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Half Yearly Journal of Science, Arts, Social Sciences, Commerce, Home Science & Home Science Technology

RESEARCH DEVELOPMENT CELL

WOMEN'S EDUCATION SOCIETY'S
LADY AMRITBAI DAGA COLLEGE FOR WOMEN OF ARTS, COMMERCE & SCIENCE AND SMT. RATNIDEVI PUROHIT COLLEGE OF HOME SCIENCE & HOME SCIENCE TECHNOLOGY

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(A Peer-reviewed Journal)

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Editorial

Welcome to Volume 12 of Research Journal ! This issue of research Journal features the work of authors from the interdisciplinary faculties of Home Science, Home Science Technology and Science.

Formulation based papers incorporated mainly focus on use of flora although their utility varies from cosmetics to chewing gums they share a common feature of popularizing the natural ingredients; may it be multi herbs, ginger extract, or fruits. “In order to awaken the people of India, it is women who have to be awakened….” with this maxim in mind, almost four papers on awareness in women, whether in rural areas or in urban locale have been included. An author believes that ‘India still lives in its villages..’ and hence unless the economic, educational, and cultural development of rural area is achieved, the dream of shining India will never come true. The intrinsic motivational factor is more responsible to adopt the pre-defined technologies. By triggering their minds to their basic needs, they can be convinced to adopt a particular technology. Two papers contemplate towards the important role of women in the welfare of the family which is being gradually realized in villages. SHG, a mini voluntary agency for self help generates confidence, self-scrutiny and self-reliance in rural sector. In this modern era, women have become financially aware if not literate. Irrespective of the occupation of women, knowledge and awareness regarding financial security is crucial and managing money wisely is a prerequisite for financial comfort as has been reflected in the rest two papers. “Save money for a rainy day” is the goal of each woman who is now being recognized as expert multi-taskers sharing numerous responsibilities outside the home and within. In yet another study, it has been observed that work-related stress and health among women employees in hotel sector is directly dependent on their work pattern. A common stress reaction includes tension, irritability, inability to concentrate, and a variety of physical symptoms that include headache and a fast heartbeat. The link between stress and personal health, according to medical experts, is very strong indeed. So is the association between dietary patterns and the level of physical activity which influences existing health levels determining whether an individual will develop chronic diseases such as cardiovascular disease, obesity and diabetes - all these topics are well encompassed in this issue. The global burden of dyslipidemia in the developing world has also been aptly reviewed. “New World Syndrome” is a set of non-communicable diseases brought on by consumption of junk food and sedentary lifestyle, characterized by obesity, hypertension and heart diseases posing substantial public health problems amongst children and the youths alike. There seems to be a tendency to skip meals and/or breakfast, have erratic eating pattern and an unsatisfactory total food consumption; Proper meal frequency and regular use of quality foods need to be encouraged and restriction on excessive utilization of fried foods and cold drinks need to be prioritized. The packed lunches of school going children were inadequate in both quantity and quality as has been vividly studied in one paper. Also each individual is different in the way his/her body responds to insulin dose.

Carbohydrate counting therefore appears to be an individual based solution for the management of type 1 diabetes. The insulin to carbohydrate ratio is a guide to determine the amount of insulin needed to metabolize the amount of carbohydrate consumed in a meal. Both quality and quantity of diet affects HbA1c is well documented in one study and intervention by a dietitian with expertise in diabetes management can improve HbA1c and enhance Quality of Living. Apart from becoming vulnerable to drastic changes in lifestyle and dietary patterns, modern man has now become addict to city life. Cities form the focal point of mans' social, cultural and economic lives today. Global urbanization is intensifying as large proportion of the global population now lives in cities. Rapid urbanization of recent times has brought many climatological changes in cities around the world, a major one being rise in temperature. One paper focuses on understanding the difference of temperature i.e. urban heat island phenomenon and indicates a marked existence of urban heat island in Nagpur city due to the lack of trees which also reduces amount of cooling. Apart from the increments in temperatures, another manmade technological threat is the pharmaceutical solid waste that is being generated on daily basis through pharmaceutical industries. The solid waste has created many environmental and health issues. One study deals with the use of earthworms in solid waste management for the decomposition of herbal waste of Arjun tree as a part of ayurvedic pharmaceutical waste. The use of vermi-compost provides better and easy option for utilization of waste. On the other hand, one study reveals the fact how the modern world is completely unaware of both; the tribes as well as the horseshoe shaped beautiful valley, with an entrance from the cliff, which encompasses a huge forest located deep in a vale where many medicinal plants are sited. Residents of Patalkot - the Bharia Dravidian tribes are skilled in using forest plants to make effective medicines. Tribal and tourism development is the dual purpose which shall mutually enhance, uplift and promote the much desired cultural, eco, adventure, medical and sustainable tourist destination and pull up the Bharia community, language and culture from the edge of extinction.

Dr. Deepali Kotwal
Editor-in-chief
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Development and Evaluation of All Herbs Shampoo

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Abstract

Shampooing is the most common hair treatment which is aimed at cleansing the hair and scalp. Most marketed shampoo including herbal shampoo usually contains high amount of synthetic surfactants that causes irritation to hair and eyes. In present scenario, the popularity of herbal shampoo among consumers is on rise because of their belief that these products, being of natural origin are safe and free from surfactants but they contain meagre amount of herbal actives. The present study is aimed to formulate and evaluate All Herbs Shampoo containing multi-herbal extracts and to compare it with the marketed synthetic herbal shampoo by examining various sensory and physical parameters. Thus a shampoo containing multi-herbs extracts of Sapindus mukorossi (Reetha), Emblica officinalis (Amla), Acacia concinna (Sheekakai), Azadirachta indica (Neem), Ocimum tenuiflorum (Tulsi), Aloe vera was prepared. Natural viscosity modifier was added to achieve proper viscosity of the shampoo. Different parameters like pH, cleansing action, foam-ability, surface tension, viscosity, colour, conditioning performance were examined. The formulated shampoo gave comparable results which were at par with the commercially available shampoo. A more radical approach in popularizing herbal shampoo would be to change the consumer expectations from a shampoo with emphasis on safety and efficacy.

Key words : All herbs shampoo, Herbal extracts, Synthetic surfactant, Safety, Efficacy

1. Introduction

Hair is a protein filament that grows from follicles found in the dermis, or skin. Hair is one of the defining characteristics of mammals. **Shampoo** is a hair care product, typically in the form of a viscous liquid, that is used for cleaning hair. It is used by applying it to wet hair, massaging the product into the hair, and then rinsing it out. Herbal shampoos are the cosmetic preparation containing traditional herbs which are meant for cleansing the hair shaft without adversely affecting the user.

From the ancient times, men have been borrowing from the nature to care for their skin and hair. In today's world also, there is an increasing demand for natural products.[1] The market is completely flooded with natural products because consumers feel they are safer and free from any side-effects. Major key players of this segment are Patan-

jali, Dabur, Himalaya, Emami and Lotus Herbals. But the herbal shampoos that are available in market contains high concentration of synthetic surfactants and very meagre amount of herbs. Synthetic surfactants are added to shampoo primarily for the foaming and cleansing action but their regular use leads to dryness of hairs, hair loss, irritation to scalp and eyes[2].

Herbal formulations are considered as alternative to synthetic shampoo but formulating cosmetics using completely natural raw material is a difficult task. There are many natural plants that have beneficial effects on hairs but it is difficult to formulate using only single ingredient to give better detergency and cleansing ability. Thus the study was designed to formulate a completely herbal shampoo containing various herbs without any addition of synthetic detergents.

It was then evaluated and compared with the marketed herbal shampoo to check safety and efficacy of the product.

1.1 Aim and Objective

To develop a shampoo containing multi herbs in order to justify that it gives satisfactory results regarding foam ability, cleansing action comparable to the marketed herbal shampoo.

2. Material and Methodology

2.1 Materials Required

- The different parts of the plants were selected for the study having hair care property, the plants are Amla fruit (Emblica officinalis),Tulsi leaves (Oscimum tenuiflorum), Neem leaf (Azadirachta indica) Shikakai fruit(Acacia concinna), Aloe leaf (Aloe barbadensis), Reetha fruit (Sapindus mukorossi).
- The pericarps of Reetha, Shikakai pods, dried desseded amla, fresh leaves of Tulsi and neem and Aloevera were collected from the local market and identified for its purity under the guidance of Associate Professors, Department of Botany, RTMNU campus.

2.2 Preparation of Plant Extracts :

- Reetha pericarps, Shikakai pods, Dried deseeded Amla, Fresh Neem leaves, Fresh Tulsi leaves were extracted using 70% ethyl alcohol by reflux condensation. The extracts were filtered, distilled out and air dried to obtain a semi-solid mass.
- Aloe vera gel was slightly sliced off from the outer part of its leaf

2.3 Formulation of All Herbs Shampoo :

- Initially different concentrations of gelatine solution were made (2%, 8%, 10%, 12%, 14%, 15%, 18%) in order to check the right viscosity for the shampoo.
- Further, the solutions were also tested for their compatibility

Table 1. Formulation of all Herbs Shampoo

Ingredients	Quantity taken for 100 % W/V			Functions
	F1	F2	F3	
Reetha Extract	33 g	35 g	40 g	Natural foaming and cleansing agent
Shikakai Extract	17 g	18 g	20 g	Universal Conditioning agent
Amla Extract	12 g	9 g	4 g	Provides nourishment and black shine to hair
Neem Extract	9 g	10 g	10 g	Anti-dandruff agent and act as preservative
Tulsi Extract	5 g	2 g	2 g	Cures dandruff and hair fall, act as anti oxidants
Aloe vera gel	4 g	2 g	2 g	Moisturizes the scalp and gives smooth shine to hair
Vitamin E	4 g	4 g	2 g	Powerful antioxidant
Gelatine solution (12%)	16 ml	17.5 ml	19.6 ml	Viscosity modifier
Tea Tree Oil	0.2 ml	0.5 ml	0.4 ml	Powerful preservative
Perfume (Marvel 8)	qs	qs	qs	To increase aethetic appeal

Note : All 3 formulations F1, F2, F3 were found to have no compatibility issue.

Table 2. Various Attributes of All 3 Formulated Shampoo

Parameters	F1 Formulation	F2 Formulation	F3 Formulation
Viscosity	Less Viscous	Moderate Viscous	Highly Viscous
Pourability	Watery like	Pourable	Non-pourable
Colour	Dark green	Dark green	Very dark green
Foaming ability	Small dense foam	Small, airy foam	Large, airy foam

with different herbal extracts. It was found that all herbs were compatible with 12% gelatine solution also achieving proper viscosity for the shampoo.

- For 5 ml shampoo, 1.75 gm Reetha was compatible with 0.5 gm Neem, 0.1 gm Tulsi, and 0.1 gm Aloe vera gel. Addition of 1 gm of Shikakai and 1 gm of Amla was causing incompatibility and hence the concentration was reduced to 0.9 gm and 0.45 gm of Shikakai and Amla extracts respectively. Reetha above 1.75 gm produced stickiness in the shampoo.
- With the above mentioned concentrations, every ingredient

was found to be congruent with each other. The pH was adjusted using TEA. Preservative were also added. Few drops of Marvel perfume was added to impart aroma to the formulated shampoo and the volume was made upto 100 mL using gelatine solution.

However, Formulation F2 was chosen as per Table 1 and 2, because it has got all the desirable properties of a good shampoo in terms of right viscosity, pourability and colour. Therefore, F2 formulation was further evaluated.

2.4 Evaluation of All Herbs Shampoo : (F2 Formulation)

To evaluate the formulated shampoo, several quality control tests including organoleptic and physiochemical properties such as pH[3], viscosity were performed. Also to ensure the quality of the shampoo, specific tests were performed including surface tension, wetting time, foam height, foam type, dirt dispersion test and preliminary stability study were also carried out. The results were compared with available marketed synthetic detergent containing herbal shampoo.[4]

Physical Appearance

Both Formulated F2 and Marketed synthetics containing shampoos were observed for their physical appearance in terms of colour and odour.

Determination of pH

The pH of both shampoos were measured using pH meter and a neutral buffer solution.[5]

Surface Tension measurement

The surface tension measurement of diluted shampoos (10%w/v) in distilled water was carried out using stalagmometer at 25°C [6]

Viscosity measurement

The viscosity of both diluted shampoos (10% w/v) in distilled water was carried out using Ostwald's Viscometer.

Foam Height

Foaming height was determined by using cylinder shake method. Briefly, 50 mL of the 1% commercial or formulated shampoo solution was placed into a 250 mL graduated cylinder; it was covered with one hand and shaken 10 times. The total volume of the foam content after 1 min of shaking was recorded.[7]

Wetting time

A canvas paper was cut into 3cm diameter discs having an average weight of 0.5 g. The smooth surface of disc was placed on the surface of 1% v/v shampoo solution and the stopwatch started. The time required for the disc to begin to sink was noted down as the wetting time.[8]

Dirt Dispersion test

Two drops of shampoo were added to 10 mL of distilled water taken in a large test tube. To this solution, one drop of India ink was added and the test tube was stoppered and shaken ten times. The amount of ink in the foam was indicated by the rubric such as None, Light, Moderate or Heavy.[9]

Table 3. Comparison of Formulated Shampoo Vs Marketed Herbal Shampoo

Parameters	Formulated Shampoo (F2)	Marketed Shampoo
Colour	Dark Green	Light Green
pH	6.79 (*5-9)	7.01
Surface Tension (dynes/cm)	33.624	35.865
Viscosity (cP)	6574 ± 11.236	7682 ± 16.345
Foam Height (ml)	156 (*250)	203
Foam Type	Small, dense, airy	Large, less compact, airy
Dirt Dispersion	None	None
Wetting Time (in sec)	164 sec	112 sec

(*As per standard BIS)

Table 4 : Conditioning Performance Customer Review (Exploratory Study) :

Score	Formulated Shampoo	Marketed Shampoo	Without Washing
1	1	2	8
2	1	5	2
3	5	2	0
4	3	1	0
Average	3	2.6	1.2

Score - 4 : Excellent, 3 : Good, 2 : Fair, 1 : Poor

* The mean number of volunteers' opinion for conditioning performance is n=10

Conditioning Performance :

A hair tress of an Asian woman was obtained from a local salon. It was cut into three swatches of the tresses with approximately the length of 10 cm and the weight of 5 g. A swatch without washing served as the control. Other three tresses were washed with the commercial and formulated shampoos in an identical manner. For each cycle, each tress was shaken with the mixture of 10 g of a sample and 15 g of water in a conical flask for 2 min and then rinsed with 50 mL water. Afterward, each tress was left for air drying at room temperature. The tresses were washed for maximum ten cycles. The conditioning performance of the shampoos i.e. smoothness and softness, was evaluated by a blind touch test, administered to twenty randomly selected student volunteers.[10] All the students were blind folded and asked to touch and rate the four tresses for conditioning performance from score 1 to 4 (1 = poor; 2 = satisfactory; 3 = good; 4 = excellent).

3. Results and Discussion

Comparative effectiveness of the formulated herbal and commercial

shampoo were evaluated by performing some simple physicochemical tests, results of which are discussed below.

3.1 Physical Appearance - A shampoo like any other cosmetic preparation should have good appealing physical appearance. The formulated and marketed shampoos were evaluated for physical characteristics such as colour and odour. The formulated shampoo was opaque, dark green and had good odour.

3.2 pH - It helps in minimizing irritation to eyes, enhance the quality of hair and maintains ecological balance of the scalp. Both shampoos were found to be in preferred range as per BIS.[11] (range is from 5 to 9)

3.3 Surface Tension - Lesser the surface tension, stronger is the cleansing ability of shampoo. A shampoo is of good quality if it reduces the surface tension from 72 dynes/cm to 40 dynes/cm.[12] Both tested shampoo showed similar reduction in surface tension indicating their good cleansing action.

3.4 Viscosity - It is the resistance to flow of liquid. Viscosity for good shampoo usually ranges from 4000 to 9000 cP. Both shampoos were found to be within the range.

3.5 Foam Height - It is very important to consumer. Foam generated by marketed shampoo was more than that of the formulated shampoo because of the presence of high amount of synthetic surfactants. The foams generated by formulated shampoo were small, dense and airy. Both tested shampoo had the same foam volume for 5 min showing that their foam has good stability.

3.6 Dirt Dispersion - It is an important criterion of cleansing action of shampoos. Shampoos that cause ink to concentrate in the foam are of poor quality because the ink or dirt that stays in the foam is difficult to rinse away and gets re-deposited on the hair. Therefore dirt should remain in the water portion.[9] Both shampoos concentrated the ink in water portion ensuring their satisfactory cleansing ability.

3.7 Wetting Time - The wetting ability of a surfactant is dependent on its concentration and is commonly used to test its efficacy. The canvas disc method is quick, efficient and reliable test to evaluate the wetting ability of a shampoo. The wetting time of formulated and marketed shampoo were 164 sec and 112 sec respectively. It can be concluded that marketed shampoo contains the maximum concentration of detergents because it had the least wetting time by contrast our formulated shampoo exhibited maximum wetting time as it contains minimum concentration of detergents.

3.8 Conditioning Performance - According to the Table no. 4, majority of the volunteer rated that, the tresses that was washed with formulated shampoo gave better results than the marketed shampoo in terms of conditioning and as expected the control tress (without washing) got the mini-

mum score (1.2). The score of the conditioning performance of the tresses washed with formulated shampoo was found to be 3.0 out of 4 and was comparable with the scores of marketed shampoo. The results clearly indicated that the formulated shampoo gave good conditioning performance.

4. Conclusion

- Although the Formulated All Herbs shampoo F2 contains no synthetic detergents, this study shows that it performs better in hair conditioning than the marketed synthetic detergent containing herbal shampoos.
- In the present scenario, it is observed that the consumers probably do not know that all herbs containing shampoo performs equally well with respect to the cleansing performance.
- Regarding cost, it is very much effective, easy to manufacture and the ingredients are readily available at reasonable cost. The manufacturing cost of formulated shampoo was around Rs.110 for 100mL pack, irrespective of taxes.
- Thus, the formulated shampoo gave comparable results and was successfully formulated without addition of any synthetic detergents. Therefore it is recommended to use all herbs shampoo instead of using synthetic herbal shampoo for the safety and efficacy of the product and the consumer.

5. Future Scope

- It has good future scope of generating employment especially in rural areas since most of the ingredients are herbal which are readily available in such areas.
- There will be more of export than import and so country's income will increase.

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Development and Evaluation of Antiacne Gel of *Tecoma Stans*

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Abstract

Acne by definition is multifactorial chronic inflammatory disease of pilosebaceous units. *Propionibacteriumacne* and *Staphylococcus* epidermis are considered as the major skin bacteria that causes the formation of acne. The objective of this study was to design a product to treat acne with herbal active as an effective to harmful antibiotics. For this purpose the herb *Tecoma stans* having antimicrobial property was selected. This was incorporated in a gel base in different concentrations to determine the antimicrobial study against *P. acne* and *S. epidermis*, All the formulations were studied against the bacteria using disc diffusion method.

Key words : Acne, Antiacne Gel, *Tecoma Stans.*

1. Introduction

Acne can be defined as a common inflammatory pilosebaceous disease characterized by comedone, papules, pustules, inflamed nodules, superficial pus, filled cysts. Acne is a common skin conditions which usually starts in adolescence and resolves by mid twenties[1]. The prevalence of acne remains constant between 24 to 44 years in both males and females and did not decrease significantly until after the age of 44 yrs. In the 20-29 years age group, 64% have acne and 43% still have acne between the ages of 30-39 yrs. With an acne clinic the mean age of patients attending increased from 20-years. Skin is a highly metabolic tissue which posses the largest surface area in the body and serves as the protective layer for internal organ[2]. *Propionibacterium acnes*, an anaerobic pathogens, plays an important role in the development of inflammatory acne by its capability to activate complements and by its ability to metabolize sebaceous triglycerides into fatty acids which chemically attract neutrophils *Staphylococcus epidermis*, an aerobic organism and part of a natural skin flora is usually involved in superficial infection within the sebaceous unit[3]. Non inflammatory lesions may be categorized as open comedons (black heads) and closed comedons (white heads).[4]

1.1 Objective

- To develop herbal anti acne gel formulation by incorporating *Tecoma stans* flower extract
- To evaluate the anti microbial activity of herbal anti acne gel against *Propionibacterium acnes, Staphylococcus epidermis.*

2. Material and Methods

2.1 Botanical description

Common names - Yellow bells, trumpet brush, yellow elder

Scientific name - *Tecoma stans*

Family - *Bignoniaceae* [5]

2.1.1 Description

Tecoma stans is a flowering perennial shrub or small trees 5-7.6 meter in height, bark is pale brown to grey and roughens with age. Leaves are opposite compound and imparipinnate with 2 to 5 pairs of leaflets and larger single terminal leaflet, leaflets are lanceolate, up to 10 cm long, with serrated margins, mid-green above and soft to touch. Flowers occur in clusters at the ends of branches and are trumpet shaped with five rounded lobes, 6 cm long, pale to bright yellow.[6]

2.2 Part used - Flowers

2.3 Geographical Source

It is native to the America, now cultivated in many topical countries Mexico, In India it is found in all over Maharashtra.

2.4 Chemical Constituents

It contains alkaloids (Tecomine) the main chemical constituents responsible for antimicrobial activity, triterpenoids (ursolic and oleanolic acids and a-amyrine), p-sitosterol and phenolics (chlorogenic, caffeic, vanillic, o-cumaric and sinapicnacids)[7].

2.5 Properties

It has an antimicrobial, antifungal, antioxidant, wound healing property. It has been shown to suppress *Propionebacteriumacne, Staphylococcus Epidermis*, *Staphylococcus Auresus*[8].

2.6 Collection and Identification of Herb

The flowes of *Tecoma stans* linn were collected in the month of from December L.A.D. College Seminary hills, Nagpur. The plant was identified and confirmed by experts from Department of Botany, R.T.M.N.U., Nagpur.

3. Methodology

3.1.1 Preparation of Extract

The soxhlet apparatus was taken and washed properly. The powder of *Tecoma stans* flower was charged into the soxhlet apparatus. The soxhlet apparatus was heated continuously for 6 hours using 95% ethanol as a solvent. Solvent was evaporated to obtained pure extract.

Table 1. Phytochemical evaluation of *Tecoma Stans* flower extract

Phytochemicals	Extract of *Tecoma stans*
Alkaloids	+
Flavonoids	+
Tannins	+
Phenols	+
Saponins	+
Terpenoids	+

+ present

3.1.2 Anti Microbial assay of *Tecoma Stans*

Anti microbial activity of herbal extract was examined before incorporation in the product using Disc diffusion method and zone of inhibitions were noted.

3.1.3 Procurement of organism

The standard bacterial cultures used for this study were proccured from MTCC. The cultures were subcultured and grown in nutrient agar medium[9].

3.1.4 Microorganism used :

1. *Propionibacterium acnes*
2. *Staphylococcus epidermis*

Standard antibiotic disc (tetracycline) was used for the control. Similarly all the other bacterial cultures were introduced in the plates and test samples were introduced and mark properly. All the above procedure was carried out in a laminar flow and in aseptic chambers[10].

3.1.5 Zone of Inhibition

The zone of inhibition was observed on the next day (approx after 24 hrs), it was measured in millimeters with the help of scale. The zone of inhibition of extract is mentioned in Table 2.

Table 2. Zone of inhibition of Extract

Conc (ug/ml)	***Propionibacterium acnes***	***Staphylococcus epidermis***
50	12mm	10mm
75	15mm	12mm
100	18mm	15mm

Since the extract showed the activity against both of the organism selected, it was introduced in the base.

4. Results

Six formulation of herbal anti acne gel were prepared. One formulation kept as control which was without active (F)

Table 3. Formulation of Suitable base & Incorporation of the Extract into the base

Ingredient	Base F	F1 % (w/v)	FII % (w/v)	FIII % (w/v)	FIV % (w/v)	FV % (w/v)
Carbopol 940	0.8	0.8	0.8	0.8	0.8	0.8
TEA	0.5	0.5	0.5	0.5	0.5	0.5
Glycerin	6	6	6	6	6	6
Distilled Water	Upto 100 ml	Upto 100 ml	Upto 100 ml	Upto 100 ml	Upto 100 ml	Upto 100 ml
Tecoma stans	-	0.1	0.25	0.5	1	1.2
Methyl Paraben	0.2	0.2	0.2	0.2	0.2	0.2
Perfume	0.2	0.2	0.2	0.2	0.2	0.2

4.1 Development of Herbal anti-acne gel formulation

Five formulations were prepared by varying concentrations of herbal extract**.** Carbopol 940 was swelled in small amount of water which was further neutralized with TEA. Then glycerin was added. *Tecoma stans* flower extract was dissolved in water and slowly added by trituration. Perfume was added. Formulations are given in Table 3.

All the formulations were further studied for Microbial assay and zone of inhibition were noted in Table 4.

Table 4. Zone of inhibition of finished product

Formulation No	***Propioni-bacterium acnes***	***Staphy-lococcus epidermis***
F	-	-
F1	5 mm	3 mm
F2	10 mm	7 mm
F3	14 mm	12 mm
F4	18 mm	17 mm
F5	24 mm	26 mm
Standard	25 mm	30 mm

4.2 Accelerated Stability Study

For the base and base with active the accelerated stability studies were carried out for one month by keeping the samples at the following temperatures.

i. Room Temperature -27+/- 2° C
ii. Oven - 50+/- 2 °C
iii. Fridge - 4 °C

Parameters for stability Study : Change in Colour, Odour, pH

Table 5. Evaluation of Herbal antiacne gel

Sr no	Parameters	Limits	Observation
1	Colour	yellow	complies
2	Odour	Pleasant Fragrance	complies
3	pH	3-7	6.5

5. Discussion

The results obtained of anti-microbial evaluation of selected herbal active against *Propionibacterium acnes* and *Staphylococcus epidermis* acne causing organisms was evaluated. All the developed herbal anti acne gel formulations except control (F) showed inhibitory effect on *Propioni-bacterium acnes* and *Staphylococcus epidermis.* Zone of inhibition of formulation F5 was higher than all formulations. All the formulations were found to be stable also.

6. Conclusions

Now a days herbal cosmetics are in great demand than chemical based cosmetics. From entire study it can be concluded that all the herbal anti acne gel formulation showed anti acne activity against *P.Acne* and *S. epidermis*. As compared with the base all the formulations showed the activity. It indicates that activity is mainly due to incorporation of active only. Further it is concluded that with the increase in concentration of active the antimicrobial activity is also increased.

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Formulation of Fruity Scrub Balls

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Abstract

There are so many benefits and reasons as to why exfoliation must be incorporated in the beauty routine. Exfoliation removes ingrained dirt, old dead skin, and improves the overall look of face and body skin. Natural ingredients added to any formulation act by value addition to the final product.

Scrubs are generally available as squeeze outs (i.e.in tubes) or as scoop ups (in bottles complimented with spatulas).Scrub balls are easy to use where a ball taken at once is sufficient for the whole face which is oftenopposite in the case of tubes and bottles.

Fruit body scrubs have been there, for at least a decade but with people getting more wary of the effect of chemicals on the skin, a majority of them are now resorting to using something from the naturals. Fruit scrubs are also excellent exfoliates. There are many benefits such as helps eliminate free radicals and toxins that cause skin and tissue damage. The best way to slough off dead skin cells is with a body scrub. This sweet scrub using nectarines exfoliates, softens and also moisturizes and brightens dull dry skin.

Key words : Fruity scrub balls, scrub balls, exfoliation, primary abrasive, secondary abrasive, binder oils, and fruit powders.

1. Introduction

Using a facial scrub can make your skin feel beautiful, youthful, soft, and glowing. Unlike a regular soap or cleanser, a facial scrub uses small particles or beads, to get rid of the old skin cells and make way for new ones in a process known as exfoliation. By definition exfoliation is to remove the surface in scales, therefore a classical exfoliant is the agent that works at the skins surface causing the removal of skin layer. In this case the exfoliation caused by abrasives is categorized as manual or physical exfoliation. [1]

Scrub balls made from binder oils, sugar as abrasive, and various fruit powders can act by naturally exfoliating and at the same time emolliating facial skin. Binder oils-apart from giving the structural shape to the balls by binding the powders and abrasive together, also show specifically beneficial action. Fruit powder adds to the nutritive value of the product.Natural scrubs containing anti-oxidants (vitamin-C, jojoba oil) promote healthy and young appearance of facial skin. Dried lemon and orange peels regulate oil secretion and make-up the skin colour

livelier.[2]

The main advantage of this type of facial scrub is that it is binded into balls that are sufficient for one time use. Scrub balls can be counted and packed in a wide mouth jar. The count will directly indicate how many times the user can scrub their face from one jar of scrub balls. Abrasives for facial skin are chosen by keeping in mind that they must exfoliate but must be gentle and softer than harsh abrasives used for body or foot skin.

For the proper exfoliation and cleansing of pores, gentle scrubbing action when done for one min (approx.) gives best results and accomplishes the claims by the product. Vitamin C which is present in almost all the secondary abrasives used shows its action of protecting skin from free radical damage. If the fruit scrub remains in contact with skin for the given amount of time (1 min) while simultaneously gentle scrubbing action is carried out, it is objected to fulfil the requirements to carry out proper exfoliation.Rubbing for more than 60-90 seconds might cause irritation or sensitivity due to activation of sebaceous gland by over-scrubbing. [3]

1.1 Aim and Objectives

- To prepare fruity scrub balls for face that exfoliates, emolliatesand gives a freshening effect.
- Formulation of four kinds of balls with characteristic natural colour and fruity smell from four different secondary abrasives (fruit powders).

2. Materials and Methods

2.1 Materials

The formulation of four different balls will require all common ingredients-primary abrasive and binder oils as mentioned bellow; however the difference occurs in the secondary abrasive, where strawberry powder is used in pink balls, sweet lime and orange peel powder in orange balls, muskmelon powder in pale yellow balls, coconut and rose petal powder in the purple balls. Details of the key ingredients used are given bellow.

2.2 Primary Abrasives

Sugar - For facial scrubbing sugar was preferred as primary abrasive. For one, sugar granules are generally gentler than any other material granules (e.g.-salt, which can cause microscopic tears in the skin); two, because of sugar's natural humectants properties, these scrubs are more hydrating

2.3 Secondary Abrasives

Strawberry powder - Fragaria × ananassa

- Strawberries contain salicylic acid. Salicylic acid aids in the process of exfoliation by eliminating surface dead skin cells and opening up pores which reduces breakouts and helps eliminate acne.[4]

It is rich source of polyphenols and vitamin C. It provides protection to the skin, skin soothing properties, skin toning properties. Vitamin C promotes collagen formation and mitigates the effects of free radicals, help-

ing to maintain firm and youthful skin. However since the topical application is just for few minutes, this advantage is not claimed.

Muskmelon Powder - Cucumis melo var. Cantalupensis

Muskmelon is rich in Vitamin B & C that aids is a powerful antioxidant which fights against free radicals and helps in maintaining skin's youthfulness. [5]

- Skin Regeneration
- Anti-Ageing Benefits

Orange - Citrus Sinensis (Rutaceae)

Being an excellent source of vitamin C, orange can do wonders for skin. Apart from the fruit itself, orange juice and even orange peels can provide a range of benefits to your skin. Thus, consumption as well as topical application of this fruit can be beneficial for skin.[6]

Benefits from the topical application of dried peel -

- Combats oily skin
- Removes white and black heads
- It tightens the skin, gives a toning effect

Sweet Lime - Citrus Lam(Rutaceae)

Due to its sweet fragrance and high vitamin C content, sweet lime juice and peels are often used in several skin cares curing dry or rough skin, moisturizing, improving the skin tone, and promoting healing. [7]

- Benefits From the peel-Mild bleaching and cleansing agent and hence lightens skin tone.

Coconut powder (Kernel) - Cocus Nucifera (Arecaceae)

The dried coconut powder cleanses and neutralizes the toxins, fungi and bacteria on the outer layers of the skin. [8]

- Cleanses
- Promotes blood circulation in skin

Rose petals - (Red Rose) (Rosaceae)

Benefits - Rose petals contain traces of aromatic volatile oil.[9]

The natural oils found in roses help to retain moisture in the skin. This results in your skin feeling smooth and soft. The sugars in rose petals especially benefit those with sensitive skin.

A rich source of vitamin C, rose petals act as an excellent sunblock.[10] Although its sun blocking property is not claimed in this product. Here it is just used to smoothen and tone the skin.

2.4 Binder Oils

Binding the abrasives and giving them the structure of scrub balls.[11]

- ***Olive Oil -*** Olive oil contains three major antioxidants: vitamin E, polyphenols, and phytosterols. Antioxidants, when topically applied, may help to protect the skin. The major benefit is its usefulness in exfoliating applications and the penetrating action of the oil, it aids in removal of dead skin cells and leave the epidermis looking renewed and glowing.

- ***Almond Oil -*** Sweet almond oil is used to clean out pores and add shine to the skin.
- ***Flaxseed Oil -*** It is an emollient and smoothens the skin and is also anti-inflammatory, however here it is only used as an emollient.
- ***Coconut Oil -*** The oil contains saturated fats which are medium chain fatty acids or triglycerides. When applied on the skin, they keep it smooth and supple. Due tothe presence of these fats, coconut oil also retains the moisture content of the skin, as the fats eliminate moisture loss through the pores on skin.

2.5 Formulation

All the fruits were dehydrated beneath sun and their dried form was powdered. The powders were then through sieves and the mesh number which retained them was noted.Sugar was also grinded as it constituted the primary abrasive and was retained on the 0.3 mm mesh size screen. The fruits (specific parts) and peels were all dried for minimum of 24 sun hours or more in different cases. It was well checked for any sort of moisture by feeling from the tips of the fingers. Over drying of ingredients and hence adverse effect on their activity was checked by letting the ingredients not be exposed to sunlight even after dried.

Whole strawberries were sliced into halves with the skin side down on the trays in a single layer. Exposed to sunlight for four days from 10 am-4 pm. The dried strawberries were powdered and the powder was retained on 0.3mm mesh size screen.

Muskmelon was cut into numerous thin slices and exposed to sunlight for four continuous days. The dried remains were grinded and retained on 0.5 mm mesh size screen.

The orange and sweet lime peels wereexposed to sunlight for nine days. The dried and tough peels where broken into small pieces, mixed and grinded. The powder obtained was retained on 0.7 mm mesh size. The ratio of the two was kept 3:1 respectively as sweet lime peel powder was harsher then the orange peel powder.

Dried rose petals and dried coconut kernel powder were mixed and grinded together. The powder of mixture obtained was retained on 1mm mesh size screen.

While sugar was a common primary abrasive, there were difference in secondary abrasives taken and therefore all the scrub balls were divided into four types on the basis of the secondary abrasive used and could be differentiated physically as well by colour and texture.

However, for formulation of each, some common steps were performed. The primary and secondary abrasives were taken together and glycerine was added to it in quantities mentioned in the formulation table. Petroleum jelly was added and mixed well. Preservatives and antioxidants were added. Binder oils were then incorporated in the resultant mixture as per quantities

specified in the formulation table. By the virtue of binding action of oils the mixture of ingredients were binded and manually moulded into scrub balls (approx. 1 cm diameter). Table 1 is the formulation table, shows the ingredients and quantities used.

Table 1. Formulation Table

Sr. No.	Ingredients	Quantity in %
1	Olive oil	5
2	Almond oil	5
3	Flaxseed oil	4
4	Coconut oil	5
5	Petrolatum	6
6	Primary Abrasive	45
7	Secondary Abrasive	25
8	Methyl paraben	0.25
9	Propyl paraben	0.25
10	BHT	0.15
11	Glycerine	4
12	Sodium Benzoate	0.25

3. Results and Discussion

- The balls were moulded into uniform spheres of 1cm ± 1.5mm diameter.
- The final product of scrub balls contained balls of different characteristic colour all with characteristic fruity smells -

1. Pink Balls

Secondary abrasive - dried Strawberry powder - characteristic pink colour

2. Yellow Balls

Secondary abrasive - dried Muskmelon powder- Pale yellow.

3. Purple Balls

Secondary abrasive - dried Rose petal powder and dried powder of coconut kernel - white colour from Coconut and dark red from rose together gave a purple colour.

4. Orange Balls

Secondary abrasive - dried Sweet lime peels powder and dried orange peels powder - Pale orange colour.

- Primary and secondary abrasives are responsible for effective exfoliation
- Binder oils and petrolatum act as emollients
- Fruity smell from the scrub balls and effective cleansing give a sense of freshness

3.1 Evaluation

The scrub balls formulated should have the required hardness to maintain their shape. However the application was easy and smooth on face. They have excellent spreadability.

Stability – the formulated scrub balls were studied for the stability by storing them at 37^0C, 4^0C and at 45^0C. for 30 days.

It did not show any structural deformity when handled casually and on being packed in a glass jar. The balls could withstand the pressure from other balls surrounding it and did not break or rupture. There was no significant change in the integrity.

The product was stable.

Performance Evaluation

The formulation was distributed to ten human volunteers and them to apply on face. The procedure was explained to the volunteers and consent-was obtained from them prior to initiate the evaluation study.

Their feedback on various parameters was obtained. Table 2 shows the summary of observations made by them on various aimed properties.

Table 2. Performance Evaluation

Properties	Excellent	Good	Ordinary
Exfolliation	3	5	2
Emolliency	5	5	-
Freshening effect	2	3	5
Spreadability	5	5	-

4. Summary and Conclusion

- Fruity scrub balls were prepared which gave a satisfactory exfoliation, emolliency and freshening effect to the face.
- The final product of scrub balls contained balls of different characteristic colour all with characteristic fruity smells. The product was stable.

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Women's Awareness about Life Security

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Abstract

Life insurance is the key to good financial planning. On one hand, it safe guards money and on the other, ensures its growth, thus providing with complete financial well-being. The simplest reason to get life insurance is to make sure that loved ones have enough money to pay the bills and cover important expenses if one was to meet with an untimely end. A person purchases a policy for a certain amount of coverage and pays a premium every month. In the event that the person passes away, the insurance company will pay a death benefit in the amount of coverage that has been selected, so that the family can then get financial security. Mostly women in India are unaware of the insurance policies and the life security. The project was undertaken to study about the Insurance awareness in 600 women- out of whom 300 were working and the rest were home makers. However, the present study revealed that working women have more information about life insurance as compared to home makers. Irrespective of the occupation of women, knowledge and awareness regarding financial security is crucial.

Key words : insurance, financial, untimely, premium, coverage, revealed, crucial.

1. Introduction

Insurance is a means of protection from financial loss. It is a form of risk management primarily used to hedge against the risk of a contingent, uncertain loss. An entity which provides insurance is known as an insurer, insurance company, or insurance carrier. A person or entity who buys insurance is known as an insured or policy holder. Life insurance is the key to good financial planning. On one hand, it safe guards ones money and on the other, ensures its growth, thus providing with complete financial well-being. Life insurance can be termed as an agreement between the policy owner and the insurer, where the insurer for a consideration agrees to pay a sum of money upon the occurrence of the insured individual's or individuals' death or other, even, such as terminal illness, critical illness or maturity of the policy.[1]

The simplest reason to get life insurance is to make sure that loved ones have enough money to pay the bills and cover important expenses if one was to meet with an untimely end. A person purchases a policy for a certain amount of coverage and pays a premium every month. In the event that the person passes away, the insurance

company will pay a death benefit in the amount of coverage selected, due to which the family gets financial security. At the very least, this person is aiming to replace his income for some years- until his kids, spouse or dependent relatives can fend for themselves, or until, his spouse can tap into retirement savings. [2]

Guidelines regarding Ideal Life Stage to Buy Life Insurance:

The first thing everyone needs to know about life insurance is that the younger and healthier the policy holder or life assured is, the less expensive the insurance policy is. This being said, there are various types of life insurance as well. Depending on:

- why a person wants the life insurance
- what is the situation
- the point in the person's life where he needs to buy it

or consider it financially responsible to buy life insurance either to find life insurance at a cheap price or to protect his family and future, situations will be different for everyone.

1. **Life Insurance as a Strategy to Protect and Build Wealth** - When people buy life insurance they are looking to protect the lifestyle of their family or dependents if they should die.
2. **Beginning Families** - Life insurance should be purchased if one is considering starting a family.
3. **Established Families** - If they have a family that depends on them, they need life insurance.
4. **Young Single Adults** - The reason single adults would typically need life insurance would be to pay for their own funeral costs or if they help support an elderly parent or other person they may care for financially.
5. **Homeowners and People with Mortgages or Other Debts** - If they plan on buying a home with a mortgage, they will be asked if they want to purchase mortgage insurance.
6. **Non-Child Working Couples** - Both persons in this situation would need to decide if they would want life insurance. If both persons are bringing in an income that they feel comfortable living on alone if their partner were to pass away, then life insurance would not be necessary except if they wanted to cover their funeral costs.
7. **People Who Have Life Insurance Through Their Work -**If they have life insurance through their work, they should still buy their own life insurance policy. The reason they should never only rely on life insurance at work is because they could lose their job, or decide to change jobs and once they do that, they lose that life insurance policy.
8. **Business Partners and Business Owners** - If they have a business

partner or own a business and there are people relying on them, they can consider purchasing a separate life insurance policy for the purpose of their business obligations.

9. **Buying Life Insurance on Parents** - Life insurance of their parents secures a death benefit to them if they put themselves as the beneficiary on the insurance policy they take out on their parent's life.
10. **Life Insurance for Children -**The loss of a child is devastating and although children do not provide financial support, they play an important role in the family and their loss can have effects on many levels. The loss may make it very difficult for parents to work, and they may suffer financial losses, require psychological help, or require help with surviving children as a result of their passing.
11. **Elderly -**As long as elderly people do not have other people depending on their income for support, life insurance at this stage in life would not be necessary, unless again, they do not have any other means to pay for their funeral expenses.

Thus as one can see, life insurance is a must for everyone and it has nothing to do with feminism, employed, unemployed, dependent or independent! It's as plain as taking care of one's individual financial needs and continuing to be independent.[3]

A new report shows the dramatic gap in life insurance ownership between men and women. Unfortunately, life insurance ownership among women has not kept pace. Women comprise 49 percent of the workforce - an all-time high, but unfortunately 43 percent have absolutely no life insurance, according to the Wholesale insurance.net study. "More women now work outside the home than ever before," explains Rose Cahill, Vice President of Acxiom's life insurance division. "Unfortunately, they rarely take the time to protect the financial value they provide." Though 27 percent of wives are breadwinners, millions of families rely solely on the male's life insurance policy, failing to recognize that their finances would be devastated without her income. "The majority of homes are now two-income households, and both spouses need coverage," explains Cahill. Cahill encourages stay-at-home moms to buy coverage as well. "Whether the wife works outside the home or not, it's important that she's covered," Cahill says. "Far too many families underestimate the economic value of stay-at-home moms."[4]

The project was undertaken to study about the Insurance awareness in women. Why women save some amount of money for their future but fail to secure the life of the family members? Women in India observe many fasts for the well-being and long life of their husband, so do they believe that their husband is immortal? And is this the reason why women do not take insurance policies. Not only

taking it, they are not even aware of the insurance policies the husband already has. Why are women so unaware of the life security?

1.1 Aims and Objectives

1. To study the views of working women and homemakers related to insurance.
2. To study the reasons as to why women take insurance policies.
3. To study the Life Securities awareness and unawareness in women.
4. To study whether there is a difference in the outlook of working women and homemakers regarding providing Life Insurance to the family.

1.2 Limitations of Study

The study was limited to:

1. Nagpur city only.
2. Homemakers and Working women only.
3. The sample size was 600 women – 300 Homemakers and 300 Working women.

1.3 Delimitations of Study

Women from Nagpur city between the age group of 25 years to 55 years were selected.

1.4 Hypothesis

Homemakers as well as Working women are not aware of insurance or life securities of the family especially their husband.

2. Research Methodology

The research was a survey-cum-interview method. The present research was based on surveying background of selected sample and their awareness about the selected project. The methodology was divided into - selection of sample, selection of method of study, framing of questionnaire, collecting data and analysis of data.

3. Result and Discussion

3.1 Purpose of Insurance : Insurance is taken for some particular reason. The survey was conducted to check whether the reason to buy insurance policy by homemakers and working women are same or not, here chi square test was applied. Table 1 below

Table 1. Reasons for taking Life Insurance Policy

Reasons	Homemakers		Working Women	
	F	%	F	%
Children's Education	193	64.33	137	45.67
Children's wedding	77	25.67	37	12.33
Life Security	172	57.33	149	49.67
Tax Benefit	46	15.33	70	23.33
Retirement	44	14.67	40	13.33
Unforeseen Situations	22	7.33	40	13.33

reveals the purpose of buying life insurance according to women.

While surveying 600 women it was observed that 57.33 percent homemakers and 49.67 percent working women consider insurance for the Life Security it gives while 64.33 percent homemakers and 45.67 percent working women consider it for their Children's Education. Working women gave more weightage to tax benefit compared to homemakers. Negligent percentage of women gave importance to various other factors like children's wedding, retirement and unforeseen situations. Almost all women believe that the advice of a personal financial advisor or agent is essential for the effective insurance management. Obtained Chi value = 29.36 for 5df with $p < 0.0001$ which is significant.

Conclusion : Homemakers and working women have different reasons for taking life insurance policy.

3.2 Sum Assured : It is the guaranteed amount the nominee will receive in case of death claim. This is also known as the cover or the coverage and is the total amount one is **insured** for. Table 2, Table 3 and Table 4 show the awareness amongst homemakers and working women about the amount of insurance they themselves, their spouse and their children have, here chi square test was applied.

Information was gathered to check whether homemakers and working women were aware of the amount of life insurance they themselves were covered. Discussing about the sum assured, it was revealed that 49.33 percent homemakers and 72.67 percent working women were aware of the insurance plan they had purchased for themselves. Obtained Chi value=11.78

Table 2. Sum Assured of Life Insurance

Sum Assured of Life Insurance	Homemakers		Working Women	
	F	%	F	%
Rs. 1 Lakh to 25 Lakh	123	41.00	158	62.67
Rs. 26 Lakh to 50 Lakh	22	7.33	36	12.00
Rs. 51 Lakh to 1 Crore	2	0.67	22	7.33
Above Rs. 1 Crore	1	0.33	2	0.67

Table 3. Sum Assured of Husband's Life Insurance

Sum Assured of Husband's Life Insurance	Homemakers		Working Women	
	F	%	F	%
Rs. 1 Lakh to 25 Lakh	119	39.67	108	36.00
Rs. 26 Lakh to 50 Lakh	27	9.00	47	15.67
Rs. 51 Lakh to 1 Crore	10	3.33	16	5.33
Above Rs. 1 Crore	1	0.33	13	4.33

Table 4. Sum Assured of Childrens' Life insurance

Sum Assured of Childrens' Life insurance	Homemakers		Working Women	
	F	%	F	%
Rs. 1 Lac to 5 Lac	106	35.33	81	27.00
Rs. 6 Lac to 10 Lac	24	8.00	41	13.67
Rs. 11 Lac to 15 Lac	0	0.00	11	3.67
Rs. 16 Lac to 20 Lac	11	3.67	14	4.67
Rs. 20 Lac to 25 Lac	96	32.00	56	18.67
Rs. 26 Lac to 50 Lac	50	16.67	91	30.33
Rs. 51 Lac to 75 Lac	8	2.67	1	0.33
Rs. 76 Lac to 1 Crore	0	0.0	0	0.0
Above 1 Crore	0	0.0	0	0.0

for 3df with p = 0.0082 which is significant.

Conclusion : The awareness amongst homemakers and working women regarding their own life insurance policy was significantly different.

Questions were asked to check whether home makers and Working Women were aware of the sum assured of their husband's life insurance policy. Surprisingly 47.67 percent homemakers and 38.67 percent working women were not even aware of the plans and schemes of the insurance policy that their husbands availed. Obtained Chi value = 15.57 for 3df with p = 0.0014 which was significant.

Conclusion : The awareness amongst homemakers and working women about the plan of their husband's life insurance policy was significantly different.

3.3 Premiums : Women should know the amount of premium being paid by their family, whether she herself was paying it or any other family member was sharing the responsibility. If premiums are not paid timely then the policy may become valueless. Premiums can be paid yearly, half yearly, quarterly or monthly. It can also be deducted from the salary directly. Table 5 reveals how aware the women were about the amount of premium being paid by the whole family.

Table 5. Premium paid by the whole family every year

Premium paid	Homemakers		Working Women	
	F	%	F	%
Rs. 10,000 to 25,000	66	22.00	93	31.00
Rs. 26,000 to 50,000	20	6.67	31	10.33
Rs. 51,000 to 75,000	12	4.00	25	8.33
Rs. 75,000 to 1 Lakh	19	6.33	24	8.00

To check whether homemakers and working women were aware of the amount of premium being paid by the family, chi square test was applied. Only 39 percent homemakers and 57.67 percent working women were aware of the amount of premiums being paid towards the insurance policy. Obtained Chi value = 1.34 for 3df with p = 0.7189 which was significant.

Conclusion : Awareness about the amount of premium being paid by the family was significantly different in homemakers and working women.

4. Summary

Hypothetically women are not aware of insurance but the study revealed that working women had significantly more information about life insurance as compared to home makers. Tax benefit can be one of the reasons why working women were more alert about insurance literacy. Most of the women took an insurance policy keeping in mind their children's future although life security was also a factor. Maximum women did not know the exact figure of premium being paid but they reported that they had approximate idea. Irrespective of the occupation of women, knowledge and awareness regarding financial security is vital.

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Financial Awareness Amongst Women

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Abstract

Managing money wisely is a prerequisite for financial comfort. Women and money are like the two sides of a coin. Single woman or married woman, working woman or homemaker, every woman needs to take charge of her financial matters. In this modern era, women have become financially aware if not literate. They may not have full control over the family's finances but they are saving money for their future. "A penny saved is a penny earned" is a very old proverb. For families who are financially prudent or wise, the amount of money that is left over after personal expenses have been met can be positive saving. Those who tend to rely on credit and loans to make ends meet; they will have negative savings. The project was undertaken to study about the financial insecurities in homemakers and working women. This study regarding how literate the women are financially has revealed that most of the women are aware of the finances of the family and play a key role in saving for the future. Working women are more aware compared to homemakers as working women have to compulsorily invest in various schemes to obtain tax benefit.

Key words : prerequisite, financial, comfort, literate, penny, earned, prudent, insecurities, revealed.

1. Introduction

Managing money wisely is a prerequisite for financial comfort[1]. Women and money are like the two sides of a coin. Single woman or married woman, working woman or homemaker, every woman needs to take charge of her financial matters. With the rise of exposure to the advanced world of computers and mobiles, it becomes a matter of interest for all women to protect the family's financial position and status. India being a developing country, every household needs at least two earning members to lead a decent middle class lifestyle. Earlier there were joint families so men did the earning and women did the household chores but with growing trend of nuclear families, it becomes essential for the lady of the house to manage earning and household chores simultaneously. Previously a woman, working or a homemaker refused to take control over her finances. The men of the family whether he is her father, husband, brother or son were allowed to take charge of her finances. This was because for years she was not allowed to manage the finances and was considered dumb to deal with the finances. Some educated women found it to be

very dull and boring. The financial literacy even in working women was very low. This led to financial insecurity in women[2]. In this modern era, women have become financially aware if not literate. They may not have full control over the family's finances but they are saving money for their future[3]. "A penny saved is a penny earned" is a very old proverb. For families who are financially prudent or wise, the amount of money that is left over after personal expenses have been met can be positive savings. Those who tend to rely on credit and loans to make ends meet, they will have negative savings. Savings can be turned into further increased income through proper and planned investment[4]. It is essential for women, be it working women or homemakers to keep themselves and their family financially secure.

The project was undertaken to study about the financial insecurities in women. Why do they depend on men to decide all the major financial decisions? Why women save money? Which saving schemes are they familiar with? Are they aware of the returns?

1.1 Aims and Objectives

1. To study the views of working women and homemakers related to savings.
2. To study the reasons as to why women save money.
3. To study the financial securities and insecurities in women.
4. To study whether there is a difference in the outlook of working women and homemakers regarding managing the finance and savings of the family.

1.2 Limitations of Study

The study was limited to :

1. Nagpur city only.
2. Homemakers and Working women only.
3. The sample size was 600 women – 300 Homemakers and 300 working women.

1.3 Delimitations of Study

Women from Nagpur city between the age group of 25 years to 55 years were selected.

1.4 Hypothesis

Homemakers as well as Working women are not aware of finances and savings of the family.

2. Research Methodology

The research was a survey-cum-interview method. The present research was based on surveying background of selected sample and their awareness about the selected project. The methodology was divided into - Selection of sample, selection of method of study, framing of questionnaire, collecting data and analysis of data.

3. Result and Discussion

3.1 Financial Literacy and Preferences : The study was conducted to know the financial awareness and preferences amongst women. The financial literacy and preference of money

Table 1. Preferences of Respondents about Investment of Money

Sr. No.	Preferences	Homemakers		Working Women	
		F	%	F	%
1	Banks	210	70.00	226	75.33
2	Insurance Company	98	32.67	120	40.00
3	Post Office	96	32.00	64	21.33
4	Shares	23	7.67	31	10.33
5	Assets	37	12.33	56	18.67
6	Not Applicable	19	6.33	12	4.00
7	Not Aware	4	1.33	0	0.00
8	Any Others	6	2.00	7	2.33

investment amongst women depends on whether she is a homemaker or a working woman. In Table 1 above, chi-square test was applied to check the preferences of women.

Today women save money in places where their money can grow and are aware of the returns in figures but they are unaware about the rate of interest, the locking period or re-investment of their savings. Although 63 percent homemakers and 74 percent working women consider themselves to be financially literate but they also believe that the advice of a personal financial advisor or agent is essential for the effective investment management. Seventy percent homemakers and 75.33 percent working women prefer to invest most of their money in banks and post offices. Obtained chi-square value is 19.41 for 7df having p value = 0.0070.It shows significant responses.

Conclusion : Preferences of Home maker and working women about investment of most money are significantly different.

3.2 Factors Considered While Saving: Every person has some pre-requisites for saving money. Women consider some important factors while investing money; this depends on whether she is a homemaker or working woman. In Table 2 below, chi-square test was applied to check the factors considered while saving by women.

Enquiring about the most important factor that women considered while investing money, it was revealed that 53 percent homemakers and 51.67 percent working women considered the Return on Investment, 42 percent homemakers and 47.67 percent working women considered Safety of Principle amount, 21 percent homemakers and 42.33 percent working women considered Tax Benefit while only 13 percent homemakers and 11.33 percent working women considered the Risk Involved in Investment as the most essential factor. Some of the factors like inflation, diversification of funds,

Table 2. Important Factors considered while Investing Money

Sr. No.	Factors	Home maker women		Working Women	
		F	%	F	%
1	Return on investment	159	53.00	155	51.67
2	Safety of principle amount	126	42.00	143	47.67
3	Diversification of funds	17	5.67	40	13.33
4	Risk involved in investment	39	13.00	34	11.33
5	Tax benefits	63	21.00	127	42.33
6	Liquidity	19	6.33	56	18.67
7	Inflation	10	3.33	16	5.33
8	Not aware	37	12.33	34	11.33
9	Not Applicable	14	4.67	5	1.67
10	Any Others	6	2.00	1	0.33

liquidity were considered by negligent percentage of women. Obtained chi-square value is 47.18 for 9df having p value < 0.0001. It shows significant responses.

Conclusion: Importance given to some factors while investing money depends on whether woman is a Homemaker or Working woman.

3.3 Popular Schemes : While checking if the schemes preferred for investment of the money amongst women depends on whether she is homemaker or working women, chi-square test was applied. Table 3 below reveals the popular schemes considered while saving by women.

Discussing about the schemes in which women invest, it was discovered that 50.33 percent homemakers and

Table 3. Schemes preferred by Respondents for Investment of the Money

Sr. No.	Schemes	Homemakers		Working Women	
		F	%	F	%
1	Fixed Deposit	151	50.33	143	47.67
2	Recurring Deposit	69	23.00	52	17.33
3	Senior Citizen	24	8.00	2	0.67
4	Monthly Income Scheme	34	11.33	47	15.67
5	National Saving Certificate	25	8.33	47	15.67
6	KisanVikasPatra	25	8.33	14	4.67
7	Personal Provident Fund	26	8.67	54	18.00
8	Gold	75	25.00	47	15..67
9	Life Insurance	116	38.67	117	39.00
10	Property	44	14.67	59	19.67

Table 4. Reasons reported by Respondents to Save Money

Sr. No.	Reasons	Home maker women		Working Women	
		F	%	F	%
1	Children's Education	196	65.33	186	62.00
2	Children's Wedding	97	32.33	47	15.67
3	Medical Expenses	99	33.00	110	36.67
4	Luxury	40	13.33	57	19.00
5	Travelling Expenses	44	14.67	67	22.33
6	Old Age	88	29.33	101	33.67
7	Unforeseen Situations	41	13.67	50	16.67

47.67 percent working women invest money in fixed deposits. Recurring deposit is more popular amongst home makers than working women. The other investment schemes like Monthly Income Scheme, National Saving Certificate, Kisan Vikas Patra etc. were not very popular amongst women. Although 15.67 percent working women invest in National Saving Certificate, 18 percent working women save in personal provident fund and 19.67 percent working women invest in a property for its tax benefit. Buying Gold is more popular amongst homemakers rather than working women. Obtained chi-square value is 51.50 for 9df having p value < 0.0001. It shows significant responses.

Conclusion : Scheme preferred for investment of the money revealed homemaker and working women are significantly different.

3.4 Purpose of Saving : The purpose of saving is to allocate resources to achieve ones wants and needs and the goal is to achieve ones desired quality of life. Table 4 below reveals whether homemaker or working woman have same reason of saving money or different, chi-square test was applied.

Everyone saves money for some particular reason. It can be for the children, family, future, luxury, travelling or unforeseen situations. The women now are also aware of the importance of education and English language. Every woman now wants her child to get the best education from a good English medium school for which she can spend a fortune. This can be one of the reasons why more than 60 percent women save mainly for their children's Education whereas only 33 percent homemakers and 36.67 percent working women saved money for Medical Expenses. Twenty Nine percent homemakers and 33.67 percent working women also save for their old age and retirement. Obtained chi-square value is 27.60 for 6 df having p value < 0.0001.It shows significant responses.

Conclusion : Working and non-working women have different reasons for saving money.

4. Summary

Women understand that they have multiple responsibilities at home and outside the home. To successfully fulfill these responsibilities women have now become expert multi-taskers. However the importance of finance and savings to lead a peaceful life cannot be ignored. This study regarding how literate the women are financially has revealed that most of the women are aware of the finances of the family and play a key role in saving for the future. Working women are more aware compared to homemakers as working women have to compulsorily invest in various schemes to obtain tax benefit. "Save money for a rainy day" is the goal of each woman. Most women trust banks and Life Insurance and save mainly for their children. Returns on investment and safety of principle amount are the main factors.

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Nutritional Composition of Packed Lunches and Mid Day Meal of School Children (9-10 yrs) in Nagpur City

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Abstract

School children often skip meals because of their heavy work load of study. So the food intake and weight management is often non – existent or disordered. Life style changes, peer pleasure, limited finances, and access to food also contribute to erratic eating patterns. Today's school children are more prone to the readymade snacks such as pizza, burger, all types of chips, & other many high- fat snacks. Assessment of nutritional quality of food plays a very vital role in improving nutritional status of individuals. Therefore, a dietary survey was conducted to study the nutritional quality of packed lunch (PL) and mid day meal (MDM) of randomly selected hundred school students of age (9-10) yrs studying in various schools of Nagpur city. Six schools were randomly selected, out of which one was a private school where children were bringing PL while the rest were government aided schools in which MDM were provided. The study revealed that maximum children were of healthy weight percentile from both the categories, overweight and obese children were more in PL category when compared to MDM. Number of children in underweight percentile was more in MDM. The packed lunches were inadequate in both quantity and quality; they need to be more attractive and nutritious; so also the techniques, scientific knowledge and skills of packing food in the tiffin boxes need to be imparted. In the present study, although 50 % students were consuming Breakfast, their total food consumption pattern was not ideal. Proper meal frequency and regular consumption of quality foods need to be encouraged and restriction on excessive consumption of fried foods and cold drinks need to be prioritized.

Key words : Mid Day Meal, Packed Lunch, BMI, School going children.

1. Introduction

The Mid-Day Meal (MDM) Scheme is a unique school meal programme in our country under which free lunch to school children is provided on few or all working days. The programme became instrumental in protecting children from classroom hunger, increasing school enrolment and attendance, improved socialization among children belonging to different socio-economic background, addressing malnutrition, and social empowerment through provision of employment to women and disadvantaged. In a landmark order on 28 November 2001, the Supreme Court directed state governments to introduce cooked mid-day meals in all government and government-assisted primary schools within

six months.[1] However, some problems have reduced the attractiveness and acceptability of this scheme. Some reports suggest that cooking of mid day meals creates disturbance in teaching work to some extent. In addition, several instances have been reported of poor quality food being distributed, and of children falling ill after eating contaminated food.[2] Packed lunches (PL) have become a necessity for school going children as schools are either away or the lunch period is too short for the children to go home and have food. The packed lunch is a lunch that is packed in a tiffin box to be eaten by the child while away from home. It can be with one compartment or two or sometimes having more than 3 compartments. Carrying food from home is less expensive, more convenient, more hygienic and meets the individual requirements. The PL should meet one-third daily requirement of calories, proteins and other nutrients of the child, to boost the concentration and energy for the rest of the school day. Preferably, the packed lunch should consist of all five food groups, though the number of dishes may be less. Inclusion of one serving of green leafy vegetables would take care of one- third requirement of many vitamins and minerals. Some amount of good quality protein like milk or milk products like curd or paneer would improve vegetable protein or combination of vegetable proteins like cereals and pulses can be given.[3]

At International front, The New York Coalition for Healthy School Food recommends getting a salad bar, switching to whole grains and whole fruits and vegetables, eliminating fried and processed foods from the menu and offer a' la carte items, such as trial mix and fresh fruit bowls instead of french fries, pizza and chips. Getting rid of vending machines is another huge step that schools can take to create healthier lunches for students.[4]

1.1 Objectives

Poor health and nutrition may impair both the growth and intellectual development of school children. The days important meal is eaten away from home in the schools –by the school going children; the period when maximum growth takes place, hence the composition and variations observed in the lunch (Packed/ Mid Day Meal) of School children was studied in respect to BMI and Nutritive value.

Specific Objectives

1. To study the dietary pattern of school children.
2. To calculate the nutrient intake from breakfast and lunch.
3. To compare the BMI of the school going children taking breakfast and not taking breakfast.

2. Materials and Methodology

Hundred school going children (9-10 yrs) from Nagpur city, who were willing to participate, were randomly selected for the study from six schools The schools randomly selected were further classified as government aided

where MDM (numbered as 1 to 5) was served and number 6th which was a private school where students were bringing PL. Necessary permission was sought from the school authorities to conduct the survey. [Codes were given to the schools as follows - 1) Somalwar High School, Ramdaspeth, Nagpur, 2) Hadas high school, South Ambazari road, Nagpur, 3) Dr. Babasaheb Ambedkar High School, Untakhana, Nagpur, 4) Saraswati Vidyalaya, Nagpur, 5) B.R.A. Mundle school, Nagpur and 6) Neeri Modern school, Surendranagar, Nagpur.] Interview cum questionnaire was the method of data collection. 3 days recall method for the consumption of breakfast, home lunch/mid day meal/packed lunch was noted and the nutrients were calculated using the food composition table.[5] Mean, percentages and standard deviations were calculated and compared with respective standards.[6]

3. Results & Discussion

Out of six schools, 50 children were taking mid day meals (MDM) from 1st 5 schools (government aided schools) whereas 50 children [25 boys and 25 girls] from the sixth school (private school) were bringing packed lunches (PL).

3.1 Age and Gender Wise Distribution:

In mid day meal category (MDM), 54% were girls while 46% were boys and those who were carrying packed lunch belonged to one school and represented 50 % from both the genders. These 50 children were bringing packed lunch from home to school. Table 1 displays the details of gender, age and meal category wise distribution.

3.2 BMI of the Children

Body mass index (BMI) defined as ratio of weight in kg and height in mt^2 offers a reasonable measure of fatness in children and adolescent and is widely used because of relative ease and accuracy of basic measurement.

Table 1. Gender and Age-wise distribution

S. No	Age (Yrs)	Gender	Meal Category		Total
			Mid Day Meal MDM	Packed Lunch PL	
1	9	Girls	17 (34)	19 (38)	36
2	10		10 (20)	6 (12)	16
Total			**27(54)**	**25 (50)**	**52**
3	9	Boys	7 (14)	7 (14)	14
4	10		16 (32)	18 (36)	34
Total			**23 (46)**	**25 (50)**	**48**
Grand total			**50**	**50**	**100**

Note : Figures in parenthesis indicate percentages

Table 2. Mean BMI of Children

Gender	Age (yrs)	BMI					#Std BMI
		MDM		PL			
		Range	Mean ±SD	Age (yrs)	Range	Mean ±SD	
Girls	9 (N= 17)	20.1-11.0	14.57 ± 2.11	9 (N=19)	20.1-12.6	16.21* ± 2.25	15.1
	10 (N= 10)	15.9-13.0	15.44 ± 1.10	10 (N=6)	16.9-14.7	16.15* ±0.73	15.9
Boys	9 (N= 7)	15.7-8.8	13.46 ±1.51	9 (N= 7)	22.2-14.2	18.07* ± 3.33	14.9
	10 (N= 16)	15.7-14.1	15.13 ± 0.70	10 (N= 18)	25.8-14.7	18.75** ±3.03	15.7

Note: Figures in parenthesis indicate percentages.
#Source = ICMR 2010

For accessing prevalence of underweight "the cut off below the 5th percentile" and for "at risk overweight" children, the conventional cut-off for BMI (for age and sex specific) above the 85th percentile was used while that for obese, above 95th percentile was considered [7].

3.2.1 Mean BMI : As per the formula, based on weight and height, mean BMI was calculated. Table 2 depicts the mean BMI of school children belonging to the two categories. From the table it can be observed that the mean BMI of government school going children was less than the respective standard BMI. The mean BMI of PL group was more than the respective standard BMI.

The children attending private school showed significantly higher BMI than the standard BMI and higher BMI than their respective counterparts attending government schools.

3.2.2 BMI Percentile : The BMI in childhood changes substantially with age. Thus conclusions was based on the recommendations of the (IOTF) International Obesity Task Force (IOTF) and the Working Group on Obesity in China (WGOC), the BMI cut off points for overweight and obesity for Shanghai children aged 2-18 years have been constructed for the first time in China [8].

The percentile indicates the relative position of the child's BMI number amongst children of the same sex and age. The growth charts shows the Weight Status Categories used for children : underweight, healthy weight, overweight, and obese as shown in the Table 3.

Out of 50 children from MDM category, 54% were in healthy (**5th percentile -85th percentile**) category, 44% were underweight (**<5th percentile**), 10% were overweight (**85th - less**

Table 3. Data for BMI for the age percentiles of school going children in Nagpur

S. N.	Category	Weight Status Category and Percentile Range			
		Underweight < 5th percentile	**Healthy weight 5th percentile - 85th percentile**	**Overweight 85th - less than the 95th percentile**	**Obese Equal to or greater than the 95th percentile**
MDM					
1	Girls (27)	10(20)	13(38)	2(4)	1(2)
2	Boys (23)	12(24)	08(16)	3(6)	0(0)
	Total (50)	**22 (44)**	**27(54)**	**5(10)**	**1(2)**
PL					
1	Girls (25)	5(10)	9(18)	8(16)	2(4)
2	Boys(25)	3(6)	11(22)	6(12)	5(10)
	Total (50)	**8(16)**	**20(40)**	**14(28)**	**7(14)**
Grand Total (100)		**30**	**42**	**19**	**8**

Note: Figures in parenthesis indicate percentages

than the 95th percentile) and 2% were obese (**Equal to or greater than the 95th percentile).** While from the PL category, 40% were healthy, 16% were underweight, 28% were overweight and 14% were obese.

Thus the study revealed that maximum children were of healthy weight percentile from both the categories, overweight and obese children were significantly more in PL category when compared to MDM. Number of children in underweight percentile was significantly more in MDM.

3.3 Dietary Information

3.3.1 Breakfast : Out of 50 children attending Govt. school, only 4 girls and 5 boys from MDM serving schools were consuming Breakfast before attending school whereas 43 (21 Girls and 22 Boys) children attending the private schools in Nagpur city were consuming breakfast. This observation informs that in spite of the early timings of the school, majority of the private school going children ate their breakfast and in spite of the Govt school being in the noon only 9 children were consuming breakfast.

Children consuming breakfast who were observed to be taking different patterns of consumption of the morning meals was as follows:

MDM : Only 9 children from government schools were taking breakfast at home and hence were not bringing any tiffin from home. They were consuming breakfast on all days.

Brunch : Whereas the rest 41 were eating brunch at home and consuming

Table 4. Mean % Energy intake of RDA from Breakfast of children

Gender	AGE (yrs)	MDM					Gender	AGE (yrs)	PL	
		MDM		Brunch					*C	Mean Energy (Kcal)
		*C	Mean Energy (Kcal)	AGE (yrs)	*C	Mean Energy (Kcal)				
Girls	9-10 (N=27)	4	251.04 ± 288.7 (44.58%)	9-10 (N=27)	23	172.02 ± 120.3 (30.55%)	Girls	9-10 (N= 25)	21	215.74 ± 81.71 (38.31%)
Boys	9-10 (N=23)	5	267.05 ± 129.25 (47.42%)	9-10 (N=23)	18	236.74 ± 51.63 (42.04)	Boys	9-10 (N=25)	22	250.02 ±0 (44.40%)
Total	9-10 (N=50)	9	259.04 ± 208.97 (46%)	9-10 (N=50)	41	204.38 ± 85.96 (36.29%)	Total	9-10 N=50	43	232.88 +81.71 (41.17%)
		Total (MDM+Brunch) Mean =231.71 Kcal						**PL Mean =232.88 Kcal**		

RDA = 1/3rd of total days energy intake = 563Kcal (1690 ÷3)

*C= Breakfast/ Brunch consumers

1] Only 9 students (from MDM) were having Breakfast; 41 were having Brunch at home

2] 43 students (from PL) were having breakfast; 7 were not eating any morning meal at home

the MDM at school, i.e. they were having a combi lunch, thrice a week.

Packed Lunch of children (PL) : These children from category 2 (PL) were bringing packed lunch from home daily. Out of this 50 children, 43 children (21 girls & 22 boys) were consuming breakfast regularly at home. 7 were not consuming breakfast or brunch but were consuming PL daily. Table 4 depicts the number of children consuming breakfast from all the different categories as well as the Mean % Energy intake from Breakfast of the Children.

3.3.2 Mean % Energy intake from Breakfast : The mean energy intake on consumption of breakfast by MDM girls was 44.58% of the RDA whereas it was 38.31% for the private school going girls. The SD however, was too high for the government school girls suggesting that the energy intake of the latter was better. Similar trend was observed in respect of the energy intake of the boys. Students "t" test was applied between the mean energy intake of MDM/ Brunch and PL of school going children. The mean energy intake of MDM/ Brunch children (Mean 231.71 Kcal) was statistically compared with the mean energy intake of PL school children (Mean 232.88 Kcal). The t test calculated value was 1.43 which was lower than the table value at 0.01 = 3.35 and at 0.05 = 2.30. Thus there is insignificant difference at both the levels.

Table 5. Mean % Energy intake of RDA from Lunch of children

Gender	AGE (yrs)	Lunch Consumption (C)		Gender	AGE (yrs)	PL	
		*MDM				C	Mean Energy (Kcal)
		C	Mean Energy (Kcal)				
Girls	9-10 (N= 27)	27	323.61 ± 55.11 (57.37%)	Girls	9-10 (N= 25)	25	294.99 ± 185.59 (52.39%)
Boys	9-10 (N=23)	23	325 ± 18.75 (57.72%)	Boys	9-10 (N=25)	25	352.37 ± 88.66 (62.58%)
Total	9-10 N=50	50	324.30 ± 36.93 (57.54%)	Total	9-10 N=50	50	323.68 ±137.12 (57.48%)

*MDM served only 3 days a week
Figures in Brackets indicate percent RDA

3.3.3 Mean % Energy intake from Mid Day Meal (Lunch) of children :

The MDM was served to children only thrice a week. Around 57 % RDA of energy was provided to MDM children thrice a week. The daily mean energy intake from Packed lunch was around 295 Kcal by girls & 352 Kcal by boys. Table 5 depicts mean % Energy intake of RDA from Lunch of children (PL).

When the above two categories of MDM and PL were compared as depicted in Table 5, it was observed that the "t" test calculated value was = 1.96 which was less than the table value at 0.01 = 3.35 and 0.05 = 2.30 with degree of freedom = 2. Thus the energy intake of these two categories of children was insignificantly different from each other. Thus the mean % energy intake from lunch of school children in both the categories was between 52 to 62 % of RDA. Similar result has been reported earlier[9] wherein the study revealed poor nutritional status of school children receiving MDM. Previous studies undertaken on MDM, recommend that the supplementary meal provided by the government under the mid day meal scheme should be enough in portion and nutrition to support the daily Recommended Dietary Allowances given by ICMR, for the growing children for this age. The investigations indicate that the porridge, khichadi, and rice puffs generally given under the mid-day meal scheme do not suffice for the nutritional needs of the children, therefore the food with a mixture of highly nutritive or fortified by essential nutrients like iron, calcium and carbohydrates should be distributed in schools or should be made readily available at subsidized rates [10].

4. Summary and Conclusion

In today's fast life, the increased consumption of processed foods, which contain high amount of fats, sugar and carbonated beverages is not a balanced one. These processed foods can change the food habits, life style and social behavior of the adolescents. These factors are now recognized to be responsible for the significant increase in the onset of diseases in children like obesity, depression, mood swings etc. The packed lunches carried by them are usually not adequate in both quantity and quality. Taking lunch from home needs a little effort, but helps in maintaining good health. In the present study, although 50% students were consuming Breakfast, their total food consumption pattern was not ideal. Apart from encouraging breakfast consumption, it is important that proper meal frequency and regular consumption of quality foods be encouraged and restriction on excessive consumption of fried foods and cold drinks need to be prioritized. Packed lunches should be made attractive and nutritious apart from using the techniques of packing, as many reported dislike in the way food is packed and hence prefer mainly bread and dry vegetables.

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Carbohydrate Counting : A Tool for Management of Type-1 Diabetes

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Abstract

Type 1 or juvenile dia¬betes affects children and adolescents. Recent estimates show an increasing incidence around the globe. The study aimed to assess the meal wise breakup of carbohydrates and insulin in type I diabetics. For the study 50 subjects in the age group of 13 to 20 yrs were selected by purposive sampling from Juvenile Diabetic Parents Association group, Nagpur. Anthropometric measurements, HbA1C, treatment modality, carbohydrate intake, meal wise breakup of carbohydrates, and insulin were assessed. The insulin to carbohydrate ratio (I:C) and Insulin Sensitivity Factor (ISF) was calculated. All the subjects irrespective of sex and age were undernourished as assessed by mean BMI status (17.80± females and 18.60± males). HbA1C levels reflected poor blood glucose control (9.02 ± 1.06 females and 9.06 ± 1.08 males). The I:C ratio varied between a minimum of 1:1 at breakfast to a maaximum of 1:10 at dinner in females. In males minimum I:C ratio at breakfast was 1:11 and maximum 1:12 at dinner. A wide variation was observed not only in I:C ratios but in ISF not only within each age group but also between the different age groups as well as between the sexes reflecting that each individual is different in the way his/her body responds to insulin dose. A wide variety in Indian meal with a lack of awareness about distribution of carbohydrate results in higher or lower carbohydrate intake at meals which may lead to sudden increase or decrease in the blood glucose level. Carbohydrate counting therefore appears to be an individual based solution for the management of type 1 diabetes.

Key words : Juvenile Diabetic, HbA1C, I: C, ISF.

1. Introduction

Type 1 diabetes affects 1 in 500 children and adolescents and is fatal unless treated. Insulin is a hormone made by the β cells in the pancreas and used by the body so that glucose can enter the cells for energy. In type 1 diabetes the β cells have been destroyed and are no longer active therefore, patient with type 1 diabetes use insulin injection. Often a change in diet, an increase in exercise and oral medications are used initially and when that is not effective a person often requires injected insulin i.e. Insulin Therapy.

Poor blood glucose control is frequently reported in children and adolescents which leads to several compli-

cations that may reduce the life span by nearly 5-8 years[1] however, survival rates are improving probably due to self monitoring blood glucose (SMBG), education and awareness which help the tighter control of blood glucose and keeping HbA1c levels below 7%. However, life style modification through practice of regular exercise, relaxation of body-mind and proper nutrition improves the condition to a greater extent and plays an important role in the long-term treatment of diabetes mellitus.

Patients with type 1 diabetes commonly take fixed pre-meal doses of insulin. Some patients change the dose according to the pre-meal glucose level, but normally the dose is taken without regard to the carbohydrate content of the meal but both carbohydrate quantity and quality affect postprandial glycemia and HbA1c. Furthermore, type1 diabetic patients are recommended to eat high fiber diet to facilitate control of blood glucose, delay gastric emptying and reduce insulin doses.

The insulin to carbohydrate ratio is a guide to determine the amount of insulin needed to metabolize the amount of carbohydrate consumed in a meal[2]**.** The insulin sensitivity factor is the number of mg/dl,1 unit of insulin lowers glucose[3]

1.1 Aim and Objectives

1. To assess the blood glucose control, meal wise carbohydrate intake, nutritional status and carbohydrate intake of Type I diabetic subjects.
2. To assess the Insulin to carbohydrate ratio and Insulin Sensitivity Factor in Type-1 diabetic subjects

1.2 Limitations

1. Selection of the subjects was based on permission granted by Juvenile Diabetic Parent Association (J DPA) and parents of the subject to conduct the survey.
2. Subject size was based on availability in both the sexes.

2. Materials and Methods

The present study was conducted at the Sunil's Diabetic Care & Research Centre (DCRC) Ramdaspeth Nagpur. The study subjects included males and females (25 each) in the age group of 13 to 20 years with Type 1 Diabetes for more than 1 year, all registered at DCRC and were under the Juvenile Diabetic Parent Association (JDPA). A GHb camp was specially conducted for children under JDPA for making them aware about their state and the care required for remaining healthy. The selection of subjects was done on the basis of purposive sampling technique based on the willingness of the subject to participate in the study.

A questionnaire come interview schedule was used to elicit information from subjects under study. The components of the questionnaire schedule included base line characteristics, anthropometric measurements, HbA1c,

treatment modality.

The meal wise breakup of carbohydrate was calculated for each subject and compared with distribution pattern suggested. Information on the type and daily dose of insulin was recorded. The insulin carbohydrate ratio (I:C) and the Insulin Sensitivity Factor (ISF) was determined for each subject. HbA1c was determined by HPLC method.

The data obtained on different parameters was compiled and tabulated. Means, SD, and minimum to maximum range for base line information, carbohydrate intake, meal wise carbohydrate distribution of subjects age wise /sex wise was calculated. The data was analyzed statistically using "t" test of significance. Confidence interval was 95% The I:C ratio was derived. ISF was calculated by applying the 1500 rule, defined as number of mg/dl of the blood glucose level that will drop after the administration of per unit of regular insulin[4]

3. Results and Discussion

3.1 Base line characteristics of the subjects

The subjects in the present study were a mixed group of males and females with equal distribution i: e (25 each). It was seen that in 12% of females subjects both the parents were diabetic, 12% from paternal and 20% from maternal side. In males 8% of subjects had both the parents diabetic, 24% were from paternal and 4% maternal side.

The mean age of females was 16.40 ± 2.30 and males was 15.92 ± 2.533. Mean height and weight of females was 154.4 cms ± 5.90 and 42.90 ± 9.30 respectively. The mean height of boys was 162.48 cms ± 11.63 while the mean weight was 49.70 ± 13.50. In females the minimum to maximum weight ranged between 25 to 60 kg and in males between 32 kg to 85 kgs. The mean BMI of females was 17.40 ± 2.96 (minimum to maximum range 12.30 to 22.30) and males was 18.60 ± 2.60. (minimum to maximum range 14 to 25).

3.2 Glycosylated Hemoglobin

HbA1c tends to serve as a marker of the average blood glucose level for previous months. Monitoring the HbA1c in type 1 diabetics may assist in the treatment modality. The mean HbA1C in female was 9.02 ± 1.06 and in males 9.06 ± 1.08. The distribution of subjects on HbA1c levels to assess the blood glucose control is given in Table 1.

The results from Table 1 very strongly point out to the fact that the

Table 1. Distribution of subjects according to HbA1c levels

S.No.	Range	Males	Females
1	Optimal Blood glucose Control (<7.5 %)	0	2(8%)
2	Good Blood Glucose Control (7.5-9 %)	13(52%)	12(48 %)
3	Poor Blood Glucose Control (> 9 %)	12(48%)	11(44 %)

Table 2. Mealwise breakup of Carbohydrate Intake (g) in Female and Male Subjects

Sr. No.	Age (yrs)	Meals	Females (n=25)			Males (n=25)			P value
			Mean	± SD	Range	Mean	± SD	Range	
1	13	BF	85.88	51.48	24-134	78.79	22.79	54-112	0.0007**
		Lunch	71.95	17.55	50-87	118.26	48.01	66-180	0.112
		Dinner	89.40	7.11	79.3-95.8	88.88	7.78	76.9-96.8	0.92
2	14	BF	64.40	16.50	49.4-85.1	62.75	31.84	32.26-113	0.92
		Lunch	147.24	33.41	110-190	83.78	27.67	52.7-115	0.0167*
		Dinner	95.72	30.48	70-137	93.74	23.70	73.4-124	0.913
3	15	BF	53.25	25.50	28-79	124.40	120.51	42.2-262	0.37
		Lunch	122.10	37.68	80.2-153.2	136.69	15.98	124-154	0-57
		Dinner	109.40	13.41	95.7-122.5	96.86	9.03	88.3-106	0.250
4	16	BF	50.04	25.22	15-75	55.09	31.51	24-87	0.822
		Lunch	125.03	47.13	86.3-145.5	88.58	18.72	70.6-108	0.268
		Dinner	93.11	11.25	81-104	101.79	26.99	79.3-94.2	0.579
5	17	BF	59.40	7.62	50.6-63.8	54.84	--	--	0.228
		Lunch	112.79	28.94	96.08-146.2	126.2	--	--	0.40
		Dinner	78.17	16.57	68.6-97.3	126.14	--	--	0.776
6	18	BF	46.98	19.08	24-68	44.15	15.87	24-58.1	0.829
		Lunch	94.08	11.88	82-107	110.68	40.49	67-162.2	0.461
		Dinner	83.95	19.11	66-102.5	115.11	45.09	64-154	0.250
7	20	BF	49.43	22.90	23.3-66	74.98	2.31	72.3-77.6	0.070
		Lunch	145.00	76.02	70-222	113.25	25.72	85-137	0.460
		Dinner	75.47	26.58	51.4-104	113.68	15.27	95.7-133	0.0591

** Highly Significant * Significant

mean HbA1c levels in both male and female subjects is considerably high indicating that they are not under good control. Higher percentage of females (44%) showed poor blood glucose control. Similarly 48% of males reflected poor glucose control. It is to be noted here that all the subjects were taking regular insulin daily for managing the blood glucose level in spite of which the control seems to be poor.

Both quality and quantity of diet affects HbA1c is well documented and intervention by a dietitian with expertise in diabetes management can improve HbA1c by 0.2% and enhance Quality of Living[5].

3.3 Carbohydrate Intake

The mean carbohydrate intake ranged between a minimum of 281.75 ± 29.74 in 17 yr old females to a maximum of 373 ± 6.24 in the 15 yr old females. In the male subjects the minimum mean carbohydrate intake was 274 ± 71'46 in 14 yr old while the mean maximum intake was 402 ± 81.69 in the 14 year old.

Many people with diabetes know that eating a healthy, balanced diet can manage this chronic disease. The relationship between eating carbohydrate and rise in blood glucose is widely discussed. However it is still not clear how many carbohydrates someone with diabetes should eat at each meal or how these carbohydrates should be distributed throughout the day.

American Diabetes Association[6] recommends allocating between 45 to 60 g of carbohydrate to each meal. An attempt has been made to break up the carbohydrate meal wise to find out the distribution in different meals at all age groups for both female and male subjects. The data is presented in table 2.

Results from the table show that the mean carbohydrate intake of female subjects was higher at lunch in almost all age groups as compared to males though statistically insignificant except in case of 14 yr old wherein the mean carbohydrate intake was significantly higher ($p = 0.0167$) than males. The mean intake of carbohydrate at breakfast is lower than that observed at dinner time. The mean carbohydrate intake of 13 yr females was significantly higher (0.0007) than mean carbohydrate intake of males.

Extremely low carbohydrate at one meal and extremely high in another is reported to lead to erratically rise in blood glucose.

The percentage distribution of carbohydrate will vary with the insulin regimen, treatment goals and also individual habits. The carbohydrate distribution varies with the type of insulin prescribed. eg: In case of regular insulin 1/3rd each carbohydrate in three meals can be distributed but not in intermediate or long acting insulin.

An attempt has been made to compare the mean carbohydrate intake at different meals to 1/3rd breakup as per requirement.

Observation from Table 3 shows that the mean carbohydrate intake of subjects in both sexes does not match the 1/3rd distribution of carbohydrate based on their requirement. Individual variations are evident at all ages in both groups of subjects highlighting the emergent need for carbohydrate counting. A wide variety in Indian meal with a lack of awareness about distribution of carbohydrate results in higher or lower carbohydrate intake at meals which may lead to sudden increase or decrease in the blood glucose level. Carbohydrate counting therefore appears to be an individual based solution for the management of type 1 diabetes.

Table 3. Comparison of mealwise breakup of Carbohydrate intake to 1/3 distribution

Sr. No.	Age (yrs)	Mean	Females (n=25)			Males (n=25)		
			BF	Lunch	Dinner	BF	Lunch	Dinner
1	13	Mean	85.88	71.95	89.4	78.79	118.26	88.88
			(82.6)	(82.6)	(82.6)	(95.3)	(95.3)	(95.3)
		±SD	51.48	17.55	7.11	22.79	48.01	7.78
		Range	24-134	50-87	79.3-95.8	54-112	66-180	76.9-96.8
2	14	Mean	64.4	147.24	95.72	62.75	83.78	93.74
			(102)	(102)	(102)	(80)	(80)	80
		±SD	16.5	33.41	30.48	31.84	27.67	23.7
		Range	49.4-85.1	49.4-85.1	70-137	32.26-113	52.7-115	73.4-124
3	15	Mean	53.25	122.1	109.4	124.4	136.69	96.86
			(94.9)	(94.9)	(94.9)	(119)	(119)	(119)
		±SD	25.5	37.68	13.41	120.51	15.98	9.03
		Range	28-79	80.2-153.2	95.7-122.5	42.2-262	124-154	88.3-106
4	16	Mean	50.04	125.03	93.11	55.09	88.58	101.79
			(89.3)	(89.3)	(89.3)	(81.6)	(81.6)	(81.6)
		±SD	25.22	47.13	11.25	31.51	18.72	26.99
		Range	15-75	86.3-145.5	81-104	24-87	70.6-108	79.3-94.2
5	17	Mean	59.4	112.79	78.17	54.84	126.2	126.14
			(83.45)	(83.45)	(83.45)	(102.3)	(102.3)	(102.3)
		±SD	7.62	28.94	16.57	--	--	--
		Range	50.6-63.8	96.08-146.2	68.6-97.3	--	--	--
6	18	Mean	46.98	94.08	83.95	44.15	110.68	115.11
			(75)	(75)	(75)	(89.9)	(89.9)	(89.9)
		±SD	19.08	11.88	19.11	15.87	40.49	45.09
		Range	24-68	82-107	66-102.5	24-58.1	67-162.2	64-154
7	19	Mean	49.43	145	75.47	74.98	113.25	51.4-104
			(89.9)	(89.9)	(89.9)	(100.6)	(100.6)	(100.6)
		±SD	22.9	76.02	26.58	2.31	25.72	15.27
		Range	23.3-66	70-222	51.4-104	72.3-77.6	85-137	95.7-133

Numbers given in parenthesis indicate 1/3 of total carbohydrate intake.

Table 4. Meal wise breakup of insulin and carbohydrate and I:C ratios in female subjects

Sr. No.	Age(yrs) (n=25)	Insulin(units)			Carbohydrate (g)			I:C		
		BF	L	D	Breakfast	Lunch	Dinner	BF	L	D
1	13	10	---	10	122	50	92.08	1:12	--	1:9
		8	10	12	134	65.6	95.84	1:16	1:6	1:8
		0	6	14	24	85.21	90.39	--	1:14	1:6
		14	---	14	63.5	87	79.3	1:5	--	1:7
2	14	10	5	10	85.17	190.57	75.68	1:8	1:38	1:7
		20	20	34	70	137.2	137	1:4	1:7	1:4
		24	8	16	49.4	110.4	70	1:2	1:13	1:4
		8	8	16	53.04	150.8	100.2	1:7	1:18	1:6
3	15	10	10	10	28	153.2	95.7	1:3	1:15	1:9
		18		14	52.74	132.9	122.5	1:3	--	1:9
		15	15	30	79	80.2	110	1:5	1:5	1:4
4	16	30	14	10	56.6	145.5	104	1:2	1:10	1:10
		10	10	20	75.05	182	101.3	1:7	1:18	1:5
		20	10	20	53.5	86.3	86.05	1:3	1:8	1:4
		16	16	32	15	86.3	81.1	1:09	1:5	1:3
5	17	24	22	28	63.8	96.08	68.6	1:3	1:4	1:3
		5	6	20	50.6	146.2	97.3	1:10	1:24	1:5
		24	22	28	63.8	96.08	68.6	1:3	1:4	1:3
6	18	---	10	14	24	107	102.5	--	1:10	1:7
		14	---	20	68	100	69	1:5	--	1:3
		16	20	24	40.2	89.3	98.3	1:3	1:4	1:4
		12	8	20	55.7	80	66	1:5	1:10	1:3
7	20	3	25	12	59	70	51.4	1:19	1:3	1:4
		16	22	28	23.3	143	104	1:1	1:6	1:4
		12	15	10	66	222	71	1:6	1:14	1:7

3.4 Insulin Carbohydrate Ratios

Data presented in Tables 4 and 5 for both sexes show the meal wise breakup of insulin and carbohydrate and the I:C ratios.

The data from the table reveals that there is a wide variation in the ratios not only between subjects in different age groups but also between the carbohydrates consumed by the subjects in different meals of the day. In the 13 yrs old female subjects the insulin administered varies between a minimum of 8 units at breakfast to maximum 14 units at dinner. Observations

Table 5. Meal wise breakup of insulin and carbohydrate and I:C ratios in male subjects

Sr. No.	Age(yrs) (n=25)	Insulin (units)			Carbohydrate (grams)			I:C		
		BF	L	D	Breakfast	Lunch	Dinner	BF	L	D
1	13	16	7	14	112.6	119.6	88.74	1:7	1:17	1:6
		7	10	9	78.00	149.04	76.9	1:11	1:14	1:8
		14	8	12	62.43	76.6	94.62	1:4	1:9	1:8
		24	10	14	54.22	180	96.84	1:3	1:18	1:7
		18	8	17	86.7	66.07	87.3	1:5	1:8	1:5
2	14	16	6	16	39	64	80.55	1:3	1:10	1:5
		6	3	6	67.8	52.76	73.47	1:11	1:17	1:17
		16	18	18	32.26	77.16	76.1	1:2	1:4	1:4
		10	6	9	61.6	109.64	114.5	1:6	1:18	1:12
		20	10	20	113.09	115.34	124.06	1:6	1:11	1:6
3	15	25	12	25	68.25	124	88.3	1:3	1:10	1:4
		6	6	12	262.74	154.64	106.3	1:43	1:17	1:9
		14	7	12	42.22	131.42	95.98	1:3	1:18	1:8
4	16	12	20	24	24	108	94.24	1:2	1:5	1:4
		6	12	16	54.27	87.1	79.38	1:9	1:7	1:5
		18	22	18	87	70.65	131.75	1:5	1:3	1:7
5	17	20	10	15	54.84	126.2	126.14	1:3	1:12	1:8
6	18	15	30	16	39	119.5	152.03	1:3	1:4	1:10
		5	5	6	55.5	67	64	1:11	1:13	1:10
		15	20	22	58.1	162.2	154	1:4	1:8	1:7
		10	10	10	24	94	90.4	1:2	1:9	1:9
7	20	24	12	24	72.3	85	95.7	1:3	1:7	1:4
		16	10	16	77.6	98	114	1:5	1:10	1:7
		10	15	15	74	133	112	1:7	1:9	1:7
		30	12	18	76	137	133	1:3	1:11	1:7

reveal that a subject receiving a bolus dose of 10 units of insulin at breakfast and dinner shows 2 different ratios with different carbohydrate intakes. i:e 1:12 at BF and 1:9 at Dinner. Very low ratio of 1:5 and 1:7 are also observed in subjects consuming low carbohydrate and taking higher doses of insulin. Whereas in male subjects minimum of 7 units at breakfast to maximum of 17 units at dinner.

In the age group of 14 yrs the minimum to maximum bolus insulin ranges between 5-34 units however the carbohydrate intake in this age group does not match with the insulin taken

Table 6. Insulin Sensitivity Factor of Female and Male Subjects

S. No	Age Group		Female ISF (mg/dl)	Male ISF (mg/dl)
1	13yrs		75	40
			50	57
			75	44
			53	31
			---	34
		Average	63.25	41.2
		SD	13.62	10.18
		Range	50-75	31-57
2	14yrs		60	39
			20	100
			31	20
			46	60
			---	30
		Average	39.25	49.80
		SD	17.46	31.70
		Range	20-60	20-100
3	15yrs		50	24
			46	62
			25	45
		Average	30.25	43.67
		SD	13.43	19.04
		Range	25-50	24-62
4	16yrs		27	26
			37	44
			30	25
			23	---
		Average	29.25	31.67
		SD	5.91	10.69
		Range	23-37	25-44
5	17yrs		20	33
			48	---
			20	---
		Average	22	33
		SD	16.17	--
		Range	20-48	---
6	18yrs		62	24
			44	93
			25	26
			37	50
		Average	42	48.25
		SD	15.47	32.09
		Range	25-62	24-93
7	20yrs		37	25
			22	35
			40	37
			---	25
		Average	24.75	30.5
		SD	9.64	6.40
		Range	22-40	25-37

and therefore very low ratios are observed .In the age group of 15 yrs except for 1 subject reflecting a ratio of 1:15 for 10 units of insulin administered 15 gms of carbohydrate consumed the other calculated ratios seems to be very low. Very high intake of carbohydrates and ratio of 1:48 is observed in male subjects. In 16 yrs age group increase in bolus insulin dose is observed without a consequent increase in carbohydrate intake. There by reflecting low ratios except for meals wherein carbohydrate intake is slightly higher. Similar observations are recorded in subjects in both the group of 17, 18 and 20 yrs of age group.

3.5 Insulin Sensitivity Factor

The no. of mg/dl the blood glucose level will drop after the administration of one unit of regular insulin in approximately how far a blood glucose reading will be lowered by 1 unit of regular insulin[7]

The mean Insulin Sensitivity Factor of Female and Male subjects Age wise are presented in table 6.

Data from the table 3-6 shows that using the 1500 Rule for the calculation of ISF a wide variation is observed not only within the age group but also between the different age groups as well as between the sexes. Each individual is different in the way his/her body responds to insulin dose. However no uniform trend is observed with respect to amount of insulin given and ISF ratio. All the subjects were being given insulin but, different doses depending upon the severity of diabetes and the control on the blood glucose levels. Different doses of insulin are observed to show different ISF ratios in both male and female subjects under study. This indicates that the formula that is used most importantly should be individually determined by the health care team in order to have good control over the blood glucose levels.

4. Conclusions

1. All the juvenile diabetic subjects irrespective of sex and age were undernourished.
2. Their carbohydrate intake of the subjects did not meet the 1/3rd distribution pattern.
3. HbA1C levels reflected poor blood glucose control in majority of the subjects in both sexes.
4. I:C ratio showed wide variations not only between subjects in the different age groups but also between the amounts of carbohydrates consumed by the subjects.
5. Insulin units varied considerably between the sexes for the same age group.
6. No uniform trend was observed with respect to the amount of insulin given and ISF ratio.

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Measures of Body Composition Amongst People with Obese Vs. Non-obese Type 2 Diabetics

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Abstract

Obesity is a major public health problem in South Asian countries which is mainly related to nutrition, lifestyle and demographic transitions, incorrect dietary practices and physical inactivity, in the background of genetic predisposition. The prevalence of obesity is more in urban areas than rural, and women are more affected than men. The present investigation screened 100 Type 2 diabetic subjects (Male-48, Female-52) by incidental sampling for the presence of Central and generalized obesity. Parameters measured included Anthropometry, Body Composition and Blood Glucose levels. The subjects were classified based on BMI categories by WHO criteria and the data statistically analyzed using students "t" test. Males showed a significantly higher waist circumference as compared to females. 81% of male and 77% of female subjects showed central obesity. High percentages of subjects in both sexes were in the obese grade I category showing a two fold increase in body fat mass. 83.3% of males and81.8% of females in obese grade II category were hypertensive. The mean body fat percentage was higher in female which is statistically significant (p-0.0001) and mean total body water was higher in males and is statistically significant at (p-0.0001). All subjects reflected a higher mean fasting and post meal blood glucose levels falling above the recommendations for diabetics (ADA).Results thus reflect that in a major percentage of Type 2 diabetic subjects, generalized & central obesity and high body fat mass were the predisposing risk factors.

Key words : Type 2 Diabetes Mellitus, Obesity, Body Composition.

1. Introduction

Diabetes Mellitus is a multifactorial disorder which includes genetic factors coupled with environmental influences like obesity due to urbanization, raised living standards, and changing lifestyle. Obesity is one of the major risk factors for diabetes, however there has been paucity in the research in this area. In spite of having lower overweight and obesity rates, India has a higher prevalence of diabetes compared to western countries suggesting that diabetes may occur at a much lower body mass index (BMI) in Indians compared with Caucasians. Therefore, relatively lean Indian adults with a lower BMI may be at equal risk

as those who are obese. Furthermore, due to dyslipidemia and low levels of high density lipoprotein, Indians are genetically prone to the development of coronary artery diseases; these determinants make Indians more prone to development of the complications of diabetes at an early age (20-40 years) compared with Caucasians (>50 years) therefore timely screening and monitoring is mandate regardless of patient age within India.[1]

"New World Syndrome" is a set of non-communicable diseases brought on by consumption of junk food and sedentary lifestyle, characterized by obesity, hypertension and heart diseases posing substantial public health problems. The World Health Organization has described obesity as one of the most ignored community health problems, affecting every region of the globe.[2] Around 90% of type 2 diabetic patients have a BMI greater than 23.0 kg/m2, moreover positive family history of diabetes increases the risk of diabetes.[3]

Epidemiological surveys use body mass index (BMI) as an indicator of 'generalized' obesity and waist circumference (WC) or waist-to-hip ratio (WHR) as a measure of 'central' or 'abdominal' obesity. Both generalized and abdominal obesity have been associated with a number of metabolic abnormalities. However, there are ethnic differences in the representative significance.[4]

Anthropometric methods like body mass index (BMI) do not give qualitative inferences like total body fat (TBF), visceral fat (VF) or subcutaneous fat (SF) that can be given by bio-electrical impedance analysis (BIA).[5] We measured body composition of type 2 diabetics in different grades of Obesity.

1.1 Aim and Objectives

1) To screen Type 2 Diabetics for the presence of obesity.
2) To determine the body composition.
3) To correlate various body composition parameters with Body Mass Index (BMI).

1.2 Limitations

1) The subjects taken were from a particular community attending the camp.
2) The present study was conducted in a small group of subjects.

2. Material & Methods

2.1 The study was designed to assess the prevalence of generalized and central obesity amongst 100 Type 2 Diabetics (Male - 48, Female - 52) from Muslim minority (Bohra) community attending a camp organized by Sunil's Diabetes Care n' Research Centre (DCRC), Diabetes Care Foundation of India (DCFI) and women's organization of the minority community.

1) Collection of data

Anthropometry measurements viz. height (cms), weight (kg), waist circumference, and hip circumference (cms) were taken by trained Nutri-

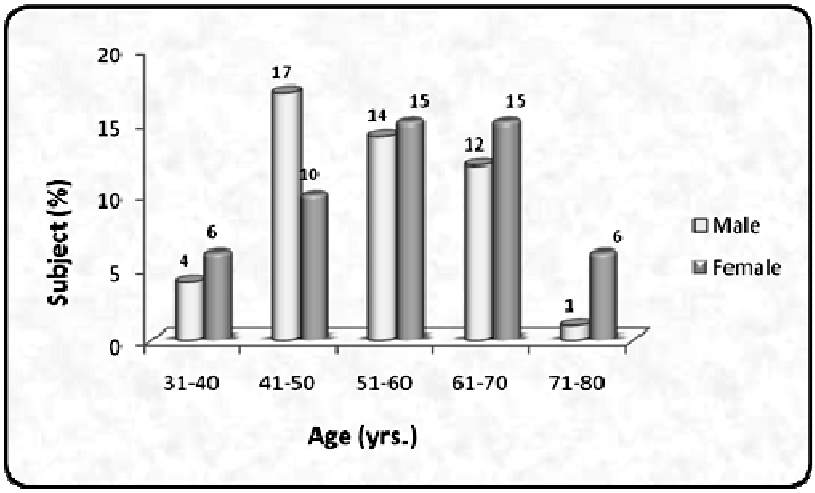

Fig 1. Male and Female Diabetic Subjects at different age categories.

tionists and Diabetes Educators. Blood pressure was measured with mercury Sphygmomanometer by Registered Medical professional.

The body composition measurements including BMI, Fat Mass (FM), Fat Free Mass (FFM), Lean Body Mass (LBM), Total Body Water (TBW) of the subjects were analyzed through the body composition analyzer (Tanita) working on the principal of bioelectrical impedance, the fastest, and non-invasive technique for body composition analysis.[6]

Biochemical parameters were done by collecting Fasting Blood sample. Fasting and 2 hrs Post Prandial Capillary Glucose Test was done by plasma calibrated Glucometer.

2) Statistical Analysis

Data was compiled, tabulated and statistically analyzed using students "t" test. Means, standard deviations and minimum to maximum ranges were derived. Subjects were classified based on BMI categories given by WHO and 't' test was applied to assess the significant difference between means of different grades of obesity with respect to body composition. The confidence interval was 95%.

3. Results & Discussion

Out of the total 100 Type 2 Diabetic subjects screened, 63% of the subjects were above the age of 50 years. The age of the male subjects varied from 35 to 74 yrs with a mean age of 52.81 ± 9.18 years and in females it varied from 33 to 75 yrs with a mean age of 56.7 ± 11.3yrs.

The age wise distribution of the subjects is shown in Fig 1. Female subjects were slightly higher (52%) as compared to that of male subjects (48%). Family history of Diabetes was positive in 60% male and 59% female subjects.

The data on mean body composi-

Table 1. Mean Body Composition of Male and Female Subjects

SN	Variables Total – 100		Male N-48	Female N-52	P Value
1	FM-Body Fat Mass (kg)	Mean ±SD	22± 15.5	22± 8.62	0.92
		Range	10-55.8	8.9-36.4	
2	Body Fat (%)	Mean ±SD	25± 4.47	34± 7	0.0001*
		Range	17.4-33.2	18-45.6	
3	FFM (kg)	Mean ±SD	56± 7.98	41± 5.4	1.00*
		Range	46-80.3	26-52	
4	TBW (kg)	Mean ±SD	41.18±5.99	29.8±3.95	0.0001*
		Range	33- 58.8	19-37.7	

* Significant

tion of male and female subjects is presented in Table 1.

The minimum to maximum range of FM in male subjects ranged between 10 to 55.8 kg with a mean of 22 ± 15.5 kg. The FM in females was seen to range between a minimum of 8.9 kg to a maximum of 36.4 kg. The mean FM in females was similar to that observed in males. Statistically insignificant difference (p = 0.92) was observed in FM of male and female subject.

In a normal weight adult body fat varies between 10 to 25% in males and 15 to 35% in females. In obesity body fat can be as high as 60-70%.

An attempt has been made to evaluate the body composition of the subjects based on their BMI status.

The mean fat percent in males was 25 ± 4.47 and 34 ± 7 in female subjects. The difference between the body fat percentage of male and female subjects was statistically significant (p = 0.0001).

The FFM (kg) ranged between 46 to 80.3 kg in male & 26 to 52 kg in females with a mean of 56 kg in the

Table 2. BMI Status vs. Body Composition Measurements of Male Subjects

BMI Categories		Healthy Weight (18.5 - 22.9)	Over weight (23 – 24.9)	Obesity Grade I (25 – 29.9)	Obesity Grade II (> 30)
	n-48	9 (19%)	10 (21%)	23 (48%)	6 (12%)
BFM (kg)	Mean	10.4± 0.6	13.45± 2.10	20.8±3.65	44.57±34
	Range	10-11.1	11.1-15.6	15.9-31.6	24-55.8
FFM (kg)	Mean	46.5± 0.86	42.19± 3.97	55.46±6	68±8.36
	Range	46-47.5	51-58.6	47-67.7	61.9-80.3
TBW (kg)	Mean	33.83± 0.9	30.95± 2.92	40.45±4.47	49.8±6
	Range	33-34.8	37-42	34.4-49.6	45-58

Table 3. Statistical Interpretation of BMI Status vs. Body Composition Measurements of Male Subjects

S.N.	Variables		BFM	FFM	TBW
1	HW vs. OW	P value	0.062	0.015*	0.015*
2	HW vs. O I	P value	0.0001*	0.02*	0.03*
3	HW vs. OII	P value	0.15	0.007*	0.007*
4	OI vs. OII	P value	0.006*	0.002*	0.002*

* Significant
HW- Healthy Weight, OW -Over Weight, OI- Obesity Grade I,OII- Obesity Grade II

Table 4. BMI Status vs. Mean Body Composition Measurements of Female Subjects

BMI Categories		Healthy Weight (18.5 - 22.9)	Over Weight (23 – 24.9)	Obesity I (25 – 29.9)	Obesity II (≥ 30)
	n-52	11 (21%)	6 (12%)	24 (46%)	11 (21%)
BFM (kg)	Mean	11.66±2.12	17.32±2.19	23.7±4.04	32.89±3.1
	Range	8.9-14.8	14.7-19.8	15.7-30.8	25.7-36.4
FFM (kg)	Mean	35±3.8	38±1.8	42±4	46±3.6
	Range	26-39	35-40	36-50	43-52
TBW (kg)	Mean	25.59±2.77	27.58±1.27	30.4±3	34±2.6
	Range	19-28.6	25.8-29.4	26-36.8	31.3-37.7

Table 5. Statistical Interpretation of BMI Status vs. Body Composition Measurements of Female Subjects

S.N.	Variables		BFM	FFM	TBW
1	HW vs. OW	P value	0.0003*	0.15	0.015*
2	HW vs. O I	P value	0.0001*	0.0002*	0.023*
3	HW vs. OII	P value	0.0001*	0.007*	0.007*
4	OI vs. OII	P value	0.0001*	0.002*	0.002*

* Significant
HW Healthy Weight, OW Over Weight, OI Obesity Grade I, OII Obesity Grade II

former and 41 kg in the latter. Male subjects show a lower fat percent as compared to female. The difference was statistically significant ($p = 1.00$).

The total amount of body water was high and can be 60 to 70 % of the total body weight. The TBW was significantly lower ($p = 0.0001$) in females (29.8 ± 3.95) as compared to male subjects (41.18 ± 5.99) BMI status. The data is shown in Table 2 for males and Table 4 for females. The statistical interpretation is given in Table 3 and Table 5 for males and female subjects respectively.

Observations from the Table 2 and Table 4 reveal that there were no subjects in the underweight category in both the males and females. The BFM in normal weight male subject was 10.4 ± 0.6 which is within the standard specified range (10 to 25 %). It is interesting to note that there was a two fold increase in the BFM in Obesity Grade I subjects (20.8 ± 3.65) and a threefold increase in the Obese Grade II subjects (44.57 ± 34). The BFM in the latter group of male subjects was found to surpass the expected ranges in normal group of subjects.

The BFM in female subjects though showed an increase with increase in BMI status the increase was however not found to be as drastic as observed in males, nevertheless observation shows that from healthy weight to overweight the increase in body fat mass was higher in female subjects (17.32 ± 2.19) as compared to the male subjects (13.45 ± 2.10). A similar trend was observed, in a two fold an increase in body fat mass in Obesity grade I subjects is observed in both males and females. Data from the table showed that females reflected a comparatively lower BFM in the Obesity grade II category (32.89 ± 3.1) as compared to the male subjects (44.57 ± 34.0).

Results analysed statistically showed that the body composition measurements differed significantly in both the sexes when categorized on the basis of BMI as also observed from Table 3 for males and Table 5 for females. However no significant difference was observed in the body fat mass of healthy weight and overweight male subjects and FFM in female subjects.

Table 6. Mean of Components of Metabolic Syndrome in Male and Female Subjects

SN	Variables Total – 100		Male N-48	Female N-52	P Value
1	Age (yrs)	Mean ± SD	52.81 ± 9.18	56.71 ± 11.3	0.0624
		Range	35 - 74	33 - 75	
2	Weight (kgs)	Mean ± SD	72.5 ± 12.37	63.4 ± 12.8	0.0010*
		Range	53 - 106	41.1 - 86.8	
3	WC (cm)	Mean ± SD	98.35 ± 8.80	85.1 ± 12.65	0.0001*
		Range	84 - 119	72 - 108	
4	BMI (kg/m^2)	Mean ± SD	26.43 ± 3.81	26.5 ± 4.16	0.8290
		Range	20 - 35.9	18.5 - 35.5	
5	FBG (mg/dl)	Mean ± SD	134.12 ± 37.87	138.7 ± 58.37	0.68
		Range	81 - 212	79 - 349	
6	PPBG (mg/dl)	Mean ± SD	203.59 ± 77.15	199.45 ± 80.57	0.86
		Range	86 - 466	84 - 461	

* Significant

The data on mean values of components of Metabolic Syndrome in male and female subjects is shown in Table 6. As observed the mean glycemic control of the subjects was higher than recommended by ADA-2016 (FBG - 80 - 110 mg/dl & 2 hr PPBG – 100-140 mg/dl). In males the FBG varied from 81 to 212 mg/dl with a mean of 134 mg/dl and in females it showed a wide variation from 79-349 mg/dl with a mean of 139 mg/dl. Similarly PPBG showed variation from 86-466 mg/dl and 84-461 mg/dl in males and females respectively with a mean of 203.59 mg/dl in males and 199.45 mg/dl in females. The mean blood glucose values in both the group of subjects thus reflected uncontrolled diabetes.

Discussion

Indians have been documented to have high prevalence of central and generalized obesity. Body Mass Index in both sexes indicated higher than the standard BMI criteria. The mean waist circumferences of male subjects was 98.35 ± 8.80 and of female subjects was 85.1 ± 12.65 both above the normal standard criteria thus 81% of male subjects and 77% of female subjects were above the normal waist circumference category indicating central obesity according to WHO classification for Asian Indians. Earlier study showed that in men, at all age groups, generalized obesity was higher compared to abdominal obesity (except at 60–69 years)[4]. Among women, abdominal obesity was higher than generalized obesity.

In our study there was two fold increase in the BFM in Obesity Grade I subjects (20.8 ± 3.65) and a threefold increase in the Obese Grade II subjects (44.57 ± 34) in male. A two fold increase in body fat mass in Obesity grade I subjects was also observed in female subjects. Statistical analysis showed that the body composition measurements differed significantly in both the sexes when categorized on the basis of BMI.

4. Conclusion

Results thus reflect that in a major percentage of Type 2 diabetic subjects, generalized and central obesity and high body fat mass were the characteristic features. Presently body fat composition is not been commonly used in most of the clinical settings, implementing use of the body composition measures would help to stratify the risk of CVD.

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Socioeconomic Characteristics of Rural SHG Member and Non SHG Women

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Abstract

The socio economic progress of the community has a direct link with the empowerment of women; the development programmes for women are receiving greater attention. Rural women need to be empowered for bringing all-round rural development. SHG can be a very good instrument to make them think better and choose better. Self Help Group is a small economically homogeneous and affinity group of rural poor which is voluntarily organized to contribute to a common fund to be lent to its members as per group decision, which works for group's solidarity, awareness, social and economic empowerment in the way of democratic functioning. Majority of the SHG members belonged to the age between 31-40 years, had little higher education than NON SHG women. Most of the SHG members belonged to SC category and ST category, had lower income than NON SHG women. The SHG members were daily wage earners and from Exclusively agriculture family where as NON SHG women were belonged to the category of Service + business family. The SHG members belonged to the Medium category of social participation and on the contrary NON SHG Women belonged to Low category of social participation.

Key words : Self Help Group, Socio-Economic Status.

1. Introduction

Mahatma Gandhi said, 'India lives in its villages'. The saying is relevant even today in the new millennium. The census report (2011) reveals that 69% population resides in rural area. But even after sixty five years of independence, rural India is characterized by severe poverty, illiteracy, lack of employment opportunities and overall backwardness. Unless the economic, educational, and cultural development of rural area is achieved, the dream of shining India will never come true. The important role of women in the welfare of the family is being realized gradually. As the socio-economic progress of the community has a direct link with the empowerment of women, the development programmes for women are receiving greater attention.

Meaning and Concept of Self Help Group (SHG)

Self Help Group (SHG) is a small economically homogeneous and affinity group of rural poor which is voluntarily organized to contribute to a common fund to be lent to its members as per group decision, which works for group's solidarity, awareness, social and economic empowerment in the way of democratic functioning.

1.1 Objective

To study the profile of MAVIM (Mahila Arthik Vikas Mandal) SHG members, NGO (Non Government Organisation) SHG members and NON SHG women

2. Methodology

The present study was conducted in Wardha district, in Maharashtra state. Out of eight blocks in Wardha district, five blocks were selected for this study. The selected blocks were Karanja, Hinganghat, Selu, Wardha and Deoli. In every block MAVIM and NGO, formed SHGs. Efforts were made to select respondents from MAVIM SHGs, NGO SHGs and NON SHG women from the same village to maintain uniformity in the sample. From each block 30 MAVIM SHG Members and 30 NGO SHG Members and 50 NON SHG Women were selected randomly from the same village. SHG members selected belonged to the SHGs of three years or above three years old. Descriptive or Survey Research Design was used for present study. Survey questionnaire or interview schedule was used as tool for data collection.

3. Result

The respondents were distributed according to socioeconomic characteristics as has been described below.

3.1 Age

The details of data on the age of respondents showed that majority of the MAVIM SHG Members 46 (30.67 %) were between the age group of 30-40 years followed by 41 (27.33 %) and 32 (21.33%) members were between the age group of 40-50 years and 50-60 years age group. Remaining 19 members and 12 members were belonged to 20-30 years age group and above 60 years age group.

Among NGO SHG members majority of them 54 (36%) were between the age group of 30-40 years followed by 46 members (30.67%) between the age group of 40-50 years. Moreover remaining 24 (16%), 17 (11.33%) and 9 (6%) were between the age group 50-60 years, above 60 years and 20-30 years age group respectively.

With regard to Non SHG Women 93 (37.20%) were belonged to the age group 30-40 years followed by 60 (24%) and 59 (23.60%) members were belonged to age group 40-50 years and 20-30 years respectively. The remaining 23 (9.20%) and 15 (6%) members were between the age group 50-60 years and 60 years onwards.

These results were in line with earlier research[1,2] and found that SHG members in the study mainly belonged to the age group of 30-40 years as 60.5%, 50% respectively. It seemed that this age group was interested to improve their present status by participating in SHG.

3.2 Education

Regarding education it was observed that among MAVIM SHG Members majority 52 (34.67%) of them were belonged to higher middle

Table 1. Age-wise distribution of respondents

Sr. No.	Age in years	MAVIM SHG Members	NGO SHG Members			Non SHG Women	
		Total	%	Total	%	Total	%
1	20-30	19	12.67	9	6.00	59	23.60
2	31-40	46	30.67	54	36.00	93	37.20
3	41-50	41	27.33	46	30.67	60	24.00
4	51-60	32	21.33	24	16.00	23	9.20
5	Above 60	12	8.00	17	11.33	15	6.00
	Total	**150**	**100.00**	**150**	**100.00**	**250**	**100.00**

school level followed by 45 (30%) members were from middle school level. 20 (13.33%) members were illiterate and 24 (16%) members had education up to primary school level. Only 8 (5.33%) members were graduate followed by one member post graduate.

In case of NGO SHG Members, large majority 81(54%) of them had higher middle school education. 32 (21.33%) members were illiterate and very small number 13 (8.67%) members were graduate followed by 9 (6%) members were post graduates.

In the group of NON SHG Women, large majority 75 (30%) members had middle school education followed by 66 (26.4%) and 51 (20.4%) members belonged to higher middle school and primary school level education respectively. Illiterate members were 36 (14.4%), 19 (7.6%) members were graduate followed by only 3 (1.2%) members were post graduate.

These results were in line with the results reported earlier by researchers[3]. It was observed that 40% of the respondents had studied up to high school, followed by 11.67% each of them were having middle school level and college level education, while 4.16% of them were having just prima-

Table 2. Education wise distribution of respondents

Sr. No.	Education	MAVIM SHG Members		NGO SHG Members		Non SHG Women	
		Total	%	Total	%	Total	%
1	Illiterate	20	13.33	32	21.33	36	14.4
2	Primary school	24	16	7	4.67	51	20.4
3	Middle school	45	30	8	5.33	75	30
4	Higher middle school	52	34.67	81	54	66	26.4
5	Graduate	8	5.33	13	8.67	19	7.6
6	Post graduate	1	0.67	9	6	3	1.2
	Total	**150**	**100**	**150**	**100**	**250**	**100**

ry school level education, respectively. While 20.83% and 11.67% of them were functionally literate and illiterates, respectively.

3.3 Caste

Data with respect to caste showed that out of 150 MAVIM SHG Members 107 members (71.33 %) were belonged to SC community followed by 17 (11.33%), 13 (8.67%) and 9 (6%) members were from OBC, ST and SBC community respectively. Only 3 members were from NT community and 1 member from DT community was included in the study sample. Whereas maximum NGO SHG Members 126 (84%) were belonged to ST community followed by 10 members belong to SC, 6 members from DT and 5 members belonged to NT community. Only 1 member was from SBC community. Not a single member was found from OPEN community nor in MAVIM SHG group or neither in NGO SHG group.

Among Non SHG Women majority of them 110 (44%) were belonged to SC community followed by 82 (32.8%) were from OBC community, 21 (8.4%) were from ST community and 19 belonged to NT community. 9 respondents were from SBC as well as OPEN community.

3.4 Occupation

A details of data on occupation of respondents, it was observed that among MAVIM SHG Members maximum number of members 67 (44.67%) were from daily wage earners category followed by 48 (32%) members were belonged to exclusively agriculture category and 11 (7.33%) were from daily wage earner + running mess category respectively. Very few of the respondents 8 (5.33%) and 7 (4.67%) were from agriculture + service category and agriculture + business category respectively. Negligible number of members 5 (3.33%) and 2 (1.33%) were from agriculture + labour, daily

Table 3. Caste wise distribution of respondents

Sr. No.	Caste	MAVIM SHG Members		NGO SHG Members		Non SHG Women	
		Total	%	Total	%	Total	%
1	SC	107	71.33	10	6.67	110	44
2	ST	13	8.67	126	84.00	21	8.4
3	DT	1	0.67	6	4.00	0	0
4	NT	3	2.00	5	3.33	19	7.6
5	SBC	9	6.00	1	0.67	9	3.6
6	OBC	17	11.33	2	1.33	82	32.8
7	OPEN (Unreserved)	0	0.00	0	0.00	9	3.6
	Total	**150**	**100.00**	**150.00**	**100.00**	**250.00**	**100.00**

Table 4. Occupation wise distribution of respondents

Sr. No.	Occupation	MAVIM SHG Members		NGO SHG Members		Non SHG women	
		Total	%	Total	%	Total	%
1	Exclusively Agriculture	48	32.00	57	38.00	25	10
2	Agriculture+ Labour	5	3.33	5	3.33	8	3.2
3	Agriculture + Service	8	5.33	3	2.00	7	2.8
4	Agriculture + Business	7	4.67	2	1.33	3	1.2
5	Daily wage earner	67	44.67	38	25.33	74	29.6
6	Daily wage earner + Mess	11	7.33	1	0.67	11	4.4
7	Daily wage earner + Business	2	1.33	32	21.33	30	12
8	Service + Business	2	1.33	12	8.00	92	36.8
	Total	**150**	**100.00**	**150**	**100.00**	**250**	**100**

wage earner + business and service + business category respectively.

High number of NGO SHG Women 57 (38%) followed by 38 (25.33%) and 32 (21.33%) were belong to the category of exclusively agriculture, daily wage earner and daily wage earner + business. Very few number of members 12 (8%) and 5 (3.33%) were from the category of service + business and agriculture + labour respectively. Negligible number of members 3 (2%), 2 (1.33%) and 1 (0.67%) were belong to the category of agriculture + service, agriculture + business and daily wage earner + mess respectively.

Large majority of the Non SHG Women 92 (36.8%) followed by 74 (29.6%) and 30 (12%) were belong to the category of the service + business, daily wage earner and daily wage earner + business respectively. Some of them 25 (10%) and 11 (4.4%) were belong to the category of exclusively agriculture and daily wage earner + mess. Negligible number of NON SHG Women 8 (3.2%), 7 (2.8%) and 3 (1.2%) were from the category of agriculture + labour, agriculture + service and agriculture + business respectively.

3.5 Annual income

Data pertaining to annual income of the respondents, it was observed that large majority of MAVIM SHG Members 67 (44.67%) were having income up to Rs. 50,000 followed by 54 (36%) members were having income between Rs. 50,000 to 1,ooooo respectively. Further 23 (15.33%) members were having annual income between the ranges of Rs. 100001-150000. Negligible members 6 (4%) were having income above Rs. 1,50,000.

Among NGO SHG Members very high number 79 (52.67%) were having annual income up to Rs. 50,000 and 48 (32.00%) members were having annual income between the range of Rs. 50,001-1,00,000. There were few 12

Table 5. Incomewise distribution of respondents

Sr. No.	Income in Rupees	MAVIM SHG Members		NGO SHG Members		Non SHG Women	
		Total	%	Total	%	Total	%
1	Upto50,000	67	44.67	79	52.67	75	30
2	50,001-1,00000	54	36.00	48	32.00	118	47.2
3	1,00001-1,50000	23	15.33	12	8.00	19	7.6
4	Above 1,50000	6	4.00	11	7.33	38	15.2
	Total	**150**	**100.00**	**150**	**100.00**	**250**	**100**

(8%) members belonged to category of 100001-150000 and 11 (7.33%) members were from the above Rs. 1,50,000.

Regarding Non SHG Women, large majority 118 (47.2%) of them were from the category of Rs. 50,001-100000 and 75 (30%) members were having annual income up to Rs. 50,000. Further 38 (15.2%) members were belonged to the annual income above Rs. 1,50,000 category and 19 (7.6%) members were having annual income range of Rs. 1,00,001-1,50,000.

Similar results were explored earlier by previous workers.[4] Study indicated that as many as 25 per cent of them have annual income of Rs. 48,000 which is followed 13.24 per cent with an income of Rs. 24,000 and another 13.24 per cent of them with Rs.72,000, at least 11.76 per cent of them has with the income of Rs. 36000, and 17 per cent of them has in the range of Rs. 40,000 to Rs. 45,000. Nearly 4.41 per cent them possessed annual income of Rs. 96,000. About 2.94 per cent, they have a maximum income of Rs. 2,10,000 per annum.

3.6 Social participation

Responses of the respondents regarding social participation\,.it was found that quite a high per cent (76%) of MAVIM SHG Members were from medium category of social participation. Further 36 (24%) members were belonged to high category. These results were encouraging and indicated that they becoming aware in participating social activities being members of SHGs.

Among NGO SHG Members great majority 107 (71.33%) of them were belonged to medium category of social participation. As well as 43 (28.67%) members were from high category. These findings were motivating to accelerate the movement of SHG.

In the group of Non SHG Women, large majority of them 220 (88%) were belonged to low category of social participation. Few members 26 (10.4%) and very few of the members 4 (1.6%) were from medium and high category. These findings were discouraging.

Supporting findings were found by researchers earlier[5] and observed that

Table 6. Social Participation wise distribution of respondents

Sr. No.	Social Participation	MAVIM SHG Members		NGO SHG Members		Non SHG Women	
		Total	%	Total	%	Total	%
1	Low (0)	0	0	0	0.00	220	88
2	Medium (up to 2)	114	76	107	71.33	26	10.4
3	High (above 2)	36	24	43	28.67	4	1.6
	Total	**150**	**100**	**150**	**100.00**	**250**	**100**

150 out of 250 respondents (60 percent) were ordinary group members while 30 percent and 10 percent members are acting as representatives and leaders of the groups respectively

4. Conclusion

It can be concluded that majority of the respondents in MAVIM SHG, NGO SHG and NON SHG women belonged to the age group of 31- 40 years. The reason was members wanted to improve economically or wanted to start income generating activity. Most of the MAVIM SHG members and NGO SHG members had higher middle school education where as maximum NON SHG women had middle school education. Majority of the MAVIM SHG members belonged to the SC category, most of the NGO SHG members belonged to the ST category and most of the NON SHG women belonged to the SC category. Maximum MAVIM SHG members were Daily wage earners, majority of the NGO SHG members belonged to the category of Exclusively agriculture and most of the NON SHG women belonged to the category of Service + business. Most of the MAVIM SHG members and NGO SHG members had annual income up to Rs. 50,000 where as NON SHG women had their annual income up to Rs. 50,000 - 1,00,000. Majority of the MAVIM SHG members and NGO SHG members belonged to the Medium category of social participation whereas maximum NON SHG women belonged to the Low category of social participation.

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Study on Profile of Self Help Groups

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Abstract

The socio economic progress of the community has a direct link with the empowerment of women. The development programmes for women are receiving greater attention. . Rural women need to be empowered for bringing all-round rural development. SHG can be a very good instrument to make them think better and choose better. Majority of SHG Members were belonged to category of 3-5 years age of SHG and of 6-8 years age of SHG. It leads to stability of SHGs and stable SHGs move towards empowerment of its members.

Key words : Self Help Group, NGO,

1. Introduction

Our first Prime Minister Jawaharlal Nehru said, 'that in order to awaken the people, it is women who have to be awakened. Once she is on the move, the household moves, the village moves the country moves and through the women her children are brought into the picture and given the opportunity of higher life and better training. Thus, we give the opportunity to women of today we build the India of tomorrow.

Concept of Self Help Group

SHG, a mini voluntary agency for self-help at the micro level has been a focus on the weaker sections particularly women for their social defense. SHGs has got great potential in creating awareness, on day-to-day affairs promoting in savings habit, developing self and community assets, increasing the income level, increasing the social power etc. The concept of SHGs generates confidence, self-scrutiny and self-reliance.

1.1 Objective

To study the profile of SHGs.

2. Methodology

The present study was conducted in Wardha district, in Maharashtra state. Out of eight blocks in Wardha district, five blocks were selected for this study. The selected blocks were Karanja, Hinganghat, Selu, Wardha and Deoli. In every block MAVIM and NGO, formed SHGs. Efforts were made to select respondents from MAVIM SHGs, NGO SHGs and NON SHG women from the same village to maintain uniformity in the sample. From each block 30 MAVIM SHG Members and 30 NGO SHG Members and 50 NON SHG Women were selected randomly from the same village. SHG members selected were belonged

Table 1. Distribution of respondents according to age of SHG

S. N.	Age of SHG (in years)	MAVIM SHG Members		NGO SHG Members	
		Total	%	Total	%
1	3 - 5	74	49.3	36	24
2	6 - 8	52	34.7	48	32
3	9 – 11	24	16.0	40	26.7
4	Above 11	-		26	17.3
	Total	150	100	150	100

to the SHGs of three years or above three years old. Descriptive or Survey Research Design was used for present study. Survey questionnaire or interview schedule was used as tool for data collection.

3. Result

Age of SHGs

It was revealed that, great majority 74 (49.3%) in MAVIM SHG Members were belonged to category of 3-5 years age of SHG followed by 52 (34.7%) and 24 (16%) were from category of 6-8 years and 9-11 years old SHGs respectively.

Among NGO SHG Members, most of them 48 (32%) were from the category of 6-8 years age of SHG followed by 40 (26.7%) and 36 (24%) were belonged to the category of 9-11 years and 3-5 years old SHGs respectively.

It was earlier exposed that 71.7 per cent of groups were formed before 10 years, followed by 13.3 per cent completed 8 years, 5.8 per cent completed 7 years and only 1.7 per cent completed minimum of 4 years[1]. The above analysis infers that members of SHG are more co-operative, unity, group strength, and decision-making because of microfinance programme.

Number of members in SHGs

It revealed that among MAVIM SHG Members high numbers of them 78 out of 150 were belonged to the group of having 14-17 members. More over 52 followed by20 were from the group of 10-13 and above 18 members of group respectively.

Table 2. Distribution of respondents according to number of members in SHG.

SN	Members in SHG	MAVIM SHG Members		NGO SHG Members	
		Total	%	Total	%
1	10 – 13	52	49.3	48	32
2	14 – 17	78	34.7	65	43.3
3	Above 18	20	16.0	37	24.7
	Total	**150**	**100**	**150**	**100**

Table 3. Distribution of respondents according to saving amount.

SN	Saving amount per month	MAVIM SHG Members		NGO SHG Members	
		Total	%	Total	%
1	30-50	55	36.67	107	71.33
2	51-100	95	63.33	43	28.67
	Total	**150**	**100.00**	**150**	**100.00**

In the group of NGO SHG Members, large majority of them (65) were belonged to the category of 14-17 members followed by 48 and 37 were from category of 10-13 members and above 18 members category respectively. These results were in line with the results of earlier researchers[2] and observed that all the SHG (Bachat Gat) are having 12 to 21 members in each SHG.

Amount of saving

It was observed that large number of MAVIM SHG Members 95 (63.33%) out of 150 were saving amount of Rs 50-100 per month followed by 55 (36.67%) were saving Rs. 30-50 per month.

Among NGO SHG Members majority of them 107 (71.33%) were saving Rs. 30-50 per month and remaining 43 (28.67%) were saving Rs. 50-100 per month.

These finding were in conformity with the earlier study done in 2015[3]. The result shows that the majority of the members that is about 46 per cent of the respondents are saving Rs. 40 monthly (i.e. weekly Rs.10 each) in the study area because it is not a burden for the members, from small savings itself they try to come out from all the difficulties. Rs.50 is also saved from the respondents that are 28 per cent.

Source of motivation to join SHG

It was noteworthy that large number of MAVIM SHG Members 91 (60.67%) were motivated by supervisors followed by 33 (22.00%) members and 15 (10%) were self motivated and motivated by neighbors'. Very few 2 (1.33 %) members were motivated by family members.

Among NGO SHG Members the same results were obtained that large majority of members 74 (49.33%) were motivated by supervisor followed by neighbor 28 (18.67%), as well as 25 (16.67%) members were self motivated. 12 (8.00%) members and 10 (6.67%) members were motivated by family member and friend respectively. It was encouraging outcome of the study that to motivate rural women to join SHG, supervisors play prominent role.

Similar results were reported previously[4] that 175 respondents out of 250 representing 70 percent reveals that NGOs/Govt. officers and friends were the main motivators to join the

Table 4. Distribution of respondents according to source of motivation

S.N.	Source of motivation	MAVIM SHG Members		NGO SHG Members	
		Total	%	Total	%
1	Self	33	22.00	25	16.67
2	Friend	9	6.00	10	6.67
3	Neighbor	15	10.00	28	18.67
4	Member in family	2	1.33	12	8.00
5	Supervisor	91	60.67	74	49.33
6	Other	0	0.00	1	0.67
	Total	**150**	**100.00**	**150**	**100.00**

group, whereas only 16 percent were the self motivated group members.

Purpose of joining SHG

Study revealed multiple responses of the SHG members. It was an amazing outcome of the study that almost all MAVIM SHG Members 150 opined that they joined SHG to meet financial needs followed by 123 (82%) members told that they wanted to develop habit of saving money. The members 110 (73.33%) which was considerable number joined SHG for business purpose. Some members 56 (37.33%) who were interested in getting new information. And 30 members were joined SHG to make new friends.

Among NGO SHG all the members 150 joined SHG to meet financial need followed by large majority 145 (96.67%) joined SHG to develop habit of saving money. Rest of the members 89 (59.33%) were interested in getting new information. Comparatively small number of members 54 (36%) and 42 (28%) joined SHG for business purpose and to make new friends.

The SHG members stated multiple purposes to join SHG. So the percentage was more than 100.

Frequency of meeting conducted by SHG

Most of the MAVIM SHG Members 149 (99.33%) out of 150 reported that the meeting was conducted once in a month and negligible number 1

Table 5. Distribution of respondents according to purpose of joining SHG

S. N.	Purpose of joining SHG	MAVIM SHG Members		NGO SHG Members	
		Total	%	Total	%
1	To develop habit of saving money	123	82.00	145	96.67
2	Meet financial need	150	100.00	150	100.00
3	Business	110	73.33	54	36.00
4	Get new information	56	37.33	89	59.33
5	Make new friends	45	30.00	42	28.00

Table 6. Distribution of respondents according to frequency of meeting conducted by SHG.

S. N.	Responses of respondents	MAVIM SHG Members		NGO SHG Members	
		Total	%	Total	%
1	Once a month	149	99.33	143	95.33
2	Twice a month	1	0.67	7	4.67
	Total	**150**	**100.00**	**150**	**100.00**

Table 7. Distribution of respondents according to topics discussed in meeting

S. N.	Topics discussed in meeting	MAVIM SHG Members		NGO SHG Members	
		Total	%	Total	%
1	About working of SHG	143	95.33	121	80.67
2	About problems of SHG members.	131	87.33	150	100.00
3	About problems of village	68	45.33	62	41.33
4	Other	5	3.33	8	5.33

(0.67%) of member replied that meeting was conducted twice a month.

Among NGO SHG large majority of members 143 (95.33%) conveyed that SHG conducted meeting once in a month and remaining 7 members reported that the meeting conducted twice a month. The findings were encouraging which indicated that the members were active and interested enough to know about happenings in SHG.

Topics discussed in meeting

It was observed that most of the MAVIM SHG Members 143 (95.33%) recorded that they discuss about working of SHG followed by 131 (87.33%) discussed about problems of SHG members and small percentage of members (45.33%) discussed about problems of village. However very few members 5 (3.33%) discussed other topics.

Regarding NGO SHG members all of them 150 discussed about problems of SHG members in the meeting followed by large majority 121 (80.67%) discussed about working of SHG. More over 62 (41.33%) members discussed about problems of village and negligible number (8) discussed about other topics. The findings revealed that in both the groups SHG members were actively participating in operation of SHG.

The SHG members stated multiple topics discussed. So the percentage was more than 100.

4. Conclusion

Majority of SHG Members were belonged to category of 3-5 years age of SHG and of 6-8 years age of SHG. It leads to stability of SHGs and stable

SHGs move towards empowerment of its members. Majority of SHG Members were belonged to the SHG group of having 14-17 members. Most of SHG Members were saving amount of Rs 50-100 per month and Rs. 30-50 per month. Most of SHG Members were motivated by supervisors. Almost all SHG Members joined SHG to meet financial needs. To develop habit of saving money was secondary purpose. Most of the SHG Members discussed about working of SHG and about problems of SHG members in the meeting.

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Motivational Factors Responsible for Technology Adoption

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Abstract

Motivation leads a person towards a goal and helps him to act in a certain manner to achieve his needs and wants. By motivating the people and by triggering their minds to their basic needs and wants, they can be convinced to adopt new technology. The study was conducted in various regions of Nagpur District. 600 samples were selected by Purposive Sampling technique on Random basis. Data was gathered by the tool Interview Schedule through Survey Method and was analyzed by Percentages. Intrinsic Motivational Factors were more responsible than Extrinsic Factors to lead a person to adopt any new technology.

Key words : Motivation, Intrinsic Motivation, Extrinsic Motivation, Technology adoption.

1. Introduction

A small bird collects the material to build its nest in the corner of the house. One tries to remove it as soon as it is seen. The bird, however, again brings straw, leaves and gets back to building its nest. The same way every morning there is a cobweb in front of the house. Even if it is removed, the next morning it is seen again. What makes the bird or the spider to work so hard? Why did they learn to build the nest or the web? How can they still work without all the obstacles? Answer to these question lies in the key word "MOTIVATION". They do because they are motivated to do so. They act or work in spite of all the obstacles because there is an inner urge which pushes them to build their house or find food. They do because it satisfies their basic need.

Motivation as defined below "is a process that initiates, guides and maintains goal-oriented behaviours. Motivation is what causes us to act, whether it is getting a glass of water to reduce thirst or reading a book to gain knowledge"[1]. As it is clear from the above definition that motivation leads a person towards goal and helps him to act in a certain manner to achieve his needs and wants.

Types of Motivation

1. Intrinsic Motivation

This is also known as Primary Motivation or Universal Motivation. It is present in each and every individual since birth. The need for thirst, hunger or sleep is some of the examples of intrinsic motivation. The way a person

behaves is related to his intrinsic motivation.

2. Extrinsic Motivation

It is just the opposite of intrinsic motivation. As seen in intrinsic motivation-the inner urge which is responsible for a person to act, while, extrinsic motivations are related to the socio-psychological need of an individual. Every person wants to prove his behavior to others in the society. In doing so a person gets satisfaction or recognition. Security, name, fame, status, prestige, praise, rewards and pressure are some of the examples of extrinsic motivation.

Technology is described as "The collection of techniques, skills, methods and processes used in the production of goods or services or in the accomplishment of objectives such as scientific investigation. Technology can be the knowledge of techniques, processes, or it can be embedded in machines which can be operated"[2]. From the above definition it is clear that technology, be it in any form-machine, device, goods or services fulfils the objectives of knowledge and provides benefit to the person using it.

Technology adoption as described is, "a process that begins with awareness of a specific type of technology or device, and progressed through various stages, ending in the use or rejection of that product"[3]. Therefore it is clear that, technology adoption is a process which starts from mental awareness of a product to finally deciding whether or not to adopt that product.

Adoption of technology is important for not only an individual but also the entire community and nation at large. As suggested below, "technology adoption is important because it is the vehicle that allows most people to participate in a rapidly changing world where technology has become a central to our lives. Individuals who won't or can't adopt will increasingly limit their ability to participate fully in the financial and convenience benefits associated with technology"[4].

In India various innovations are being launched for the development of people especially for the rural masses. But it is very obvious, the rural people are illiterate and unaware of all the latest technologies and are resistant to change. The rural people should be made aware of all the latest technologies and happenings around them. In doing so, motivation plays a very important role. By motivating the rural people and by triggering their minds to their basic needs and wants, they can be convinced to adopt a particular technology. This motivation will help a person realize the benefit of innovations and how it can solve their problems.

1.1 Objectives

The present study had the following objectives:

1. To find out the socio-economic conditions of the respondents.
2. To find out the intrinsic motiva-

tional factors responsible for technology adoption.

3. To find out the extrinsic motivational factors responsible for technology adoption.

1.2 Need and Importance of the study

The basic need and importance of the study was to find out the intrinsic motivational factors and the extrinsic motivational factors which are responsible for adopting any new technology. The result of this study will be helpful to sociologists, economists, technology providers, and other community development planners to assist them to incorporate the findings in their future plans.

2. Methodology

The present study was conducted in various rural areas of **Nagpur District** covering East, West, North, South and Central regions. **Purposive Sampling** was used in which only those people who have adopted the predecided home and farm technology were selected. **Random Sampling** was used to select the samples which gave each and every unit of the population an equal opportunity of getting selected. **Survey Method** was used to collect data which comprises of **600 samples** from Nagpur District. **Inter-**

Table 1. Intrinsic Motivational Factors responsible for technology adoption

N = 600

Sr. No.	Factors / Statements	Number	Percentage
	Desire for recognition		
1.	Desire	579	96.5%
2.	No desire	21	3.5%
	Motivation leads to perform better		
1.	Yes	585	97.5%
2.	No	15	2.5%
	Connectedness with the Technology		
1.	Yes	564	94%
2.	No	36	6%
	Environment at home after adoption		
1.	Conducive	462	77%
2.	Not conducive	138	23%
	Traditional Barrier in adoption		
1.	Barrier	129	21.5%
2.	No Barrier	471	78.5%
	Family accepted Technology adoption		
1.	Accepted	531	88.5%
2.	Not accepted	69	11.5%

view Schedule was the tool used to collect data; which was further analyzed with the help of **Percentages**.

3. Results

Characteristics of the respondents

Maximum respondents were found to be of 21-30 years of age, were Hindu and were married. Most of them stayed in joint families and had permanent houses. Many of the respondents have completed their education till Higher Secondary level; their main occupation was farming and earned a monthly income more than Rs. 6000/-. Maximum respondents enjoyed various facilities like electric supply, water connection, toilet and medical facilities. Many respondents have various social organizations available in their area like small scale industries, Mahila Mandal, Anganwadi and Gram Panchayat.

It is revealed from Table 1 that 96.5% of respondents had a desire for recognition after technology adoption. Maximum respondents (97.5%) believed that motivation will lead them

Table 2. Extrinsic Motivational Factors responsible for technology adoption

N = 600

Sr. No.	Factors / Statements	Number	Percentage
	Financial increment after technology adoption		
1.	Increment	468	78%
2.	No increment	132	22%
	Praised for technology adoption		
1.	Praised	441	73.5%
2.	Not praised	159	26.5%
	Feedback facility available		
1.	Available	228	38%
2.	Not available	372	62%
	Interaction with Adopters		
1.	Interacted	192	32%
2.	Never interacted	408	68%
	Social pressure for technology adoption		
1.	Pressure	210	35%
2.	No pressure	390	65%
	Local Leaders helpful in transferring Message		
1.	Leaders helpful	114	19%
2.	Not helpful	486	81%
	Adoption due to Market Influence		
1.	Positive influence	372	62%
2.	No influence	228	38%

to perform better in life. Ninety four percent respondents were connected with their adoption, while 77% of them say that there is a pleasing climate at home after technology adoption. For maximum respondents (78.5%) there was no traditional barrier while technology adoption and 88.5% of respondent's family member had accepted the adoption as well.

As revealed from Table 2 that 78% of respondents had seen financial increment after technology adoption and even got praised (73.5%). Sixty two percent of respondents have opined that there was no feedback facility available to them from the technology providers, which sometimes become a problem. 68% of respondents had never interacted with adopters who had already adopted the same technology. Sixty five percent of the respondents opined that they did not face social pressure for technology adoption. It is sad to see that 81% of respondents' complains that local leaders in their area were not helpful in transferring message related to new technology and 62% of them say that they had adopted new technology due to market influence.

4. Conclusion

Maximum respondents had desire for recognition after technology adoption and felt that motivation led them to perform better in life. Most of them were emotionally connected with their adoption and opined that environment at their home after adoption was conducive and everyone in their family had accepted the adoption without any barrier. Maximum respondents had gained financial increment after technology adoption and were even praised. Most of them adopted the technology due to market influence and never had any social pressure for adoption.For most of the respondents there were no feedback facilities available after technology adoption and they had never interacted with adopters who had adopted the same technology. Most of them have even reported that the local leaders in their areas were not helpful in transferring message related to new technology.

It can be inferred that intrinsic motivational factors were more responsible than extrinsic motivational factors to lead a person to adopt any new technology.

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Work Environment Related Stress and Its Impact on Health amongst Women Employees in Hotels : An Empirical Study

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Abstract

Stress is the emotional and physical strain caused by our response to pressure from the outside world. The medical experts say that there is a strong link between stress and personal health. Occupational stress nowadays is seen as a growing problem. Adjusting to the work place culture can be intensely stressful. Hotels have a typical operating pattern. The employees of the hotels are constantly dealing with guest demand and services. At the same time the nature of job demands lot of physical output from an individual. They also have to work in shifts round the clock. All this takes a toll on their health. Women working in hotels have to go through lot of stress due to nature of job, the timing and their family responsibilities. The present study takes an insight into the stress caused amongst the female employees of five star hotels. The study also investigates on probable causes, effects and ways to improve the stressful conditions. The women employees working low level management were taken as sample for the study. The obtained score through chi-square test shows that stress level of employee are depended on their work pattern.

Key words : Hotel, stress, women employee.

1. Introduction

Stress is the emotional and physical strain caused by our response to pressure from the outside world. Common stress reactions include tension, irritability, inability to concentrate, and a variety of physical symptoms that include headache and a fast heartbeat.

1.1 Stress and Health

The World Health Organization (2004) defines health as a state of physical, mental and social well-being, not just the absence of injury or disease[1]. The link between stress and personal health, according to medical experts, is very strong indeed. Stress plays a role in some of the most serious and life-threatening ailments known to medical science. Most jobs involve at least a degree of stress, yet somehow the persons performing them manage to cope. They continue to function despite their daily encounters with various stressors.

1.2 Workplace Culture

Adjusting to the workplace culture, whether in a new company or not, can be intensely stressful. Making one adapt to the various aspects of workplace culture such as communication patterns, hierarchy, dress code if any,

workspace and most importantly working and behavioral patterns of the boss as well as the co-workers, can be a lesson of life. Maladjustment to workplace cultures may lead to subtle conflicts with colleagues or even with superiors. In many cases office politics or gossips can be major stress inducers.

Occupational stress nowadays is seen as a growing problem which is discussed more and more in the media.

One of the reasons is that costs of stress aroused from work environments that resulted in substantial costs to work organizations and to individual employees in the whole world[2].

It is known that unhealthy work organizations can create very big financial costs. As an example, United States industry loses approximately 550 million working days each year because of absenteeism. 54 percent of absences are in some way stress related that is, created by an unhealthy work environment[3].

WHO (2003) reports, that occupational stress plays an important role in contributing to the large social status differences in health, sickness absence and premature death[4].

Talking about occupational stress it is important to overview the costs of stress at individual and organizational level. At organizational level high level of stress in a workplace might lead to increased absenteeism, conflict and turnover, and reduced quality and quantity of work.

The rising issue of occupational stress places a premium on being able to understand the causes and consequences of work-related stress, so that it would be possible to develop appropriate policies and practices to deal with work-related stress[2]. These facts arises various concerns about what effect this change is having on the well-being and health of employees and their work organizations. For some employees the changing nature of work has led them to greater mobility and more flexible work arrangements, for others it have increased work demands. These changes, in 1990s, have been associated with different aspects such as rapid technological change, increased competitiveness and improved customer service in many work organizations. It was further predicted that the climate of continual change could in future create the type of work organizations that will produce enormous levels of occupational stress[2]. Stress becomes unsafe once excessive level of stress begins to affect ones health and productivity. Employers in any setting therefore have become cautious about the incidences of stress at the workplace both due to commercial and moral reasons. They are trying to adopt management approaches for controlling such stress. The situation is particularly sensitive in the hotel industry as it consists of both intensive labor and involves face-to-face communication with the guests. It has been noticed that both the front office and housekeeping operational staff are susceptible to stress. Due to

the nature of the duties, the front office is more vulnerable to stress[5].

1.3 Purpose of Study

As the hotel industry has a typical way of functioning, the employees are expected to be working 24x7 in very demanding conditions. These conditions cause stress to employees. Women employees go through more stress as their traditional role is also to be played by them at the family front. The purpose of this study is to investigate the various levels of occupational stress on low-level employee's. The study concentrates on the probable causes, effects on health ways to improve the stressfull conditions.

1.4 Aim

To Study Work Environment Related Stress and Its Impact on Health amongst Women Employees in Hotels.

1.5 Objectives

1. To study the work-related stress on the lower level Management employee's (women) in 5 star hotels of Pune.
2. To find out the major causes of stress among the employee's in hotel.
3. To find out the effect of stress on the employee's in hotel.
4. To suggest the ways to relieve the stress.

1.6 Hypothesis

Ho : Stress level of low-level management employees are independent of work pattern.

1.7 Limitations

The study entitled, "Work Environment Related Stress and Its Impact on Health amongst Women Employees in Hotels" has the following limitations:-

1. Limited to Low-level management employees in hotels only.
2. The study has been carried out with limited variables.

2. Methodology

To achieve the aim and objectives of the study the researcher adopted a general survey method to collect the relevant data/material.

2.1 Selection of Area

Researcher has chosen 5 star Hotels of Pune city.

2.2 Sample size

The participants of this study were women hotel employees in Pune city were selected as sample for study only lower-level management were selected as samples further studies. The questionnaire were tested with 1-1 employee's of different departments of the hotel (Front Office, Housekeeping, Food and Beverage and Kitchen) after questionnaire were successfully tested, researcher handed out 80 questionnaires to the employees but only 50 samples chosen, those properly responds.

Primary data : Primary data was collected from selected sample, with the help of a questionnaire

Secondary data : Secondary data

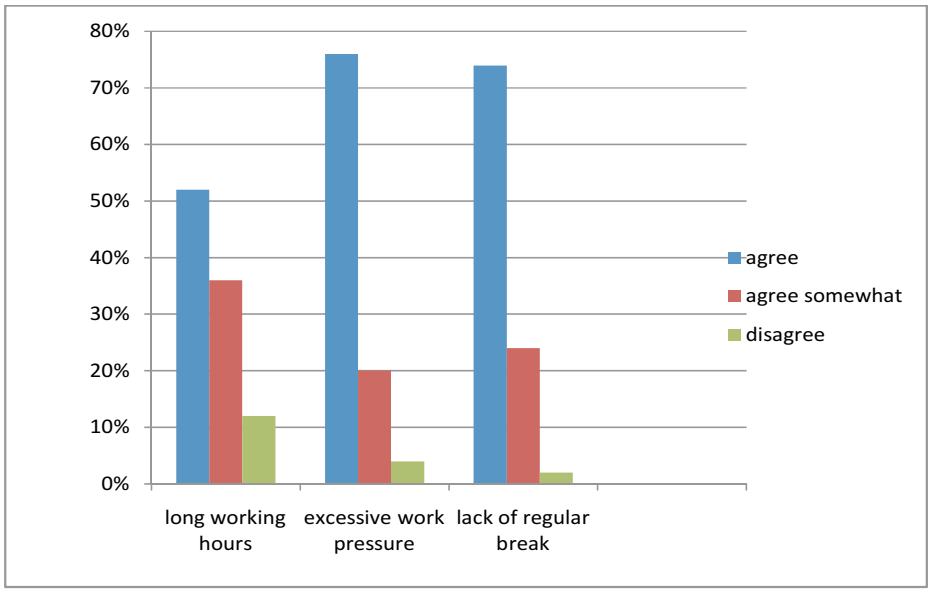

Fig 1. Causes of Stress

was collected through books, journals, and internet.

2.2 Tools Used

The main research instrument that has been employed in this research is the questionnaire. The questionnaire is prepared on the bases of PSSI [Personal Stress Source Inventory] scale. The questionnaire is divided into 3 parts:

Table 1. Effect Of Stress On Health

S.N.	EFFECT	CATEGORY		
		Agree	Agree Somewhat	Disagree
1	Insomnia	80%	12%	8%
2	Blood Pressure	80%	8%	12%
3	Headache	56%	38%	6%

Oi	Work overload	Work underload	Interpersonal relationship	Total
High	30	6	14	50
Moderate	15	6	9	30
Low	11	4	5	20
	56	**16**	**28**	

Ei :

30(28)/60%	6(8)/12%	14(14)/28%
15(16.6)/30%	6(4.8)/12%	9(8.4)/18%
11(11.2)/22%	4(3.2)/8%	5(5.6)/10%

The introductory part includes name, age, department. The second part of the questionnaire is about types of stress, causes of stress and level of stress. The third part of the questionnaire is about effects of stress.

2.3 Data analysis

It is done with the help of information collected through questionnaire. For this purpose a sample size of 50 employees were selected and the results are presented in the tabular and graphical form. Researcher applied chi square test on type of stress and level of stress and find the result that stress level of employee are dependent on work pattern.

3. Results

From the graph above it can be seen that maximum employee agree excessive work pressure create work-related stress while minimum employee disagree with lack of regular break makes them feel exhausted.

From the Table 1 it can be seen that maximum employee agree that work stress affect on their physical health and find symptoms like B.P., headache was also a resultant of work stress.

$\mathbf{x^2}$ = (Oi-Ei)/Ei

$\mathbf{x^2}$ Calculated value = 11.44

$\mathbf{x^2}$ Tabulated value = 9.48

Since, $\mathbf{x^2}$ calculated value > x^2 Tabulated value

The research work reject null hypothesis and conclude that stress level of low-level management employees are dependent of work overload.

4. Summary

The whole study can be summarized as the stress is the emotional and physical strain caused by our response to pressure from the outside world. A common stress reaction includes tension, irritability, inability to concentrate, and a variety of physical symptoms that include headache and a fast heartbeat.

Occupational stress is the physical and emotional responses that occur when employees perceive an imbalance between their work demands and their capability and/or resources to meet these demands or in simple words it is the harmful and emotional responses that can happen when there is conflict between job demands on the employee and the amount of control an employee has over meeting these demands. In general, the combination of high demand in a job and a low amount of control over the situation can lead to stress.

Most of the lower-level employees working in hotel industry face physical and mental stress frequently due to excessive work pressure, irregular breaks, long working hours, work overload, interpersonal relationship, aggressive behavior of guest and working place ambience which affect their work performance and health. The obtained score through chi square test shows that the stress levels of employee depend on their work pattern.

5. Conclusion

The presented study is based on the work-related stress and health among hotel employees, the respondent in the study were the low-level employee who are in the hotel sector. The observations are completely based on their response to a standard questionnaire.

- The main causes of stress are long working hours, excessive work pressure, irregular breaks, work overload, interpersonal relationship, aggressive behavior of guest and working place ambience.
- The major causes of stress through which the maximum employee face stress are lack of regular break and excessive work pressure.
- The minor causes of stress through which the employee face stress are aggressive/violent behavior of guest.
- The major effects of the stress are on the respondent's health included symptoms like headache, increased Blood Pressure, insomnia.

6. Suggestions and Recommendations

- The scholar after the study suggest that the hotel needs implement good working practices of 'ergonomics' in the operations of hotels, that will reduce stress and will have positive effect on health.
- Time to time consultation with ergonomist is suggested.
- Family counselors / physiologists to be regularly consulted.
- The women employees needs to be given due time for breaks during their shifts.
- Providing wellness facilities in the hotel (like yoga, meditation centre) would help in reducing the stress.
- The scholar would recommended future research in the field of actually measuring the effects of stress on the medical condition created due to the same.

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Study of Patalkot for the Upliftment of Primitive Tribe

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Abstract

The purpose of the present work is to save the Bharia community, tradition, language and its culture and to promote tourism, which is slowly going towards the edge of extinction. Bharia Tribe is a Dravidian tribe. The study was carried out for the upliftment and development of Patalkot and Bharia tribe so that a new product can be given to the tourist. They have been given the status of being one of the scheduled tribes of the Indian subcontinent. The tribal development generally refers to the process of improving the quality of life and economic welfare of people living in relatively isolated and sparsely populated areas. Because of the inaccessibility of this area, the tribals of Patalkot were totally cut off from the civilized world. The tribals here lived a self-sufficient lifestyle and rarely ventured out into the outside world. The detailed research work was done at Patalkot and on Bharia tribes. It was observed that local people of Patalkot had poor existing condition and had lot of expectations from the Government. The researcher found that on paper, government had lots of plans to develop Bharia Tribe and different schemes were available for the promotion of Bharia Tribe but it was observed that they were not getting any benefit of the same as it was not reaching to them.

The researcher has strongly suggested that Patalkot has a potential that it can be developed as a Tourist Destination. It was found that at Patalkot cultural, eco, adventure, medical and sustainable Tourism can be developed. Tourism Development will help in increasing the economic and social level of tribal.

Key words : Bharia Tribe, Tourism, upliftment,

1. Introduction

Tourism and Hospitality is a booming industry in India and its third largest net earner of foreign exchange. They are expected to be number one. The boom in tourism industry has led to the development of hospitality sector. Due to immense demand of trained manpower in the hospitality sector, there are great opportunities of career in top notch hotels, retail malls, airlines etc.[1] Tourism in India has received a major boost in the past decade since the Indian Government realized the great potential of tourism in India during the vacations[2].

Patalkot will give you an interesting peek into the life and habits of Bharia tribes that reside in Patalkot. It is of great importance because of its Geographical and Scenic beauty. This forest is significant because it has many medicinal plants and its kind.

It has a lovely landscape located at a depth of 1200-1500 feet in a valley.

Patalkot is a horseshoe-shaped valley and its entrance is from the cliff. It is also home to a tribal culture, skilled using the forest plants to make effective medicines. The Patalkot forest is well hidden that people on the outside did not even know it ever existed. The modern world has been completely unaware of its existence.

'Patalkot' name comes from Sanskrit word "Patal" that means very deep. There is one more belief that after worshipping 'Lord Shiva' Prince 'Meghnath' had gone to Patal-lok through this place only. People say that Kings ruled this place in 18th and 19th Century and that there was a long tunnel connecting this place to 'Pachmarhi' in Hoshangabad District. Patalkot is known for its richness in medicinal plants. The endemic and rare flora and fauna is also found in the region. This valley is covered with tropical forests, which are rich in biodiversity. However the subtropical hill forests are found in few areas. Some of the economically important medicinal plants are on the verge of extinction.(3)

Most of the people belong to 'Bharia' and 'Gond' tribes. Because of the inaccessibility of this area, the tribal of this region were totally cut off from the civilized world. But, with the constant efforts being made by the Government, tribal of this area started tasting the advantages of adopting civilized life.

'Patalkot' is attracting many tourists because of its geographical location, scenic beauty, culture of the people who live here, and the immense and rare herbal wealth. Patalkot remains on its high allure and gorgeousness during the rains. Monsoon is a wonderful time to visit this place. Tourist will be sheltered with clouds all around. Patalkot is a deep valley on the way to Chhindwara from Bhopal. Tourist can halt at Tamia from where Chhindwara remains only 58 kms. From Tamia, Patalkot valley is around 20 kms**.**

1.1 Brief Identification of Patalkot

Area	79 Kms
District	Chhindwara
State	Madhya Pradesh
Total Population	Approx. 3835
Growth Rate	Approx. 22.5%
Language	Gondi
Best Time To Visit	September To March

1.2 Aim

Bharia tribe stays in a particular place, which has its own distinct character and geographical location. The major aim was to study “Promotion of Tourism for upliftment of Primitive Tribe Bharia.

1.3 Objectives

- To conserve Bharia community, culture, natural vegetation and medicinal plant and their habitat.
- To find out the facilities provided to the Bharia tribe by the Government

1.4 Limitations

- The study was limited to Patalkot

in Chhindwara district of Madhya Pradesh due to time and money constrain.

- Local people of Patalkot were uneducated and scared to share details.

2. Methodology

2.1 Selection of Area : The area selected for the study was Patalkot.

2.2 Selection of Sample : The Bharia tribe residing in Patalkot, Tourists visiting Patalkot and government officials involved in the development of Patalkot.

2.3 Data Collection : Primary data was collected through questionnaire and interview technique.

Secondary data was collected through website, journals and books.

2.4 Analysis of Data : The data collected was tabulated and analysed in graphical form.

2.5 Hypothesis : Ho1: There is no significant difference between Accessibility of Patalkot and other popular tourist places that tourists visited.

3. Result and Discussion

The collected data as per the requirement of the study was tabulated and analysed and result was discussed by means of figures and graphs followed by interpretations.

3.1 Types of Occupation

According to Figure 1, 55.91% of the people were farmers, they had their own farms, Apart from cultivation, 23.18% people of this tribe collected various forest products like tubers, roots and fruits to meet the demands of their daily survival. The region where Bharia tribe dwelled was quite rich in

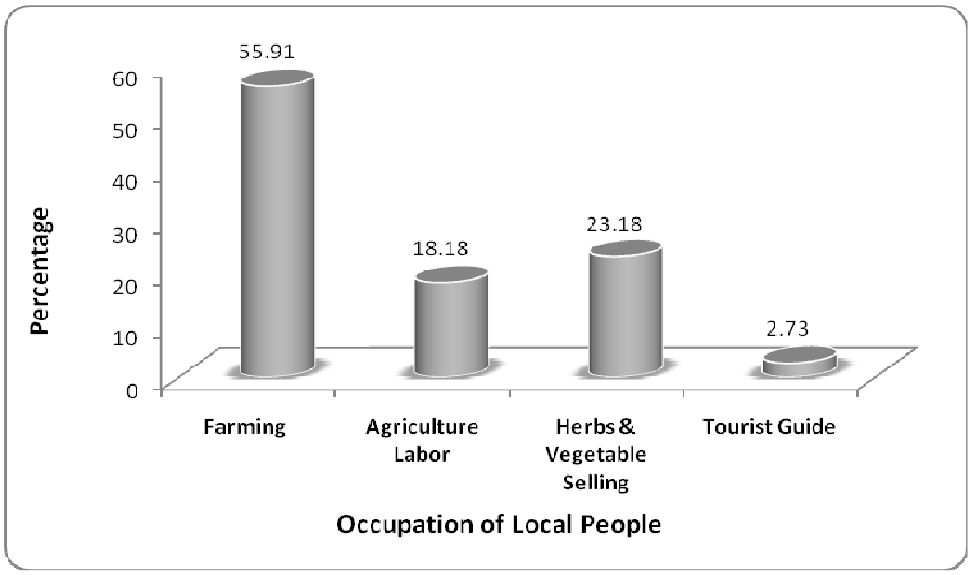

Fig. 1. Types of Occupation

Table 1. Satisfaction levels of Facilities provided

Sr. No.	Facilities	Satisfaction Levels (responses in percentage)					chi-value
		1	2	3	4	5	
1	Food	2.73	26.36	3.64	6.82	60.45	32.82**
2	Water supply	4.09	5	2.73	23.18	65	27.84**
3	Electricity	3.64	4.09	3.64	19.09	69.55	29.45**
4	Medical facilities	4.55	8.18	1.82	25	60.45	26.27**
5	Education for children	2.73	25.45	2.73	27.73	41.36	32.82**
6	Job	3.64	3.18	4.55	53.18	35.45	29.45**
7	Loans	3.64	20	3.64	30	42.73	29.45**
8	Agriculture equipments	3.64	7.73	5.91	25.45	57.27	29.45**
9	Local Transportation	4.55	7.27	13.64	25.45	49.09	26.27**
10	Roads	5	5.45	15.91	34.09	39.55	24.75**
11	Sanitations	3.64	6.82	5.91	32.73	50.91	29.45**

*significant at 0.05, ** significant at 0.01 level.
Scale: 1= Not Satisfied, 2= Partially Satisfied, 3= Dissatisfied, 4= Satisfied, 5=Highly satisfied.

medicinal plants and the tribal people possessed a deep knowledge about them. Rest 18.18% people worked as agriculture laborers, some worked upon bamboo to create beautiful baskets, collection of rock honey, forest products & their major income was from usage of medicinal plants to treat various diseases and other 2.73% people worked as tourist guide.

3.2 Satisfaction Levels of Facilities provided :

Bharia tribe exhibited different levels of satisfaction (marked as 1 to 5) regarding the facilities provided to them.

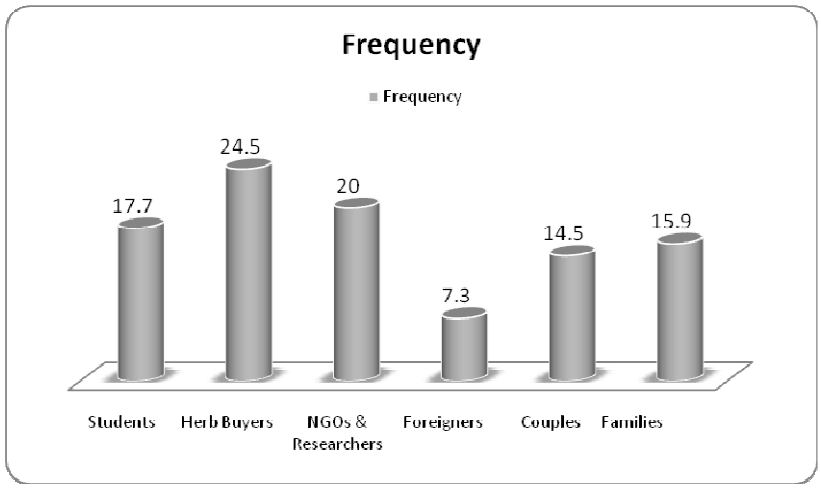

Fig 2. Tourist visiting Patalkot

Table 1 shows the responses of the facilities provided by the Government.

3.3 Tourist visiting Patalkot :

Responses regarding the reasons for the visit are presented in Fig 2.

It can be observed from the Figure 2 that almost 24.5% people visiting Patalkot were Herbal buyers, 20% people are researchers and from NGO. 17.7% of tourists were students who went for one day camp or for other activities and 7.3% were foreigners. 15.9% people were Tourists who came in groups for Leisure activities and 14.5% tourists were couples who visited for relaxation and to enjoy the scenic beauty of Patalkot. It can also be seen that very few families, students and foreigners visited Patalkot. Patalkot, thus, needs proper promotion and development to attract more Tourists.

3.4 Best season to visit Patalkot :

Figure 3 shows that 57.3% people liked to visit Patalkot between January to March. About 17.7% people preferred to visit Patalkot in the month of April to June as they bought medicinal herb in that season. Due to long vacation and pleasant weather 16.4% visited Patalkot in the month of October to December. 8.6% people liked to visit Patalkot between July to September, due to rainy season. In rainy season, at Patalkot, weather is very pleasant due to mountain surrounding with all green lush valleys. Although the weather is one of the important factor to attract tourist, it is not accessible as no proper roads are available to go down the valley.

3.5 Comparative study of Patalkot with other Tourist places

In Table 2 the researcher used the Z test to know the opinion of tourists about the Patalkot and other tourist destination.

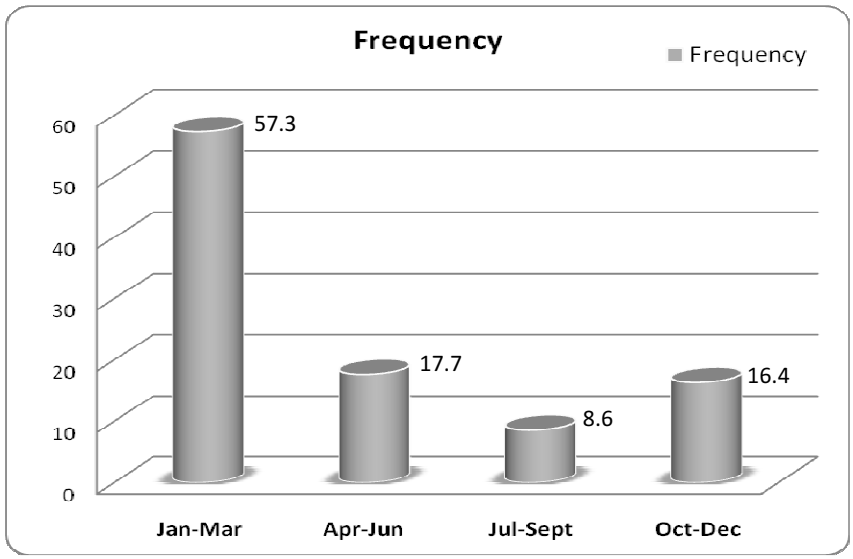

Fig 3. Best season to visit Patalkot

Table 2. Comparative study of Accessibility

Sr. No.	Factor	Mean of Rank	SD of Ranks	Z-test	Signific-ance
1	Accessibility (Patalkot)	2.93	1.28	10.67**	Significant
2	Accessibility (Other visited place)	1.98	0.14		

From Table 2 one can observe that value of Z was equal to 10.67 where as table Z-value of at 1 % level of significance for 209 degrees of freedom is 2.58. Since calculated Z-value was greater than table Z-value, Ho1 was rejected. Thus it can be concluded that there was significant difference between Accessibility of Patalkot and other popular tourist place that tourist visited. Tourist found other tourist place accessibility better than Patalkot.

4. Conclusion

Agriculture is the main occupation at Patalkot, Bharia Tribe is in need of alternate source of income. Facilities which are provided by the government to the local people of Patalkot are not satisfactory. The purpose of the study was to analyze the main tourism attraction in indigenous Bharia tribes, as well as for the development of tribal aboriginal tourism. For promoting Bharia tribal area for tourism, engaging tribal's for tourism related business activities, things that will help the Bharia community are:

- Income to local tribals in sustainable manner.
- Financial support for students for their future.
- Interactions and communication will improve the confidence and skill of Bharia tribes.
- Bharia tribal community can experience various people, so they can find correct way of development from them
- The economy of Bharia tribes will be improved in long run

Tourism will save the Bharia tribes from becoming concrete jungles and on the other gives a firsthand experience of tribal culture to the tourists. Tourism will create a means of income generating activity for tribal's. Tourism has the potential to enhance wilderness protection and wildlife conservation, while providing nature-compatible livelihoods and greater incomes for a large number of people living in the those areas. This becomes more important in case of tribal areas considering the fact that the environment and the originality of tribal culture have to be maintained. Moreover there is also a need to create income avenues for these people[(4)].

Government has to develop this place as eco tourist destination and have to follow the strict rules for the tourist at Patalkot, so as to conserve this place.

5. Suggestions & Recommendations

- Awareness should be created among the host community about the importance of the tourist destination around them.

- To provide self-employment opportunities for local resident government should encourage maximum participation of the host community.
- The physical infrastructure in and around tourist place needs development.
- Government should provide water supply and sanitary facilities.
- Making people participation in the preservation by inculcating a sense of pride among the local community.
- To promote tourism, attract domestic tourist more as they act as spring bond for growth of international tourists.
- Infrastructural development is very important at Patalkot
- Awareness among the local people should be done through different programs
- Promoting measures to be taken by using promotional message and campaigns by the government and Local travel agencies
- On radio and television, Patalkot should be promoted as a new destination
- Create a Facebook page and post something every day to know about the place

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Ayurvedic Pharmaceutical Waste - Source of Vermicompost

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Abstract

The pharmaceutical waste also forms the part of solid waste that is being generated on daily basis through pharmaceutical industries. The solid waste has created many environmental and health issues. The use of vermicompost provides better and easy option for utilization of waste. The present study deals with the use of earthworms in solid waste management for the decomposition of herbal waste of Arjun tree as a part of ayurvedic pharmaceutical waste.

Key words : pharmaceutical waste, earthworms, solid waste management, Arjun tree.

1. Introduction

Plants have been major source of medicines to humans since time unknown. The Indian medicinal practice Ayurveda has been totally based on plants for the preparation of various syrups, ointments, tablets, formulations and decoctions. Human beings are using plants as source of food, fodder, fuel and medicines and as culinary practices.

The medicines are either obtained from various herbs or prepared synthetically and are tend to be expired on the date prescribed by the company. This medical disposal is causing serious threat to human life, ground water, soil. The major portion of pharmaceutical waste includes expired medicines, discontinued medicines, various solid waste used for preparation of medicines and chemicals used for synthetic preparation of medicines. It has been observed that when medicines are prescribed in response to acute or chronic illness only small portion of the active ingredient is metabolized. The non metabolized part is left as it is causing serious threat to humans and environment.[1] It has been reported by Central Pollution Control Board, India registered health care facilities generate 4057 tons of waste/day.[2] It has been reported that India is slowly becoming breeding ground for most of multidrug resistant microbes due to extensive usage and improper disposal of drugs in environment[3].

Indian scenario on pharmaceutical waste largely depends upon use of herbal medicines which are highly organic in nature; but cause serious threat if left untreated[4]. Medicinal waste transfers itself from waste water to sludge or to sediments or from soils to water bodies[5]. Though herbal or synthetic drug waste can be treated by biotic or abiotic methods they still pose threat to

environment.[6] The objective of the present study was to use earthworms for disposal of pharmaceutical waste. It was also aimed to analyze the vermicompost obtained from this waste for various physico-chemcial parameters and enzymes.

2. Materials and Methods

For the present study earthworm species *Eisenia foetida* was used. For this purpose cement pots having capacity of 5 kg were used. Each pot was sprinkled with water periodically to maintain moisture level between 60-70%. The animals in the control and experimental set up were analyzed on 30^{th}, 60^{th}, and 90^{th} day for physico-chemical parameters and enzyme activities.

The collection of material

The herbal waste (Arjun Tree) was obtained from Shri Baidynath Ayurved Bhavan, Ghat Road, Nagpur, Maharashtra State (India). For present study only Arjun Tree was used, however, individual plants and waste from various Ayurvedic formulations can be similarly used as source of vermicomposting.

Arjun tree

The scientific name of Arjuna tree is *Terminalia Arjuna.* It grows up to 20-25 mts. Tall, usually has buttresses trunk and forms wide canopy at the crown. It is usually found on river banks or near dry river beds in Bangladesh, Uttar Pradesh, Madhya Pradesh, West Bengal, South and Central India.

Medicinal Properties

It was introduced in Ayurveda as a treatment for heart disease by Vagbhata[7]. It is used in the treatment of wounds, hemorrhages, ulcers and applied topically as powder. It is excellent in heart treatment and has the capability to even reverse heart failure [8].

Classification

Kingdom - Plantae
(Unranked) - Angiosperms
(Unranked) - Eudicots
(Unranked) - Rosids
Order - Myrtales
Family - Terminalia
Species - *T. Arjuna*
Binomial name - Terminalia Arjuna (Roxb.) Wight & Arn.

Experimental set up

The experiment was divided into various groups depending upon waste type used. Each set of experiment was subdivided into four groups which were one control group C and three experimental groups E-I, E-II and E-III respectively. Control group C was prepared using cow dung and earthworms as mentioned in the table below. Experimental groups were prepared by using three different proportions of Arjun tree waste. Group E-I contained 150g of Arjun tree waste, group-II with 200g of Arjun tree waste and experimetal group-III with 250 g of Arjun tree waste. Each set was taken in triplicate. Twenty earthworms were introduced in the control group and each experimental group also had twenty earthworms.

Table 1. Vermicomposting with Arjun plant tree waste

Materials	C	E- I	E- II	E - III
Cow dung	2000 g	2000 g	2000 g	2000 g
Green matter	500 g	500 g	500 g	500 g
Garden waste	500 g	500 g	500 g	500 g
Arjun plant waste	-	150 g	200 g	250 g
Brick, sand, card board pieces, coconut scrap	3 inch layer	3 inch layer	3 inch layer	3 inch layer
Trichoderma viridiae	15 ml	15 ml	15 ml	15 ml
Azotobacter	5 g	5 g	5 g	5 g

C = control group, E-I = experimental group I with 150g of Arjun plant waste,
E-II = experimental group II with 200g of Arjun plant waste,
E-III = experimental group III with 250g of Arjun plant waste.

Table 2. Study of changes in physico-chemical properties

Parameters	No. of days	Control	E-I	E-II	E-III
pH	30 days	7.00	7.10	7.40	7.30
	60 days	7.10	7.90	7.35	7.25
	90 days	7.15	7.85	7.30	7.10
Electrical conductivity (millisimon/m)	30 days	2.74	2.43	0.81	0.93
	60 days	2.20	2.30	0.95	0.99
	90 days	2.15	2.10	0.88	0.95
Carbon/nitrogen ratio (in %)	30 days	4.41	3.37	2.78	2.32
	60 days	3.99	3.30	2.50	2.35
	90 days	3.90	3.25	2.09	2.36
Phosphorus (kg/hectare)	30 days	615.54	583.69	470.57	427.54
	60 days	645.90	550.75	450.00	400.80
	90 days	600.20	580.90	390.04	450.80
Potassium (kg/hectare)	30 days	557.76	466.36	298.36	334.65
	60 days	590.00	450.90	275.99	350.90
	90 days	540.80	400.50	250.75	321.80

3. Results and Discussion

Study of changes in physico-chemical properties following 90 days of vermicomposting using Arjun tree were undertaken and the results are shown in Table 2. The post experimental analysis was carried out at District Soil Testing and Analysis Laboratory, Agriculture College area, Maharajbag Nagpur. The herbal pharmaceutical wastes are all in organic forms hence can be degraded easily using earthworms. They were analyzed for various physic-chemical parameters such

as pH, electrical conductivity, carbon/nitrogen ratio, phosphorus and potassium content. It has been observed that pH in vermicompost obtained from Arjun tree waste showed insignificance change during 90 days of vermicomposting. The neutral pH indicated towards excellent quality of manure. Similar types of results were also obtained by investigators working with pressmud, sludge and cowdung using earthworm species *Eudrilus Eugeniae* [9].

The electrical conductivity is the movement of ions across the solution. The electrical conductivity in Arjun tree waste showed significant change from 30 to 90 days of vermicomposting. The treatment groups (E-I and E-II) showed higher values of electrical conductivity with lower quantity (100g and 150g respectively) than in experimental group (E-III) with higher quantity; indicating easy movement of ions across the vermicompost. The results obtained from the present study was in accordance to earlier work[10] who used water hyacinth, pineapple waste and corn brat as substrate.

The carbon/nitrogen ratio is an indicator of stable decomposition. The herbal waste showed good quality of this ratio during 90 days of vermicomposting. It has been reported that microflora present in the gut of earthworms increased the emission of carbon in the form of CO_2 and nitrogen was retained as nitrate for the plant growth [11].

Phosphorus is an essential mineral and called as quality mineral required for plant growth. The worms convert insoluble phosphorus into soluble phosphate with the help of phosphate solublizing micro-organisms present in the gut. It has been observed that during initial stages of vermicompost phosphorus content was higher and after 60 days it becomes stable till 90 days of vermicomposting[12].

Potassium is another essential mineral present in vermicompost. The physical grinding of waste in the gut and biological grinding by enzymes help in converting insoluble form of potassium into soluble form[13]. During initial stages of vermicomposting the potassium content was found to be higher and then it becomes stable indicating role of micro-organisms present in the gut of earthworms [14].

4. Conclusion

The present study indicated good quality of vermicompost obtained from Arjun tree waste. The herbal pharmaceutical waste also provides excellent bedding material for earthworm activity and has high absorbency. There was no mortality during 90 days of vermicompost. The neutral pH, lower electrical conductivity, high carbon/ nitrogen ratio, higher values of phosphorus and potassium content can prove the utility of herbal waste as source of vermicompost. Hence vermicompost obtained from this waste is safe and nutritious for plant growth.

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Study of Urban Heat Island Intensity in Nagpur City

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Abstract

Rapid urbanization of recent times has brought many climatological changes in cities around the world, a major one being rise in temperature. Several studies now show that there is a notable difference in temperatures between urban areas and their adjoining rural areas, with urban areas recording higher temperatures. This difference of temperature, called 'urban heat island' greatly impacts thermal comfort and hence lives of residents. This paper focuses on understanding of urban heat island phenomenon and its scenario in city of Nagpur. Measurements of temperatures carried out in different parts of city during study indicate that there is a marked existence of urban heat island in Nagpur city. It was observed that areas having different land-uses indicate different intensities of heat islands. Intra urban heat island intensity was measured to be 3.2 deg C (at 12 pm), while the heat island intensity was measured upto 6 deg C during night hours (9 pm), when compared with Airport station on outskirts of city as reference station.

Key words : Urbanization, Urban heat island, Rural, Thermal Comfort, Land-use

1. Introduction

Cities form the focal point of our social, cultural and economic lives today. Global urbanization is intensifying as large proportion of the global population now lives in cities. Urban areas affect local and regional weather and air quality. The percentage of global urban population may reach 60% by the year 2030. In India 31.99% of population lives in urban areas which is higher by 5% than in 2001 (source : united nations word organization report). Urbanization has brought many challenges like depleting natural resources, deterioration in quality of air and water, climate change, increase in global temperature and changes in cities. This has resulted in climatic conditions termed as urban climate – i.e. conditions in urban areas that differ from rural areas and are attributable to urban development. Urban climates differ from those in rural areas by differences of air temperature, humidity, wind speed and its direction and amount of precipitation.[1] An increased rate of urbanization also results in high growth rate of vehicular population, residential and commercial complexes and industries. This causes significant changes in landuse landover pattern and increase in anthropogenic heat emissions.[2]

The main differentiating parameters between the urban and the rural climates, which affect human comfort are air temperature and wind speeds near street level. These differences are caused by changes in the radiant balance of the urban space, the convective heat exchange between the ground and the buildings, the air flowing above and by the heat generation within the city. Various urban design features play an important role in modifying the regional climatic conditions and creating specific urban climate.

2. Formation of Urban Heat Island

Urban constructions such as buildings made up of cement concrete, roads of asphalt, roofs covered with tiles have much greater heat capacity than natural vegetation. As a result urban structures absorb a large amount of heat during daytime and slowly re-emit this stored heat during the evening and night. The lack of natural vegetation and soil further enhances heat retention by limiting the effectiveness of natural cooling mechanism known as evapotranspiration. The excess heat energy that is absorbed as a result of urban construction and lack of natural vegetation actually raises the average temperature of city by several degrees over that of rural areas[3] and is the main cause of creation of heat island.

The urban heat island intensity (or urban heat island) is typically presented as a temperature difference between the air temperature within the urban areas and that measured in a rural or open area outside the urban settlement. *A heat island* is a dome of stagnant air over the heavily built-up areas of cities[4]. The intensity of a heat island depends on many factors like population density, size and morphology (physical structure) of the city. Major causes leading to formation of urban heat island include[4,5]:-

1. Reduced vegetation in the urban areas.
2. Heat absorbing properties of materials used in urban settings
3. Urban geometry
4. Anthropogenic heat in the form of heat emitted by air conditioners, engines of vehicles etc. and other metrological parameters.

These factors vary from city to city, season to season, time of day and also as per climatic zones. Such drastic changes in urban climate have far reaching consequences and should be addressed adequately to ensure sustainable development. Rise in urban heat island intensities causes thermal discomfort, increases the energy use for cooling, increases health risks and aggravates accumulation of smog due to the existence of high temperatures along with atmospheric pollutants.

Many Indian cities are today facing the problem of increase in air temperature, which directly affect comfort level and quality of life of residents. The magnitude of heat island intensities at Indian cities vary from 0.6 deg C over Vishakhapatnam to 10 deg C over Pune and 9.5 deg C over Mumbai.[6] Central Indian city of Nagpur is

no exception to this phenomenon. This paper focuses on understanding of urban heat island phenomenon and aims to investigate Intra-Urban differences in air temperature in Nagpur city.

3. Research Methodology

Earlier studies have indicated that the land use / land cover (LULC) has most significant influence on urban climate. Based on spatial organization of city, it was therefore decided to consider Land use Land cover as the main variable influencing the urban climate in the city. In the present research, fixed point monitoring stations were located in areas with different land use / land cover patterns, for recording temperature and humidity. The data collected during summer seasons was then analyzed to understand the intra-urban air temperature differences.

3.1 Criteria for selection of measurement sites

Following criteria were used for selecting study area and locations of monitoring stations in different parts of city:

1. Study areas should be representative of different types of LULC patterns existing in city
2. Study area should represent a wide range of urban morphologies.
3. Study area should have uniform surface cover, structure, material and human activities.
4. Study area should not have much variation in temperature within a zone of influence of 100m x 100m.

Field study was carried out in selected zones. Land use consisting of

Table 1. Descriptions of Study Areas

Sr. No.	Study Area	Description
1	Mahal	Highly built up area of old city with few open spaces and narrow lanes. Mixed residential / commercial use
2	Dharampeth	Well planned colony. Built up area = 65-80% of total area. Low as well as high rise buildings, Commercial area, shopping malls, etc
3	Shankar Nagar	Well planned colony with open spaces. Open fields / farms of agricultural university. Built up area 50-65%. Mostly 2-4 storied buildings, predominantly residential area
4	Jayprakash Nagar	Purely residential area – 1-2 story structures with large open spaces. Built up area 30-50%
5	Seminary Hills	Green Area – forest within city limits . 10-20% built up area
6	Maharajbag	Zoo park with cultivation of short grass and shrub
7	Variety Square (Sitabuldi)	Commercial area. Very high vehicle movement

different classes - i.e. residential and commercial activities was used to delineate study areas along with different land covers such as paved area, open area and green surfaces. Land use land cover classification was based on built-up area, building density, green and open area coverage. Built-up area was further sub-classified on the basis of built-up density into following categories: high density, medium density and low density. Based on these, following areas were selected (Refer Table 1).

3.3 Fixed Stations and Measuring Instruments

Field measurements of Air temperature and relative humidity within the street canyons were taken and recorded by the HTC wireless data logger. The data logger is designed with a high accuracy temperature and humidity sensor, providing fast response and stability. Positions of field measurement stations were identified by GPS instruments. All the instruments were calibrated before the experiments. The air temperature and humidity measuring instruments were installed at a height of about 1.5 m to 2.0 m above ground level as per WMO guidelines.[7] Measurement of Air temperature, relative humidity was recorded during the summer season – i.e first week of June 2014. Temperatures were recorded at all monitoring points in all four areas on the same day simultaneously at 3 hours intervals from morning 9 am to 10 pm in night. These timings were considered for analysis because humans are more active during these periods. During this period of survey, sky was clear and winds were calm. Wind speed was very low at 0.4 to 0.8 m/s , and therefore has not been considered for analysis in this study. The Weather Data was obtained from Regional Meteorological Centre, Govt. of India, located at Nagpur Airport.

3.4 Calculations for UHI Intensity

Urban heat island intensity is calculated as a difference between the maximum urban temperature and nearby rural area temperature. As rightly pointed out by *stewart and oke,* the conventional classification of field sites as “urban or rural” has become especially difficult in regions where both cities and country sides are densely populated and land uses are intensely mixed.[8] City of Nagpur is also expanding in all four directions with urban influence, and it is very difficult to find rural site very near to Nagpur. Therefore in the present research, UHI Intensity has been calculated as difference of the temperature at a given study area location and the temperature recorded by meteorological station at Nagpur Airport (baseline temperature) at the same time. The intra-urban UHI intensity has been calculated as difference between temperature at a given study area location and the lowermost temperature recorded at the same time amongst all stations within the same study area.

4. Results and Discussions

The data collected through the fixed point observation display distinguish pattern of temperature (Ref. Table 2 and Fig. 5). Ambient air temperature recorded at all urban stations varied substantially i.e. green areas show lower temperatures whereas commercial and mixed land-use areas show rise in temperature. It was observed that at 9 am, in all the study areas temperature was more or less the same. The temperature started rising slowly after 9 am and reached a maximum between 12 to 3 pm.The maximum temperature of 48 deg C was recorded at Sitabuldi (near Variety square). This is a purely commercial area - heavily crowded with high traffic intensity due to which percentage of anthropogenic heat is more. When compared with Airport station at the same time difference in temperature is observed to be almost 2 deg C. A temperature of 47 deg C was recorded at Mahal, which is old part of the city and has high built-up density and mixed landuse. It was observed that Jaiprakash nagar, which was well planned purely residential area with low rise buildings, recorded a temperature of 42.2 deg C. Lowest temperature of 40 deg C was recorded at a Maharajbagh, which is a densely vegetated area. The intra-urban heat island intensity (UHI) in the study areas was calculated as difference in the average temperature in each of these study areas and the observed temperature at that hour at station, which was found to be lowest amongst all the study areas. The mean intra urban heat island intensity was found to be 2 deg C (mean temperature between 12 to 3 pm).

It was observed that during night time i.e. at 9 pm - Mahal, which is old part of the city and has high built-up density, had highest ambient air temperature of 44ºC. amongst the all study areas. Urban heat island intensity at this time was 6ºC when compared to Airport station which is a reference station, followed by Sitabuldi (4ºC), Dharampeth (3ºC) and purely residential zones Shankar nagar and Jaiprakash nagar (1ºC).

Maharajbagh, which is a zoo with high percentage of vegetation and surrounded by agricultural land recorded a low temperature of 33ºC acting as urban heat sink, with difference of temperature being 4.3ºC when compared to Airport station. The case of

Table 2. Recorded Ambient Air Temperature at Various Stations in Nagpur city

Time	Air-port	Mahal	Dharam-peth	Shankar nagar	Jaiprakash nagar	Seminary hills	Maharaj-bag	Sita-buldi
9 am	37.4	38	38	34.8	37	37.1	37	38
12 pm	43	45.8	45	45.1	44	44.4	44.4	44
3 pm	46.6	46.9	47	46.3	42.5	42.9	40	48
6 pm	41.6	45	43	42	41	38.6	37.1	46
9 pm	38	44	41	39	38.6	34.2	33.7	42

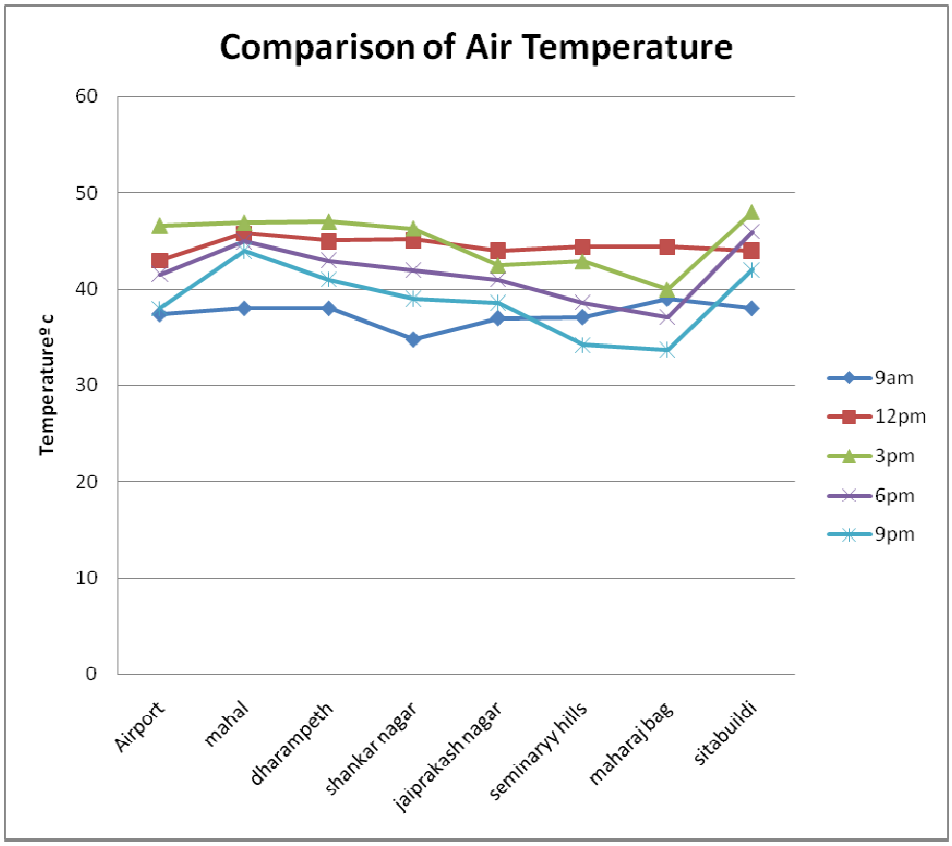

Fig 1. Recorded Temperature in study areas

seminary hills which is also a green area was similar, which recorded a low temperature of 34.2 deg C.

This substantial difference in urban heat island intensity or temperature variation within the study areas of Nagpur city indicates that built-up density and local urban characteristics have a strong influence on the urban heat island intensity.

5. Conclusion

From the study we can conclude that there is an existence of urban heat island in city of Nagpur. It was observed that areas shaving different land-uses showed different temperature i.e. commercial areas such as Sitabuldi which has high traffic density recorded higher temperature and areas such as Maharajbagh and Seminary hills having dense vegetation recorded lower temperatures. This indicates that land-use land-cover significantly affects the urban heat island intensity.

Urban and suburban areas have very high percentage of roofing and paving and lower number of trees and vegetation. The type of roofing and paving materials used are mainly solid and dark and easily absorb and retain heat. The lack of trees also reduces

amount of cooling through evapo-transpiration. Therefore basic strategies to reduce urban heat island intensity shall include increasing the percentage of vegetation and reducing the anthropogenic heat.

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Formulation and Evaluation of Medicated Chewing Gum Using Ginger Extract

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Abstract

In the recent years scientific and technological advancements have been made in the research and development of oral drug delivery systems. The reasons that the oral route achieved such popularity may be primarily due to its ease of administration. Chewing gum is one of the very popular oral confectionary products. It is a potentially useful means of administering drugs either locally or systematically, via the oral cavity. Ginger is one of the most important natural medicinal plants which are used for the various traditional and medicinal purposes in India as well as China, Africa and African countries. Ginger has been used for the centuries to support many various digestive imbalances including, indigestion, nausea, motion sickness, vomiting, diarrhea, coughing, and many other uses. In this formulation chewing gum release the active ingredient into the saliva up to the time as the gum product is masticated. In present work chewing gum formulations were prepared by Ginger extract with synthetic gum base and by using different Plasticizers and sweeteners such as glycerin, dibutyl phthalate, sodium saccharine and stevia. Glycerin batch shows better result than dibutyl phthalate.

Key words : Chewing gum, Ginger extract, phytochemical screening, Motion sickness, Evaluation parameter

1. Introduction

Drug can be administered via different routes of administration to produce a systemic pharmacologic effect. The most common method to administer drug is oral route, in which the drug is swallowed and it enters the systemic circulation. Many therapeutic agents are absorbed in the oral cavity, some drugs have significant buccal absorption, dosage such as lozenges, chewable tablets and chewing gum permits more therapeutic action compared to per oral dosage forms.[1] There are various dosage forms those can be administered orally. Out of which, chewing gum is most popular, which is considered as a drug delivery system to administer active principles that can improve health and nutrition.[2] It is a potentially useful means of administering drugs locally as well as systemically. Chewing gum has been used for centuries to clean the mouth as well as fresh the breath. During the process of chewing the gum most of the drug is released into the saliva and either absorbed through buccal mucosa or is swallowed and absorbed through the GIT.[3] The advantage of buccal route is administration and has direct access to systemic circulation and thus bypasses

the first pass hepatic metabolism and local loss of the drug at site.[4]

In the present work non toxic synthetic gum base has been used in the formulation of medicated chewing gum (MCG) by using Ginger extract. The aim of this work was to formulate, prepare and evaluate medicated chewing gum by using ginger extract for motion sickness. Different excipients such as plasticizer and sweeteners were used for the preparation in varying amount. Trial runs were performed using plasticizers in combination. When plasticizers were used in combination, it was observed that the gum formulations formed were very sticky.

2. Materials and Method

Fresh Ginger (Zingiber officinale Roscoe) was collected and authenticated from the Department of Botany, RTMNU, Nagpur (Herbarium Sheet no- 9941). Synthetic gum base was procured from Gum Pharma, Nagpur. Glycerin, Dibutyl phthalate, Sodium Saccharine and stevia were purchased from LOBA Chemie Pvt.Ltd.

Preparation of Zingiber Officinale Extract[5]

Fresh ginger was collected and authenticated from the Department of Botany, RTMNU, Nagpur (Herbarium Sheet no- 9941). The ginger was then dried in shade, and powdered to coarse consistency. The extraction of dried ginger powder was carried out with petroleum ether (40^0-80^0C), filtered, filtrate was collected and dried the ginger powder. Ginger powder was filled in a Soxhlet apparatus and alcohol was added. It was then heated to reflux till the complete extraction. The liquid extract was collected and evaporated until a brown semisolid extract was obtained.

Phytochemical Screening

1. Detection of alkaloids
2. Detection of carbohydrates
3. Detection of Glycosides
4. Detection of Saponins
5. Detection of Phytosterols
6. Detection of Phenol
7. Detection of Tannins
8. Detection of Flavonoids
9. Detection of Protein and Amino acids

Preparation of TLC

Chromatographic Study of Ginger Extract[5]

Preparation of TLC plate

Prepared the slurry of adsorbent media (silica gel-G) in distilled water and poured the slurry on the TLC glass slide plates to obtain thin layer.

Activation of TLC plate

Heating in oven for 30 min. at 105^0C.

Mobile phase

n-Hexane, Diethyl ether (4:6)

Sample application

Dipping the capillary touched into the solution to be examined and applied the sample by capillary touched to the thin layer plate at point about 2 cm from the bottom. Air dried the spot.

Table 1. Formulation of Medicated Ginger Chewing Gum

S.N.	Ingredients	F1	F2	F3	F4	F5	F6	F7	F8
1	Gum Base	500	500	500	500	500	500	500	500
2	Ginger Extract	300	300	300	300	300	300	300	300
3	Dibutylphthalate	100	150	-	-	100	150	-	-
4	Glycerine	-	-	100	150	-	-	100	150
5	Stevia	100	50	100	50	-	-	-	-
6	Sodium Saccharine	-	-	-	-	100	50	100	50

* Quantities per chewing gum (mg)

Chamber saturation

The glass chamber for TLC was saturated with the mobile phase. Mobile phase was poured into the chamber and capped with a lid, and allowed to saturate for 30 min.

Chromatogram development

After the saturation of chamber and spotting of sample on plate, it was kept in chamber. The solvent level in the bottom of the chamber must not to be above spot that was applied to the plate, as the spotted material will dissolve in the pool of solvent instead of undergoing chromatography. Allowed the solvent to run around 10-15 cm on the silica plate. Plates were removed and examined visually by spraying the vanillin sulphuric acid reagent solution on plate.

R_f = Distance travelled by solute from origin line

Distance travelled by solvent from origin line

Standard Calibration Curve of Ethanol

UV spectroscopy can be utilized for qualitative and quantitative analysis of compound in dosage form. Beer's law suggests that the absorbance at particular wavelength is directly proportional to the concentration of that compound. Determination of the concentration of substance from absorbance is made easy by Beer's curve.

Formulation of Medicated Ginger Chewing Gum

Preparation of Medicated Chewing gum[6]

All ingredients were weighed accurately as shown in Table 1. The gum base was softened or melted and placed in a porcelain dish to which sweeteners, extract and other excipients were added at a definite time. The gum was then set through a series of rollers that formed into a thin, wide ribbon. In a controlled environment, the gum was cooled. This allowed the gum to set properly. Finally the gum was cut to the desired size and cooled at a controlled temperature. After cooling chewing gum pieces were wrapped properly.

Evaluation of Medicated Chewing Gum

1. Physical evaluation of Synthetic gum base:

i. Colour
ii. Softening point.

2. Physical evaluation of formulated medicated chewing gum:
   i. Colour
   ii. Stickiness
   iii. Thickness
   iv. Weight variation
   v. Percentage drug content
   vi. In-vitro drug release studies
3. Stability studies of optimized formulated medicated chewing gum

3. Results and Discussion

Preparation of Ginger Extract

The dried ginger powder was extracted with solvent like ethanol. The dried extract was used for phytochemical examination as shown in Table 2.

Table 2. Preliminary Phytochemical Screening of Ginger extract

Constituents	Petroleum ether	Ethanol
Alkaloids	+	+
Glycosides	_	+
Flavonoides	+	+
Phenolic groups	+	_
Triterpenoids	_	+
Proteins	+	_
Amino acid	+	+
Steroids	+	_
Carbohydrates	_	+
Saponins	+	+
Tannins	_	+

(+) indicate presence, (-) indicate absent

Isolation of Ethanolic Extract of Ginger

Evaluation by TLC:

TLC of ethanolic extract of Ginger

Stationary Phase : Silica Gel G

Mobile Phase : n-Hexane: Diethylether (4:6)

Spraying agent : Vanillin-Sulphuric acid reagent

After spraying with Vanillin-Sulphuric acid reagent a Brown - yellow zone at R_f 0.44 was observed. In TLC studies, a spot was found at 0.44 showing Brown -yellow colour. The spot of reference standard of Gingerol was 0.4. So the spot at 0.44 may be of Gingerol as shown in Table 3.

Table 3. Isolation of Ethanolic Ginger Extract

Spot No.	Colour of spot after elution	Colour of spot after spraying	R_f value std.	Observed value
1.	Brown	Brown – yellow	0.4	0.44

Standard Calibration Curve of Ethanol

UV spectroscopy can be utilized for qualitative and quantitative analysis of compound in dosage form. As the Beer's law suggests absorbance at particular wavelength is directly proportional to the concentration of that compound, determination of the concentration of substance from absorbance is made easy by the Beer's curve.

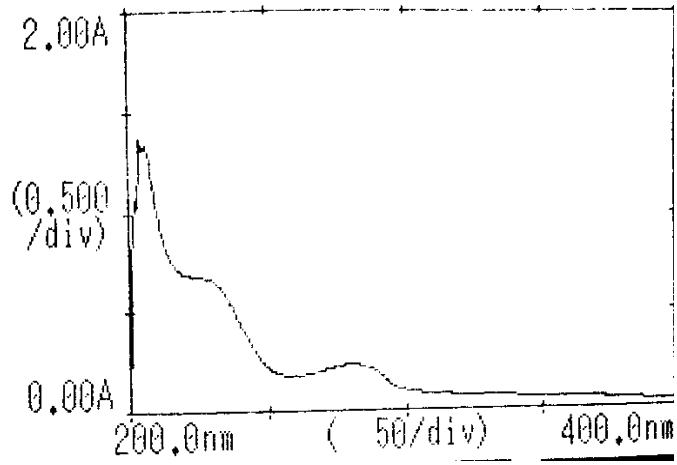

Fig: 1: Scans of Ethanol in Phosphate Buffer and in Ethanol in a ratio of 9:1

Scan of ethanol in phosphate buffer and in ethanol in a ratio of 9:1

The λ max of ethanol was found to be 280.5 nm in phosphate buffer & in ethanol in a ratio of 9:1 as shown in Fig. 1.

Calibration Curve of Ethanol

As describe earlier, standard calibration curve was prepared for concentration of 10 µg/ml, 20 µg/ml, 30 µg/ml, 40 µg/ml, 50 µg/ml, 60 µg/ml, 70 µg/ml, 80 µg/ml, 90 µg/ml and 100 µg/ml at 280.50 nm. The graph of absorbance v\s concentration was plotted and data was subjected to linear regression analysis. The standard calibration curve of ethanol with buffer pH 6.8 & in ethanol in a ratio of 9.1 was depicted in Fig 2 (Table 4). The data of absorbance is shown in Table 4 and Fig 2. The correlation coefficient was found to be 0.999 and equation of regression line as y= 0.003x - 0.015.

Table 4. Calibration Curve of Ethanol using Phosphate Buffer pH 6.8 and Ethanol at ratio of 9:1

Sample no.	Concentration (µg/ml)	Absorbance
1	10	0.021
2	20	0.052
3	30	0.090
4	40	0.118
5	50	0.160
6	60	0.184
7	70	0.226
8	80	0.259
9	90	0.291
10	100	0.330

Evaluation of Medicated Chewing Gum

1. Physical evaluation of synthetic gum base

The synthetic gum base was evaluated physically for following parameters and is mentioned in Table 5.

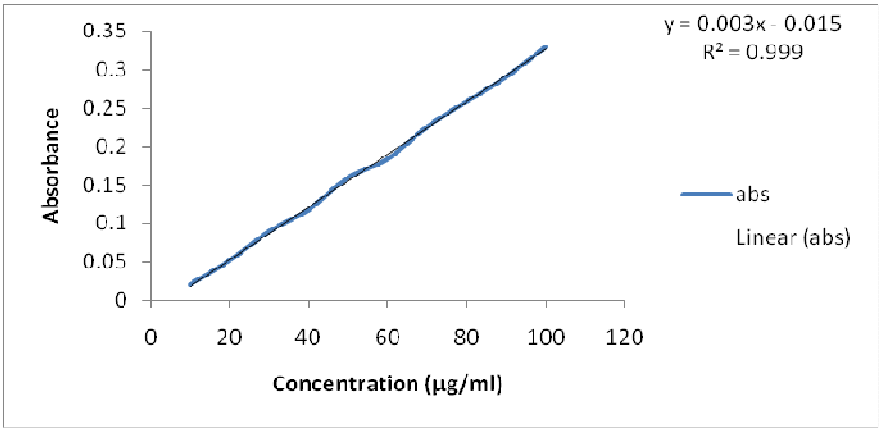

Fig 2. Graph of Calibration Curve of Ethanol

Table 5. Physical Evaluation of Synthetic Gum Base

Sr. No.	Properties	Observation
1.	Colour	Pale yellow
2.	Softening Point	55^0C -60^0C

1.1 Colour

Colour of synthetic gum base was observed Pale yellow.

1.2 Softening point

Softening point of synthetic gum base was observed by heating the base in porcelain dish. The temperature at which it starts melting is the softening point of that base. It was found to be 55^0C - 60^0C.

2. Physical evaluation of medicated chewing gum

The formulated medicated chewing gum was evaluated physically for following parameters and are mentioned in Table 6.

2.1 Colour

The colour of formulated medicated chewing gum was observed visually and all the batches were brown in colour which was acceptable.

Table 6. Physical Evaluation of Medicated Chewing Gum

Sr. No.	Batch	Colour	Stickiness	Thickness (mm)	Weight variation (mg)	% Drug content
1	F1	Brown	Non Sticky	2.18 ± 0.1	1000 ±0.080	49.11%
2	F2	Brown	Non Sticky	2.17 ± 0.1	1000 ±0.092	49.86%
3	F3	Brown	Non sticky	2.14 ± 0.2	1000 ±0.094	70.22%
4	F4	Brown	Non sticky	2.17 ± 0.2	1000 ±0.092	73.11%
5	F5	Brown	Non sticky	2.16 ± 0.2	1000 ±0.091	47.53%
6	F6	Brown	Non sticky	2.13 ± 0.2	1000 ±0.090	48.22%
7	F7	Brown	Non sticky	2.14 ± 0.2	1000 ±0.084	62.22%
8	F8	Brown	Non sticky	2.16 ± 0.2	1000 ±0.090	64.88%

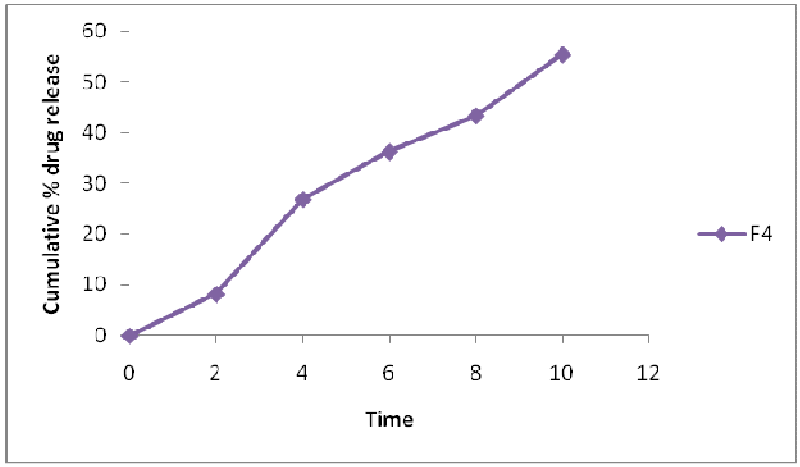

Fig 3. Cumulative % Drug Release F4

2.2 Stickiness

The formulated medicated chewing gum was placed on plain surface. A mass of 250gm was hammered on it up to 10 min. The frequency of hammering was about 30/min. None of the batch stuck to hammer or surface.

2.3 Thickness

Thickness of medicated chewing gum was determined by digital thickness gauge and the average thickness was found to be in the range of 2.14 to 2.18 mm.

2.4 Weight variation

Medicated chewing gum from each batch was individually weighed on analytical balance, the average weight and standard deviation were calculated which was found in acceptable limit.

2.5 Percentage drug content

One gram of the formulation was taken in mortar; to this about 20 ml of pH 6.8 phosphate buffer was added and triturated. This was transferred in to a conical flask. About 30 ml of pH 6.8 phosphate buffer was added to this and shaken well. It was filtered and the filtrate was made up to mark with the same buffer. Suitable dilutions were made and the drug concentration was determined by measuring the absorbance at 280.5 nm. The percent drug content was found to be 73.11% for Batch F4.

2.6 In-vitro drug release studies

The release study was carried out using Franz diffusion cell. The receiving compartment was filled with pH 6.8 phosphate buffer (to maintain sink condition). The system was maintained at $37\pm0.5^{0}C$ by magnetic stirrer. The dialysis membrane was put between the donor and the receptor compartment. 1gm of the formulation was added to the donor compartment. 1 ml of sample was withdrawn from the receptor compartment and replaced with 1 ml of fresh pH 6.8 phosphate buffer at intervals of 2, 4, 6, 8, 10 hrs. Col-

Table 7. Cumulative % Drug Release

Sr. No.	Time	Cumulative % drug release							
		F1	F2	F3	F4	F5	F6	F7	F8
1	0	0	0	0	0	0	0	0	0
2	2	4.31	5.11	6.94	8.20	2.14	2.96	3.95	3.38
3	4	31.66	33.96	11.31	26.90	15.25	0.06	15.77	12.41
4	6	29.22	33.68	25.62	36.29	21.50	21.48	37.80	33.74
5	8	34.56	38.98	42.72	43.42	27.92	25.48	41.51	44.20
6	10	36.03	40.72	45.31	55.45	35.48	32.56	48.39	50.40

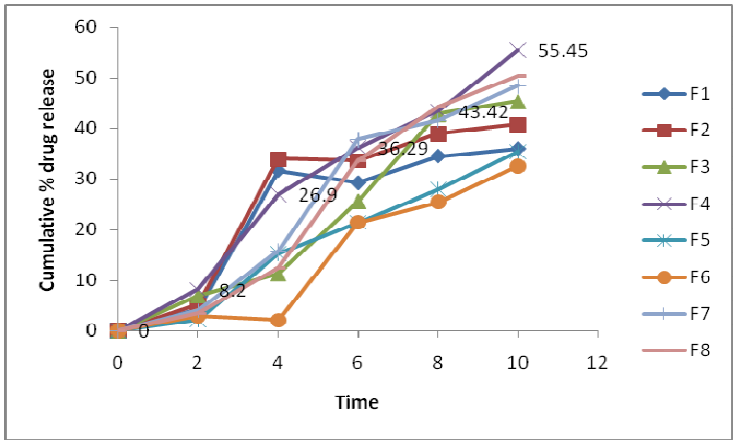

Fig 4. Cumulative % Drug Release F1 to F8

lected samples were estimated by UV-Visible spectrophotometer at 280.5 nm.

2.7 Stability studies of synthetic gum base

The batch F4 has showed maximum % drug content and all acceptable parameters as compared to other batches and also maximum percentage cumulative drug released. Hence, stability study was performed on optimized batch F4. In the stability study, stability of gum was checked by keeping formulation at different atmospheric conditions viz. at $40^0 \pm 2^0$C at 75% RH ± 5% RH for one month in stability chamber as shown in Table 8.

Table 8. Stability Studies of Optimized Batch F4

Sr. No	Properties	Observation
1	Colour (Initial)	Brown
2	Colour (After one month)	Light Brown
3	Softening point (Initial)	55^0C -60^0C
4	Softening point (After one month)	55^0C -60^0C
5	% drug content	70.22%

3. Conclusion

The present work was aimed to develop the medicated chewing gum

by using Ginger extract as a new drug delivery system, for motion sickness with fast onset of action. Chewing gum formulations were prepared using synthetic gum base and different plasticizers and sweeteners such as Dibutylphthalate, glycerin, sodium saccharine and Stevia in varying concentration. 8 different MCG formulations were evaluated for different parameters like stickiness, thickness, weight variation, percent drug content and in vitro drug release study were performed. All the batches of MCG pass these evaluation parameters. To get specific quantification of the in-vitro drug release studies it can be carried out using Chewing gum apparatus (ERWEKA DRT). From in vitro drug release data it was concluded that drug release from the medicated chewing gum was satisfactory. Batch F4 containing glycerin as plasticizer and Stevia as a sweetener was found to be the best formulation in all respect and hence was selected for the stability studies which showed good results.

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The Global Burden of Dyslipidemia in the Developing World

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Abstract

Dyslipidemia is the medical term for an imbalance of cholesterol in the bloodstream, and is a major risk factor in developing cardiovascular disease. There are several types of cholesterol in the body-HDL is commonly called "good" cholesterol, and is vital to a person's health. LDL, or "bad" cholesterol, can accumulate on the walls of arteries, increasing the risk of cardiovascular events like heart attacks (myocardial infarctions), angina (chest pain), and stroke. The most common form of dyslipidemia is an excess of LDL cholesterol. A person's lifestyle can affect their cholesterol levels—obesity, inactivity and poor diet increase the amount of harmful LDL cholesterol in the bloodstream, and smoking can lower beneficial HDL levels. There are certain diseases that cause an increased risk of dyslipidemia, such as diabetes. Diabetics are more likely to develop dyslipidemia and are up to four times as likely to experience a heart attack or stroke. Dyslipidemia, however, can affect otherwise healthy individuals and they are labeled as at risk group if family history is reported. A healthy diet and regular exercise have been shown to help, but medications called "statins" that lower bad cholesterol remain essential to be effective treatment of dyslipidemia. If untreated, those with dyslipidemia are more likely to suffer heart attacks, strokes, and other cardiovascular events. Dyslipidemia can be fatal, and many of those affected may not experience any symptoms. It is of the utmost importance, therefore, that dyslipidemia is studied closely, as innovative treatment strategies hold the key to effective management of this deadly condition.

Key words : Dyslipidemia, Cardiovascular disease(CVD), High density lipoproteins(HDL), Low density lipoproteins(LDL), Statins.

1. Introduction

The increasing urbanization and mechanization occurring in most countries around the world is associated with changes in diet and behaviour, in particular, diets are becoming richer in high-fat, high energy foods and lifestyles more sedentary. High levels of obesity often coexist in the same population (or even the same household) with chronic under nutrition especially in many developing countries undergoing economic transition. Increases in obesity over the past 30 years have been paralleled by a dramatic rise in the prevalence of diabetes.[1]

The second half of the 20th century has witnessed major shifts in the pattern of disease, in addition to marked improvements in life expectancy; this period is characterized by profound changes in diet and lifestyles which in

turn have contributed to an epidemic of non communicable diseases. This epidemic is now emerging, and even accelerating, in most developing countries, while infections and nutritional deficiencies are receding as leading contributors to death and disability. Because unbalanced diets, obesity and physical inactivity all contribute to heart disease, addressing these, along with tobacco use, can help to stem the epidemic.[2]

Prevailing mortality rates are the consequence of previous exposure to behavioural risk factors such as inappropriate nutrition, insufficient physical activity and increased tobacco consumption. Overweight, central obesity, high blood pressure, dyslipidaemia, diabetes and low cardio-respiratory fitness are among the biological factors contributing principally to increased risk. Unhealthy dietary practices include the high consumption of saturated fats, salt and refined carbohydrates, as well as low consumption of fruits and vegetables, and these tend to cluster together.[3]

Anthropometric parameters are commonly used as research tools to assess the non-communicable disease risk factors in the populations as they are inexpensive and easy to monitor at the community level**.** Currently used general and central obesity anthropometric measures for assessing adiposity related risk include BMI, waist circumference (WC), Hip circumference (HC), waist-to-hip ratio (WHR) and body adiposity index. BMI or WC is most commonly used to measure body fatness.[4] Mortality rates increase with increasing degrees of overweight, as measured by BMI. As BMI increases, so too does the proportion of people with one or more co morbid conditions. In one study in the USA, over half (53%) of all deaths in women with a BMI>29 kg/m2 could be directly attributed to their obesity. A recent report by the World Health Organization concluded that, where possible, abdominal obesity should also be measured and used in conjunction with BMI to assess and predict disease risk.[5]

The National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) defined metabolic syndrome as the presence of any three or more of the following five criteria: waist circumference (WC) 102 cm for men, 88 cm for women; fasting glucose (FG) 110 mg/dL; plasma TG 150 mg/dL; HDL-C, 40 mg/dL for men, 50 mg/dL for women; and blood pressure 130/85 mm Hg or treatment for hypertension. A major advantage of using these criteria is that the metabolic factors making up this definition are relevant to clustering of risk factors observed in Asian Indians and are routinely measured in clinical practice.[6]

2. Unhealthy Lifestyle

Lifestyle is a way used by people, groups and nations. According to WHO, 60% of related factors to individual health and quality of life are correlated to lifestyle.[7] Malnutrition, unhealthy diet, smoking, alcohol consuming, drug abuse and stress are presentation of unhealthy lifestyle.

Addiction is considered as an unhealthy lifestyle. A longitudinal study shows that 30% of people between 18-65 years old smoke permanently.[8]

2.1 Faulty eating habits

A meta-analysis has shown that glucose and lipid metabolism are strongly related and a high carbohydrate diet, which contributes to disorders of glucose metabolism, increase plasma triglycerides and decrease in HDL-cholesterol. It is suggested that local eating habits, lifestyle patterns and consumption of high caloric foods are predisposing factors of obesity. A diet high in carbohydrates has been associated with overeating and the risk of obesity. Some researchers reported the effects of high carbohydrate consumption on being over-weight in which triglyceride concentrations appear to be greater in men than women.[9] Previous work separated the effects of weight loss and carbohydrate restriction. The study clearly confirmed that carbohydrate restriction leads to an improvement in atherogenic lipid state in the absence of weight loss or in the presence of higher saturated fat. In distinction, low fat diet seemed to require weight loss for effective improvement in atherogenic dyslipidemia.[10]

2.2 Physical inactivity

Physical activity is an important determinant of body weight. In addition, physical activity and physical fitness (which relates to the ability to perform physical activity) are important modifiers of mortality and morbidity related to overweight and obesity. Furthermore, high fitness protects against mortality at all BMI levels in men with diabetes. Low cardiovascular fitness is a serious and common co morbidity of obesity, and a sizeable proportion of deaths in overweight and obese populations are probably a result of low levels of cardio-respiratory fitness rather than obesity per se. Fitness is, in turn, influenced strongly by physical activity in addition to genetic factors. These relationships emphasize the role of physical activity in the prevention of overweight and obesity, independently of the effects of physical activity on body weight[3]**.** Earlier work on observational and clinical trial data suggested that as little as 30 min/day of moderate-intensity physical activity could reduce the incidence of type 2 diabetes and cardiovascular events. The mechanisms that underlie these protective effects included the regulation of body weight; the reduction of adiposity, insulin resistance, blood pressure, dyslipidemia, and inflammation; and the enhancement of insulin sensitivity, glucose tolerance, and fibrinolytic and endothelial function.[11]

3. Anthropometry

It has been revealed that dyslipidemia significantly increased with age, and is significantly associated with obesity. Body mass index was not a predictor for any type of dyslipidemia. Waist/height ratio was the significant predictor for all types of dyslipidemias, and its use was recommended for

screening and follow up of dyslipidemic patients. It is easy, inexpensive, and can be used by all health team members, as well as other persons, with minimal training.[12] In another cross sectional study conducted in Taiwan concluded that waist to hip ratio (WHpR) was a better predictor for cardiovascular risk factors than body mass index, waist circumference and waist to height ratio.[13]

4. Metabolic Syndrome

Impaired glucose tolerance and insulin resistance associated with pronounced central/abdominal obesity are especially prevalent in people of South Asian origins, which places them at high risk for coronary heart disease (CHD) and type 2 diabetes. Asian Indians tend to have higher glucose levels in fasting and in response to oral glucose load, lower fasting plasma high-density lipoprotein cholesterol (HDL-C), and high fasting plasma triglyceride (TG) levels. This clustering of risk factors appears to have its basis in insulin resistance associated with increased propensity towards central/abdominal obesity.[14]

4.1 Diabetes

Diabetes mellitus (DM) is a major risk factor for the development of cardiovascular disease (CVD). Diabetes increases as a consequence of changes in lifestyle, including physical inactivity and unhealthy diet. Physical inactivity and obesity have been well recognized as major lifestyle related risk factors for diabetes. Cardiovascular disease (CVD) is the most threatening complication of diabetes. While the leading cause of mortality worldwide, it is three to four times more common in diabetics than non-diabetics individuals. The most common disorder that besets type 2 diabetic subjects is coronary heart disease (CHD). Irrespective of the ethnic background the risk for CHD among diabetic subjects is greater by a factor of 2 to 4 compared to non-diabetic subjects.[4] A study of fifty uncomplicated diabetic patients was taken-up by previous researchers[15] to see how often hyperlipidemia was associated with diabetes mellitus. There was a high incidence of hyperlipidemias among uncontrolled diabetic patients. There was no significant correlation between the duration of diabetes and the tendency for abnormal lipid profile pattern. In both Type 1 DM and Type 2 DM groups the serum triglycerides showed a significant elevation. The serum total cholesterol and serum LDL cholesterol also showed a definite elevation. The serum HDL cholesterol showed a decrease in both Type1DM and Type2DM patients.

4.2 Obesity promoting factors

Both obesity and dyslipidemia appear to develop from an interaction of genotype and the environment. This interaction involves the integration of social, behavioral, cultural, physiological, metabolic, and genetic factors.

4.2.1 Eating behaviours

Eating behaviours that have been linked to overweight and obesity in-

clude snacking/eating frequency, binge-eating patterns, eating out, and (protectively) exclusive breastfeeding. Nutrient factors under investigation include fat, carbohydrate type (including refined carbohydrates such as sugar), the glycaemic index of foods, and fibre. Environmental issues are clearly important, especially as many environments become increasingly ‘‘obesogenic’’(obesity-promoting). The relationship between dietary fats and CVD, especially coronary heart disease, has been extensively investigated, with strong and consistent associations emerging from a wide body of evidence accrued from animal experiments, as well as observational studies, clinical trials and metabolic studies conducted in diverse human populations. Saturated fatty acids raise total and low-density lipoprotein (LDL) cholesterol, but individual fatty acids within this group, have different effects**.** Overweight and obesity is one of the leading risk factors for mortality, estimated to account for 23% of the ischaemic heart disease burden. [3]

4.2.2 Fat distribution

Fat distribution, apart from overall obesity, is an important risk factor for type II diabetes and cardiovascular diseases. Most studies use the waist-to-hip ratio (WHR) for measuring fat distribution, or simply the waist circumference because the waist circumference alone is more strongly correlated to visceral fat than the WHR.[4] Visceral fat has been shown to be strongly correlated to components of the metabolic syndrome, and is generally assumed to be a causal factor by releasing free fatty acids into the portal vein. However, results are not consistent, and some studies showed abdominal subcutaneous fat to be more strongly associated. A high WHR is generally taken to indicate an excess of visceral or abdominal fat, however, it can also be due to a smaller hip circumference. Therefore, recent studies have investigated the separate contributions of waist and hip circumferences to the glucose levels and type II diabetes. A larger waist circumference has been known to be associated with higher glucose levels and risk for developing type II diabetes. In contrast, a larger hip circumference was consistently associated with lower glucose levels and risk of type II diabetes, independently of waist circumference. These results also remained after adjustment for age and body mass index (BMI), possibly indicating a protective role of a larger hip circumference. However, the underlying mechanisms explaining these associations are still unclear. [16] Both total fat mass and regional fat masses have been proved to be predictors of CVD risk and abdominal fat mass was generally the strongest predictor of both CVD risk factors and stroke events.[17]

4.3 Dyslipidemia and Hypertension

Dyslipidemia and hypertension are the two widely recognized independent key risk factors for development of CVD and these may constitute Metabolic syndrome (MetS). Therefore, they can serve as an easy clinical ap-

proach to know persons at greater risk for the timely interference directed to decrease CVD events. [18]

4.4 Dyslipidemia and Atherosclerosis

Accumulation of fatty deposits lead to the narrowing of blood vessels (e.g. atherosclerosis) obstructing blood supply to the vital organs like brain, heart etc and causing stroke, cardiac failure etc. Lipid changes can cause deposits of fatty plaque in arteries and results in the CVD**.** Nevertheless, glucose plays a crucial role by glycating the proteins in whole body including LDL. Therefore, any disturbance in the normal metabolism of glucose and/or glycation, particularly that resulting from altered insulin functionality has serious consequences. [4]

5. Global ethnicity linked with dyslipidemia

The Asian metabolic syndrome is the constellation of adverse metabolic and clinical effects of insulin resistance. Recently published guidelines on its definition now make convenient and reliable diagnosis possible. Anthropometric and biochemical parameters have evolved into reliable indicators for predicting the incidence of cardiovascular disease as they are inexpensive and easy to monitor. [19]

5.1 Asians vs Non-Asians

Studies have reported higher prevalence of lipid abnormalities among Asians compared with non-Asians. Low HDL cholesterol and high TG concentrations have been implicated as possible independent predictors of CVD and the combination of these two conditions are called as atherogenic dyslipidemia.

Dyslipidemia is a primary, widely established as an independent major risk factor for coronary artery disease (CAD). Asians differs in prevalence of various lipid abnormalities than non-Asians. South Asians are facing growing “epidemics” of obesity and dyslipidemia. Preponderance of abdominal obesity, more intra-abdominal and truncal sub-cutaneous adiposity, fat deposition in liver (fatty liver) and skeletal muscles.[20] South Asian general populations wrap an elevated incidence of cardiovascular risk factors and earlier onset of cardiovascular disease (CVD) in spite of a normal body mass index as per international values. It is expected that individuals of Indian Asian ethnicity will account for 40-60% of global CVD burden within the next 10-15 years. It has been hypothesized that higher risk observed in this ethnic group can be due to underlying genetic susceptibility unmasked by environmental factors and excess accumulation of visceral body fat in adult life. The metabolic abnormalities associated with increased visceral fat; raised triglycerides (TG) and low high density lipoprotein (HDL) cholesterol are more prevalent in individuals of South Asian origin. [21]

5.2 Indians more prone to CVD

Cardiovascular disease (CVD) is the leading cause of death worldwide, and mortality due to CVD is higher in

low and middle-income countries. Different and lower cut offs for BMI and waist circumference, and specific guidelines for diet and physical activity have been advocated for Asian Indians.[20]Asian Indians have a higher prevalence of low HDL cholesterol and lower prevalence of high cholesterol than non-Asian Indians, which suggests impaired reverse cholesterol transport. These findings suggest the importance of high TG and low HDL cholesterol in Asian Indians compared with high cholesterol, which is more prevalent in western countries, which may have therapeutic implications.[21] In India, there has been an alarming increase in the prevalence of CVD over the past two decades so much so that accounts for 24% of all deaths among adults aged 25–69 years. Asian Indians have been found to develop CVD at a younger age than other populations. The likely causes for the increase in the CVD rates include lifestyle changes associated with urbanization and the epidemiologic and nutritional transitions that accompany economic development. Dyslipidemia has been closely linked to the pathophysiology of CVD and is a key independent modifiable risk factor for cardiovascular disease. While Asian Indians are known to have a unique pattern of dyslipidemia with lower HDL cholesterol, increased triglyceride levels and higher proportion of small dense LDL cholesterol, there have been no large scale representative studies on dyslipidemia to assess the magnitude of the problem in India. The estimation of the prevalence of dyslipidemia will ensure proper planning of health care resources for both primary and secondary prevention of CVDs. [22]

The prevalence of coronary heart disease (CHD) is known to be very high among Indians both in India and abroad. Moreover, CHD among Asian Indians occurs at least a decade or two earlier than that seen in Europeans. The precise aetiology and mechanisms leading to the development of CHD catastrophe among Indians (both in India and migrants elsewhere) remain incompletely understood. Yet it is quite clear that some risk factors of atherosclerosis (considered to be the leading cause of CHD) are particularly prevalent among the Asian Indian population namely, insulin resistance, glucose intolerance, central or abdominal obesity, hypertriglyceridaemia, and increased level of low density lipoprotein cholesterol (LDL-c). Factors such as genetic predisposition (which appears to be mediated by elevated levels of lipoprotein (a) or Lp(a) and apolipoprotein (E) or Apo (E)) as well as changing lifestyle (including physical inactivity) may also increase the coronary risk profile among Indians both in India and abroad.[23]

6. Conclusion

There is now a large, convincing body of evidence that dietary patterns and the level of physical activity can not only influence existing health levels, but also determine whether an individual will develop chronic diseases such as cardiovascular disease and

diabetes. These chronic diseases remain the main causes of premature death and disability in industrialized countries and in most developing countries. Encouraging omega-3-fatty acid consumption, increasing dietary fibre intake, fruits, vegetables, cereals, oats, whole grains and legumes are good sources of soluble fibre. Good food source of antioxidant are carotenoids, whole grains, citrus fruits, melons, berries and dark orange/yellow, leafy green vegetables, vitamins C and E which may lower CHD risk. They may also act as supplements.

Developing countries are demonstrably increasingly at risk, as are the poorer populations of industrialized countries. There is a need for data on current and changing trends in food consumption in developing countries, including research on what influences people's eating behaviour and physical activity and what can be done to address this. There is also a need, on a continuing basis, to develop strategies to change people's behaviour towards adopting healthy diets and lifestyles, including research on the supply and demand side related to this changing consumer behaviour. Beyond the rhetoric, this epidemic can be halted -the demand for action must come from those affected. Nutrition education and lifestyle modification are the supreme modes to reach the target groups.

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Critique on Real Ecotourism Development with reference to Nagpur District

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Abstract

Ever wondered what is real Ecotourism? It is a useful concept, but not a well-defined one or may be misinterpreted one. Ecotourism is more of a catchword in tourism industry. Many consider it like a fashionable trend with less substance. In developing countries and in India it is mostly believed as 'visiting to natural areas specially bestowed with wildlife i.e. to forest, sanctuaries and national wildlife parks'. Hence many state governments have tendered ecotourism custody to their respective forest departments- who are doing exemplary work in forest conservation and ecotourism development to some extent. But does all ecotourism practices by community participants are observed here? What about other panoramicscenic serene areas which needs conservation, protection and sustainable development inclusive for its locals? Why not the tourism development corporation identify such spots in their states and perform real ecotourism practices? Nagpur district has many untapped exotic green areas, why notthese areas sustainablydeveloped and promoted as ecotourism destinations. With all these probes in mind a preliminary study was conducted and its critique cited here.

Key words : Development, Hard/ Real Ecotourism, Carbon footprint, Forest Department.

1. Introduction

For many countries tourism is an industry of great economic significance; tourism is seen as a main instrument for regional development, as it stimulates new economic activities. Tourism may have a positive impact on the balance of payments, on employment, on gross income and production, but it also has negative effects, particularly on the environment. Unplanned and uncontrolled tourism growth can result in such a deterioration of the environment that tourist growth can be compromised: we are left with the phenomenon known as "tourism destroys tourism". The environment, being the major source of tourist products, should therefore be protected in order to have further growth of tourism and economic development in the future: ecotourism, sustainable tourism and sustainable economic ecotourism development should be reflected upon.[1]

TIES - The International Ecotourism Society defines Ecotourism as "responsible travel to natural areas that

conserves the environment and improves the well-being of local people." This means that those who implement and participate in ecotourism activities should follow the following principles.

- Minimize impact.
- Build environmental and cultural awareness and respect.
- Provide positive experiences for both visitors and hosts.
- Provide direct financial benefits for conservation.
- Provide financial benefits and empowerment for local people.
- Raise sensitivity to host countries' political, environmental, and social climate.
- Support international human rights and labour agreements.[2]

Different people use different definitions for ecotourism itself, and hence draw different boundaries between ecotourism and relevant sub-sectors like Nature based tourism, Adventure tourism, Wildlife tourism, Cultural Tourism.

Ecotourism as narrowly defined above is part of much broader tourism product sector which includes the nature, wildlife, adventure, cultural and perhaps also farm and rural tourism. It is only the environment management, education, local people economic development and conservation components distinguish ecotourism.

Visiting to national parks, wildlife sanctuary or biological reserves is not Ecotourism but can be referred to as NEAT as little emphasis to other components of Ecotourism is administered here. Most of the growth of NEAT is increasing in and around national parks. Since NEAT is increasing best-practice in environmental management is becoming increasingly significant. This includes minimal impact education and interpretation. Hence ecotourism may act as catalyst.[3]

Table 1. Related product terms: Sub-sectors

Term	Meaning
Nature or Nature-based	Any kind of tourism where features of the natural attraction provide the primary attraction
Wildlife	Tourism where the main attraction is the opportunity is to watch the wild animals
Adventure	Tourism where the main attraction is an outdoor activity with an excitement-based component
Cultural	Tourism that focuses on exposing or introducing tourists to different local cultures
ACE	Aggregate term: Adventure- Culture- Ecotourism
NEAT	Aggregate term: Nature, Eco and Adventure- tourism
Outdoor	All forms of tourism that take place outdoors: essentially the same as NEAT, but including the high impact and consumptive tourism such as motorized vehicles, hunting, etc.

Table 2. Characteristics of hard and soft ecotourism as ideal types[4]

Hard	**Soft**
(Active)	**(Passive)**
Strong environmental commitment	Moderate environmental commitment
Enhancement sustainability	Steady-state sustainability
Specialized trips	Multi purpose trips
Long trips	Short trips
Small groups	Large groups
Physically active	Physically passive
Few if any services expected	Services expected
Emphasis on personal experience	Emphasis on interpretation
Make own travel arrangement	Rely on travel agents and tour operators

1.1 Understanding Real Ecotourism Concept

The emergence of ecotourism in the mid-1980s is closely associated with the Mexican consultant Hector Ccballos-Lascuråin, who defined the sector as involving travel 'to relatively undisturbed or uncontaminated natural areas with the specific object of studying, admiring and the scenery and its wild plants and animals, as well as any existing cultural aspects (both past and present) found in these areas'. This oft-quoted definition captures two criteria - nature-based attractions and educational or appreciative motivations.

1.2 Hard and Soft Manifestations

While recognition of the comprehensive/minimalist distinction is a recent development in the literature, a distinction between 'hard' and 'soft' dimensions of the sector is long established as both a theoretical and empirical construct. As depicted in Table 2, hard ecotourism is essentially a form of alternative tourism involving small groups of ecotourists who take relatively long specialized trips into relatively undisturbed settings where opportunities for physically and mentally challenging experiences are available. Hard ecotourists typically do not rely on facilitating sectors such as travel agencies and tour operators, or services at the destination. Soft ecotourists are associated with a more conventional tourist market that engages in mentally and physically unchallenging ecotourism experiences as a short duration component of a multi-purpose trip. They generally prefer a high level of comfort and facilitation during these experiences.

There are few guidelines which should be followed by all travellers, community participants and others who are a part of ecotourism activity, which are :

- Counteract your Carbon Footprint - by planting and avoiding, minimizing use of carbon emission vehicles.
- Reduce, Reuse, Recycle all natural

resources.

- Follow proper waste disposal procedures (dry and wet waste segregation, composts)

1.3 Ecotourism Development at Nagpur District

Places, spots having natural beauty and potential to attract tourists are usually ignored in terms of its holistic development and maintenance. There are some good places near Nagpur at the rural areas which can be framed as ecotourism spots to create the economic ripples of community development. Places to name like Mansar, Ramtek-Khindsi, Navegaon and Nagzira, Totladoh, Ambakhori, Adasa, Khekranala, Ambhora, Chandpur - Itiadoh lake, Mahakali Dam, Bordam, Waqi Wooda, Pench Tiger Reserve, Umred Karhandla Wildlife Santuary, Pavnar, Pauni, etc. Its tourism potentiality is underestimated and overlooked due to the casualness of the community partners.

After the primary study of some selected spots it was observed that the ecotourism development has been authorized to Maharashtra Forest Department, Nagpur Territory for conservation in forest areas of Nagpur. Rest of the tourist spots are left unnoticed by the Maharashtra Tourism Development Corporation, Nagpur. Nagpur Forest Department has undertaken some ecotourism development, the spots are:

The Pench Tiger Reserve - At about 70 km from Nagpur along the Mumbai-Jabalpur Highway, Pench Tiger Reserve is home to a variety of flora and fauna. It is spread across the borders of Maharashtra and Madhya Pradesh, and Pench is about 257.23 km^2 in area. The Reserve gets its name from the Pench River that flows, north to south, 74 km through the reserve. Administratively, the Tiger Reserve is divided into 3 Forest Ranges; Karmajhiri, Gumtara and Kurai, 9 Forest Circles - Alikatta, Dudhgaon, Gumtara, Kamreet, Karmajhiri, Kurai, Murer, Rukhad, Pulpuldoh, 42 Forest Beats and 162 Forest Compartments. The NH 44 (old NH 7), runs between Nagpur and Jabalpur along the eastern boundary of the reserve for around 10 km.[5]

Bor was declared as a Tiger Reserve in August 2014. It is one of the latest and smallest tiger reserves in the country. Bor Tiger Reserve is situated along the southern boundary of Nagpur district and northern boundary of Wardha district of Maharashtra, and extends over an area 61.10 sq. kms excluding the reservoir. It represents the floral and faunal wealth of Satpuda-Maikal landscape. It was a game reserve which was subsequently declared as wildlife sanctuary in 1970 to conserve its rich bio diversity[6].

Umred Karhandla Wildlife Sanctuary, about 58 km from Nagpur, spread over Pauni, Umred, Kuhi and Bhivapur Taluka. This Sanctuary has also connection with Tadoba Andhari Tiger Reserve through forest along Wainganga River. The sanctuary is home to resident breeding tigers, herds of Gaur, wild dogs and also rare animals like

flying squirrels, pangolins and honey badger.

From the last few years, the numbers of tourists are increasing because it is very close to the Umred and Nagpur city. The sanctuary provides connectivity between key tiger reserves like Tadoba, Pench, Bor and Nagzira. It thus also serves to reduce pressure of tourists and tourist-related activities from those protected areas because they are more Eco sensitive.

Starting a few years, several water management programs have been created by tiger protection NGO Wildlife Trust of India (WTI). About 100 km of motorable road have been developed out of which tourists are allowed on 44 km. The Forest department has trained about 20 villagers from the nearby and surrounding areas as guides which provides them employment. The main entrance of the sanctuary is at Karhandla village.[7]

To conclude, unravelling the forest areas there are also lakes, picnic spots and places of tourist interests within driving distance of Nagpur city viz. Waki woods, Khindsi, Ramtek, Adasa, Khekranala, Zilpi Lake, Ambhora, etc. which should be noticed and developed as sustainable ecotourism spots by the concerned officials with all the community participants fulfilling their responsibility.

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