7%) | 32 (34.8%) | 4 (4.3%) | 92 | 56.8 49 | 16. 00 0 | 0.000* |
| Primary | 26 (13%) | 50 (25%) | 88 (44%) | 25 (12.5%) | 11 (5.5%) | 200 | | | |
| Secondary | 45 (12.6%) | 99 (27.7%) | 132 (37%) | 64 (17.9%) | 17 (4.8%) | 357 | | | |
| Graduate | 68 (24.3%) | 59 (21.1%) | 83 (29.6%) | 51 (18.2%) | 19 (6.8%) | 280 | | | |
| Postgraduate | 17 (15.6%) | 28 (25.7%) | 41 (37.6%) | 18 (16.5%) | 5 (4.6%) | 109 | | | |
| Total | 163 (15.7%) | 266 (25.6%) | 363 (35%) | 190 (18.3%) | 56 (5.4%) | 1038 | | | |
| ANXIETY | | | | | | | | | |
| No Formal education | 2 (2.2%) | 7 (7.6%) | 30 (32.6%) | 30 (32.6%) | 23 (25%) | 92 | 48.1 46 | 20 | 0.000* |
| Primary | 15 (7.5%) | 31 (15.5%) | 76 (38%) | 50 (25%) | 28 (14%) | 200 | | | |
| Secondary | 22 (6.2%) | 52 (14.6%) | 130 (36.4%) | 105 (29.4%) | 48 (13.4%) | 357 | | | |
| Graduate | 38 (13.6%) | 34 (12.1%) | 100 (35.7%) | 64 (29.9%) | 44 (15.7%) | 280 | | | |
| Postgraduate | 13 (11.9%) | 23 (21.1%) | 29 (26.6%) | 24 (22%) | 20 (18.3%) | 109 | | | |
| Total | 90 (8.7%) | 147 (14.2%) | 365 (35.2%) | 273 (26.3%) | 163 (15.7%) | 1038 | | | |
| STRESS | | | | | | | | | |
| No Formal education | 26 (28.3%) | 22 (23.9%) | 31 (33.7%) | 10 (10.9%) | 3 (3.3%) | 92 | 20.2 84 | 16 | 0.208 |
| Primary | 42 (21%) | 54 (27%) | 70 (35%) | 31 (15.5%) | 3 (1.5%) | 200 | | | |
| Secondary | 78 (21.8%) | 96 (26.9%) | 127 (35.6%) | 44 (12.3%) | 12 (3.4%) | 357 | | | |
| Graduate | 73 (26.1%) | 59 (21.1%) | 87 (31.1%) | 48 (17.1%) | 13 (4.6%) | 280 | | | |
| Postgraduate | 37 (33.9%) | 24 (22%) | 27 (24.8%) | 17 (15.6%) | 4 (3.7%) | 109 | | | |
| Total | 256 (24.7%) | 255 (24.6%) | 342 (32.9%) | 150 (14.5%) | 35 (3.4%) | 1038 | | | |

Depressive symptoms in line with anxiety were found to be highest at the moderate level among children of mothers with primary education (44%), whereas at the severe level the children whose mothers had no formal education exceeded their counterparts (34.8%). A study conducted by Sukla *et al.*, (2019), also found “depression to be significantly higher among those whose mothers were educated up to primary (OR 3.19; $P < 0.01$) or up to intercollege (OR 1.59; $P < 0.001$) when compared with illiterate mothers”. At an extremely severe level, the children of graduated mothers had an upsurge (6.8%) against their cohorts, which should not go unnoticed.

The highest percentage (38%) of children belonging to families whose mothers had primary education seemed to be anxious at a moderate level whereas anxiety at a severe and extremely severe level was found to be the highest among children from families whose mothers had no formal education (32.6% and 25% respectively).

However, the chi-square test for association reveals that there is a significant association in the domains of anxiety and depression. This result was similar to the results stated by Finkelstein *et al.*, (2007) who revealed that “adolescents from families with lower parent education are less optimistic than those from more educated families”.

Equal distribution of respondents stressed at a moderate level was found among children whose mothers had completed primary and secondary education (35% and 35.6%) and it was high when compared to their cohorts (UG – 31.1%, PG - 24.8%, and No formal education-33.7%). Whereas stress at the severe and extremely severe was found to be highest among children whose mothers had completed graduation (17.1% and 4.6%) closely followed by PG-completed mothers’ children (15.6% and 3.7%) compared to their counterparts. However, the differences in the levels of stress in relation to the mother’s education were not statistically significant

Objective 3: To evaluate the efficacy of CSIT-DAS in alleviating DAS

Table 4 Comparison between pre-test and post-test mean scores on DAS between Experimental and Control Group

| | Experimental (n= 60) | | Control (n=80) | |
|-----------------------------|----------------------|-------------|----------------|-------------|
| DEPRESSION | | | | |
| <i>Stages of assessment</i> | <i>Pre</i> | <i>Post</i> | <i>Pre</i> | <i>Post</i> |
| <i>Mean</i> | 25.43 | 9.08 | 17.26 | 20.51 |
| <i>SD</i> | 8.079 | 6.904 | 7.592 | 7.674 |
| <i>Median</i> | 28.00 | 7.50 | 17.00 | 21.00 |
| <i>z value</i> | -5.730 | | -7.441 | |
| <i>p value</i> | 0.000** | | 0.000** | |
| ANXIETY | | | | |
| <i>Stages of assessment</i> | <i>Pre</i> | <i>Post</i> | <i>Pre</i> | <i>Post</i> |
| <i>Mean</i> | 24.05 | 7.55 | 13.51 | 17.90 |
| <i>SD</i> | 9.004 | 5.134 | 6.533 | 4.970 |
| <i>Median</i> | 26.50 | 6.00 | 12.00 | 17.00 |
| <i>z value</i> | -6.432 | | -8.567 | |
| <i>p value</i> | 0.000** | | 0.000** | |
| STRESS | | | | |
| <i>Stages of assessment</i> | <i>Pre</i> | <i>Post</i> | <i>Pre</i> | <i>Post</i> |

| | | | | |
|----------------|---------|-------|---------|-------|
| <i>Mean</i> | 25.28 | 13.35 | 19.70 | 19.74 |
| <i>SD</i> | 8.457 | 7.618 | 8.139 | 7.597 |
| <i>Median</i> | 28.00 | 11.00 | 19.00 | 18.00 |
| <i>z value</i> | -3.946 | | -5.110 | |
| <i>p value</i> | 0.000** | | 0.000** | |

It is evident from the above table that the experimental group showed a tremendous decline in the post-intervention mean score on depression, anxiety, and stress when compared to the pre-evaluation mean score (9.08 from 25.43 for depression; 7.55 from 24.05 for anxiety; 13.35 from 25.25 for stress). In other words, the participants’ level of DAS has declined by practicing and applying the coping skills learned through the CSIT-DAS. The results were also further statistically analysed by Mann Whitney U test and it reveals statistically significant variations in the three domains (z value = -5.730 (depression); z value = -6.432 (anxiety); z value = -3.946 (stress) with p value= 0.000 p<0.01).

The table further authenticates an important fact that the mean score in post-evaluation was higher in the control group when compared to pre-evaluation scores on the two domains of mental disorder namely depression (17.26 to 20.51) and anxiety (13.51 to 17.91). The stress mean scores were almost the same for pre and post-test data (19.70 to 19.74). The results were also further statistically analysed which reveals statistically significant for the three domains (z value = -7.441 (depression); z value = -8.567 (anxiety); z value = -5.110 (stress) p value= 0.000 p<0.01). A review of the adolescents by Bertha and Balázs (2013) showed a high prevalence of depression and anxiety among adolescents, which has a negative impact on quality of life and is a significant risk indicator later.

The context of the both the control and the experimental group was similar in terms of workload, exams and the parental/ teacher expectations, the experimental group of participants were significantly better in handling DAS. The reason is owed to the CSIT-DAS that had facilitated them to practice a repertoire of coping skills and it was the only reason for their decreased DAS levels. In other words, CSIT-DAS helped them confront depression, anxiety, and stress in them, which otherwise would have been elevated as the students of control group. In sum, the CSIT-DAS that was tailored for school-going children conducted in three phases had hand-held the experimental group of students and provided a shield over the susceptible stressful events. Moreover, the augmented mean score of DAS among the control group cautions the academicians that the level

Table 4 Comparison between pre-test, post-test and follow up cycles for DAS

| Comparison between pre-evaluation, post-evaluation and follow up | | | | |
|---|-----------------------|------------------------|--------------------|--------------------|
| Overall (n=60) | Pre-Evaluation | Post-Evaluation | Follow Up 1 | Follow up 2 |
| Mean | 25.43 | 10.62 | 8.58 | 7.90 |
| Median | 28.00 | 8.00 | 7.00 | 7.00 |
| SD | 8.079 | 7.339 | 5.625 | 5.461 |
| Friedman Test | $\chi^2(3)= 76.805$ | | | |

| | | | | |
|----------------------|---------------------|-------|-------|-------|
| | p-value=0.000** | | | |
| Anxiety | | | | |
| Mean | 24.03 | 7.55 | 6.35 | 6.40 |
| Median | 26.50 | 6.00 | 5.00 | 5.00 |
| SD | 9.048 | 5.134 | 4.686 | 4.691 |
| Friedman Test | $\chi^2(3)= 85.402$ | | | |
| | p-value=0.000** | | | |
| Stress | | | | |
| Mean | 25.28 | 13.35 | 9.27 | 9.75 |
| Median | 28.00 | 11.00 | 7.50 | 9.00 |
| SD | 8.457 | 7.618 | 7.025 | 7.175 |
| Friedman Test | $\chi^2(3)= 70.402$ | | | |
| | p-value=0.000** | | | |

Interfering into the data that authenticates the difference in pre, post, and follow-up assessment mean scores of depressions, the mean score in pre-evaluation (25.43) is higher than post-test (10.62). The researcher had given a follow-up 1 after an interval of a 1-week gap of the post-intervention programme and follow-up 2 was conducted after an interval of 1 month, where a lowered mean score was observed in follow-up 1 and follow-up 2 (8.58 and 7.90 respectively from 10.62).

The second part of the table reveals that the overall mean score on anxiety in Pre-Evaluation is significantly higher than the post-intervention mean score (from 24.03 to 7.55). In other words, the experimental participants learned the techniques to alleviate anxiety through the sessions of CSIT-DAS. The mean score on anxiety in follow-up 1 also shows a noticeable decline, however, follow-up 2 is on a slight increase. This verity cautions the researcher that the CSIT-DAS implemented to alleviate DAS should be refreshed periodically to maintain its sustainability.

The same pattern of anxiety was witnessed for stress Pre - 25.28 prior, Post - 13.35, Follow-up 1 - 9.27 and Follow-up 2 – 9.75), Which further confirms the continuation of the CSIT-DAS in a periodic manner.

The results were further statistically analysed through the Friedman test, which reveals a statistically significant value for all three domains of mental concerns (Depression -i.e., $\chi^2 (3) = 76.805$, $p<0.000$; Anxiety-i.e., $\chi^2 (3) = 85.402$, $p<0.000$; Stress- i.e., $\chi^2 (3) = 70.402$, $p<0.000$ at one percent $p<0.01$). Therefore, the need for CSIT-DAS especially tailored for school children was found to be effective in reducing DAS.

CONCLUSION

Depression, anxiety, and stress directly or indirectly have an impact on one’s lifestyle in different aspects. These issues mandate research in the domain of mental health. The key finding of the present study is that out of 1038 total respondents, 3/4th of them had perceived to be depressed, anxious, and stressed, at varying levels between mild and extremely severe where more children were found to be anxious, followed by depression and stress. The analysis of potential indicators of DAS among the selected students shows that the anxiety was highly correlated to the seven chosen anxiety indicators (separation nervousness, phobias, social worry, generalized social disorder,

generalized panic, academic anxiety and obsessive and compulsion) and stress with three indicators namely social stress, family stress, and poor time management. However, for depression no significant correlation was found with the seven chosen determinants.

The CSIT-DAS formulated for this sect of population was found to be effective in two terms. Firstly, the experimental group showed a tremendous decline in the post-intervention mean score on DAS compared to the pre-evaluation mean score and was statistically significant. Secondly, the sustainability of CSIT-DAS was also witnessed with the stipulated follow up cycles. The finding clearly states that the CSIT-DAS should be a continuous training with periodic sessions of rejuvenation.

Limitation: The sample size was too big and it was very difficult to collect data as it was too time-consuming. Moreover, making the students come for intervention daily was also another difficulty faced by the researcher.

Implications: On the whole, CSIT-DAS has boosted the students' vigilance and developed a sense of mastery over the usage of coping skills, which undoubtedly validates the efficacy of the CSIT-DAS intervention provided to them. Therefore, CSIT-DAS especially tailored for school children is strongly recommended to be used by every school to alleviate the risks of mental issues prevalent among the student population.

Future directions: The alarming risk of DAS among school students is also caused by the family pressure to perform better, hence the researcher feels that the focus of intervention should not only be on children but also on the parents. All the more, the school environment should be a positive one as perceived by the school children by providing extra co-curricular activities and make every child feel important.

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IDENTIFICATION OF CONSTRAINTS FACED BY THE AGRICULTURE ENTREPRENEURS IN KOTTAYAM DISTRICT

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ABSTRACT

Agriculture being one of the largest sectors in the world employs more than a billion people and accounts for 3% of global GDP. The economic liberalization, reduced protection of agricultural markets, and fast-changing agrarian societies has transformed agriculture and provided opportunities to entrepreneurs. An agri-entrepreneur is a person involved in a business sector encompassing agriculture and agriculture-related commercial activities. Allied enterprises in agriculture help the farmer to generate additional income. Value addition, fisheries, animal husbandry and other enterprises consisting of mushroom, apiculture and floriculture are included in the agri allied sector. The study was done in Kottayam district of Kerala state. The data was collected through an online survey conducted among 400 agri-entrepreneurs. A pre-structured questionnaire was the tool used for collecting the data. The data was analysed and interpreted, using appropriate procedures and statistical techniques. The objectives were the classification of entrepreneurs based on agri-allied sectors and to identify the constraints faced by these agri-entrepreneurs in various agri-based allied sectors like value addition, fisheries, animal husbandry and other enterprises. The major constraints identified in agri allied sectors were personal, managerial, technical, production, government support, labour, environmental, marketing and financial. The results show that the mean score of constraints faced by agri-entrepreneurs differs with different type of agri allied sectors. This study attempts to identify and prioritize these constraints. This will make it easier to target and correct the issues faced by agri-entrepreneurs and will be beneficial for directors, research and extension agents and government officials to design further policy and law to minimize these constraints.

Keywords: Agri-allied sectors, agri-entrepreneurs, constraints.

INTRODUCTION

Among the largest sectors in the world, agriculture employs more than a billion people and accounts for 3% of the world's GDP. In India, agriculture contributes about 20% of the GDP, while employing about 52% of the country's population. Entrepreneurship can be considered as the backbone of economic progress. And it can be seen that the level of economic progress of a region is greatly influenced by the level of entrepreneurial activities in that region.

An entrepreneur involved in a business sector encompassing agriculture and agriculture-related commercial activities is an agri-entrepreneur. The sector that depends on the agricultural activity in various ways and which affects the outcome of the agricultural sector is referred to as allied sector. Value addition, fisheries, animal husbandry and other enterprises consisting of mushroom, apiculture and floriculture are all part of agri allied sector.

Value addition can be a process in which a high price is realized for the same volume of a primary product, by means of processing, packing, upgrading the quality or other such methods. The absence of simple processing, preservation and transport technologies have resulted in losses, which according to Gardas *et al.*; (2018) could be estimated at 40% from production worth INR 50,000 crores.

With regard to the fishing sector this study concentrates on fish farming, which involves raising fish commercially in tanks or enclosures such as fish ponds usually for food. India has a major role in aquaculture and ranks second after China.

Livestock sector is a sub-sector of agriculture which provides nutrient-rich food products, draught power, organic manure and domestic fuel, hides and skin and is a regular source of cash income for rural households. Currently, India accounts for 18.5% of world milk production.

Agricultural enterprises mean those small business concerns engaged in the production of food, fiber, ranching, raising of livestock, aquaculture, and all other farming and agricultural-related industries. The other enterprises include floriculture, apiculture and mushroom cultivation. Floriculture is concerned with the cultivation of flowers and ornamental plants. In terms of production India has the second position. Apiculture is the cultivation and care of honey bees to extract honey from them. Honey produced in India in 2020-2021 was 1.25 lakh tonnes. Globally, the mushroom industry has expanded but the expansion in India is comparatively low.

A business constraint is anything that interferes with the profitability of a company or business endeavour. Improving profitability requires the removal or reduction of business constraints. Glass (2017). The major constraints identified in agri allied sectors were based on personal, managerial, technical, production, government support, labour, environmental, marketing and financial. This study primarily classifies entrepreneurs based on agri-allied sectors and to identify the constraints challenging the agri-entrepreneurs in various agri based allied sectors like value addition, fisheries, animal husbandry and other enterprises.

OBJECTIVES

The main objective is to identify the constraints challenging the agri-entrepreneurs.

The specific objectives are:

- 1) Classification of entrepreneurs based on agri-allied sectors.
- 2) To identify the constraints of the agri-entrepreneurs in various agri based allied sectors like value addition, fisheries, animal husbandry and other enterprises.

HYPOTHESIS

There is great potential in Kottayam district for agri-entrepreneurships. Despite this, entrepreneurs face significant constraints. This study attempts to discover these constraints. The assumption is that the prioritisation of these constraints will make it easier to target and correct the issues faced by agri-entrepreneurs.

METHODOLOGY

Selection of area: The study was done in Kottayam district in Kerala state. This district had high potential for agri-entrepreneurs.

Selection of sample: A purposive sampling technique was used. Entrepreneurs with more than three years' experience were selected. These entrepreneurs were grouped into four, i.e., value addition, fisheries, animal husbandry and other enterprises. For each group 100 respondents were identified.

Design: The study was done in two phases. A survey was conducted in Phase I to collect the data from the selected sample. In Phase II the data was analysed and interpreted with the help of appropriate procedures and statistical techniques.

Tools and techniques of data collection: The information was collected through an online survey. The method of collecting data used was a questionnaire schedule and the tool used for collecting the data was a pre-structured questionnaire.

Data analysis and interpretation: Data analysis was done by SPSS 20.0. Descriptive statistics were used to describe and summarize the properties of the mass of data. One-way ANOVA was used for comparison of the factors considered between different agri allied sectors. Post hoc test or multiple comparison test is used where an ANOVA test was found to be significant. Confirmatory Factor Analysis (CFA) was used to determine the significance and impact of constraints faced by agri-entrepreneurs.

FINDINGS AND DISCUSSION

1 Profile of the agri-entrepreneurs

Data pertaining to the demographic profile was collected. Data related to age, gender, level of education, and income are shown in Table 1.

Table -1 Profile of the Agri-Entrepreneurs

| <i>Sl. No.</i> | <i>Age</i> | <i>Percent</i> |
|----------------|---------------|----------------|
| 1 | 20-30 years | 1.0 |
| 2 | 30-40 years | 12.0 |
| 3 | 40-50 years | 34.0 |
| 4 | 50 and above | 53.0 |
| | Total | 100.0 |
| <i>Sl. No.</i> | <i>Gender</i> | <i>Percent</i> |
| 1 | Male | 72.0 |

| | | |
|----------------|---------------------------|----------------|
| 2 | Female | 28.0 |
| | Total | 100.0 |
| <i>Sl. No</i> | <i>Level of education</i> | <i>Percent</i> |
| 1 | High school | 25.0 |
| 2 | Intermediate | 39.5 |
| 3 | Graduation | 26.5 |
| 4 | Post-Graduation | 9.0 |
| | Total | 100.0 |
| <i>Sl. No.</i> | <i>Annual income</i> | <i>Percent</i> |
| 1 | Up to 50000 | 9.0 |
| 2 | 50001-100000 | 12.0 |
| 3 | 100001-500000 | 54.0 |
| 4 | 500000-1000000 | 17.0 |
| 5 | Above 10 lakhs | 8.0 |
| | Total | 100.0 |

It is observed that half of the respondents (53%) were in the age group, 50 and above and the result is comparative to the findings of Dev (2018) who showed that youth were disinterested in agriculture due to low profitability and income. The results also show that a major part of the entrepreneurs were males and these findings stay in line with results reported by Strawser *et al*; (2021) who opined on women being underrepresented in entrepreneurship. The table revealed a majority of the agri entrepreneurs only had an intermediate education. This is supported by Carbonell (2022) who stated that the availability of good jobs in the public and private domains for the highly educated reduces the probability of choosing entrepreneurship. The table also shows that annual income of majority of the agri entrepreneurs are between 1-5 lakhs, this is in accordance with the study by Hamilton (2000) who finds that most entrepreneurs persist with small enterprises despite lower initial earnings relative to employees. The study suggests that non-pecuniary benefits likely explain both entrepreneurial entry and persistence.

2 Classification of Entrepreneurs based on Agri-Allied Sectors

The entrepreneurs selected as sample were engaged in agri-based allied sectors viz. value addition, fisheries, animal husbandry and other enterprises. The entrepreneurs were classified based on agri-allied sectors is shown in Table-2

Table -2 Classification of Entrepreneurs Based on Agri-Allied Sectors

| Sector | Enterprise | Frequency | Percent |
|------------------|----------------|------------|-------------|
| Value addition | Dairy Products | 04 | 4% |
| | Value addition | 96 | 96% |
| | Total | 100 | 100% |
| Fisheries | Fisheries | 100 | 100% |
| | Total | 100 | 100% |
| Animal Husbandry | Cattle rearing | 48 | 48% |
| | Poultry | 28 | 28% |
| | Duck rearing | 08 | 8% |
| | Goat rearing | 16 | 16% |
| | Total | 100 | 100% |
| Others | Floriculture | 28 | 28% |
| | Apiculture | 40 | 40% |
| | Mushroom | 32 | 32% |
| | Total | 100 | 100% |

This table shows the different types of agri-allied sectors in Kottayam district and the identified agri-entrepreneurs were classified based on value addition, fisheries, animal husbandry and other enterprises.

3 Constraints Faced by Agri-Entrepreneurs in the Value Addition Sector

The table shows the model fit indices for CFA- constraints for value addition sector.

Table -3 Model fit Indices for CFA – Constraints- Value addition

| | χ^2 | DF | P | Normed χ^2 | GFI | AGFI | NFI | TLI | CFI | RMR | RMSEA |
|-----------------------------|----------|----|------|-----------------|------|-------|------|------|------|------|-------|
| Constraints- Value addition | 62.642 | 19 | .000 | 3.297 | .992 | .7945 | .939 | .965 | .976 | .682 | .152 |

All the attributes loaded significantly on the latent constructs. The value of the fit indices indicates a reasonable fit of the measurement model with data. Table 3(a) presents the regression coefficients.

Table -3(a)The regression Coefficients –Constraints-Value addition

| Factors/ Latent Variables (Dependent Variable) | Construct (Independent Variable) | Regression Coefficient | C.R. | P | Variance explained (%) | Rank |
|---|---|-----------------------------------|-------------|----------|---------------------------------------|-------------|
| Constraints - Value addition | Personal | 0.405 | 4.231 | <0.001 | 16.4 | 6 |
| | Managerial | 0.249 | 2.505 | 0.014 | 6.2 | 8 |
| | Technical | 0.681 | 8.184 | <0.001 | 46.4 | 3 |
| | Production | 0.678 | 8.129 | <0.001 | 45.9 | 4 |
| | Government support | 0.264 | 2.663 | 0.009 | 7.0 | 7 |
| | Labour | 0.125 | 1.238 | 0.219 | 1.6 | 9 |
| | Environmental | 0.706 | 8.659 | <0.001 | 49.9 | 2 |
| | Marketing | 0.576 | 6.465 | <0.001 | 33.2 | 5 |
| | Financial | 0.834 | 11.830 | <0.001 | 69.6 | 1 |

In the value addition sector, the main constraint was financial, followed by environmental, technical, production, marketing and personal. The financial constraints included delay in sanction of loans, tight loan repayment schedule, insufficient financial assistance, low subsidies provided, delay in payments and high cost of raw material. Incidence of pest and disease and high fluctuating weather conditions were the environmental constraints noticed. The technical constraints included lack of technical guidance, lack of knowledge about scientific methods and non-availability of scientific laboratories.

These constraints were comparatively similar to a study by Rani, S. *et al*; (2021) where for financial matters it was found that ‘no awareness and knowledge about interest-credit facility’ was the major constraint. ‘Inadequate fund to buy farm implements’ along with ‘inadequate subsidy’ were found to be other serious financial constraints. In constraints related to environmental conditions the study revealed that ‘attack of insect-pests’ was the major problem, and ‘unfavourable agro-climatic conditions, soil type and difficulty to maintain the proper moisture soil’ were also problems noticed in the study. And related to technical constraints ‘no guidance about postharvest technology’ was the major problem.

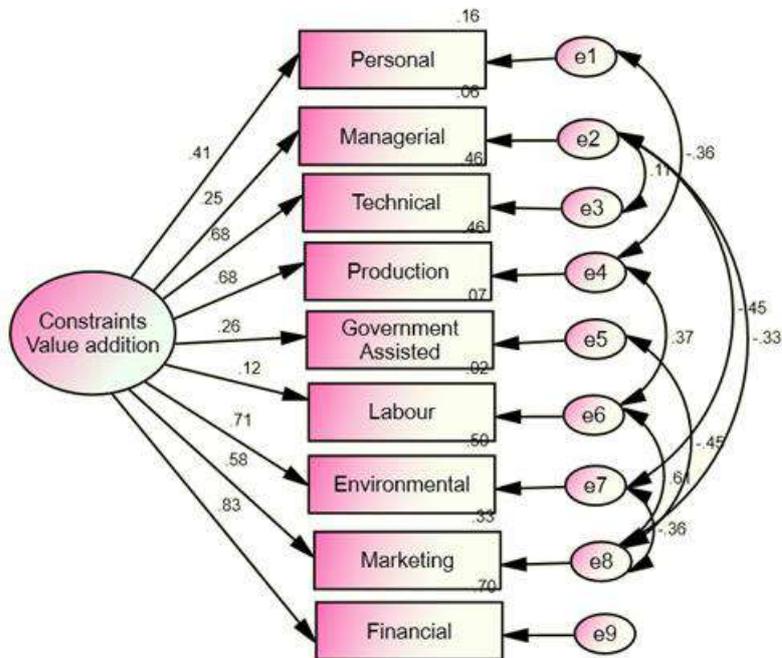


Fig. - 1

4 Constraints faced by the agri-entrepreneurs in fisheries sector

This table shows the model fit indices for CFA- constraints for fisheries sector.

Table -4 Model fit Indices for CFA – Constraints- Fisheries

| | χ^2 | DF | P | Normed χ^2 | GFI | AGFI | NFI | TLI | CFI | RMR | RMSEA |
|-----------------------|----------|----|------|-----------------|------|------|------|------|------|------|-------|
| Constraints-Fisheries | 59.610 | 19 | .000 | 3.137 | .999 | .961 | .996 | .957 | .925 | .178 | .147 |

All the attributes loaded significantly on the latent constructs. The value of the fit indices indicates a reasonable fit of the measurement model with data. Table 4(a) presents the regression coefficients.

Table -4 (a)The regression Coefficients –Constraints-Fisheries

| Factors/ Latent Variables (Dependent Variable) | Construct (Independent Variable) | Regression Coefficient | C.R. | P | Variance explained (%) | Rank |
|--|--|---------------------------|--------|--------|------------------------------|------|
| Constraints - Fisheries | Personal | 0.772 | 10.098 | <0.001 | 59.6 | 3 |
| | Managerial | 0.240 | 2.411 | 0.018 | 5.7 | 8 |
| | Technical | 0.598 | 6.796 | <0.001 | 35.8 | 5 |

| | | | | | |
|--------------------|--------|--------|--------|------|---|
| Production | 0.981 | 22.883 | <0.001 | 96.3 | 1 |
| Government support | 0.536 | 5.895 | <0.001 | 28.7 | 6 |
| Labour | 0.263 | 2.653 | 0.009 | 6.9 | 7 |
| Environmental | -0.044 | -0.434 | 0.665 | 0.2 | 9 |
| Marketing | 0.699 | 8.523 | <0.001 | 48.9 | 4 |
| Financial | 0.845 | 12.197 | <0.001 | 71.4 | 2 |

Production ranks first as a constraint in the fisheries sector followed by financial, personal, marketing, technical, and government support. The main problems encountered in production were with the electricity with the supply being erratic and higher cost of electricity as the sector did not receive subsidies normally given to the agriculture sector. The low quality and non-availability of fish seed and high cost was another problem in production. Feed cost too was a further problem in production. Financial constraints were due to delay in payments and delays in sanctioning of loans. Personal constraints were lack of free time, health problems and lack of support from the community members.

A study by Pongener & Sharma (2018) revealed that good fingerlings of improved species were reported to be scarce. The fingerlings supplied were untimely, of low quality and led to low productivity. With regard to finance, non-availability of credit was a problem faced by the fish growers. Personal constraints with regard to health maybe compared to a study by Frantzeskou, *et al*; (2016) where health affects observed were causally related to smoking, alcohol consumption and fatigue which in turn relate to the specific working conditions and culture in small scale fishing.

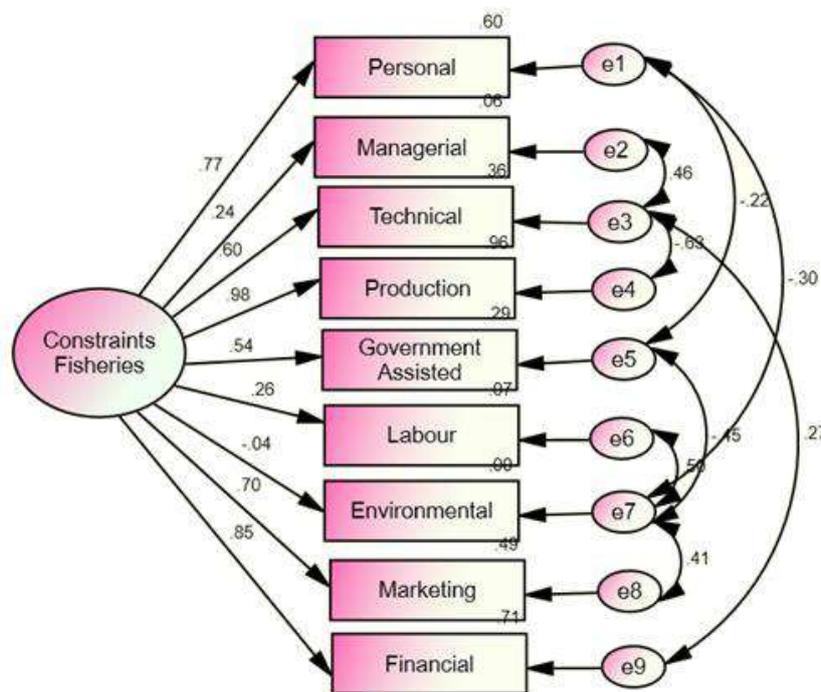


Fig. -2

5 Constraints faced by the agri-entrepreneurs in animal husbandry sector

The table below shows the model fit indices for CFA- constraints for animal husbandry sector.

Table - 5 Model fit Indices for CFA – Constraints- Animal husbandry

| | χ^2 | DF | P | Normed χ^2 | GFI | AGFI | NFI | TLI | CFI | RMR | RMSEA |
|-------------------------------|----------|----|------|-----------------|------|------|------|------|------|------|-------|
| Constraints- Animal husbandry | 21.175 | 14 | .097 | 1.512 | .957 | .962 | .912 | .910 | .965 | .622 | .072 |

All the attributes loaded significantly on the latent constructs. The value of the fit indices indicates a reasonable fit of the measurement model with data. Table 5(a) presents the regression coefficients.

Table -5 (a) The regression Coefficients –Constraints-Animal husbandry

| Factors/ Latent Variables (Dependent Variable) | Construct (Independent Variable) | Regression Coefficient | C.R. | P | Variance explained (%) | Rank |
|--|--|---------------------------|--------|--------|------------------------------|------|
| Constraints - Animal husbandry | Personal | 0.261 | 2.631 | 0.010 | 6.8 | 5 |
| | Managerial | 0.840 | 12.027 | <0.001 | 70.6 | 1 |
| | Technical | -0.055 | -0.542 | 0.589 | 6.8 | 9 |
| | Production | 0.598 | 6.796 | <0.001 | 35.8 | 2 |
| | Government support | 0.432 | 4.554 | <0.001 | 18.7 | 4 |
| | Labour | 0.187 | 1.864 | 0.065 | 3.5 | 7 |
| | Environmental | 0.550 | 6.090 | <0.001 | 30.2 | 3 |
| | Marketing | 0.238 | 2.390 | 0.019 | 5.7 | 6 |
| Financial | 0.030 | 0.296 | 0.768 | 0.1 | 8 | |

In animal husbandry sector, managerial constraints were ranked first followed by production, environmental and government support. The major managerial constraints analysed were lack of scientific training and absence of agencies to support the enterprises. According to AbdaNeja (2020) the livelihood of smallholder farmers was severely impacted by livestock diseases. Inadequate machinery utilisation, non-availability of equipment, high cost of feed, and a lack of good technology were the production constraints. Zinich *et al;* (2021) in a study stated that the dairy farming had low technical equipment and also a low base for its maintenance. And obsolete and physically worn-out equipment in animal husbandry was over 72%. The absence of scientific training was similar to a study in Uttar Pradesh by Singh, *et al;* (2021), And with Attapadi tribal farmers by Nisha, (2019) where it was observed that lack of knowledge and awareness about the scientific practices in dairy production prohibited adoption of modified knowledge and skills. Lavanya & Babu (2020) also found that lack of training was a major constraint.

Regarding environmental constraints, fluctuating weather conditions and heavy incidence of diseases were noted. Fluctuating weather conditions was corroborated by Thornton *et al;* (2014) where climate variability and extreme weather conditions increased multiple stresses for crops and animals by endangering the habitats and the organisms themselves, the animals may not genetically evolve fast enough with the rate at which the climate is changing.

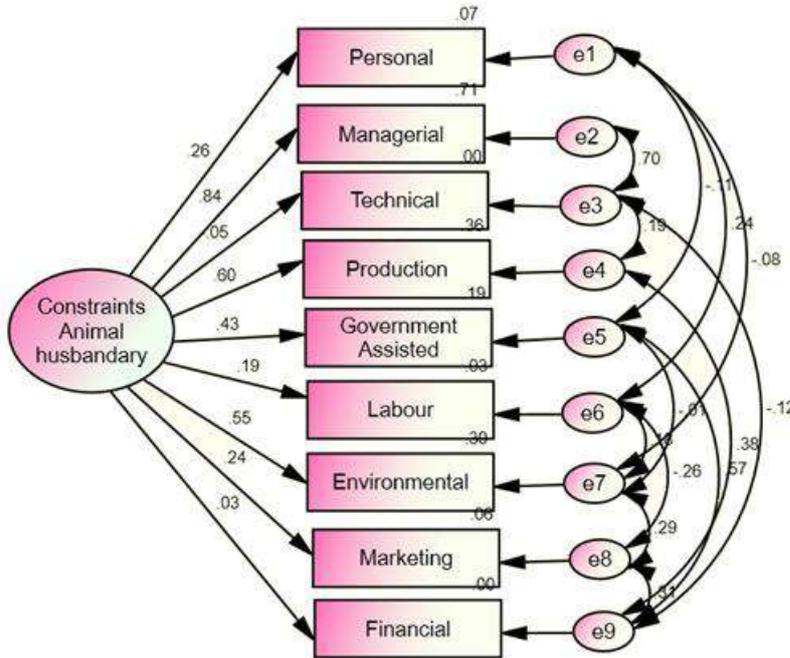


Fig. -3

6 Constraints faced by the agri-entrepreneurs in Other Enterprises

The table shows the model fit indices for CFA- constraints for other enterprises sector.

Table 6 Model fit Indices for CFA – Constraints- Other enterprises

| | χ^2 | DF | P | Normed χ^2 | GFI | AGFI | NFI | TLI | CFI | RMR | RMSEA |
|--------------------------------|----------|----|------|-----------------|------|------|------|------|------|------|-------|
| Constraints- Other enterprises | 24.947 | 19 | .162 | 1.313 | .949 | .979 | .965 | .924 | .960 | .499 | .056 |

All the attributes loaded significantly on the latent constructs. The value of the fit indices indicates a reasonable fit of the measurement model with data. Table 6(a) present the regression coefficients.

Table -6(a) The regression Coefficients –Constraints-Other Enterprises

| Factors/ Latent Variables (Dependent Variable) | Construct (Independent Variable) | Regression Coefficient | C.R. | P | Variance explained (%) | Rank |
|--|--|---------------------------|--------|--------|------------------------------|------|
| Constraints - Other enterprises | Personal | 0.282 | 2.855 | 0.005 | 7.9 | 6 |
| | Managerial | -0.309 | -3.146 | 0.002 | 9.6 | 8 |
| | Technical | 0.306 | 3.113 | 0.002 | 9.4 | 5 |
| | Production | 0.714 | 8.818 | <0.001 | 51.0 | 1 |
| | Government support | 0.193 | 1.925 | 0.057 | 3.7 | 7 |
| | Labour | 0.442 | 4.675 | <0.001 | 19.6 | 4 |
| | Environmental | -0.230 | -2.306 | 0.023 | 5.3 | 9 |
| | Marketing | 0.625 | 7.221 | <0.001 | 39.1 | 2 |
| | Financial | 0.463 | 4.935 | <0.001 | 21.5 | 3 |

In other enterprises production constraint was ranked first followed by marketing, financial, and labour. In production, unstable yields, inability to keep pace with advanced technology, high cost of technology, erratic electric supply, and inadequate water supply and non-availability of equipment were the constraints. Verma, Nag, & Tomer, (2020) concluded that a major constraint in floriculture was inadequate knowledge of recommended packages and practices and non-availability of high yielding variety seeds. In marketing lack of adequate marketing facilities, competition from established and large units, market distance, low price, middle men malpractice, perishable nature of the product. A study by Sonam *et al*; (2021) Roy, R. *et al*; (2020) has shown that marketing constraint was among the most serious issue in mushroom cultivation together with lack of proper marketing channels. Verma, Nag, & Tomer (2020) opined that lack of scientific storage facilities, price fluctuations, and higher transportation costs were constraints in marketing in floriculture. In financial; delay in payments, loan amount is not disbursed as a single disbursement. Lack of loan facilities, low subsidy, tight repayment schedule. It is similar with Shaibur (2020) who reported on a lack of credit facilities. Similarly, Schouten & Caldeira (2021) showed that regarding financial service beekeepers found it difficult to repay loans from beekeeping activity.

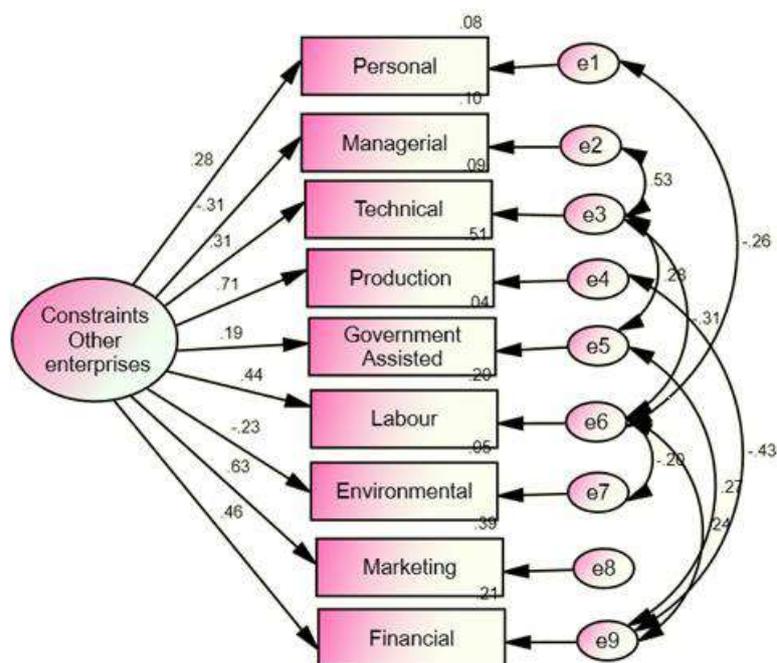


Fig. -4

7 Constraints faced by the agri-entrepreneurs

ANOVA was used to compare the mean scores of different allied sectors and the results are shown in Table 7.

Table -7 Means, Standard deviation and F value for Type of agri-allied sectors.

| Variables | Type of agri-allied sector | N | Mean | Standard Deviation | F | p value |
|-------------|----------------------------|-----|--------|--------------------|--------|---------|
| Constraints | Value Addition | 100 | 162.68 | 21.21 | 22.712 | <0.001 |
| | Fisheries | 100 | 139.56 | 30.69 | | |
| | Animal husbandry | 100 | 155.68 | 19.45 | | |
| | Other enterprises | 100 | 163.12 | 19.07 | | |

The results of the ANOVA test reveal that the mean score of constraints differs with different type of agri allied sectors.

A post hoc test or multiple comparison test was conducted to identify which among the sectors differs significantly and the result is shown in the Table 7(a).

Table7(a) Post hoc Tests

| Dependent Variable | | | Mean Difference (I-J) | Std. Error | Sig. |
|--------------------|-------------------|-------------------|-----------------------|------------|-------|
| Constraints | Value Addition | Fisheries | 23.12000* | 3.266 | 0.000 |
| | | Animal husbandry | 7.00000* | 3.266 | 0.033 |
| | | Other enterprises | -0.440 | 3.266 | 0.893 |
| | Fisheries | Value Addition | -23.12000* | 3.266 | 0.000 |
| | | Animal husbandry | -16.12000* | 3.266 | 0.000 |
| | | Other enterprises | -23.56000* | 3.266 | 0.000 |
| | Animal husbandry | Value Addition | -7.00000* | 3.266 | 0.033 |
| | | Fisheries | 16.12000* | 3.266 | 0.000 |
| | | Other enterprises | -7.44000* | 3.266 | 0.023 |
| | Other enterprises | Value Addition | 0.440 | 3.266 | 0.893 |
| | | Fisheries | 23.56000* | 3.266 | 0.000 |
| | | Animal husbandry | 7.44000* | 3.266 | 0.023 |

The groups showing significant difference are indicated by (*).

The outcome of the analysis indicates that, fisheries and animal husbandry differ significantly with every other allied sector. No difference is seen between value addition and other enterprises. The difference between the groups is indicated by (*).

SUMMARY, CONCLUSION AND IMPLICATIONS, SUGGESTIONS FOR FUTURE RESEARCH

Summary:

The constraints encountered by agri -entrepreneurs were based on personal, managerial, technical, production, government support, labour, environmental, marketing and financial. In the value addition sector, the main constraint was financial, followed by environmental, technical, production, marketing and personal. Production ranks first as a constraint in the fisheries sector followed by financial, personal, marketing, technical, and government support. In the animal husbandry sector, managerial constraints were ranked first, followed by production, environmental and government support. In other enterprises production was ranked first, followed by marketing, financial, and labour. Further more, mean score of constraints for agri-entrepreneurs differs with different type of agri allied sectors. And also, it is shown that the fisheries and animal husbandry sectors differ significantly with every other allied sector.

Conclusion and implications:

This study emphasizes the different constraints in the various agri allied enterprises and points out that the policies and supports that the government provides should be designed for each enterprise rather than follow a one size fits all approach. The outcome will be beneficial to directors, research, extension and government agents thus enabling future policy and law.

Suggestions for future research:

Since this study was limited to only four sectors, it is suggested that a comprehensive study consisting of all the sectors, be conducted.

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Women Empowerment through Income Generating Activities in Andaman and Nicobar Islands

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ABSTRACT

Gender inequality was observed in several aspects of our daily life. Empowerment is the process of being empowered from unpowered. Empowerment is a multifaceted concept which includes different components. Women's empowerment was based on the assumption of their participation in small groups with a collective agenda. The data gathered through a structured, questionnaire from 407 respondents in three Blocks of Andaman & Nicobar Island was entered in statistical software SPSS v.22 for investigation. The economic status indicates more than 88 per cent were above poverty line, which was possible because of the income generating activities and training conducted by the SHGs in the respective areas. The population of Andaman and Nicobar Island still has a considerable portion of illiterate people and it is suggested that the Government should take appropriate steps to provide proper education to them and make the territory fully educated. The IGAs of SHGs certainly resulted in improving the income of their members in all the three Blocks. The number of members in the income group below Rs.2000 has drastically reduced and also the number of members in the income group above Rs.4000 has substantially increased in all the three Blocks. This is a strong indication of economic improvement of members after joining SHGs and IGAs are very much effective in improving the income of their members. Further, the IGAs of SHGs resulted in increase in the number of families with asset holding capacities above Rs.1 lakh after joining the SHGs. It was also evident that almost 100 per cent economic independence was achieved by women after joining SHGs and performing IGAs. The regular flow of income added to the family treasury enabled the women to receive support from family members. The attitudinal changes with earning potential of women has helped the families.

Keywords: Attitudinal, Empowerment, Gender, IGA, Treasury

INTRODUCTION

From last few decades, women's unrecognized role plays a significant part in the development of the family's economy and society. They are still discriminated by the male dominating society in different areas like social, economic and educational field (Snehil Misra, 2000). In developing countries, gender differences were observed whenever the investigation was made in ground level of research. As a result, this type of discriminations and economic imbalances lowers the power of domains to live the life such type of domains are health- care discrimination, lower access toward basic needs, unequal opportunities towards education (Ashraf, Haq, & Ashraf, 2017, Choudhry, Mutalib, & Ismail, 2019a). For flourishing both the genders, males and females, and to maintain an equal balance in social justice to attain the objectives, which is required to attain independence and empowerment of women (UN Women, 2017). Gender equality spontaneously focus on goals. In the most discussing agenda economic empowerment of women is the most alarming topic of

discussion as compared with women empowerment like political empowerment and social empowerment. (Noureen, 2015). Empowerment is that condition where the powerless individual or a group of persons gain control over resources and ideologies which is associated with various types of denomination such as autonomy, strength, rank and agency. To safeguard the rights of women, Indian constitution has very clearly provided and directed the authorities to frame rules and regulations. For the equal share of the rights as if the Indian constitution has provided equal level of playground to women. In 1970s, feminist scholars had challenged patriarchy, which is a radical approach that transforms power relations in terms of women's rights and gender equality (Batliwala, 1993, 2007). In 1990, women's rights and gender equality were the process of self-transformation (Batliwala, 1993; Kabeer, 1994; Rowlands, 1997; Sen, 1997). The complex and rigid reciprocal relationship between women's self-understanding was highlighted (Kabeer, 1994). The women are able to self-express themselves and are able to access and control over the material resources (Sen, 1997). The term empowerment is not a specific concept for women, but it is unique to cut across class and caste within the families and households (Malhotra *et. al.*, 2002). Women's empowerment bring change in women's life, which enables her to increase her capacity to lead and fulfill the human life expectancy. Among the internal qualities of women self-awareness and self-confidence is also improved (Mathew, 2003).

OBJECTIVES

The general objective of the study is to prepare a status report of women empowerment through SHG's in Andaman and Nicobar Islands.

The specific objectives of the study are:

1. To assess the economic empowerment of women after joining SHGs
2. To assess the factors influencing the economic empowerment of women

METHODOLOGY

A Descriptive survey Design was followed for the study. Interview method was used for gathering information from the respondents such as personal, family and employment details followed by details of the training and income generating activities under NRLM and their impact oneself and their families.

Geographically, Andaman and Nicobar Islands is divided into three districts, namely, South, North and Middle Andaman and Nicobar district. Of the three Districts, South Andaman was chosen on the basis of the existence of highest number of active SHGs. The researcher used stratified random sampling technique to select the sample items from the three districts. The researcher decided to consider ten per cent of the population as sample size, i.e., 358 sample items, but in order to take care of errors in filled questionnaire, twelve percent of population, i.e., 430 responses were collected, and after eliminating the incomplete responses, the sample size was finalized as 407 from the population of 3579 SHG members of South Andaman district of Andaman and Nicobar Islands. There are 92 villages in total in Andaman and Nicobar Islands, out of which 30 villages were selected for the study. Ten in Prothrapur, Eight in Little Andaman and Twelve in Ferrargunj Block according to the population size of blocks. The study was done on the basis of demographic profile, amenities available in the household.

Keeping in view the specific set of objectives enumerated, an in-depth study of the performance Self-Help Groups through NRLM in South Andaman District of Andaman and Nicobar Islands has

been attempted. The study is based on both primary and secondary data. For collecting primary data, interview schedule was used. The present study aims at studying the role of NRLM in empowering the women economically under its jurisdiction in South Andaman District of Andaman & Nicobar Islands. The sampling design is formulated for the purpose of collection of primary data. South Andaman District of Andaman and Nicobar Islands is selected purposively for the following reasons. There is no / meager prior study on NRLM in the entire Andaman and Nicobar Islands. Influence of Community Based Organisation and NGOs are high in mobilizing and capacity building of SHG women in developing their skill for gainful self-employment in South Andaman district than other two District viz. North and Middle Andaman and Nicobar District. To test the relationship between attitude scores and social empowerment scores, Chi-square test, test for equality of proportions, and Structural Equation Modelling (SEM) were administered to check the association between SHG, Family, Training Component and Training Institution in Economic Empowerment of women. Structural Equation Modelling (SEM) was used to test this hypothesis and it was found that a significant relationship exists between attitude of women towards NRLM training and their social empowerment.

RESULT AND DISCUSSION

Participation in Income Generating Activities (IGAs)

The income generating activities (IGAs) were studied through various factors likely Participation in IGAs with support from SHG, Support from family, Previous experience, Financial source for IGA, Assistance received, Nature of IGA, Specify IGA product, Training provided by whom, Other SHG buy your products, You Purchase of products from others, Difficulties experienced, Difficulties experienced, Average monthly profit from IGAs, Utilization of the profit, etc.

Analysis of economic independence

The economic independence indicators were studied through various factors likely income from IGA, Freedom to spend money, reduced contribution of husband/father to family income aspects have been investigated respectively. The study reveals that 81.3% of the respondents stated income from IGAs as additional source of income to the family whereas 99.5% has freedom to spend the money. Also, 89% of the respondents stated that contribution of their husband/father reduced after they joined IGAs.

Analysis on Economic Empowerment

The effectiveness of the activities of SHG can be well measured by substantial increase in income or savings of its members. If the activities of SHGs are effective, the income, expenditure as well as savings of the members should increase substantially. The distribution of income should show decreasing trend for lower income group and an increasing trend for middle- and higher-income groups. Therefore, an analysis was done for the increase / decrease in income, expenditure and savings of the members before and after joining SHGs and the results of such analyses are being discussed in this section.

The household income of members before and after joining SHGs is shown in Table 1. The table also contains the results of the test as to whether there is an increase or decrease in the number of members in each category of income before and after joining SHG. This analysis is done through the statistical test - test for proportion. The null hypothesis assumed was there is no

increase/decrease in proportion of beneficiaries in each category of income from IGAs in each of the blocks after joining SHGs.

Table 1 Block-wise Distribution of Income Pre and Post IGA

| Block | Household Income | Pre IGA | Post IGA | Z value | p-value | Remark |
|----------------|--------------------|---------|----------|---------|---------|-------------|
| Prothrapur | Below Rs.2000 | 28 | 2 | 4.75 | 0.000* | Significant |
| | Rs.2000 to Rs.4000 | 75 | 30 | 4.39 | 0.000* | Significant |
| | Rs.4000 to Rs.6000 | 25 | 96 | -6.45 | 0.000* | Significant |
| Little Andaman | Below Rs.2000 | 46 | 0 | 6.78 | 0.000* | Significant |
| | Rs.2000 to Rs.4000 | 58 | 35 | 2.38 | 0.023* | Significant |
| | Rs.4000 to Rs.6000 | 9 | 78 | -7.40 | 0.000* | Significant |
| Ferrar Gunj | Below Rs.2000 | 46 | 3 | 6.14 | 0.000* | Significant |
| | Rs.2000 to Rs.4000 | 99 | 45 | 4.50 | 0.000* | Significant |
| | Rs.4000 to Rs.6000 | 21 | 118 | -8.23 | 0.000* | Significant |

NS – Not significant*

* Significant at 5% level

It is very much evident from the above table that the IGAs of SHGs certainly resulted in improving the income of their members in all the three Blocks. The number of members in the income group below Rs.2000 has drastically reduced and also the number of members in the income group above Rs.4000 has substantially increased in all the three Blocks. It was statistically significant ($p < .05$) at 5 per cent level of significance. However, the increase in the number of families in the income category of Rs.4001/- to Rs.6000/- on undertaking IGAs, was not statistically significant. It can be assumed from this observation that SHGs have helped the respondents in the lowest income groups to raise their income to the next level, but not of those in the higher slabs. This is a strong indication of economic improvement of members after joining SHGs and IGAs are very much effective in improving the income of their members.

Table 2 Block-wise Distribution of Savings Pre and Post IGA

| Block | Household Savings | Pre IGA | Post IGA | Z value | p-value | Remark |
|----------------|--------------------|---------|----------|---------|---------|-------------|
| Prothrapur | Below Rs.500 | 17 | 3 | 3.13 | 0.003* | Significant |
| | Rs.500 to Rs.1000 | 30 | 5 | 4.23 | 0.000* | Significant |
| | Rs.1000 to Rs.1500 | 41 | 19 | 2.84 | 0.007* | Significant |
| | Rs.1500 to Rs.2000 | 40 | 101 | -5.14 | 0.000* | Significant |
| Little Andaman | Below Rs.500 | 31 | 6 | 4.11 | 0.000* | Significant |
| | Rs.500 to Rs.1000 | 52 | 14 | 4.68 | 0.000* | Significant |

| | | | | | | |
|-------------|--------------------|----|-----|-------|--------|-------------|
| | Rs.1000 to Rs.1500 | 21 | 41 | -2.54 | 0.016* | Significant |
| | Rs.1500 to Rs.2000 | 9 | 52 | -5.51 | 0.000* | Significant |
| Ferrar Gunj | Below Rs.500 | 24 | 1 | 4.60 | 0.000* | Significant |
| | Rs.500 to Rs.1000 | 48 | 11 | 4.82 | 0.000* | Significant |
| | Rs.1000 to Rs.1500 | 51 | 14 | 4.59 | 0.000* | Significant |
| | Rs.1500 to Rs.2000 | 43 | 140 | -7.17 | 0.000* | Significant |

NS – Not significant

* Significant at 5% level

The null hypothesis assumed was there is no increase/decrease in proportion of beneficiaries in each category of savings in each of the blocks. It is very much evident from the above Table No. 2 that the IGAs of SHGs certainly resulted in improving the savings of their members in all the three Blocks. The number of members in the savings group below Rs.500 has reduced and also the number of members in the savings group above Rs.1500 has substantially increased in all the three Blocks. This is a strong indication of economic improvement of members after joining SHGs and IGAs are very much effective in improving economic status of their members.

Table 3 Block-wise Distribution of Asset holding capacities Pre and Post IGA

| Block | Asset holding capacity | Pre IGA | Post IGA | Z value | p-value | Remark |
|----------------|------------------------|---------|----------|---------|---------|-------------|
| Prothrapur | Less than Rs.50000 | 59 | 3 | 7.11 | 0.000* | Significant |
| | Rs.50000 to 100000 | 69 | 100 | -2.38 | 0.023* | Significant |
| | Above Rs.100000 | 0 | 25 | -5.00 | 0.000* | Significant |
| Little Andaman | Less than Rs.50000 | 51 | 3 | 6.53 | 0.000* | Significant |
| | Rs.50000 to 100000 | 62 | 82 | -1.67 | 0.099 | Significant |
| | Above Rs.100000 | 0 | 28 | -5.29 | 0.000* | Significant |
| Ferrar Gunj | Less than Rs.50000 | 95 | 1 | 9.59 | 0.000* | Significant |
| | Rs.50000 to 100000 | 71 | 138 | -4.63 | 0.000* | Significant |
| | Above Rs.100000 | 0 | 27 | -5.20 | 0.000* | Significant |

NS – Not significant

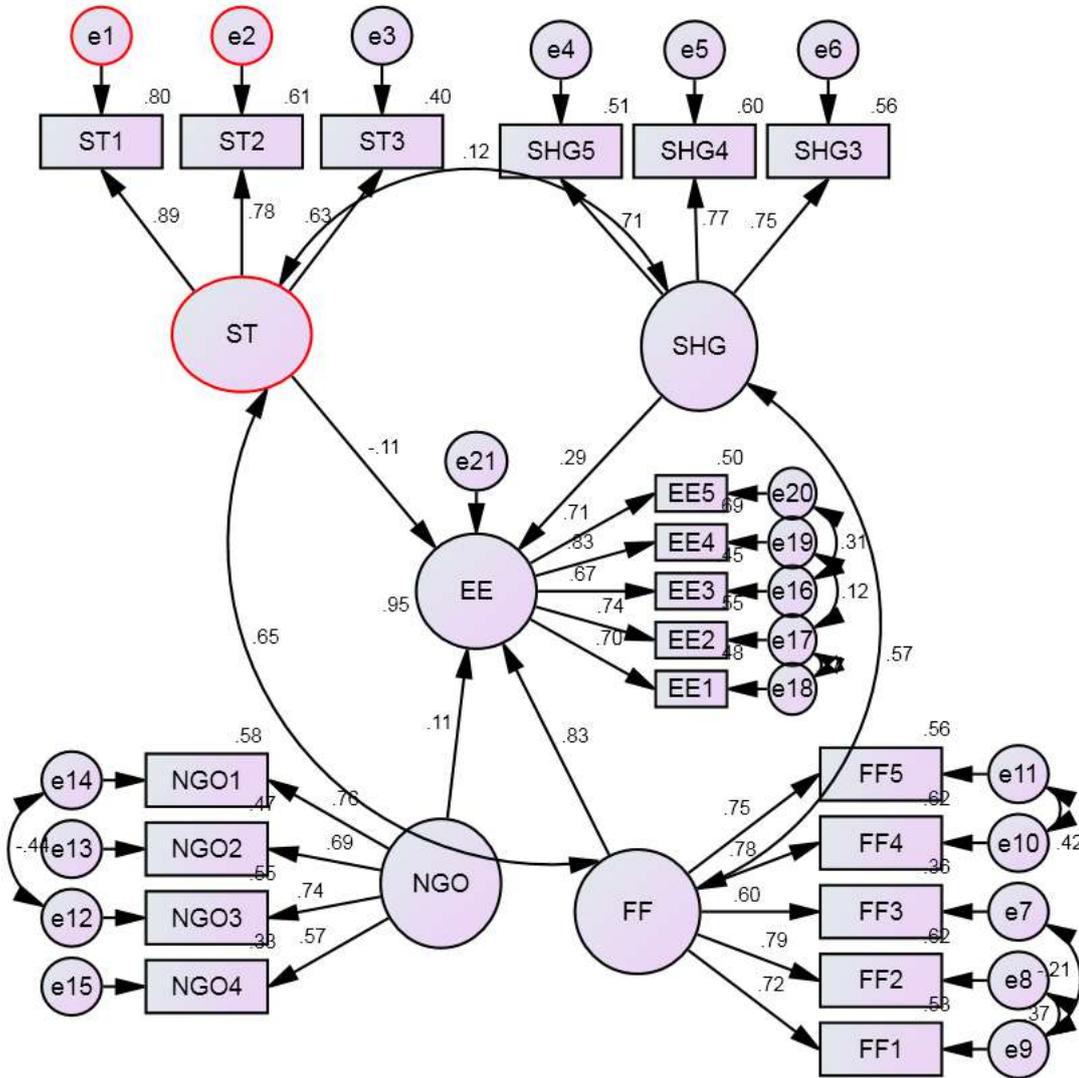
* Significant at 5% level

The null hypothesis assumed was there no increase/decrease in proportion of beneficiaries in each category of asset holding in each of the blocks. As p-value is It is very much evident from the above Table No.3 that the IGAs of SHGs certainly resulted in improving the asset holding capacities of their members in all the three Blocks. The number of members in the asset holding capacities group below Rs.50000 has reduced and also the number of members in the asset holding

capacities group above Rs.1,00,000 has substantially increased in all the three Blocks. This is a strong indication of economic improvement of members after joining SHGs.

Structural Model

A structural model was developed and tested for its validity explaining Economic Factor through Training factor, Family factor, SHG factor and NGO factor. The structural model for Economic Factor is depicted in the following Figure 1.



CHI-SQ = 782.052; DF = 156; P = .000; GFI = .808; AGFI = .741; RMSEA = .099

Figure 1 Structural Model for Economic Factor

The individual reliability of the items was evaluated using factor loadings (Ce’sar Camiso’n and Ana Villar Lo’pez 2010). Carmines and Zeller (1979) has propogated that the factor loadings should not be less than 0.707 to constitute a valid model. However, some researchers such as Barclay et al., 1995 and Chin, 1998) are of the opinion that factor loadings to the extent of 0.5 or 0.6 is acceptable. In the above table all the factor loadings

are above the recommended value it shows the factors having individual reliability. The results of the model are tabulated below.

Table 4 Results of the Structural Model – Model fit

| Chi-square | DF | p | CMIN/df | GFI | RMSEA |
|------------|-----|------|---------|------|-------|
| 782.052 | 156 | .000 | 5.013 | .808 | .089 |

The results are presented in Table 4. These results reveal that all the pre-requisites for the acceptance of the Structural model are met (even though the value of RMSEA is slightly high, the GFI of 81% confirms the validity of the model). After establishing the individual item reliability of the model, the validity of the model is next tested.

Table 5 Validity of Structural Model

| Items | Standard Solutions | Factor estimate | Critical Ratio | P | Error variance | R ² | C R | AVE |
|------------------------|--------------------|-----------------|----------------|-----|----------------|----------------|-------|-------|
| Training Factor | | | | | | | | |
| ST1 | 0.893 | 1 | | | 0.057 | 0.797 | 0.919 | 0.604 |
| ST2 | 0.782 | 1.008 | 16.253 | *** | 0.155 | 0.612 | | |
| ST3 | 0.634 | 1.098 | 13.039 | *** | 0.26 | 0.402 | | |
| SHG Factor | | | | | | | | |
| SHG5 | 0.711 | 1 | | | 0.375 | 0.506 | 0.861 | 0.555 |
| SHG4 | 0.775 | 0.915 | 13.165 | *** | 0.214 | 0.601 | | |
| SHG3 | 0.747 | 0.843 | 12.855 | *** | 0.216 | 0.558 | | |
| Family Factor | | | | | | | | |
| FF3 | 0.599 | 1 | | | 0.373 | 0.359 | 0.933 | 0.537 |
| FF2 | 0.79 | 1.026 | 12.167 | *** | 0.132 | 0.624 | | |
| FF1 | 0.725 | 0.91 | 10.48 | *** | 0.157 | 0.526 | | |
| FF4 | 0.785 | 0.965 | 12.114 | *** | 0.122 | 0.616 | | |
| FF5 | 0.748 | 1.017 | 11.722 | *** | 0.171 | 0.560 | | |
| NGO Factor | | | | | | | | |
| NGO3 | 0.741 | 1 | | | 0.391 | 0.549 | 0.810 | 0.483 |
| NGO2 | 0.685 | 0.886 | 9.102 | *** | 0.422 | 0.469 | | |
| NGO1 | 0.764 | 1.096 | 10.375 | *** | 0.409 | 0.584 | | |
| NGO4 | 0.573 | 0.763 | 8.472 | *** | 0.568 | 0.328 | | |
| Economic Factor | | | | | | | | |
| EE3 | 0.672 | 1 | | | 0.355 | 0.452 | 0.936 | 0.536 |
| EE2 | 0.741 | 0.739 | 13.089 | *** | 0.131 | 0.549 | | |
| EE1 | 0.696 | 0.684 | 12.511 | *** | 0.145 | 0.484 | | |
| EE4 | 0.833 | 0.812 | 14.539 | *** | 0.085 | 0.694 | | |
| EE5 | 0.708 | 0.823 | 15.413 | *** | 0.196 | 0.501 | | |

* Composite reliability

** Average Variance Extracted

*** This regression weight was fixed at 1.000, not estimated.

where

$$\text{Construct Reliability} = \frac{(\sum \text{Standardized loadings})^2}{(\sum \text{Standardized loadings})^2 + \sum e_j}$$

$$\text{Average Variance Extracted} = \frac{\sum (\text{Standardized Loadings})^2}{n}$$

e_j is the measurement error

It can be seen from the above table that the construct reliability for all the factors are well above the accepted level of 0.6 (Fornell and Larcker, 1981). Also, the AVEs for all the factors are near and above 0.5 (0.483 for NGO Factor, which is very near to 0.5) and hence all the measurable items meet the desirable construct reliability. The estimates of the structural model with of each attribute of the factors taken for study is depicted in Table 6.

Table 6 Estimates of Structural Model

| Regression weights | | Unstandardized Regression weights | Standardised Regression weights | S.E. | C.R. | P | R ² |
|--------------------|----------|-----------------------------------|---------------------------------|-------|--------|---------------------|----------------|
| EE | <--- ST | -0.124 | -0.109 | 0.076 | -1.630 | 0.103 ^{NS} | .949 |
| EE | <--- SHG | 0.252 | 0.290 | 0.056 | 4.532 | <.001* | |
| EE | <--- NGO | 0.089 | 0.114 | 0.027 | 3.284 | 0.001* | |
| EE | <--- FF | 0.981 | 0.831 | 0.133 | 7.346 | <.001* | |

S.E.: Standard error; C.R: Critical Ratio; P: Probability value; R²: R-squared; NS: Not significant

* Significant relationships are identified at 1% level of significance

It can be seen from the above table that the about 95 per cent of variation in the economic factor is explained by the Training, Family, SHG and NGO factors. It can also be noted that the skill training factor is not significantly influencing the economic factor of respondents ($p > .05$). However, the other factors Family, SHG and NGO factors have a significant contribution to the economic factor of members ($p < .05$). The standardised regression coefficient column reveals that Family factor is the largest influencing factor on the perception of members on Economic Factor, followed by SHG Factor and NGO Factor.

The covariance between the independent variables, i.e., Skill training, SHG Factor, NGO Factor, and Family Factor are portrayed in the following Table 7.

Table 7 Covariance between Independent variables

| Factors | | | Estimate | S.E. | C.R. | P |
|---------|------|-----|----------|-------|-------|---------------------|
| SHG | <--> | FF | 0.162 | 0.023 | 6.923 | <.001* |
| ST | <--> | SHG | 0.034 | 0.018 | 1.918 | 0.055 ^{NS} |
| ST | <--> | FF | 0.141 | 0.017 | 8.071 | <.001* |

S.E.: Standard error; C.R: Critical Ratio; P: Probability value; R²: R-squared; NS: Not significant
 * Significant relationships are identified at 1% level of significance

The above reveals that the relationships between SHG Factor and Family Factor and also between Skill Training Factor and Family Factor are statistically significant ($p < .05$). Also, the relationship between Skill Training and SHG Factor is not significant ($p > .05$). This implies that even though Skill Training does not contribute effectively to the economic factor of members, it may have indirect effect through Family Factor. It can be seen from the structural model that there is a positive relationship between Skill Training and Family Factor is (.570) and also there is a strong positive relationship between Family Factor and Economic Factor (.831). Therefore, it can be construed that Skill Training has a significant indirect effect on the perception of members on Economic Factor.

Table 8 Hypotheses set in the model

| Factors | | | Hypothesis | C.R. | P |
|---------|------|-----|--|--------|---------------------|
| EE | <--- | ST | There is no impact of Training factor on economic factor | -1.630 | 0.103 ^{NS} |
| EE | <--- | SHG | There is no impact of SHG factor on economic factor | 4.532 | <.001* |
| EE | <--- | NGO | There is no impact of NGO factor on economic factor | 3.284 | 0.001* |
| EE | <--- | FF | There is no impact of Family factor on economic factor | 7.346 | <.001* |

* Significant at 5% level of significance

The hypothesis of no impact of Training factor on economic factor is not rejected at 1 per cent level of significance ($p > .01$) and it is concluded that there is no significant direct effect of Skill Training on Economic factor.

The hypothesis of no impact of SHG factor on Economic factor is rejected at 1 per cent level of significance ($p < .01$) and it is concluded that there is a significant impact of SHG factor on Economic factor.

The hypothesis of no impact of NGO factor on Economic factor is rejected at 1 per cent level of significance ($p < .01$) and it is concluded that there is a significant impact of NGO factor on Economic factor.

The hypothesis of no impact of Family factor on Economic factor is rejected at 1 per cent level of significance ($p < .05$) and it is concluded that there is a significant impact of Family factor on Economic factor.

The model developed through structural equation modelling revealed that the economic factor is highly influenced by Family Factor followed by SHG Factor and NGO Factor. Also, Skill Training has a significant indirect effect on Economic Factor.

CONCLUSION

The diversified need specific livelihood training is the need of the hour to spearhead women to take up self-employment to eke out their livelihood. This augmentation of family income has yielded a positive impact not only on their economic empowerment but also on their attitudinal changes towards the activity, family life enhancement and improvement of social skills. With the Mission's backing for establishing forward and backward linkages in each sector with involvement of a few selected representative members from each trade will be beneficial to plan for a phased withdrawal of the government from the field leaving SHGs to manage the enterprises on their own. The regular flow of income added to the family treasury enabled the women to receive support from family members. The attitudinal changes with earning potential of women has helped the families to reap the benefits through NRLM as it has changed the primary occupation of many.

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HERBAL MEDICAL TEXTILES BOON TO WOMEN'S HEALTH AND HYGIENE CARE

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ABSTRACT

Right from the Stone Age use of plant sources for medical purposes has been in practice. Evidences for use of textiles to heal wounds and to support tissue repairs are seen in the bible, and reviews about Indus and Nile valley civilizations. The extracts from plants were commonly used as medicines but with the slow invention of chemicals most of the medical textiles have become a part of synthetic materials which show some side effects. Hence the need to back to the available plant and animal kingdom has become the need of the hour. Interesting therapeutic fabrics have been created by amalgamating herbal extracts and essential oils into textiles for preservation of the mummies and for protection against skin allergies, asthma, odour, acute pain, rashes, healing wounds are slowly regaining interest among researcher, academicians and manufactures. The global market value for medical textiles is expected to increase by US\$23.76Bn in 2025. Considering these facts health and hygiene care textile products like sanitary pads, wound healing bandages, under arm sweat pads, crack healing bandages, bedsore pads, hand gloves, eye pads, shoe soles, and face masks as a precaution essentially in the recent past Covid 2019 were designed with suitable fabrics, which were finished with herbal or plant extracts. An in-depth review was carried out followed by a pilot study to finalize various sources like *Coleus aromaticus*, *Dioscorea alata*, *Azadirachta indica*, *Araucaria columnaris*, *Carica papaya*, *Aloe barbadensis*, *Calendula officinalis*, *Cassia auriculata*, *Pisonia grandis*, *Sesamum indicum*, *Citrullus lanatus*, *Cucurbita maxima*, *Eichhornia crassipes* were selected. Each source was extracted with different solvents like water, methanol, ethanol and converted into nano particles using nano spray dryer or microcapsules and finished. The fabric properties were evaluated and suitable products were developed. The results have proved all the products to have safe properties. Wound healing bandages have a patent published while other are in the TRL level 5.

Keywords: Antimicrobial activity, Bacteria, Ethanol extract, Optimization, Nano Particles, Microencapsulation, Phytochemicals.

INTRODUCTION

The pandemic world of today clearly explains the essential and unavoidable needs of medical textiles. Medical Textiles infused with medicinal herbs are becoming popular especially, in urban India. The need to shift from chemical or synthetic based medical treatments to sustainable plant based herbal medical textiles is the present need. The natural antibacterial compounds obtained from herbs may be the most attractive choices for medical and healthcare textiles, primarily because of their environmental friendliness. New inventions are taking up the old ones everyday with improved properties. The disposable products like bandages and napkins are now treated with natural herbal extracts with sustainable natural fibers to make the medical textile products biodegradable.

This paper puts forth the development and evaluation of various products developed using herbal extracts to finish them which are sustainable and renewable and can replace the synthetic chemical hygiene and health care products.

OBJECTIVES

The main objectives of the research are as follows:

- Identify suitable herbs/ plant sources for developing sustainable health care products
- Study the properties of the herbal/ plant extracts
- Select suitable solvents, time, temperature, concentration, finishing techniques
- Designing and developing Women's health and hygiene care product

METHODOLOGY

Experimental Procedure

- **Selection of Sources**

Fifty plant and herbal sources were selected and tested for their functional groups.

- **Preparation of Collected Sources**

The collected leaves and stems were washed thoroughly with distilled water and allowed drying in shade for two days. The seed was collected from fruit shops and washed in distilled water, dried in shade for five days. The petals alone were separated from the stalk and allowed drying in shade for five days by mixing every day and powdered.

- **Selection of Solvent for Extraction**

The various solvents used in the extraction procedures are water, acetone, alcohol, chloroform and ether. Water is a universal solvent used in extraction, though traditional healers use primarily water but plant extract from organic solvents have been found to give more consistent antimicrobial property compared to water extract (Das et al., 2010). Also ethanol and methanol (ChitraWendakoon,2011) were found to penetrate easily into the cellular membrane to extract the intracellular ingredients from the plant material (Cowan., 1999). Hence considering the above facts all three were tested and the best was selected.

- **Selection and Extraction of bio active compounds**

The active compounds from herbs were extracted by Soxhlet extraction method (Egwaikhide and Gimba, 2007). The advantage of this method is that large amounts of drug can be extracted with a much smaller quantity of solvent (Iwu et al., 1999) & (Sukhdev et al., 2008).

- **Phytochemical Screening**

Phytochemical screening was carried out for phenol, tannins, glycosides, flavonoids (Farhatali et al., 2011). (Lang et al.), (Hanna, 2008) and (Lee et al., 2003) and anthraquinones (Bhuwaneshwari et al., 2011) following the standard procedures.

- **Selection of Finishing Techniques**

The microencapsules (Thilagavathi et al., 2007) and nano particle (Wasfi and Laga., 2009) prepared were finished using the padding mangle and ultrasonic atomizer. The antimicrobial activity was found and best technique was selected. For wound healing bandages sensitive studies were also carried out.

- **Selected Herbs/ Plants for Finishing the Health and Hygiene Care Products**

The table below shows the list of selected of fabrics, sources and products developed.

Table 1 Fabrics Details, Sources Used and Products Developed
RESULTS

Evaluation of the Finished Fabrics

| Type of Fabrics Used | Botanical name /Common name | Parts used | Finishing Techniques | Herbal Medical Textile Products Developed |
|--|--|------------|----------------------------------|---|
| 100% Cotton, Viscose | Karpuravalli <i>Coleus aromaticus</i> | Leaves | Padding mangle | Under arm Sweat pads |
| 100% Cotton, Viscose | Air potato <i>Dioscorea alata</i> | Leaves | Ultrasonic atomizer | Under arm Sweat pads |
| 100% Cotton, Viscose | Neem <i>Azadirachta indica</i> | Leaves | Ultrasonic atomizer | Under arm Sweat pads/ Face Masks |
| 100% Bamboo, Viscose and Polypropylene spunlaced | Cypress <i>Araucaria columnaris</i> | Leaves | Dip and Dry | Under arm Sweat pads |
| 100% Bamboo, Viscose and Polypropylene spunlaced | Papaya <i>Carica papaya</i> | Seed | Ultrasonic atomizer | Sanitary Pads |
| 100% Bamboo, Viscose and Polypropylene spunlaced | Aloe vera <i>Aloe barbadensis</i> | Gel | Ultrasonic atomizer | Sanitary Pads Wipes |
| 100% Bamboo, Viscose and Polypropylene spunlaced | Marigold <i>Calendula officinalis</i> | Flower | Dip and Dry | Sanitary Pads |
| 100% Cotton, Bamboo: Cotton | Avaram <i>Cassia auriculata</i> | Flower | Ultrasonic atomizer | Under arm Sweat pads |
| 100% Cotton / Gauze material | Birdlime <i>Pisonia grandis</i> | Leaf, Stem | Dip and Dry, Ultrasonic atomizer | Wound Healing Bandages |
| 100% Cotton | Sesame <i>Sesamum indicum</i> L | Seed | Dip and Dry | Crack Healing Bandages |
| 100% Cotton | Mustard <i>Brassica nigra</i> | Seed | Dip and Dry | Crack Healing Bandages |
| 100% Cotton | Bees Wax <i>Triacetyl palmitate</i> Cera Alba | Seed | Dip and Dry | Crack Healing Bandages |
| 00% Cotton | Watermelon <i>Citrullus lanatus</i> | Seed | Dip and Dry | Bed Sour Pads |
| 100% Cotton | Pumpkin <i>Cucurbita maxima</i> | Seed | Dip and Dry | Bed Sour Pads |
| 100% Cotton | Water Hyacinth <i>Eichhornia crassipes</i> Fibres extracted were used as stuffing material | Stem | Ultrasonic atomizer | Under arm Sweat pads |
| Applied on all type of fabrics | Rose <i>Rosaceae</i> | Flower | Ultrasonic atomizer | For odour enhancement |

Various fabric testes like strength, thickness absorbance capacity, drape, stiffness, were tested and fabrics with suitable parameters were selected.

Product Development and Evaluation

Wound healing Bandages

- To optimize the finishing process conditions, the fabric was treated at different time intervals of 1, 3 and 5hrs, at different temperatures of 40°C, 50°C and 60°C and at concentrations of 0.5g, 1.0g, 1.5g,2.0g and 2.5g respectively. The best parameters were selected. (Patent Published) *Pisoniagrands* leaves showed the better zone of incubation hence it was applied on 100 percent Cotton Gauze material was purchased from SITRA, Coimbatore and used for developing wound healing bandages. Thick strands of gauze material were taken and folded to get a square size of 5X5 cm² shape. Placed finished fabric of size of 4X4 cm² over the gauze with the help of synthetic resins. The prepared herbal bandages were then sterilized with ETO sterilization and evaluated for wound healing efficacy, skin irritation test, cyto-toxicity studies, anti-bacterial study and animal study was carried out at SITRA (South Indian Textile Research Association, Coimbatore) and KMCH and PSG IMS, Coimbatore.

TABLE 2 Wound Healing of the Rats

| GROUP | | DAY 1 | DAY 4 | DAY 8 | DAY 12 | DAY 16 | DAY 21 |
|---------------|--------------------|--------|--------|--------|--------|--------|-----------------------|
| A Control | Wound measurement | 200 mm | 180 mm | 150 mm | 130 mm | 120 mm | 100 mm |
| | % of Wound | 100 mm | 90 mm | 75 mm | 65 mm | 60 mm | 50 mm |
| | % of wound Healing | 0 | 10 | 25 | 35 | 40 | 50 |
| B Standard | Wound measurement | 200 mm | 160 mm | 100 mm | 50 mm | 20 mm | Scar |
| | % of Wound | 100 mm | 80 mm | 50 mm | 25 mm | 10 mm | - |
| | % of wound Healing | 0 | 20 | 50 | 75 | 90 | 100% |
| C Finished | Wound measurement | 200 mm | 170 mm | 120 mm | 70 mm | 30 mm | Scar with tiny injury |
| | % of Wound | 100 mm | 85 mm | 60 mm | 35 mm | 15 mm | - |
| | % of wound Healing | 0 | 15 | 40 | 65 | 85 | 99% |

The table revealed that the percentage of wound on control group was 10%, 25%, 35%, 40% and 50% on 4th, 8th, 12th, 16th and 21st day. The standard group showed 20%, 50%, 75%, 90% and at last 100% wound healing efficiency over the 21st day with scar remains on the surface. Similarly, *Pisoniagrands* leaf finished fabric bandage treated group showed 15%, 40%, 65%, 85% and 99% with a tiny injury left on the surface of wound healing on the final day of wound measurement. Therefore, the *Pisoniagrands* leaf finished fabric is considered to be an excellent wound healing property.

Sanitary Napkins

➤ Preparation of Control and finished Sanitary Pads

The following materials are required for developing Sanitary Napkins: Wood pulp, Polypropylene spun bond fabric, Polyethylene sheet, Super bond adhesive, Brush, Release sheet. To develop the herbal treated sanitary napkin wood pulp and cotton were pulverized, filled in the dye core sealed with antimicrobial treated polypropylene fabric and UV sterilized. As soon as the napkins are sterilized, they are packed in the zip lock covers which have 12 napkins per cover.

➤ Evaluation of the Developed Sanitary Napkins

The physical properties like resistance to mechanical penetration test, Aerobic biodegradation test, water retention test, leak proof, flexibility test of the developed Sanitary Napkins was evaluated at SITRA, Medical Center and compared with commercial pads. The test results proved the herbal finished sanitary pads to be good and par with the commercial ones.

➤ Evaluation of the Developed Sanitary Napkins- Performance Wear

The samples were suggested to give feedbacks in the questionnaire of the Sanitary Napkins the one which they use at present. Then the volunteers are asked to use the developed control and antimicrobial treated Sanitary Napkins for four months and suggested to give their feedbacks of the developed Napkins regarding the comfort, irritations, itching, side effects etc. From the results it is proved that all the 100 samples were comfortable with the finished sanitary pads.

Underarm Sweat Pads

➤ Preparation of control and finished Underarm Sweat Pads

For the preparation of control and finished under arm sweat pads bamboo and bamboo cotton fabrics were treated with the selected herbal extracts which were converted into microcapsules. These fabrics were stitched into under arm sweat pads of standard size with an absorbance sponge for some samples and with *Eichhorniacrassipes* non-woven fabrics. Elastic threads were attached and completed. These were tested for antimicrobial property after every use.

➤ Evaluation of the Developed Underarm Sweat Pads

The physical properties like resistance to abrasion, absorbance, flexibility test of the developed underarm sweat pads was evaluated at SITRA, Medical Center and compared with commercial pads. The test results proved the herbal finished underarm sweat pads had good absorbance property and resistance to abrasion.

➤ Evaluation of the Developed Underarm Sweat Pads - Performance Wear

The samples were distributed among fifty samples for usage and their feedback regarding the appearance, comfort of the underarm pads was collected. Even the presence of irritation or rashes were noted. The pads were washed and the antimicrobial effects very also note. From the results it is proved that all the 2 samples expressed discomfort effect by the herbal finished armpit pads made with *Eichhorniacrassipes* non-woven fabrics. The antimicrobial activity reduces with washes but the zone of incubation was present up to five washes.

Crack Healing Pads

Preparation of Control and finished Sanitary Pads

➤ Selection of Sources

Sesame (*Sesamum indicum L.*), seed extract are sources for some photo-nutrients such as omega 6 fatty acid. Mustard (*Brassica nigra*) seed oil has been used for centuries as a pungent condiment and healing herb by Chinese, the Greeks and Ayurvedics, (Shealy, 2012). It is a very good antiseptic and sterilizing agent and deodorizer. Bee wax is known for moisturizing skin, because they are humectants that draw and retain moisture, (Jones, 2011). Moisture in the bee wax will reduce the cracks on the foot. Hence these substances were selected for finishing crack healing bandages.

➤ Extraction of Sources

The seeds were collected pre-treated and then the extracts were acquired by mechanical press method. The bee hive was collected and then the wax was extracted from in using natural traditional melting method. By conducting a series of pilot studies the optimum value for preparing

natural cream with crack healing property with different temperature, time and pH were determined through standard antimicrobial test values. The best concentration was taken for the final study.

➤ **Preparation of Crack Healing Pads**

Bees wax was melted and mixed with the seed extracts and coated on the sterilized cotton using the screen, which was prepared by mounting a selected mesh fabric on to the frame. The design was transferred to the screen using photographic technique. The coating was done by pouring the prepared extract on the screen and squeezing it with rubber squeeze. The hygienic nature of the crack healing pads was maintained by carrying out the entire processes in the laminar air flow. The medicated part of the bandages was sealed to be opened on the time of use. The coated fabric was also tested for its oozing out of the extract both in single layer and double layer fabric. Crack healing pads were then packed into Ziplock covers.

➤ **Preparation of the Bandage and Performance Study**

The developed crack healing bandages were given to the samples with the permission of the Human Ethical Committee of Avinashilingam Institute for Home Science and Higher Education for Women, No. AUW/IHEC-13-14/XPD-13. The samples were asked to use the bandage for a period of five days. The evaluation of the changes in the cracks was recorded in the perform a every day.

Visual Inspection of the Prepared Crack Healing Bandages

Considered the appearance of bandage it was clear that 90 per cent of the samples said that the general appearance of the bandage is good, as medium by maximum of 60 per cent for texture. About 40 per cent of the samples said that the bandage is mild and 50 per cent feels that the colour is medium.

Performance of the Crack Healing Bandage

As per the results ninety-three per cent of the samples on using the crack healing bandage for period of five days stated that it was easy to apply and remove the bandage from the heel but 7 per cent of the sample didn't agree with it, as they felt some discomfort in removing the bandage. Ninety per cent of the samples expressed positive changes that are reduction in cracks. The movement of the users was also comfortable and did not disturb once regular activity as stated by 93 per cent of the samples. With reference to allergy 97 per cent of the sample felt that it was very safe and did not create any skin problem or allergy even after five days. All over the comfort was good according to 97 per cent and 3 per cent felt with some discomfort.

➤ **Number of Cracks Based on Usage:** On the first day before using the crack healing bandage 10 per cent of the samples were with six deep cuts which was the maximum and 10 per cent of the samples with minimum of no deep cut in their feet. After the first day of usage only 3 per cent of the samples had 6 deep cuts. This further reduced to 5 deep cuts on the third day as stated by 7 per cent of samples. On the fourth day only 3 per cent of the samples had 5 deep cuts. The table also shows an increase in one deep cut as stated by 17 per cent samples on the first day to 30 per cent on the fifth day. After the fifth day none of the samples had 5 or 6 deep cuts. In a nutshell, the increase in number of days has decreased the deep cuts. Hence, it could be concluded that the prepared bandage was effective and reduced the cracks.

➤ **Size of Cracks Based on Usage:** The crack affected areas of the samples were from 1" – 6". On the first day before the bandage used 7 per cent of the samples were having 5.6" to 6" crack affected area but during the second day to reduce to 5.1" to 5.5" as stated by 7 per cent of the samples. The maximum number of samples 33 per cent had foot crack affected area as 2.6" – 3", which reduced to 1.5", as stated by 30 per cent of the samples on the fifth day. By using the eco-friendly crack healing bandage regularly all the samples showed positive changes which is obtained by reduction in the length of the affected area on the heel.

Hence, it could be concluded that the developed crack healing bandage were comfortable to use with no ill effects.

Bed Sore Pad

➤ Preparation of Herbal finished Bed Sore Pad

The *Citrullus lanatus*, *Cucurbita maxima* and *Rosacea* finished fabric to prepare the bed sore pad and the treated fabric was cut into the size of 20"x25". This was finished and cut under sterilized condition in the laminar air flow in which cleaner air reduces the risk of contamination. These neatly cut samples were packed into the zip lock covers.

- **Inspection of the Herbal Bed Sore Pad-** Thermal resistance test showed 0.0272 m².k/w amount of heat resistance on testing proving comfort to the user.

CONCLUSION

From the various researches it was concluded that, even in the fast moving and busy world, one cannot spend much of their time for changing sanitary pads avoid underarm odour or find ample time to scrubbing and cleaning the foot hence the herbal health care and hygiene textiles can be a boon to womanhood. The results have proved positive results and these products are in TRL level 5 hence mass production is at the door step for next generation women health care products.

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- "Designing Biodegradable Sanitary Pads from Water Hyacinth (*EichorinaCrassipes*)" Year 2012-13, Isha Jajodia

INDOOR AIR POLLUTION: POLLUTANTS RELEASED DURING COOKING

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ABSTRACT

Atmospheric pollution is on a rise and while many attributes this to the industries, vehicle fumes, urbanization etc. Indoor air pollution, the source of pollution with the greatest health consequences, remains unseen. As a lot of time is spent indoors, IAQ has become a topic of grave concern. This research was motivated by the limited knowledge on personal exposure to cooking of various types of food and emission contributed specifically by it. To estimate the amount of damage contributed entirely by cooking, the emissions must be analysed and compared with the standard allowed emissions. The present research attempts to study the pollutants generated and emitted into air due to cooking. In this experimental study, cooking was performed in laboratory setup inside test chambers specially made for the purpose. Five types of fuel, namely Charcoal, Kerosene, LPG, Wood and Wood Shaving were selected for assessing the pollutants released due to their combustion. Three different types of foods were cooked (Vegetarian meal, Egg, Meat) using four different cooking methods (Boiling without lid, Boiling with lid, Shallow frying and Deep frying). The combination of each food type with a cooking method using a particular fuel was studied individually. Flue Gas Analyzer *Kane 900 plus* was used as a standard tool to measure four major pollutants released, namely- Carbon Monoxide, Sulphur Dioxide, Nitrogen Monoxide and Nitrogen Dioxide. Data revealed that carbon monoxide was released in the highest amount, LPG was found to be the cleanest and charcoal the most polluting fuel. Using fat as a medium of cooking also showed more amounts of pollutants being released in the air as compared to water-based cooking methods. Making wise choices on the type of fuel used and the method of cooking adopted can significantly reduce the indoor air pollution caused due to cooking.

Key Words: Indoor Air Pollutants, Cooking methods, Fuels, Pollution

INTRODUCTION

Human activities have been one of the major contributors towards polluting atmospheric air. It is therefore essential to adopt environmentally conservative and precautionary measures. Most people associate air pollution with industrialization and urbanisation, however, the UNEP/WHO Global Environment Monitoring System (GEMS) has demonstrated quite convincingly that the worst ambient conditions reported today is found in the cities of the developing countries in both rural and urban households causing indoor air pollution (Chen, Hong, Pandey, & Smith, 1990). Indoor air pollution can be defined as 'the totality of attributes of indoor air that affects a person's health and well-being' (Singh & Jamal, 2012).

Use of open fires with simple solid fuels, biomass, or coal for cooking and heating exposes an estimated 2 billion people worldwide to concentrations of particulate matter and gases that are 10 to 20 times higher than health guidelines for typical urban outdoor concentrations (Smith & Mehta, 2003). Since people tend to spend most of their time in indoor activities (be it work, eating, sleeping,

etc.), typically 90% or more, indoor pollution is frequently the predominant factor in total exposure ill-effects. House-hold air pollution and ambient air pollution account for 6% and 3%, respectively, of the total National burden of disease (Air & Exposures, 2014).

Evidence based on various research articles leads to the conclusion that indoor air pollution increases the risk of chronic obstructive pulmonary disease and of acute respiratory infections in childhood, the most important cause of death among children under the age of 5 in developing countries. Evidence also exists of associations with low birth weight, increased infant and prenatal mortality, pulmonary tuberculosis, nasopharyngeal and laryngeal cancer, cataract, and, specifically in respect of the use of coal, with lung cancer (Nigel Bruce et al., 2000). There have been studies in developing countries that have reported on the association between exposure to indoor air pollution and acute lower respiratory infections) Kossove, 1982; Campbell, Armstrong, & Byass, 1989; Cerqueiro, 1990; Collings, Sithole, & Martin, 1990; Armstrong & Campbell, 1991; Johnson & Aderale, 1992; Robin, 1996). Findings asserts the rule of 1000 which states that a pollutant released indoors is one thousand times more likely to reach people’s lung than a pollutant released outdoors (World Health Organization(WHO), 1997; Singh, Aligarh, & Pradesh, 2011).

Table 1: WHO air quality recommendations for particulate particles (2005)

| Air Quality Index (µg/m³) | Air Quality | Health Advisory |
|---|--------------------------------|--|
| 0-50 | Good | None |
| 51-100 | Moderate | People who are more sensitive may consider minimizing prolonged or intense effort. |
| 101-150 | Unhealthy for Sensitive groups | People with heart or lung illness, elderly people, and small children should limit prolonged or strenuous activity. |
| 151-200 | Unhealthy | People who have health problems with their heart or lungs, as well as older people and women, shouldn't do long or hard physical activities. Everyone else in the family should limit prolonged or strenuous activity. |
| 201-300 | Very Unhealthy | People with heart or lung illness, older people, women, and small children should avoid prolonged or strenuous physical activity. Everyone else in the home should minimize lengthy or strenuous activity. |

Common cooking methods, ingredients, and oil types

A great deal of seasoning is utilized in the cooking process (Ishige, 1992), and the chef often preheats oil to a high temperature in a metal wok. Consequently, the contribution of various cooking techniques to indoor air pollution is of utmost relevance. Emissions include oil particles, cooking odours, heating and combustion by-products, and water vapor. Principal domestic cooking

techniques include boiling, steaming, stewing, braising, stir-frying, pan-frying, deep-frying, and grilling. The following meats and vegetables are often used in cooking: pig, shellfish, chicken, and beef; cabbage, carrots, cucumbers, and broccoli. Eggs, ginger, spicy peppers, scallions, garlic, rice, flour, peanuts, and fruits are other frequent components. Chicken essence, salt, light soy sauce, and sugar are used as seasonings, and the most popular oils are soybean, peanut, and canola. (Abdullahi et al. 2013).

Justification

The review of literature highlighted that the studies that have been conducted in India related to indoor air pollution mostly covers issues related to impact of poor indoor air quality on the health issues. It specially focuses on diseases like asthma, respiratory tract infections etc. There are studies that focus on the impact of indoor on women's health (Dave 1983; Smith , Aggarwal , Behera , Chakrabarti and Khanduja , 2001; Singh and Jamal 2012; Soni , Dhankar; Mor , 2013, Kankaria , Baridalyne Nongkynrih, Gupta , 2014).

Since cooking is an integral part of everyday activity, compromising or reducing the activity itself is irrelevant. This leaves no other option than to conduct the activity efficiently keeping in mind that the major sufferers i.e., low- and middle-class people, cannot spend lavishly on costly options such as using chimneys over gas burner, having electric range, using costly oil for cooking which releases less fumes etc.

Cost efficient alternatives must be established. This requires close scrutinizing, which may reveal more aspects of the activity, giving way to newer realms of coping with the situation. The present study is of great importance since studies were conducted in different locales but not in Baroda and do not assess the emission of pollutants when different types of fuel are used to cook different food by using different cooking method. Since information on this perspective lacks literature support, the study was undertaken with the following objectives.

OBJECTIVES

1. To assess the indoor air pollutants emitted during cooking using different fuels
2. To give recommendations for reducing the effect of pollutants released during cooking
3. To suggest ways to control the levels of indoor air pollution in general for the residences.

DELIMITATIONS

The study was limited to the following:

- The use of five types of fuels only namely Charcoal, Kerosene, LPG, Wood and Wood-shaving.
- Cooking of three food products only namely Vegetarian full meal, Egg and Meat
- The four methods of cooking only namely Boiling with lid, Boiling without lid, Shallow frying and Deep frying
- The assessment of four types of indoor air pollutants namely Carbon Mono-oxide (CO), Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2) and Nitrogen Monoxide (NO)

HYPOTHESES OF THE STUDY

1. The quantity of CO released in cooking vegetarian food will vary with the type of fuel used in cooking with lid and without lid method.
2. The quantity of CO released in cooking eggs will vary with the type of fuel used in cooking with lid and without lid method.
3. The quantity of CO released in cooking non-vegetarian food will vary with the type of fuel used in cooking with lid and without lid method.

METHODOLOGY

Research design of the present study was experimental in nature. The study was conducted in a laboratory set up inside test chamber, which allowed the entrapment of gases released while cooking. Before the analysis, the degassing by vacuum pump is carried out to remove the air and particulate from the test chamber and ensure to minimise the any obnoxious air pollution from the chamber. 'Flue Gas Analyser Kane 900 plus' was used to measure four types of pollutants- Carbon Monoxide (CO), Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2) and Nitrogen Monoxide (NO).

Spot testing for IAQ (Indoor Air Quality) parameters was conducted using LPG, kerosene, coal, wood and wood shaving, as fuel for cooking vegetarian food, eggs and meat, by using different cooking methods- boiling with lid, boiling without lid, shallow frying and deep frying. The vegetarian meal included rice, vegetable and puri for a nuclear family (500 gms cauliflower and potato vegetable, 200 grams rice and 12 puri) Eggs taken at a time were 4 for boiling and shallow frying. The quantity of meat was 1 kg. 3 readings were taken and then average was taken as readings. The spot samples were collected and analyzed as per the standard procedure.

The air pollutants released from burning only fuel (taken as baseline) and those produced while cooking in test chamber was measured. Difference between the two provided a measure of the concentration of pollutants in air released only by cooking activity alone.

Equipment used in the study:



Figure 1
Flue Gas Analyser Kane 900 plus



Figure 2
Laboratory Set-Up (Test chamber)



Figure 3
Cooking in a chamber

FINDINGS AND DISCUSSION

The present study aimed to measure the emission of gaseous pollutants while cooking selected type of food by applying different cooking methods and by using selected fuels. It aimed to examine the indoor air quality during the preparation of a lunch for a nuclear family. The focus of the study was the examination of gases produced by the combustion or burning of food during cooking.

Different fuel used were:

- 1) Charcoal
- 2) Kerosene
- 3) LPG
- 4) Wood
- 5) Wood-shaving.

The type of food cooked was divided into three, each with three types of cooking methods:

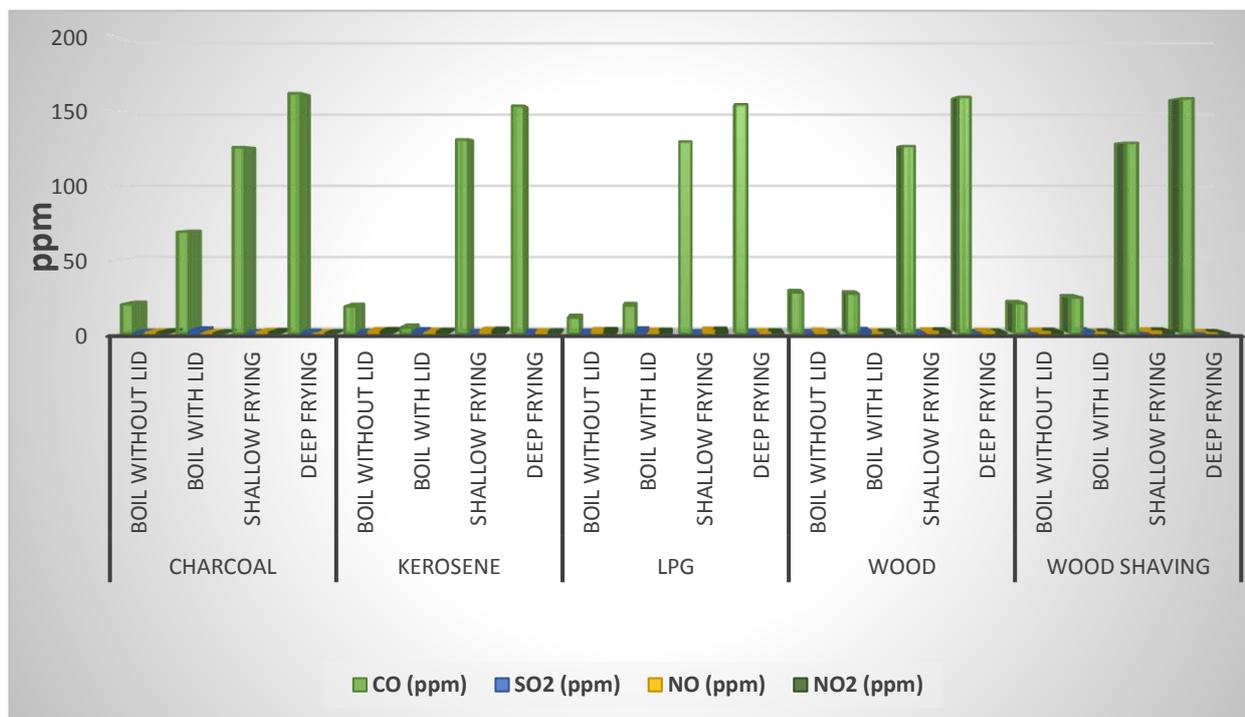
- 1) Vegetarian:
 1. Boiling (Open/ Closed) (200 grams rice)
 2. Shallow Frying (Cauli flower and potato vegetable)
 3. Deep Frying (12 puris)
- 2) Eggs
 1. Boiling (Open/ Closed) (4 eggs)
 2. Shallow Frying (4 eggs, omlette)
- 3) Meat
 1. Boiling (Open/ Closed) 1 kg meat
 2. Shallow Frying 1 kg meat
 3. Deep Frying 1 kg meat

Comparison of the Air pollutants released during Cooking

Table 2: Emission of Pollutants during cooking Vegetarian items by using different cooking methods and various fuels

| Fuel | Cooking Method | CO (ppm) | SO₂ (ppm) | NO (ppm) | NO₂ (ppm) |
|--------------|-----------------------|-----------------|-----------------------------|-----------------|-----------------------------|
| Charcoal | Boil without Lid | 19.8 | 0.4 | 0.6 | 0.6 |
| | Boil with Lid | 68.93 | 2 | 0 | 0 |
| | Shallow Frying | 126.2 | 0 | 0.8 | 0.8 |
| | Deep Frying | 162.6 | 0.4 | 0 | 0 |
| Kerosene | Boil without Lid | 18.4 | 0.4 | 1.6 | 1.6 |
| | Boil with Lid | 4 | 1.5 | 1 | 1 |
| | Shallow Frying | 131.5 | 0.1 | 1.8 | 1.8 |
| | Deep Frying | 154.2 | 0.4 | 0.6 | 0.6 |
| LPG | Boil without Lid | 10.8 | 0.4 | 1.6 | 1.6 |
| | Boil with Lid | 19 | 2 | 1 | 1 |
| | Shallow Frying | 130.1 | 0 | 1.8 | 1.8 |
| | Deep Frying | 155.2 | 0.4 | 0.6 | 0.6 |
| Wood | Boil without Lid | 27.93 | 0.06 | 1 | 0.1 |
| | Boil with Lid | 27 | 1.66 | 0.4 | 0.4 |
| | Shallow Frying | 126.93 | 0.10 | 1.2 | 1.2 |
| | Deep Frying | 160.13 | 0.06 | 0.84 | 0.45 |
| Wood Shaving | Boil without Lid | 20.35 | 0 | 1.05 | 1.05 |
| | Boil with Lid | 24.41 | 1.5 | 0.45 | 0.45 |
| | Shallow Frying | 129.15 | 0 | 1.25 | 1.25 |
| | Deep Frying | 159.15 | 0 | 0.05 | 0.05 |

Fig 4: Emission of Pollutants during cooking Vegetarian items by using different cooking methods and various Fuels



In this investigation, for vegetarian food it was observed that deep-frying and shallow-frying increased the carbon monoxide concentration in the air more than other cooking techniques.

Table 3: Emission of Pollutants during cooking of an Egg using different cooking methods and various fuels

| Fuel | Cooking Method | CO (ppm) | SO ₂ (ppm) | NO (ppm) | NO ₂ (ppm) |
|----------|------------------|----------|-----------------------|----------|-----------------------|
| Charcoal | Boil without Lid | 128.35 | 0 | 0 | 0 |
| | Boil with Lid | 26.93 | 0 | 0 | 0 |
| | Shallow Frying | 127.6 | 0 | 1 | 1 |
| | Deep Frying | 160.32 | 0 | 0 | 0 |
| Kerosene | Boil without Lid | 22.75 | 0 | 0 | 0 |
| | Boil with Lid | 24 | 0 | 0 | 0 |
| | Shallow Frying | 134.75 | 0 | 2 | 2 |
| | Deep Frying | 159.36 | 0 | 0 | 0 |
| LPG | Boil without Lid | 14 | 0 | 0 | 0 |
| | Boil with Lid | 14 | 0 | 0 | 0 |
| | Shallow Frying | 133.40 | 0 | 2 | 2 |
| | Deep Frying | 154.6 | 0 | 0 | 0 |
| Wood | Boil without Lid | 21.83 | 0 | 0 | 0 |
| | Boil with Lid | 22 | 0 | 0 | 0 |
| | Shallow Frying | 137.83 | 0 | 1.4 | 1.4 |
| | Deep Frying | 158.5 | 0 | 0 | 0 |

| | | | | | |
|--------------|------------------|--------|---|------|------|
| Wood Shaving | Boil without Lid | 22 | 0 | 0 | 0 |
| | Boil with Lid | 19.41 | 0 | 0 | 0 |
| | Shallow Frying | 129.2 | 0 | 1.45 | 1.45 |
| | Deep Frying | 155.40 | 0 | 0 | 0 |

CO is the sole pollutant generated by eggs; no other pollutants are produced. CO is once again the sole pollutant emitted, and at a very low concentration. Since there is no release of pressure, as in the case of a pressure cooker, the carbon monoxide stays contained inside the vessel. As the vessel cools, it is gradually diluted by atmospheric air. For eggs, shallow frying gives the most contaminants compared to boiling.

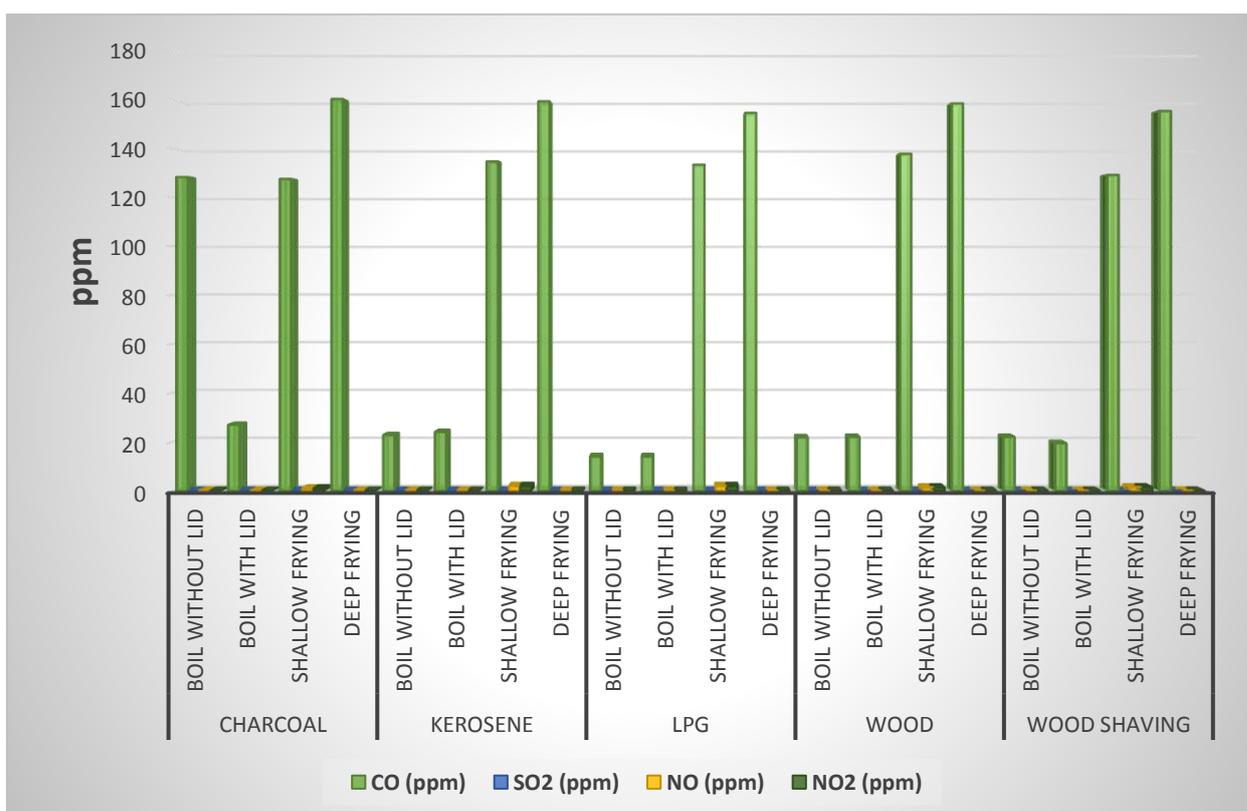


Fig 5: Emission of Pollutants during cooking of an Egg using different cooking methods and various Fuels

Table 4: Emission of Pollutants during cooking of Meat using different cooking methods and various fuels

| Fuel | Cooking Method | CO (ppm) | SO ₂ (ppm) | NO (ppm) | NO ₂ (ppm) |
|----------|------------------|----------|-----------------------|----------|-----------------------|
| Charcoal | Boil without Lid | 2.43 | 0 | 0 | 0 |
| | Boil with Lid | 9.93 | 0 | 0 | 0 |
| | Shallow Frying | 127.4 | 0 | 1 | 1 |
| | Deep Frying | 160.8 | 0.4 | 0 | 0 |
| Kerosene | Boil without Lid | 2.05 | 0 | 0 | 0 |
| | Boil with Lid | 8.66 | 0 | 1 | 1 |
| | Shallow Frying | 130.31 | 0 | 2 | 2 |

| | | | | | |
|--------------|------------------|--------|------|------|------|
| | Deep Frying | 154.4 | 0 | 0.6 | 0.6 |
| LPG | Boil without Lid | 0 | 0 | 0 | 0 |
| | Boil with Lid | 3.66 | 0 | 1 | 1 |
| | Shallow Frying | 125.16 | 0 | 1.83 | 1.83 |
| | Deep Frying | 162.3 | 0 | 1 | 1 |
| Wood | Boil without Lid | 4.38 | 0 | 0 | 0 |
| | Boil with Lid | 11.66 | 0 | 0.4 | 0.4 |
| | Shallow Frying | 128.33 | 0 | 1.4 | 1.4 |
| | Deep Frying | 164.02 | 0.06 | 0 | 0 |
| Wood Shaving | Boil without Lid | 3.53 | 0 | 0 | 0 |
| | Boil with Lid | 9.08 | 0 | 0.45 | 0.45 |
| | Shallow Frying | 129.15 | 0 | 1.45 | 1.45 |
| | Deep Frying | 158.75 | 0 | 0.05 | 0.05 |

When compared to all other food types, cooking meat produces the fewest pollutants. Boiling it simply produces carbon monoxide, leaving no other contaminants. When meat is shallow-fried, a large quantity of CO is produced, but small levels of NO₂ are noticed.

Deep-frying meat does significantly contribute to air pollution despite the fact that the quantity of pollutants emitted by coal is notably high in concentration.

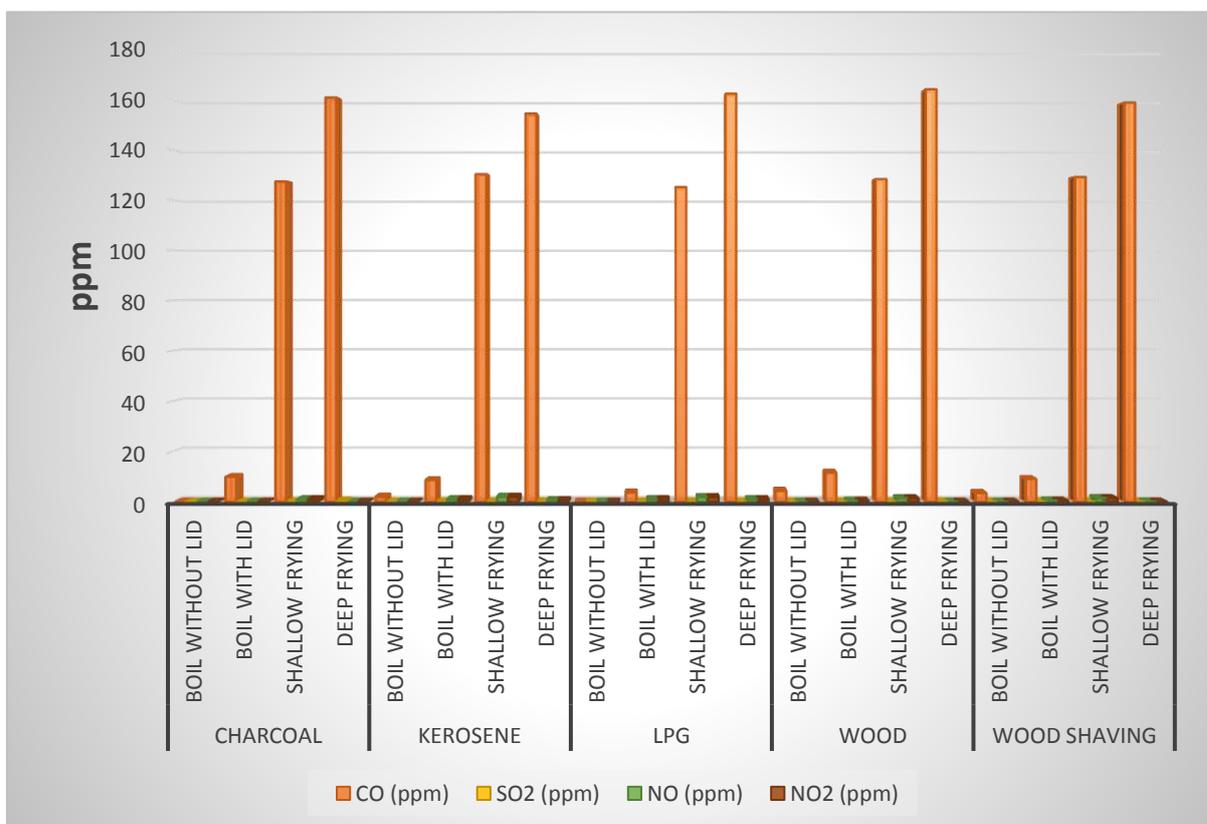


Fig 6: Emission of Pollutants during cooking of Meat using different cooking methods and various Fuels

- The average levels of carbon monoxide were 45.63ppm for charcoal, 24.74ppm for wood shaving, 23.13ppm for kerosene, 20.96ppm for wood, and 19.9ppm for LPG. Sulphur dioxide was emitted at negligible levels, with kerosene producing the highest average (0.43ppm). The typical levels of nitrogen monoxide and nitrogen dioxide were equally negligible, with the exception of those produced when wood was burned (9.8ppm for both). Thus, it was determined that LPG is the cleanest fuel available. Furthermore, statistics indicate that the emission of contaminants rises whether food is shallow-fried or deep-fried.
- In this investigation, we observed that deep-frying and shallow-frying increased the carbon monoxide concentration in the air more than other cooking techniques. The WHO recommended that this air quality was hazardous to human health.

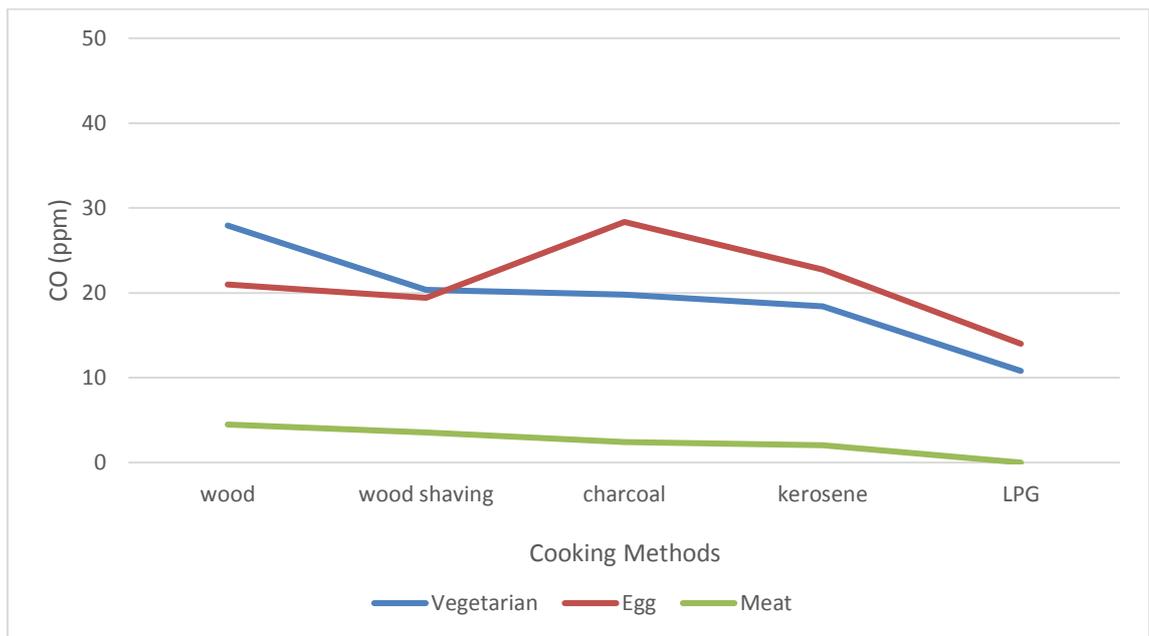


Fig 7: Comparison of CO emitted when using Different Fuels and Different Food

Figure 7 compares Carbon monoxide emissions to different cooking techniques. The graph indicates that wood fuel emits maximum amount of CO. LPG fuel demonstrates lesser amount of CO air pollutant released by different cooking techniques for different food items.

According to the findings from the research, the technique of deep frying contributes the most to greenhouse gas emissions, followed by shallow frying and stir frying. It is claimed that more gentle techniques of cooking, such as boiling food with a lid or boiling food without lid on, may result in less pollution being released into the atmosphere. The most polluting options for cooking fuel are firewood, biomass, and pellets. Kerosene is a relatively cleaner option, and Liquefied Petroleum Gas (LPG) is the cleanest option, with LPG emitting 50 times fewer pollutants than biomass burning. Among the various options available for cooking fuel, firewood, biomass, and pellets are the most polluting. So, the best way to cook is to use LPG as a fuel source because it lets you reduce the harmful effects of the fumes that cooking makes.

Testing of Hypotheses: Several hypotheses were formulated to find out the relationship between variables of the present study. For present investigation, as per the nature of variables the Analysis of Variance (ANOVA) was computed.

Ho1: The quantity of CO released in cooking vegetarian food will not vary with the type of fuel used in cooking with lid and without lid method.

Analysis of Variance was computed to find out the variation in the type of fuel used for cooking vegetarian food with lid and without lid method of cooking.

| <i>Variables</i> | <i>Sum of Squares</i> | <i>df</i> | <i>Mean square</i> | <i>F-ratio</i> | <i>P-value</i> | <i>Level of Significance</i> |
|------------------|-----------------------|-----------|--------------------|----------------|----------------|------------------------------|
| Fuel type | 1351.989 | 4 | 337.9973 | 1.185 | 0.436 | N.S |
| Cooking method | 212.1524 | 1 | 212.1524 | 0.744 | 0.437 | |

The 'F' ratio was not found significant and hence the null hypotheses was accepted.

Ho2: The quantity of CO released in cooking egg will not vary with the type of fuel used in cooking with lid and without lid method.

Analysis of Variance was computed to find out the variation in the type of fuel used for cooking egg with lid and without lid method of cooking.

| <i>Variables</i> | <i>Sum of Squares</i> | <i>df</i> | <i>Mean Score</i> | <i>F</i> | <i>P-value</i> | <i>Level of Significance</i> |
|-----------------------|-----------------------|-----------|-------------------|----------|----------------|------------------------------|
| Fuel type | 5419.13166 | 4 | 1354.782915 | 1.323 | 0.396 | N.S |
| Cooking method | 1052.47081 | 1 | 1052.47081 | 1.028 | 0.367 | |

The 'F' ratio was not found significant and hence the null hypotheses was accepted.

Ho3: The quantity of CO released in cooking non-vegetarian food will not vary with the type of fuel used in cooking with lid and without lid method.

Analysis of Variance was computed to find out the variation in the type of fuel used for cooking non-vegetarian food with lid and without lid method of cooking.

| <i>Variables</i> | <i>Sum of Squares</i> | <i>df</i> | <i>Mean Square</i> | <i>F</i> | <i>P-value</i> | <i>Level of Significance</i> |
|-----------------------|-----------------------|-----------|--------------------|----------|----------------|------------------------------|
| Fuel type | 41.1289 | 4 | 10.28223 | 3.862 | 0.109 | 0.01 |
| Cooking method | 109.09809 | 1 | 109.0981 | 40.980 | 0.003 | |

The computed analysis of variance depicted significant variation (α at 0.01, $P=0.003$) in the quantity of CO released in cooking non-vegetarian food with the type of fuel used in cooking with lid and without lid method. The 'F' ratio was found significant at 0.01 level. Hence the null hypothesis was

rejected and it was concluded that the quantity of CO released in cooking non-vegetarian food varied with the type of fuel used in cooking with lid and without lid method of cooking.

Recommendations for Reducing the Effect of Pollution Released during Cooking

The following recommendations are given to the users mainly to the homemakers to reduce the effect of pollution during cooking:

- Switch to use of solar energy for generating electricity and using electric cooking range.
- Opt for water-based cooking methods like boiling and steaming instead of oil-based cooking methods like grilling and frying since the later releases more pollutants
- Oil with higher smoking point such as corn oil, avocado oil, and peanut oil should be used as it will release less particulate matter
- Avoid cooking food at very high temperatures
- Food with high fat content releases more air pollutants as compared to others, thus avoiding such items whenever possible

Suggestions to Control Indoor Air Pollution

- The most effective way to reduce indoor air pollution is by ensuring adequate natural ventilation inside the house. Movement of fresh natural air from openings like doors and windows result in the displacement of polluted air.
- Installation of mechanical ventilation systems like fans, kitchen chimney and exhaust fans can be very beneficial to control indoor pollution.
- Regularly cleaning the mechanical ventilation systems as well as the interior spaces (furniture, floor, walls, ceiling etc.) and keeping them free from dust and grease is also essential in keeping indoor air clean.
- Indoor plants like Snake Plant, Areca Palm, English Ivy, Peace Lily, Bamboo Palm, Spider Plant etc. can naturally absorb indoor pollutants. Keeping these in the kitchen, living rooms and even bedrooms will help in reducing indoor air pollution.
- Using paints that are low on VOC (Volatile organic compounds) can definitely contribute towards cleaner indoor air.
- Avoiding activities like smoking inside the house
- Installing energy efficient lighting
- Washing soft furnishing like sofa covers, cushions, curtains, draperies and carpets periodically, decluttering by removing unnecessary things around the house, removing footwear when entering the house and keeping trash covered are some of the ways in which indoor air pollution can be controlled.

The researcher also suggests creating awareness among the residents regarding the ill effects of indoor pollution. Thus, detailed information of the types of indoor pollutants, causes of their occurrence, their adverse effects on health and ways to control and remove them, can be disseminated in the form of attractive and easy to understand pamphlets and brochures.

CONCLUSION

From the present study, it appears that there is significant number of pollutants being released from cooking. Pollutants like carbon monoxide, sulphur dioxide, nitrogen monoxide and nitrogen dioxide can prove to be very dangerous for human health if exposed to them over long periods of time. LPG was seen to be the cleanest among all the other fuel used for the study. Boiling with or without lid also released lesser pollutants in comparison to shallow frying and deep frying. This shows fat as a medium of cooking also contributes to air pollution. If appropriate steps are not taken to reduce the release and impact of such pollutants, then they may cause serious respiratory diseases especially in those with lower immunity levels. This data when multiplied on a larger level appears of much concern. However, by making positive changes in our way of working and the choices that we make, we can significantly reduce the ill effects of the pollutants released due to cooking.

IMPLICATIONS OF THE STUDY

As Humans frequently spend their time indoors IAQ becomes very important to study as IAQ and wellbeing are closely related. The present study will help the Home Science fraternity who always works towards providing a good quality of life to specifically the homemakers. Providing an environment free from respiratory infections, and a lower risk of developing a number of chronic ailments is possible if the IAQ is clean and healthy to breathe. The present study will be of help to not only the Home Science field of study but also for other educational institutions who are concerned with the sustainable development. As the National Education Policy 2022 is to be implemented shortly in all the colleges, all the educational institutions should include the indoor air quality component in the curriculum as it is concerned with the health of all the human beings who work indoors and specially the homemakers who spend most of their time in cooking tasks.

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Section –II

**A Brief Report on Biennial Conference of Home Science Association of India on
“Innovation and Incubation Opportunities in Home Science for Self-reliant India”**

December 15-17, 2022

**Organized by HOME SCIENCE ASSOCIATION OF INDIA, (KERALA
CHAPTER)**

Conference Brief:

The 34th biennial national conference of the Home Science Association of India was organised by the Kerala state chapter of HSAI on December 15–17, 2022, at St. Teresa’s College (Autonomous), Kochi, Kerala. The theme of the conference was "Innovation and Incubation Opportunities in Home Science for Self-Reliant India." The conference started with an invocation from the Almighty. Dr. Susan Cherian, president of the Kerala Chapter, welcomed the dignitaries and audience. It was followed by the presidential address by Prof. N. Vasugi Raaja, President of the Home Science Association of India. She introduced the theme and concept of the 34th biennial. More than 550 attendees, including scientists and students from all across the country, distinguished speakers, dignitaries, and guests, participated in the conference.

Sub themes of the conference:

1. Digital Approaches
2. Entrepreneurship Development
3. Social and Food Innovations
4. Sustainable Development
5. Gender and Development

Inaugural Session:

Dr Susan Cherian President of Kerala State HSAI Chapter **welcomed the delegates**. Shri V Muraleedaran, Hon. Minister of State and Parliamentary Affairs, officially opened the conference. Dr Vandana Shiva, Indian Scientist and Environmentalist gave the key note address. The special address was delivered by Dr Krishna Srinath, former director of the ICAR-Central Institute of Women in Agriculture in Bhubaneswar and ex-ICAR scientist. Prof N Vasugi Raaja, President of Home Science Association of India and Dean, School of Home Science & Prof in Textiles, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore presided the meeting. The session was followed by felicitations from Rev. Dr.Sr.Celine E, Manager, St. Teresa’s College, Kochi; Dr.Alphonsa Vijaya Joseph, Principal, St. Teresa’s College; Prof.Jyoti V Vastrad, Vice-President, HSAI South; Prof. Gabriel Simon Thattil, Director, IQAC, University of Kerala; and Dr.Sivadasan P, Director, IQAC, Calicut University.



Welcome by Dr Susan Cherian



Presidential Address by Prof N Vasugi Raaja



Inaugural address by Hon. Union Minister of State for External Affairs & Parliamentary Affairs Shri V Muraleedharan



Key note address by Dr Vandana Shiva

In his **inaugural address**, **Honble Minister Sri V.Muraleedharan**, pointed out that there is a lot that home science could take advantage of with the National Education Policy. He also emphasised that the theme of the conference, "Innovation and incubation opportunities through home science for self-reliant India," is very relevant today. The five pillars of Atma Nirbhar Bharat or a self-reliant India that our Prime Minister has enunciated are: economy, which brings in a quantum jump and not incremental change; infrastructure, which should become the identity of India; system, based on 21st century technology-driven arrangements; vibrant demography, which is our source of energy for a self-reliant India; and demand, whereby the strength of our demand and supply chain should be utilised to full capacity. The International Year of Millets will be celebrated in 2023, with a focus on millets-based products. India will steer the IYM2023 celebrations worldwide and organise campaigns to promote the cultivation and consumption of millets, both in India and abroad, during the next year. IYM2023 will lead India toward food and nutritional security. With PM Modi's vision

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of "Vasudaiva Kutumbakam" (The World is One Family), the IYM2023 celebration is an opportunity for India to promote nutri-cereal millets globally and place them on the world's "food map." To reap the health benefits of locally available millets, we should encourage their consumption. The Home Science Association should take a lead so that Indian millets, recipes, and value-added products are accepted globally and celebrate IYM in a befitting manner. He concluded by pressing the necessity of nurturing relevant small-scale industries and home-based entrepreneurs.

Dr. Vandana Shiva, in her **key note address** talked on "Health of our planet and our health is one health." Dr Shiva has spoken extensively on the conceptual and practical determinants of health in different dimensions. Dr. Shiva has postulated a new era for health in which profit and social benefit coexist, complementing each other.

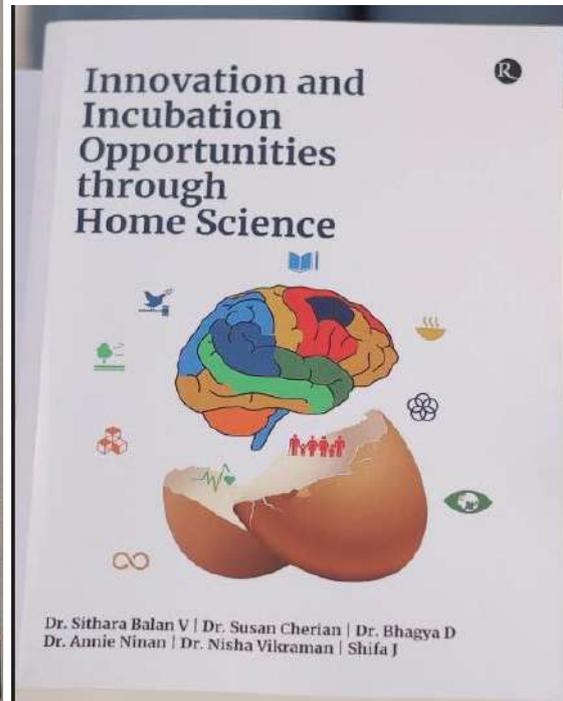
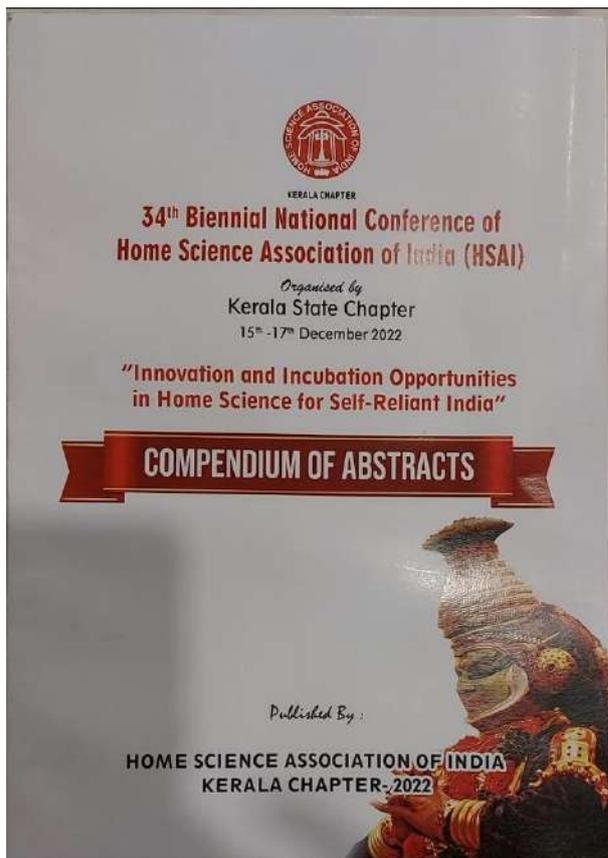
The **special address** was delivered by **Dr Krishna Srinath**. She talked explicitly about the Chellanam model of development, which she conceived. She also stressed the importance of keeping the nomenclature of "home science."



Dr Krishna Srinath

Release of the Publications:

The Proceedings of the biennial along with the edited volume of the selected full papers were released during the conference by the President of HSAI.





Dr Sithara Balan V, Organising Secretary for the 34th Biennial National Conference proposed the **vote of thanks**.



Vote of thanks by Dr Sithara Balan V

Dr Mrunalini Devi Puar Memorial lecture

The most prestigious Dr. Mirulani Devi Puar Oration lecture was given by Dr. Neelam Grewal. She is the former Vice Chancellor, GKU, Bhatinda; former Member, Punjab Public Service Commission, Patiala; and Director, ICAR-Central Institute for Women in Agriculture, Bhubaneswar. Her talk was on **COMMUNITY SCIENCE - EMPOWERMENT THROUGH GENDER INCLUSIVE SUSTAINABLE LIVELIHOODS**. She pointed that improving the quality of life has been the ultimate goal of a number of sustainable livelihood activities being carried out in the developmental

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arena. Livelihood comprises peoples' consciousness, participation and responsible attitude and also encompasses physical and emotional wellbeing, empowerment of the self through acquisition of personal and professional knowledge/skills and enhancement of interpersonal and societal relations to move forward in participatory manner. It enables the self, community and the society to identify and look for solutions to pressing challenges. In a larger context, it is a means of social change through a series of well devised, progressive steps – identify gaps, plan and administer suitable interventions. Critical review elucidates that there is no difference in the approach of Community Science and, sustainable livelihood as both strive to improve the quality of life of the self and the community.



Dr Mrunalini Devi Puar Memorial lecture by Dr Neelam Grewal



Plenary sessions:

Five plenary sessions based on the sub themes of the conference were presented by eminent speakers. Dr. Sarita Anand, Professor, Dept of Development Communication and Extension, Lady Irwin College, University of Delhi, delivered the talk on "Facilitating development through digital technologies". Mr.Sridhar Radhakrishnan, Engineer and Environmentalist debated on- "The Green Food Entrepreneur – Transformation to diversity, nutrition and taste, naturally". Mr.Rajit K Nair, former Director Rajadhani School of Business, Tvpm talked on "Breaking the Glass Ceiling – Confidence Code". The role of Sustainable fashion was well discussed by Prof Anjali Karolia-Dean, Faculty of family and community sciences, MSU, Baroda. It was followed by expert talk from Ms Anju Dubey Pandey, Gender specialist and former programme officer of UN Women India on- "Are you a working women".

A panel discussion was conducted on the conference theme- Innovation and Incubation Opportunities in Home Science for self-reliant India. Experts from the fields of Human Development, Food Nutrition & Dietitics, Resource Management and Interior Designing, Textile and Clothing and Extension and Communication presented the role of each specialisations of Home Science. The panel discussion was chaired by Former Professor of MS University, Baroda, Dr Uma Joshi and co-chaired by Dr Anupama Mishra Vice President East Zone.



HSAI Award papers:

Six short listed paper presentations were also done for HSAI awards under the three categories namely Young scientist Award, Mid-Career award and Senior Scientist Award. The judges were eminent experts from the relevant fields. Ms Upashree Dutta, Research Scholar, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore won the Young Scientist Award. Dr. K.Venketesan; Assistant Professor and Head, JNM College, Portblair, Andaman bagged the prize for Mid-career Award and Dr S Amsamani, Professor, Avinashilingam Institute for Home

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Science and Higher Education for Women, Coimbatore received the Senior Scientist Award. The winners were given certificates, mementos and cash prize sponsored by HSAI.

Technical session-I, was held in Forenoon session on 15th December 2022, where SubTheme - wise Parallel sessions were conducted at five different venues. Under, these sub themes, total 76 oral presentations were made, which were evaluated by experienced and renowned home scientists from various fields. The best presentations under each theme were awarded in the valedictory function. Technical session-II was held on 16th December 2022 in the Afternoon session in which e-poster presentations were conducted at five different venues for the 5 subthemes identified. A total of 165 poster presentations were made and were judged by a panel of judges under each subtheme and the best presenters were awarded in the valedictory function.

General body meeting of HSAI

The general body meeting of Home Science Association of India was held at 11 am in the College Auditorium, which was attended by good number of Home Scientists. All the executives of HSAI were present in the meeting. At the outset, Dr Suman Mundkur, General Secretary, HSAI, welcomed the participants and informed about the regional wise activities of HSAI along with new and old enrolments of HSAI membership. She gave updation about the new face of the HSAI Website. Prof N Vasugi Raaja, President of HSAI declared that next Biennial Conference of HSAI will be held at Meghalaya by the mid of 2024.

Valedictory Session

Ms. Anne Mary Joseph, Chairperson of the HSAI Kerala Chapter, welcomed the gathering. Dr. Nisha Vikraman, Treasurer of the Kerala Chapter, presented the report of the three-day conference. It was followed by the valedictory address by Dr. Bijay Kumar Sahu, Regional Manager and Head, National Research Development Corporation, MSME-Intellectual Property Facilitation Centre, Government of India. He talked about the innovation and incubation opportunities and how the Ministry is supporting small, medium, and micro enterprises to flourish and explore themselves. Prizes and certificates were distributed to all the winners and participants.



Dr Suman Mundkur presenting the activities of HSAI at the General Body meeting



Valedictory Session

Major Recommendations

- A paradigm shifts of Home Science curriculum from just teaching to economically sustainable focused approach for catering to the needs of various section of society is observed. Hence there is tremendous scope for innovation and entrepreneurship.
- Promotion of incubation and innovation through curriculum helps in knowledge transfer as it is a collaborative programme.
- Curriculum should equip students with latest gadgets used in industry. State of the art lab facilities should be created. Multidisciplinary approach should be integral to the curriculum planning and implementation.
- Mechanisms to enhance entrepreneurial skills and abilities needs to established. Flexible curriculum, collaborative teaching-learning process, infrastructure should promote innovative and entrepreneurial skills in students.
- Social, economic and environmental values need to be woven with curriculum based innovative and incubation (I & I) process focusing on sustainable development.
- Small and lone players in Innovative and Incubation (I & I) process collaborations need to be identified so as to make their contributions effective and beneficial to college students.
- Education as well as industries will need lot of reorganisations to minimize the problems and challenges in promoting I & I through our colleges.
- There will be lot of challenges faced by Home-Science Colleges/faculties like funding, infrastructure, faculty with innovative approaches to teaching, experienced faculty/resource persons incubation centres and its challenges effectively.
- Home-Science education should go beyond entrepreneurship to establishing incubation centres in collaboration with IITs. Policy initiatives should be taken to encourage Home-Science students in formal training of entrepreneurship and financial education to become self-reliant.

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Original research papers are invited from scholars from various fields of Home Science (Family and Community Sciences) to be published in the forth coming 'The Indian Journal of Home Science'.

- The Journal is published only in English language.
- At least one of the authors should be life member of The Home Science Association of India. .
- Original research papers are invited for publication in the journal from 1st February to 30th March for the issue intended to be published in July and from 1st August to 30th September for January issue. “. The submission is to be done ONLY though web site to the Editor.
- The guidelines for the contributors are uploaded on the website of H.S.A.I. The guidelines must strictly be followed.

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