



# JIGYAASA

A Multidisciplinary  
Research Initiative of KC College, Mumbai  
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## Chief Editors

Dr. Sagarika Damle

Dr. Shalini R Sinha

H(S)NC Board's  
KISHINCHAND CHELLARAM COLLEGE  
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### **Editorial**

*The ambitious project of harnessing the undergraduate student's potential as a future researcher, and imbuing in them the thirst for conducting research methodically and analytically, resulting in insightful and precise research outcomes - is the primary goal of the two major research platforms at KC College, the Science Honors Program-SHP and the Certificate Programme for Commerce and Arts-CPCA. This current research volume is a compendium of selected research papers illustrating case studies based on research projects of the students enrolled in the above-mentioned programmes.*

*The first volume marks a new beginning of presenting multidisciplinary research including the scientific data, methodology, observations, and conclusions of a variety of research projects that have been completed by the students of both SHP and CPCA under the tutelage of their Teacher Guides.*

*The chapters include interesting research papers from different fields such as Biotechnology, Life Sciences, Microbiology, Chemistry, Physics, Statistics, Social Sciences, Commerce and Humanities. These articles bear testimony to the efforts taken by the research guides and students, at the same time serving as a stepping stone for the future batches of students who might be inspired to carry forward certain interesting possibilities of their predecessors and discover yet another life lesson.*

*We are sure that the readers would enjoy the chapters that include topics ranging from the Brexit and its Impact upon Indian Economy to the Use of Ultrasonic Sensors in a walking cane used by a blind person. After going through these well written, research-based articles, one would understand the importance of inculcating the true spirit of enquiry at an early stage of their undergraduate years. Existence of such compendiums indicate the confidence generated in students who are publishing their research work to the outside world and is ready to defend the outcome in front of the external scholars and scientists as the reviewers.*

*The excitement and interest generated by these two projects has led us to hope that more insightful research will be carried in the years ahead*

*and more research volumes of Jigyasa will be published, showcasing the research orientation and critical thinking abilities our young 'Jigyasus' at KC College. As was once said by the noted author, Antoine De Saint Exupery, "As for the future, your task is not to foresee it, but to enable it". Our efforts with this volume of Jigyasa is to enable our future Jigyasus to develop research capabilities involving formalized curiosity coupled with creative insights*

**Foreword**

*The fountainhead of genius is curiosity. The eighteen-month Jigyaasa Journey provided amazing insights into research processes to the undergraduate students. They learnt to think what nobody else had thought of in the research process. They developed an instinct for truth by being into scientific research, failing but not giving up. If we look at the Science Honors Program initiated back in 2004, we realise that it's not the intellect that makes a researcher but it's character that does so. Today, we can see how Jigyaasa - Curiosity - has created opportunities, empathy and growth. Like Albert Einstein said, "I have no special talent. I am only passionately curious."*

*Research knows no country because knowledge belongs to humanity and is the torch that illuminates the world. We see our students carrying the torch forward into the world. UGC applauded the research done by our students as The Best Innovative Practice. The UGC recognition was a catalyst in inspiring our Arts and Commerce Departments to initiate similar opportunities for their students. That led to the Certificate Program in Arts and Commerce (CPCA), initiated in 2014. Both these programmes had mentors guiding the students in planning their research methods and executing them systematically.*

*We can see how both these programmes developed values, life skills and other learning too in the undergraduate students through various modules such as social and environmental awareness, personality development, empathy for gender issues, and awareness of current issues. Some of our research projects have gained recognition at National and International levels through publications in peer-reviewed journals. However, our aspiration was to bring up a series of Periodical Research Volumes that could provide insights to readers, and motivate our young students into research work and avenues that are available in various disciplines of Science, Arts and Commerce in K. C. College.*

*I am truly happy to see the First Volume of Jigyaasa for the year 2017 – 2018 being published with an ISBN. I congratulate the mentors*



*and students and wish them the best for their persistent efforts in the exciting journey of Jigyaasa. The most rewarding quest to learn anything is curiosity. If you are curious about something, go ahead and do it. It will lead you to new paths of discovery.*

*Best wishes and a great life ahead.*

**Dr. Hemlata K. Bagla**

Principal,

Kishinchand Chellaram College, Mumbai

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## SECTION I - LIFE SCIENCES

### CHAPTER 1 - EXPRESSION OF STRESS RESISTANT GENE -HVA22 IN *S. CEREVESIAE*.

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#### INTRODUCTION

- Aloe vera is a succulent plant which can withstand abiotic conditions like drought and extreme temperatures. It belongs to family Liliaceae. It is a sturdy plant that with-stands abiotic stress such as extreme temperature and drought conditions. Drought and high salinity are the most important environmental factors that cause osmotic stress and dramatically limit plant growth and crop productivity (Boyer, 1982). Aloe is known to possess tolerance to cold stress and a DREB1-Drought Resistant Ethylene Binding Gene 1 has been isolated from Aloe vera and characterized (Yang-Meng Wang, 2007). Aloe has heat resistant genes hsp70, hsp100 and ubiquitin genes (Huerta C Freire M, 2012). Homologue of HVA22 is found in aloe vera.
- HVA22 -a highly inducible gene for Abscisic acid and environmental stress in Barley. Its yeast homolog, Yop1p, functions in vesicular trafficking and in the endoplasmic reticulum (ER) network in vivo.
- The yeast *Saccharomyces cerevisiae* is the most sophisticated eukaryotic model for recombinant DNA technology. One of the main reasons is that the transmission genetics of yeast is well understood. In yeast, another important advantage is the availability of a circular 6.3-kb natural yeast plasmid. This plasmid, which has a circumference of 2  $\mu\text{m}$  , known as the “2-micron” plasmid. It forms the basis for several sophisticated cloning vectors. This yeast plasmid is transmitted to the cellular products of meiosis and mitosis.

- Features such as a life cycle with isomorphic haploid and diploid phases, the formation of tetrads in meiosis, a short generation time, and the ability to grow in defined media forms the fundamentals of yeast methodology.
- Considering the above characteristics, yeast is selected for learning about the expression of Yeast homolog gene HVA22 by carrying out yeast transformation.

## **METHODS AND REQUIREMENTS**

- Lithium acetate method for yeast transformation
- Lithium method is developed by Ito et al and was published in 1983.
- Lithium acetate is used to permeabilize the cell wall of yeast for use in DNA transformation
- One of the important findings was that monovalent cations such as Na<sup>+</sup>, K<sup>+</sup>, Cs<sup>+</sup> and particularly, Li<sup>+</sup> enhances the transformation efficiency of intact *S. cerevisiae* cells. It was found that incubation of intact cells with polyethylene glycol (PEG) and plasmid DNA is essential for transformation and short-term incubation of intact cells with PEG and plasmid DNA at 42°C (heat shock) enhances the transformation efficiency and transformation of the cells is most effective at the mid-log phase.
- Schiestl and Gietz increased the efficiency of the alkali cation protocol to 100 000 transformants / µg plasmid DNA by using single-stranded carrier DNA in the transformation mixture.

### **Requirements:**

**Culture of Microorganisms** - Yeast strains of *Saccharomyces cerevisiae*, Plasmid DNA (HVA22 homolog from Aloe Vera)

**Equipments & apparatus** - Incubator, micropipettes, Test tubes, agar plates, etc.

**Chemicals & Media** - Lithium acetate, Tris-HCl, EDTA, Polyethylene glycol, Dimethylsulphoxide, YPD media, Sabouraud’s broth, Salmon sperm DNA.

**YPD media composition:**

- For 1 L media, 10gm yeast extract, 20gm peptone, 20 gm dextrose, 1000ml distilled water.

**Sabouraud’s broth:**

- In mg/L 40 gm dextrose, 10gm peptone, 15 gm agar, 1000ml distilled water

PERIOD OF STUDY	ACHIEVABLE TARGETS
<b>Term 1: - Oct 2015 – Feb 2016: (5 months)</b>	Referencing.
<b>Term 2: - Mar. 2016 – Sep. 2016: (6 months)</b>	Finding out the optimal growth conditions for lab yeast strain. Ordering for chemicals.
<b>Term 3: - Sept 2016 – Jan 2017: (5 months)</b>	Carrying out yeast transformation.

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## **CHAPTER 2 - EFFECT OF COMMERCIALY AVAILABLE FOOD COLOUR ON THE DEVELOPMENT OF CHICK EMBRYO**

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### **ABSTRACT**

The analysis of toxicants in commercially available food colours is an upcoming area of research. It is believed to have adverse effects on the health of humans and animals alike due to increased consumption and biomagnification. This study involves checking the effects that synthetic food colours have on the developing chick embryo, the choice of this model organism was unanimous as it shared considerable sequence homology with human beings in the early stages of development. The effects, positive or negative, that these commercially available food colours had on various morphological characteristics and biochemical parameters like protein content and total lipid content was the highlight of this study.

One of the major challenges was to establish a stable culture after the infusion of synthetic food colours. This proved to be quite daunting hence in order to reduce the mortality rate a pilot experiment of culturing shell less embryos were carried out which progressed to become a separate experiment in itself simultaneously. Shell less cultures were found to be useful in studying the various developmental stages of the developing embryo and various other developmental processes including organogenesis. Hence it was plausible to correlate the differences in

development with the experimental shelled cultures or control shelled cultures.

**KEY WORDS:** Food colour, chick embryo, toxicants, shell less cu

## **INTRODUCTION**

The link between colour and taste is logical. A lot of natural foodstuffs are altered by the addition of food colour and various synthetic processes that eventually earn them a label called “processed food”. These synthetic additions usually have harmful consequences. High concentrations of synthetic food colour present in processed food usually cause abnormalities. The study of these harmful repercussions that prolonged consumption of synthetic food colours has on human health is gaining an impetus in recent times. The model organism used for this comparative study is the chick embryo. It is primarily preferred over all the other organisms as it is easy to access and observe and is therefore an attractive model to study developmental processes. In the early stages of development, chick embryo morphology is very similar to human, both are amniotes and their development is very similar. Also the chicken and human genomes share considerable homology. Experiments in chicken, which examine the function of genes, have helped elucidate the underlying mechanisms of human genetic diseases and provide a basis for testing novel therapies.

Synthetic food colours often have hazardous chemicals or toxicants whose effects might not manifest at reduced concentrations but might have adverse consequences due to repeated consumption and increased retention of these toxicants. Effects of the popular food additive sodium benzoate on neural tube development was studied in chick embryo. Neural tube obstruction was detected on microscopic examination in one embryo in one of the groups to which 20mg/kg of sodium benzoate was administered. (16). Effects of Monosodium glutamate on chick embryo development was observed after the treated eggs were infused with 0.1ml of MSG solution (0.75 MSGmg/gm, egg weight) in the air chamber before incubation. MSG is a natural excitatory neurotransmitter in the brain. The artificial form of MSG is used as a food additive and

flavouring agent. Prolonged and increased consumption has found to cause intense bleeding, retardation of growth, subcutaneous bleeding, abnormal hernia and other congenital malformations in an average 10-day old embryo. (11)

Though shelled cultures form an ideal experimental set up to observe various malformations and developmental changes during the course multiple ministrations of chemicals, both toxic and nontoxic, at the end of their development they don't quite allow one to observe the changes taking place during the course of development.

Shell less cultures on the other hand enable one to observe the normal development of the embryo outside the egg shell thereby providing an insight on how development proceeds in a egg.

Previous studies in establishing a shell less culture have been carried out for a variety of reasons. Shell less cultures act as an alternative in vitro model to study various induced malformations and to study the normal development that takes place within a shelled culture. Experimental studies on animal models play essential roles in the development of preventive, diagnostic and therapeutic procedures for diseases in a wide spectrum of fields (7)

Shell less chick embryos at the selected stages of development were treated with varying concentration of glucose in saline in order to observe the tolerance of the embryo towards increasing external supplementation. This aided in correlating the various glucose induced malformations observed to the effects it might have on larger mammals or humans on increased or repeated consumption. (21)

Culturing of embryos outside the shell is referred to by students as "chicks-in-plastic," "chick-in-a-cup," or "the omelette lab," allows contiguous observation of living chick embryos from day 3 to day 18 of incubation. Differentiation of organ systems and extra-embryonic structures as well as pre hatching behaviour can be studied by students from grade school to college. (20)

A shell less chick embryo culturing technique reproduced under local circumstances achieved the goal of demonstrating shell less chick embryo culturing as a potential experimental model in the field of developmental anatomy. The embryos were found to survive for a period of 15 days after which their survival rates vary. The most advanced age reached in the project was day 19 of embryonic life. (9)

This field of research is gaining an impetus in recent times as the mass production commercially available food colours, especially a few that are not approved by the FDA is on the rise. This often causes the addition of various toxicants under the pretext of improving the shelf life, taste of flavour of a particular food item. This study aims at studying the effects that synthetic food colours have on the developing chick embryo and the main objectives of this study were to study the effect that synthetic food colours have on the developing chick embryo for a period of six days and maintenance of shell less cultures in order to study their survival rate.

In the past various model organisms have been used to study effects of teratogenic substances. The embryonic zebra fish was used to study the effects of environment toxicants on its behaviour (14). Human relevant sugar levels of added sugar consumption have shown to increase female mortality and lower the rate of male fitness in mice (12). These experiments suggest that model organisms are manipulative, easy to work with and the effects of various toxicants and other nutritional supplementations can be correlated with the adverse effects they might have on humans.

## **MATERIALS AND METHODOLOGY**

### **Procurement and Acclimatization**

Fertilized eggs which were a few hours old were bought from Aarey dairy farm, Goregaon. The eggs were then allowed to acclimatize at 40 degrees for a period of 24 hours. Thus, the age of the eggs at the beginning of establishment of shell less cultures and infusion of synthetic food colours was approximately 32-36 hours.

The shell-less culture being a novel way of growing an embryo in the absence of the confined space containing all the essentials that an eggshell provides was cumbersome initially, involving reduced rates of survival and a generous amount contamination. Over time the survival rate of the shell less cultures improved along with a reduction in the amount of contamination.

### **Dosage of synthetic food colour**

The dosage administered to the shelled cultures was 200 microlitres of both raspberry red and green food colour infused in 10ml of avian saline, which was then autoclaved in order to maintain sterility. 50 microlitres from this was administered on a daily basis over a period of four days to various batches of shelled cultures. The experimental sets of embryos were then compared with the control set in terms of growth rate, survival rate, morphological characters, total lipid content and protein content.

The morphological parameters which involved assessing the growth rate and developmental changes in the embryo were carried out manually whilst comparing it with the standard Hamburger Hamilton stages. Estimation of the total lipid content and protein content of shelled cultures was done with the help of Stern Shapiro method and Lowry's method respectively.

### **Incubation and infusion of chick embryo**

The synthetic food colour prepared in saline was administered by the pin hole method to the shelled cultures wherein post infusion the hole was sealed using sellotape in order to prevent contamination. The eggs were then incubated for a period of 24 hours at 40 degrees. This process spanned four days after which the eggs were broken on the 5th day and the contents were emptied into a sterile glass bowl with utmost caution. Post which the control and experimental sets were compared along with the standard Hamburger and Hamilton stages in order to assess the changes in morphological development, various biochemical assays were also carried out in order to assess the intricacies in the changes that might have been brought about by the infusion of synthetic food colour in the total lipid content and protein content of the shelled culture.

A batch of shell less cultures were also infused with green food colour but further analysis and experimental procedures were stalled due to the high mortality rate.

Sterilized glassware like glass bowls, petri plates, pipettes, micro pipette-tips were used to maintain shell less cultures and to infuse synthetic food colours into shelled cultures. These experiments were mandatorily carried out in a sterile environment which is the Animal Tissue Culture Lab under stringent measures in order to increase viability and reduce contamination.

### **Morphology**

Once the shelled cultures were opened in a sterile glass bowl the embryo was carefully cut around the edges using a sharp forcep and a brush to wipe away the extra albumin and yolk stuck onto it. It was then scooped up using a spatula and gently transferred onto a clean slide and then onto the stage of a dissection microscope. The embryos were then analysed in order to correlate the developmental changes observed.

### **Biochemical Assays**

Stern Shapiro Method (1952)

This assay is typical for estimation of total lipid content. Lipids form a major part of the yolk that supplements the nutrition of the embryo up until it hatches hence it was imperative to check the positive or negative effects it has on the uptake of the same and hence the development and survival rate of the embryo. Folin Lowry (1951); This is the most widely used assay for protein estimation. It is preferred over Biuret because it is sensitive to concentrations below 5 micrograms per millilitre and hence more accurate. It is necessary to quantitatively discern the protein concentration as plausible correlation could be made with the toxicant concentration present in synthetic food colour.

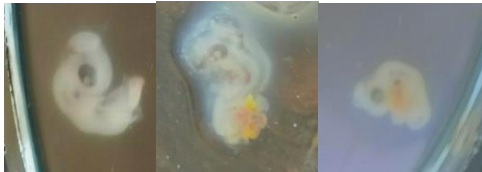
Graphical Representation.

There were two sets of shelled cultures each that were infused with commercially available food colour raspberry red and green obtained

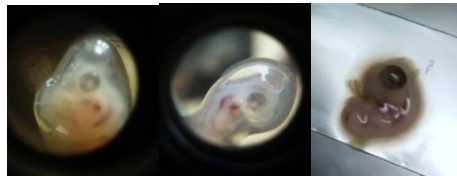
from a company called TAMCO. The varying values for absorbance that was obtained for protein and total lipid content for each of the sets was plotted using a bar graph. The deviations from the values of the control set were then correlated and discussed accordingly.

### **RESULTS: Biometric Analysis**

**Shelled Cultures:** The Shelled Cultures infused with red and green food colours were seen to show a little stunted growth in size as compared to the control. The embryos infused with red food colour showed incomplete formation of flexure and it was disrupted easily as compared to green infused embryo and control in all sets. So it was inferred that the Red Infused embryos showed abnormality during the growth and also the structures were developing inefficiently.



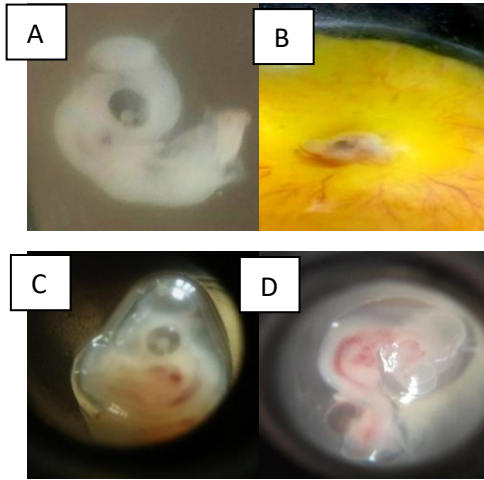
**Fig 1: Batch 1 of Shelled Culture Infused:** Control (left), Red Infused (centre) with distinct loss of flexion, Green Infused (right).  
[Approx 6 days on comparing to HH Stages 27-29].



**Fig 2: Batch 2 of Shelled Culture Infused:** Control (left), Red Infused (centre) showing Stunted growth in brain development, Green Infused (right) [Approx 6 days on comparing to HH Stages 27-29].

**Shell Less Culture:** The Shell-less Culture was successfully established and was seen to show at par growth when compared to the Shelled Control through a period of six days. The survival rate was found to be

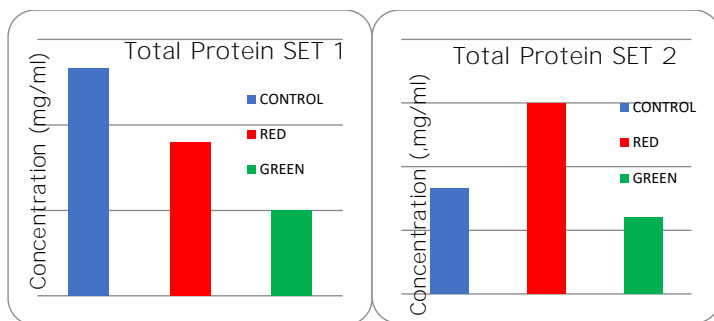
vary in different sets. Initially the survival rate in the first few cultures was found to be 40% which gradually increased to a 60% survival rate.



**Fig 3:Shell-less Culture compared to Control:** A&C:Control (left) approx 6 days B&D:Shell-less culture embryo approx 5.5-6 days.

**Protein Estimation** was done from the albumen collected from each embryo broken 4 days after infusion. The absorbance was recorded and the concentrations of the corresponding experimental value were found and plotted as a mean ( 0.772 & 0.863 for experimental red) and ( 0.748 & 0.788 for experimental green). The Protein Concentrations found from the assay showed that there was a major deviation in the protein content in the experimental red embryo (0.89mg/ml & 1.0mg/ml). Whereas the Green infused embryo showed slight deviation in the two sets.





Total Lipid Content of the yolk that was extracted from the embryo when the eggs were broken 4 days after infusion. The results observed were known to deviate greatly in the experimental green of both sets (1.4 mg/ml & 4.79 mg/ml) with the Control (12.82 mg/ml). The experimental red was seen to show concentration of 8.56 mg/ml and 10.74 mg/ml. The inference from this assay was that lipid content showed a marginal deviation in the Green Infused embryos, as compared to the Control (9.645 mg/ml).

## **DISCUSSIONS**

**Food Colours:** As we all know that the synthetic food colours are harmful effects on all sorts of organisms. This study was basically our view of extrapolating the known facts at our level. There are specific ingredients in the synthetic dye which we have chosen and on which probably not much of the experiments are carried out. Like the tartrazine, brilliant blue, ponceau 4R and carmosine. There are individual studies carried out on these chemicals but no morphological study could be found during our referencing.

**Shell-less Cultures:** In our study, we developed a shell less culture system for the chick embryos using a glass petri plate and a glass bowl (sterile). We choose this method since it does not require any complicated operations, special materials or techniques. Also, the use of a glass petri plate does offer a comparatively easy observation of the embryonic morphology from almost all angles as well as it is also easy to access the embryo for manipulations by removing the lid.

We transferred the embryos to the shell-less system after day 1 of preincubation period. There are certain papers which mention that transferring the embryo after 54h-55h is considered to be optimum in terms of its viability, but since our culture was supposed to last only for a period of 6 days, we decided to transfer it on the 2nd day itself.

Also, one of the reasons for our retarded growth of the embryo could be the calcium content which was not provided in our experiments, but which the embryo would get from its shell (normal eggshell).

Another reason for the less viability or survival rate of the shell-less system would be that the aeration of the artificial vessel would have caused loss of moisture of the embryo via transpiration.

Kamihira et al. (1998) also pointed out the importance of oxygen supply in the later stage of embryo culture using surrogate eggshell. Hence, we had to maintain the oxygen content by rotating the petri plate at regular intervals.

The first 4-5 days of incubation in chicks correspond to 2-5 weeks of post conceptional age in human embryos. The shell-less culture system reported here, therefore, may also be used to help improve understanding of the pathophysiology in humans, although the technique has its own limitations.

## **CONCLUSION**

- Speaking of infused shelled experimental sets, the experimental red set showed retarded growth in terms of morphological factors when compared with the experimental green set and the control set of shelled culture.
- For biochemical aspects, the protein content of both the experimental green and red sets (shelled) when compared to the control shelled culture did not show much deviation.
- The total lipid content of the experimental red set (shelled) was found to be in range with the control shelled set, whereas, the experimental

green set (shelled) showed exceedingly large deviation with respect to the control shelled set.

- Coming to shell less culture, we were successfully able to make it survive for a period of 6 days. It could have survived for a longer duration but due to lack of an ethical certificate, we had to stop it at the 6th day.
- The growth rate of the shell less culture when compared with the growth rate of the shelled culture showed retarded growth and development in terms of lens formation and the length and width of the embryo.
- The shell less culture when infused with the green synthetic food colour resulted in the blood island lysis.

Knowing the effects of the several ingredients of the synthetic food colour which we have used here on the human body from previous studies and literature review we could conclude that possibly the different ingredients would be the reason for difference in the observations. Like the presence of ingredients like Brilliant blue (known to cause refractory shock and muscle acidosis in humans) or tartrazine (known to cause DNA damage and cancer in humans) in the commercially available green food colour, could be responsible for the blood island lysis in the shell less culture and also for the deviation seen in the total lipid content analysis. And the ingredients like carmosine (known to cause breathing difficulties and cancer in humans) or ponceau 4R (known to cause ADHD, allergic responses and cancer in humans) present in the commercially available red food colour, could be responsible for the retarded growth in terms of morphological factors. Creating a natural looking environment is a difficult task in itself and hence we faced a lot of challenges for establishing the shell less culture. The initial survival rate of the shell less culture was less than 40% but later by overcoming several challenges we were able to bring it up till 60%. The survival rate can still be increased making the exact replica of the within-shell environment. The retarded growth seen in the shell less culture could be because of the disturbances offered to the embryo during

the transfer or rotation, either in terms of the environmental conditions or the manual errors.

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## **SECTION II - STATISTICS**

### **CHAPTER 3 - IMPACT OF IMPORTS & EXPORTS ON THE ECONOMY OF INDIA.**

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#### **ABSTRACT**

“Export growth is important because of its effect on internal trade and economic stability. Even more, the rate of economic growth and the distribution of income and wealth in a country are closely related to export growth.”

In a Developing country like ours, the role of Exports as well as Imports plays a major role on the development and Growth on the Economy of the nation.

The purpose of the following study is to study in detail the various aspects in Exports & Imports in India and how India has achieved Growth through it.

#### **INTRODUCTION**

For the past few years there has been a call for ‘‘Make In India’’ by the current government of our country. a new national program designed to transform India into a global manufacturing hub. It contains a raft of proposals designed to urge companies — local and foreign — to invest in India and make the country a manufacturing powerhouse.

As Narendra Modi in his speech very greatly said -

“My country’s youth can resolve ... he would manufacture at least one such item (which is imported) so that we need not import the same in future. We should even advance to a situation wherein we are able to export such items. If each one of our millions of youngsters resolves to manufacture at least one such item, India can become a net exporter of goods,”

Exports of a country play an important role in the economy. A healthy balance, a sustainable development with trade and foreign exchange reserves to maintain the country's export growth should be a constant and high rate. Exports as a whole affect the industrial environment. To compete internationally, the industry standard for quality products, competitive price, good packaging, etc, which is important for overall industry. For export as a national priority for government and private sectors recognized by all agencies to export, export growth is to maintain high rates.

Taking this into consideration this study tries to examine the current state of India's Import and Export system and how it has changed over the years and also predict what it would be in the coming years. Hence the following parameters will be discussed and analysed throughout our study as we try to find ways to strengthen each aspect

### **OBJECTIVES AND AIMS**

1. To find the Correlation between Imports and Exports and to Find the type of relation (linear or non-linear).
2. Study individual industries for Imports and Exports (Industrial I & E, Agricultural I & E)
3. Study the data for the Imports & Exports of the country Before and After the year 1991.
4. Measure the Growth in the economy & the different aspects in which Growth has taken place over the years (GDP etc.)
5. Study Imports & Exports for both Air Freight as well as Sea Freight.
6. Find ways through which Exports can be increased and Imports can be Decreased.
7. Identify the goods manufactured in India which has the maximum potential to Boost Export

## **RESEARCH DESIGN & METHODOLOGY**

Overview

Population and Study Sample

Sources of Data

Collection of Data

### **Data Analysis**

1. First, we identify and list the parameters on which we are going to be collecting and analysing data.
2. Our second step would be to data collection and compilation. (EXIM BANK)
3. The compiled data should be thoroughly analysed and discussed.
4. By using method of sampling and various other statistical methods the data should be calculated and equation should be formed.
5. Explain through various graphical techniques the relation as well as growth parameters for the Imports and Exports of India
6. State the Conclusion and what the research has tried to achieve.

### **LITERATURE REVIEW**

Some studies have claimed that there is no relation between exports and GDP or their growth rates. It can be expected that exports do not lead to growth; rather, economic growth (whether due to technological innovation, fiscal or monetary stimulus or other reasons) could lead to exports or the two may not be related (see, for example, Bhagwati 1978, 1988). Thus, we see that, analytically, these results are possible:

1. Export growth causes output (or gdp) growth;
2. Output growth causes export growth;
3. There is no long-run relation or causality between exports growth and output growth.



## **DISCUSSIONS AND CONCLUSION**

Growth of an economy is directly related to exports. If exports increase at a faster pace as compared to imports, nothing can stop an economy from being a developed one. On the other hand, the instability in exports can adversely affects the process of economic development. Since India is a fast-developing country we predict that Imports of india is decreasing over the Years and Exports are increasing. Hence greater exports lead to a more competitive, technologically mature, productive and rapidly growing economy.

The period after 1991 has been marked by a substantial transformation in trade policy and the policy of trade is tilted towards export promotion and import substitution/restriction to achieve higher growth rate as one of the objectives of existing trade policy. Therefore, through the present endeavour, we try to establish a causal relationship among these variables vis-à-vis growth rate, exports and imports.

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## **CHAPTER 4 – IMPACT OF SOCIAL MEDIA ON YOUTH OF MUMBAI**

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### **Introduction**

Social media is a platform to interact with people all over the world through texting, sharing images, audio-video sharing etc. It is one of the cheapest and fastest modes of communication on individual as well as mass level. It is something that is major part of all age group people. Its use is increasing day by day especially in the youth of the world. Social media has a great influence on the youth. This led us to think how much social media is governing decision of the generation and its positive and negative impacts on their lives. Here in this study Youth of Mumbai city is focused.

### **Statement of the Problem**

Major issue today is how social media is becoming an essential need of the majority which in turn is influencing their lifestyle and opinion like political awareness, religion, trends, etc.

### **Relevance of the Study**

This study will throw light on how social media has become an integral part of our lives and how one use that in their advantage and avoid damage caused by social media.

### **Review of Literature**

There has been studies on social media. Social media are increasingly visible in higher education settings as instructors look to technology to mediate and enhance their instruction as well as promote active learning for students. Many scholars argue for the purposeful integration of social media as an educational tool. Empirical evidence, however, has lagged in supporting the claim.

### **Objectives of the study**

1. To analyze the influence of social media on life of Mumbai youth.
2. To evaluate the purpose youth of Mumbai uses social media for.
3. To find the most preferred form of social media.
4. To assess the time spent on social media.
5. To analyze the dependency on social media
6. To recommend some proper use of social media so one can benefit from it without being dependent.
7. To suggest how to channelize the use of social media to our benefit.

### **Hypothesis**

1. It is likely to say that social media is major source of quick information and entertainment.
2. It is likely to say that social media one of the easiest, quickest and most creative source of communication.
3. It is likely to say that youth is spending significant amount of their time on social media.
4. It is likely to say that social media is a necessary evil.

### **Methodology**

The descriptive method will be used to carry this study and survey type research will be conducted through the questionnaire public opinion. Other statistical tools will be used to collect, distribute and analyze the study.

### **Conclusion**

It is possible that social media will soon become an integral part of education and would consume most of our time.

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### **SECTION III - BIOTECHNOLOGY**

#### **CHAPTER 5 - STUDY OF ORAL MICROFLORA AND QUANTIFICATION OF SALIVARY BIOMARKERS IN SMOKELESS TOBACCO CONSUMERS**

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#### **ABSTRACT**

Objectives:

1. Isolation and characterization of selected microbes from oral fluids of smokeless tobacco consumers.
2. Quantification of salivary biomarkers from saliva of consumers and non- consumers.

Methods: In a random population of 18 subjects, salivary biomarkers such as protein, malondialdehyde, thiocyanate and nitrite were assayed. Microbial analysis and Antibiotic Sensitivity Testing was also carried out on simple, selective and differential media for saliva samples.

Results: These results were tabulated and are analyzed by regression analysis. We report, an unusual bacterial strain that was observed and further characterized. The Antibiotic Sensitivity Testing (AST) profile of the same is reported, it was found to be a plasmid bearing strain showing  $\beta$ -lactamase and Vancomycin resistance.

Conclusion: A significant increase in the levels of salivary biomarkers was observed in some saliva sample of SMT consumers as compared to non-consumers and hence can be used as effective biomarkers. Understanding the changes in the levels of these biomarkers and oral microbiota can help in preventing chronic diseases in their early stages.

**KEYWORDS: Salivary cancer biomarkers, Smokeless Tobacco (SMT) consumers, Antibiotic Sensitivity Testing (AST)**

ABBREVIATIONS: SMT Consumers- Smokeless Tobacco Consumers  
AST- Antibiotic Sensitivity Testing

## **INTRODUCTION**

Betel quid chewing is an ancient practice common in many countries of Asia which was introduced by Europeans in 1600s. India is next to China in both tobacco production and consumption in the world. (Boddu Naveen- Kumar, 2016). Tobacco in India is used in various forms: chewing pan (mixture of lime, pieces of areca nut, tobacco and spices wrapped in betel leaf), chewing gutkha or pan masala (scented tobacco mixed with lime and areca nut, in powder form), and mishri (a kind of toothpaste used for rubbing on gums) etc. Most of these products are held in the mouth, cheek, or lip or chewed to allow absorption of nicotine in the lining of oral cavity. Tobacco contains variety of harmful chemicals and nitrogen compounds. Along with cancer, consumption of such products may lead to other serious health problems. Tobacco intake increases generation of free radicals and reactive species as well as some constituents that can cause inflammation. (S. Preethi, 2016). Thiocyanate, a metabolic product of certain cyanide containing compounds of tobacco has ability to cause changes in epithelial cells. As saliva is in continuous contact with the epithelial cells, it can be used as a quantitative measure pertaining to tobacco exposure. Hence, Saliva can be a valuable source for periodontal diagnosis as it contains tobacco specific biomarkers. Saliva is the first line of defence against oxidative stress, microorganisms. (Fawaz Pullishery, 2015). Normal functions of saliva are critical for the maintenance of oral health. The early diagnosis is key to the treatment of any disease. (L. F. Mollashahi et al., 2016). Oral fluids provide an easily available non-invasive method for the diagnosis of a wide range of diseases and clinical situations. The substances released due to chewing of the product also disturb the normal oral microflora, certain molecules can also stimulate or enhance the growth of pathogenic microbes and saliva itself a nutrition rich medium which further enhances the growth. Hence, the study was undertaken to quantify certain salivary biomarkers and to isolate and characterize altered oral microflora from the saliva of smokeless tobacco consumers.

## **MATERIALS AND METHODS**

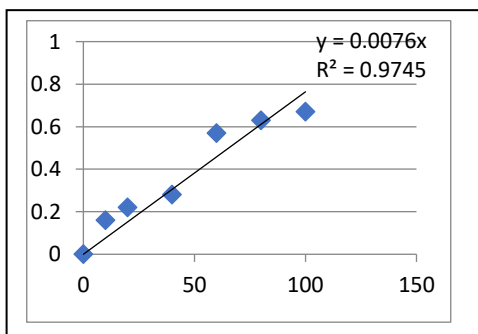
The study was carried out in the city of Mumbai between September 2016 and August 2017. A total of 18 people including three controls ranging from the age group of 20-60 years participated in the study. A verbal consent was taken from the subjects after giving them the required information and answering any queries. 1ml of saliva was collected in sterile centrifuge tubes which was then diluted with sterile distilled water in the ratio of 1:5. The collected samples were then tested for the presence of certain tobacco specific salivary biomarkers like thiocyanate, protein, nitrite and malondialdehyde. Potassium thiocyanate (concentration:  $0.4 \times 10^{-4}$  to  $2 \times 10^{-4}$  M) were used as standards and 0.2M ferrous nitrite was used as the working reagent. Sodium nitrite (Concentration: 20 to 100  $\mu$ M) was used as standard for estimation of nitrite. The reagent used was Greiss reagent prepared using 1% sulphanilamide in 5% phosphoric acid and 0.1% naphthylethylene diamine dihydrochloride (NED). Protein estimation was carried out using Folin Lowry method using bovine serum albumin as standards. Malondialdehyde estimation involved the use of thiobarbituric acid-trichloroacetic acid reagent (TBA-TCA).

The saliva samples were analysed on different media by streaking on sterile Nutrient Agar, Sabouraud's Agar, MacConkey's Agar and Veillonella Agar. The bacterial colonies observed on the sterile media plates were characterised by Hans Christian Gram's staining method and observed under 100x oil immersion of the light microscope. The fungal colonies were analysed by fungal staining using lactophenol cotton blue stain and observed under 45x of the microscope. The colony characteristics were studied and noted down. Colonies showing unusual characteristics were further analysed by other staining methods and biochemical tests. The resistance pattern of the organisms was studied and those showing resistance were further studied by determining the presence of a plasmid by extraction using cold alkaline lysis method followed by Agarose Gel Electrophoresis (AGE).

## **RESULT**

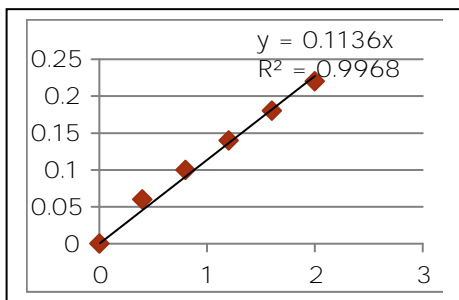
The quantitative analysis of the unknown samples for protein, thiocyanate and nitrite was done by correlation and regression analysis. The maximum value for nitrite, thiocyanate and protein for smokeless tobacco consumers was determined to be 105.71 $\mu$ M, 3.27 $\times$  10<sup>-4</sup>M and 120 $\times$ 10<sup>-2</sup> mg/ml respectively. Malondialdehyde concentrations were determined using the extinction coefficient 1.56  $\times$  10<sup>-5</sup> /M cm and the maximum value observed was 4.3 $\times$ 10<sup>-6</sup>M. There was a significant increase in the concentration of these biomarkers for few samples when compared to the control i.e. the non-consumers.

### Protein Estimation



X - AXIS: Protein concentration (mg/ml)  
Y - AXIS: OD at 660 nm

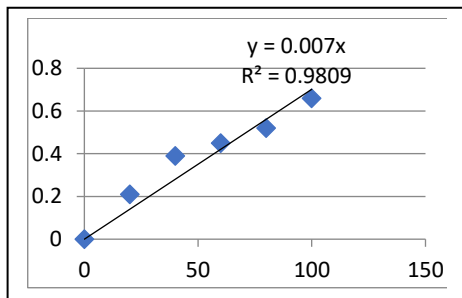
### Thiocyanate Estimation



X - AXIS: Thiocyanate concentration (M $\times$ 10<sup>-4</sup>)  
Y - AXIS: OD at 447 nm

### Nitrite Estimation





X AXIS: Nitrite concentration (mg/ml)  
 Y AXIS: OD at 545 nm

SAMPLE	CONCENTRATION OF PROTEIN (mg/ml)	CONCENTRATION OF MALONDIALDEHYDE (M×10-6)	CONCENTRATION OF NITRITE (µg/ml)	CONCENTRATION OF THIOCYANATE (M×10-4)
S1	32.85	1.4	97.14	0.88
S2	51.42	2.3	65.71	0.70
S3	32.85	1.4	25.71	0.79
S4	24.28	1.0	38.57	0.53
S5	81.35	0.8	18.57	1.41
S6	97.71	0.2	0.00	0.26
S7	120	0.19	0.00	1.59
S8	75.71	2.4	55.71	0.79
S9	84.28	2.6	90.00	2.83
S10	82.85	0.3	105.71	0.88
S11	95.45	4.3	40.00	3.27
S12	48.57	4.3	47.14	0.35
S13	105.71	0.7	28.57	0.97
S14	57.14	0.7	85.71	0.97
S15	48.57	1.2	10.00	0.70
C1	41.42	0.3	30.00	0.79
C2	20	0.12	4.28	0.26
C3	20	0.51	10.00	0.61

### Concentrations of Biomarkers

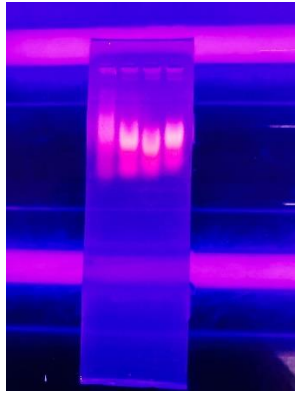
Key: S- Sample, C- Control

Microbiological analysis of the oral cavity revealed the presence of Gram negative bacilli in one of the samples. Further biochemical tests were employed to identify the organism which was found to belong to the *Klebsiella spp.* Antibiotic sensitivity test of the same showed resistance towards beta lactam drugs and glycopeptides (Vancomycin). The plasmid extracted from the organism displayed the presence of a supercoiled DNA when subjected to Agarose Gel Electrophoresis (AGE).

### Results for Antibiotic Sensitivity Test:

Antibiotic	Concentration (mcg/disc)	Zone of inhibition (mm)	Sensitivity
Ciprofloxacin (CIP)	5	25	Sensitive
Vancomycin (VA)	30	0	Resistant
Oxacillin (OX)	1	0	Resistant
Imipenem (IPM)	10	27	Sensitive
Ticarcillin (TI)	75	0	Resistant
Gentamycin (GEN)	10	17	Sensitive
Tetracyclin (TE)	30	22	Sensitive
Neomycin (Ne)	30	13	Intermediate

### Agarose gel showing presence of Supercoiled plasmid DNA



KEY- (from left to right)

LANE 1: *E.coli* DH5 $\alpha$  (control), LANE2-4: Resistant plasmid

### DISCUSSION

Saliva is a complex fluid secreted by oral cavity which is composed of a wide variety of constituents. Non-invasive parameter and easy availability of saliva serves diagnosis purposes. From literature survey it was known that tobacco intake increases generation of free radicles like thiocyanate (SCN) and nitric oxide (NO) which will lead to nitrosation process and lichenoid reactions respectively and lipid peroxidation is induced by reactive oxygen species. Thiocyanate, nitric oxide and malondialdehyde are considered to be an ideal salivary biomarkers. The study was conducted among random smokeless tobacco consumers like taxi drivers, support staff and construction workers by collection of their saliva.

A significant increase was observed in the levels of salivary thiocyanate, nitric oxide and malondialdehyde of smokeless tobacco consumers when compared to non-consumers. Elevated levels of biomarkers may be responsible for excessive cancer risk and disorders. Oral health is influenced by oral microflora. In our study, we reported difference in oral flora of smokeless tobacco consumers and non-consumers. Gram negative rods are unusual isolates found in normal flora of oral cavity,

suggesting the presence of host defence mechanism. Change in the oral microbiome may reduce immunity. The Gram negative (rods) isolates from Veillo Veillonella agar showing resistance to glycopeptide (vancomycin) was reported which showed resistance against beta-lactum drugs on further antibiotic sensitivity testing which was plasmid mediated. Hereby, understanding the alteration in the levels of biomarkers and oral microbiome will aid in prognostic diagnosis.

## **CONCLUSION**

Tobacco addiction in large number of adults develops during adolescence. In countries with the high prevalence of smokeless tobacco use, their prices are lowered, warning labels are weak and surveillance is not efficiently mediated. Health organization and government should therefore launch programs for creating awareness among tobacco consumers. Elevated values of thiocyanate,

proteins, malondialdehyde and nitrite helps to differentiate between smokeless tobacco consumers and non-consumers and therefore can be used as effective biomarkers. The organisms showing unusual characteristics should be effectively analysed to study the effects on the oral cavity. The results obtained in our study highlights the alteration in the conditions of the oral cavity of SMT consumers when compared to non-consumers.

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monitoring and constant encouragement throughout this project and also for motivating us at each and every step.

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## **CHAPTER 6 - EXTRACTION OF NATURAL DYES & ITS APPLICATIONS**

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### **ABSTRACT**

There is a worldwide demand for natural dyes due to increased awareness on their therapeutic properties. Several artificial dyes are harmful and may be carcinogens. The current research aimed at extracting dyes of different colors from natural plant sources, carrying out its characterization & its applications. The dyes were tested for their antimicrobial ability and were found to be inhibitory to common organisms like *S. typhi*, *P. aeruginosa*, *C. diphtheriae* & *S. aureus*. Phytochemical tests were performed and they confirmed presence of several important metabolites like Proteins, Carbohydrates, Phenols, Tannins, Terpenoids, Flavonoids and many more. The dyes were tested for anti-oxidant activity by FRAP assay and antioxidant levels ranging from 0.62 to 2.00 were obtained. Preparation of cosmetics like lip balms, was done and dyes were also tested as natural food coloring agents. The results indicated that the dyes caused inhibition of wide range of bacteria and proved to be good sources of antioxidants. They departed a natural color to food items and hence can replace artificial food colorings. Thus, the use of natural dyes should be promoted as they are cheap, safe and non-toxic to use.

**Key words:** natural dyes; antimicrobial; anti-oxidant; cosmetics; food coloring.

### **Introduction:**

Dyes are natural or synthetic (artificial) substances used to add a color to or change the color of something. Artificial dyes have been used widely since its inception. They are used in everyday items like clothes, food products, cosmetics, plastics, etc. The harmful effects of these dyes,



however, go unnoticed by the people. In the recent years, due to the scientific development, the adverse effects of these dyes are being discovered. They have been found to cause or contribute to various allergic reactions, toxicity, mental disorders like ADHD, tumor formations, etc. Recent studies show that seven of the artificial dyes contributed to cancer in lab animals, including brain and testicular tumors, colon cancer, and mutations.(4) These dyes not only pose a risk to the biotic components, but are also responsible for degradation of abiotic components like soil & water. The contamination of soils and waters by dye-containing effluents is of environmental concern. Water pollution can also result from manufacturing synthetic dyes when untreated dye effluent is dumped directly on bodies of water. Dyes derived from natural materials such as plant leaves, roots, bark, insect secretions, and minerals were the only dyes available to mankind for the coloring of textiles & other products until the discovery of the first synthetic dye in 1856.(17) Rapid research strides in synthetic chemistry, supported by the industrialization led to the development of synthetic alternatives to popular natural dyes and gradually pushed the natural dyes into oblivion.(17) However, environmental and health issues have once again revived interest in production & use of natural dyes. Natural dyes are considered eco-friendly as these are renewable and bio-degradable; are skin friendly and may also provide health benefits to the wearer.(17) Natural dyes are harmonizing & soothing to the human eye.(18) Some of its constituents are anti-allergens, hence prove safe for skin contact and are mostly non-hazardous to human health.(18)

Beetroot (*Beta vulgaris*) is high in immune-boosting vitamins & minerals, it is also good for the bones, liver, kidneys, it reduces risk of heart disease & improves endurance and blood pressure.(3) The petals of Rose (*Rosa*) are beneficial to the skin & cure dry and patchy skin; they are also used in health tonics. Carrot (*Daucus carota*) is a rich source of vitamin A & helps in protecting eye health & vision. Marigold (*Tagetes*) has been used to make healing herbal ointments; it is a rich source of flavonoids and anti-oxidants. Spinach (*Spinacia oleracea*) is high in protein, zinc, fibre, vitamins, etc; its health benefits include skin care, eyesight, regulated blood pressure etc. Peppermint (*Mentha piperita*)

soothes digestive issues, sore muscles, various respiratory illnesses, etc. (2) Henna (*Lawsonia inermis*) has the ability to relieve headaches, detoxification, skin protection, boost hair health, etc. Pomegranate peels (*Punica granatum*) are effective detoxifying agents, combat tool against heart diseases in prevention of skin cancer, for coughs & sore throats, etc. (1)

Bioactive compounds in plants are known to be responsible for various bioactivities of the plant. (5) Phytochemical assays are often considered to be the first step for characterization of a plant sample depending on the presence of the various metabolites. A positive response of the plant sample for the presence of Phenols, Tannins, Terpenoids, Glycosides, etc indicates its potential use for defence against micro-organisms, since most of these metabolites impart the ability to inhibit the growth of organisms. Since natural dyes are obtained mostly from plant sources, they are a rich source of anti-oxidants, and thereby can replace the artificial anti-oxidant supplements available in the market today. The various advantages of natural dyes over artificial dyes help in promotion of use of these natural dyes in industries for textiles, foods & beverages, cosmetics, etc.

With regards to the increased scope of natural dyes, its study, production & usage; the present research is designed for the extraction of dyes from natural plant sources, its characterization & studying its applications.

### **Materials & Methods:**

Selection & collection of plant materials - 8 different plant sources were chosen for extraction of dyes of 4 different colors. Beetroot & Rose for Red, Pomegranate peel & Henna for Brown, Spinach & Peppermint for Green, Carrot & Marigold for Orange.

Extraction of natural dyes - Dyes were extracted using both water & organic solvents. Water-based dyes were prepared by blanching, grinding & filtering the plant material using Distilled water.(17)(18) These were further lyophilized for concentration. Organic solvents were used for extraction of the color-imparting phytochemical. Methanol was used for Beetroot, Rose, Marigold, Henna.(7)(8) Ethanol was used for

Pom peel, while Petroleum ether was used for Carrot. Spinach & Peppermint were extracted using acetone.(9)(13)(14)

Qualitative phytochemical analysis - The water-based dyes were used for phytochemical screening. Phytochemicals like Proetins, Glycosides, Terpenoids, Quinones, Coumarin & Saponins were analysed.(5) Phenols. Tannins, Carbohydrates, Flavonoids were also analysed.(6)(7)(10)

Antimicrobial ability - The ability of the dyes to inhibit bacteria was tested using the Agar dilution method. 1g of concentrated dye mixed with 2ml 20% DMSO was incorporated into molten nutrient agar butts which

Dyes Compound	Beetroot	Rose	Pom peel	Henna	Spinach	Pepper mint	Carrot	Marigold
Proteins	+	+	+	+	+	+	+	-
Carbohydrates	+	+	+	+	+	+	+	+
Flavonoids	-	+	+	-	+	+	+	+
Glycosides	+	+	+	+	+	+	-	+
Terpenoids	+	+	+	+	-	+	+	-
Saponins	+	+	+	+	+	+	-	+
Phenols	+	+	+	+	+	+	+	+
Tannins	+	+	+	+	+	+	-	+
Quinones	+	+	+	+	-	+	-	-
Coumarin	+	+	+	-	-	-	-	+

were poured onto plates. 6 common pathogenic organisms, namely, E. coli, S. typhi, P. aeruginosa, S. aureus, S. faecalis & C. diphtheriae. were spot inoculated on the plates and incubated to check for results(15)(16).

Anti-oxidant activity - The ability of the dyes to scavenge free oxygen radicals was determined using the FRAP (Ferric Reducing Ability of Plasma) assay(8)

Applications of the dyes - 1.Use as Food coloring agents- Noodles were colored by boiling them in water containing the dye for 5-10 minutes, while, doughs of white flour were prepared using dye mixed with water.

2.Cosmetic production (Lip-balm)- Natural ingredients like aloe gel, almond oil, beeswax, rice powder & cornstarch were mixed well. 5-6 drops of the dye was added and mixed until a good consistency was obtained. The prepared lip-balm were then stored at 4°C and RT.

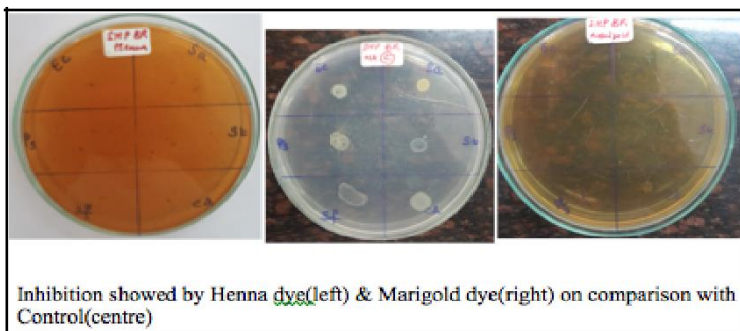
**Results:**

The extracted dyes showed a good color imparting ability and were of the desirable concentration.



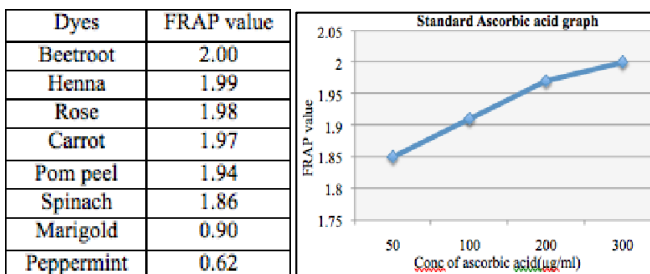
Phytochemical analysis revealed the presence of important metabolites like Proteins, Carbohydrates, Phenols, Tannins, Terpenoids, Glycosides. These are major metabolites present which are responsible for several additive properties of the plants. In the table given below, ‘+’ and ‘-’ indicates presence and absence of that phytochemical respectively

Organism	<i>E. coli</i>	<i>S. typhi</i>	<i>P. aeruginosa</i>	<i>S. aureus</i>	<i>S. faecalis</i>	<i>C. diphtheriae</i>
Dyes						
Beetroot	--	--	--	--	--	--
Rose	+	--	--	--	+	--
Pom peel	+	--	--	--	+	--
Henna	--	--	--	--	--	--
Spinach	+	--	--	--	-	-
Peppermint	--	--	--	--	--	--
Carrot	--	+	+	--	+	+
Marigold	--	--	--	--	--	+
Media Control	+	+	+	+	+	+
DMSO Control	+	+	+	+	+	+

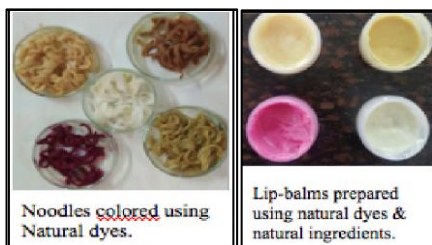


The dyes were checked for their antimicrobial ability by the Agar Dilution method. Organisms like *S. aureus*, *P. aeruginosa*, were inhibited by all the dyes. While, *S. typhi*, *E. coli*, *C. diphtheriae* & *S. faecalis* were inhibited by most of the dyes. The following is a tabular representation of the antimicrobial ability of the dyes as observed, upon comparing with the controls.

The anti-oxidant activity of the dyes was tested using FRAP assay & ascorbic acid as standard. Highest anti-oxidant activity was shown by Beetroot dye, followed by Henna, Rose, Carrot dye. Other dyes also showed a good anti-oxidant activity.



The noodles & white flour dough that were prepared using the dyes retained a good color and no considerable change in taste was imparted to the food products. The prepared lip-balm were found to be stable upon storage at RT & 4°C for upto 4 weeks. They had a good consistency and gave a vibrant color, Also, since the dyes were prepared using all natural ingredients, they gave a refreshing and soothing feel to the skin.



## **DISCUSSION**

The dyes extracted from natural sources are rich sources of important bioactive compounds. Plants like Henna, Beetroot, Carrot, Spinach, etc are known to have therapeutic properties. The extracted dyes showed prominent and lucid colors. Upon testing for presence of various phytochemicals, the dyes showed presence of important metabolites like Proteins, Tannins, Carbohydrates, Phenols, Glycosides and many more. These phytochemicals are known to have therapeutic properties like like protecting the cellular systems from oxidative damage, modulating immune system, preventing cancer and lowering the risk of chronic diseases like cardiovascular diseases, etc. The antimicrobial ability of the dyes was tested using the agar dilution method & the dyes showed inhibition to common pathogenic organisms like *Staphylococcus aureus*, which is a common skin infection causing bacterium; *Pseudomonas aeruginosa*, which is a frequent cause of various nosocomial infections. Organisms like *Streptococcus faecalis*, *Salmonella typhi*, *Pseudomonas aeruginosa*, and *Corynebacterium diphtheria*, that are the causatives of various afflictions were also inhibited by most of the dyes. Being extracted from natural plant sources, the dyes were found to be rich in anti-oxidants using the reduction based analysis–FRAP(Ferric Reducing Ability of the Plasma) assay. The highest anti-oxidant level found spectrophotometrically was that in Beetroot Red dye (FRAP value-2.00). The other dyes obtained were also found to have a good anti-oxidant activity. The food products colored using the dyes showed no change in taste & retained a vibrant color. Also, the cosmetic (lip-balms) prepared using the dyes were found to be stable upon storage & gave a refreshing and soothing feel to the skin.

Natural dyes are on the rise ever since the harmful effects of artificial dyes have begun to uncover. Presence of important metabolites and high anti-oxidant activity are an indication of the beneficial purposes these dyes will serve in food industries. The ability to inhibit commonly pathogenic organisms is proof of the medicinal & therapeutic properties of these natural dyes. Natural dyes can, thus, replace artificial dyes in the near future.

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**CHAPTER 7 - PREDISPOSITION OF ATTENTION  
DEFICIT HYPERACTIVITY DISORDER (ADHD)  
AMONG SECONDARY SCHOOL CHILDREN**

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**ABSTRACT**

**Objective:** ADHD is a neurobehavioral disorder that develops during childhood and can lead to other mental health difficulties. This research survey aims at determining the number of secondary school children that are predisposed to ADHD and assessing the gender difference in the prevalence of ADHD while taking into account other factors like - locality in which the child lives, economic status, father and mothers' occupation. The ultimate goal is to spread awareness about the prevalence of ADHD in the Indian population.

**Method:** 410 school children aged between 10-16years were selected randomly from towns and suburbs of Mumbai and their parents were made to fill out a questionnaire containing 15 DSM-IV-TR questions.

**Result:** 40% of secondary school children showed symptoms highly consistent with ADHD out of which males were 46% and females were 35%.

**Conclusion:** Our study showed significant percentage of secondary school children predisposed to ADHD (40%) due to lack of awareness. Also males were more prone (46%) than females (35%) in all age groups considered (10-16yrs). 14-16yrs of age group was more predisposed to ADHD (50%).

**KEYWORDS:** ADHD, secondary school children, neurobehavioral disorder, DSM-IV-TR.

## **INTRODUCTION**

ADHD is a neurological disorder that develops during childhood and can persist into adulthood. The “attention deficit” component of ADHD refers to inattention, or difficulty focusing for long periods and being easily distractible. The “hyperactivity” portion of ADHD is used to describe behaviour that is restless, agitated, and difficult to resist [1]. Symptoms of the disorder first become apparent in preschool years and persist into adulthood in approximately 60% of the cases. Attention deficit hyperactivity disorder (ADHD) is a complex disorder having multiple causes including genetics as impacted by one’s environment. The condition is usually diagnosed in childhood, when difficulties arise during play and school, and it is marked by lack of concentration, short attention span, and physical restlessness [2][3]. ADHD often is blamed on bad parenting, or a “bad” attitude [4][5]. In ADHD patients, reductions in volume have been observed in total cerebral volume, the prefrontal cortex, the basal ganglia (striatum), the dorsal anterior cingulate cortex, the corpus callosum and the cerebellum [6]. Neuroimaging studies have also reported reduced white matter (WM) volumes, midsagittal corpus callosum (CC) areas, and cortical thickness in ADHD patients compared with controls [7][8].

Scientists are not sure what causes ADHD. Like many other illnesses, a number of factors can contribute to ADHD, such as:

- Genes
- Cigarette smoking, alcohol use, or drug use during pregnancy
- Exposure to environmental toxins during pregnancy
- Exposure to environmental toxins, such as high levels of lead, at a young age
- Low birth weight
- Brain injuries

SOCIAL RELEVANCE ADHD influences the following: -

- Increase in drug abuse
- Increase in levels of depression
- Increase in anxiety disorder
- Increase in low self-esteem
- Increase in learning disabilities
- Increase in damaging of social & personal relationships

Undiagnosed ADHD can lead to development of Learning disabilities, Tourette Syndrome, Oppositional defiant disorder, Conduct disorder, Anxiety and depression, Bipolar disorder.

### **OBJECTIVES**

This study aims to:

- Identify the percentage of secondary school children predisposed to ADHD.
- Identify the gender difference in the prevalence of ADHD.
- Compare the distribution of ADHD among different age groups.
- Spread awareness about the prevalence of ADHD in the Indian population.

### **METHODOLOGY**

This study aims to:

- Identify the percentage of secondary school children predisposed to ADHD.
- Identify the gender difference in the prevalence of ADHD.
- Compare the distribution of ADHD among different age groups.
- Spread awareness about the prevalence of ADHD in the Indian population.

## RESULTS AND DISCUSSIONS

This study reports results of 410 students within the age group of 10-16 yrs. from various schools across Mumbai.

### 1) PREDISPOSITION OF ADHD AMONG SECONDARY SCHOOL CHILDREN

Amongst the 410 students 164 students were predisposed to ADHD and 246 students were not predisposed to ADHD. That is 40% of students were predisposed to ADHD. At 95% confidence interval the percentage predisposition range is between 36%- 44%. The percentage of students predisposed to ADHD is high.

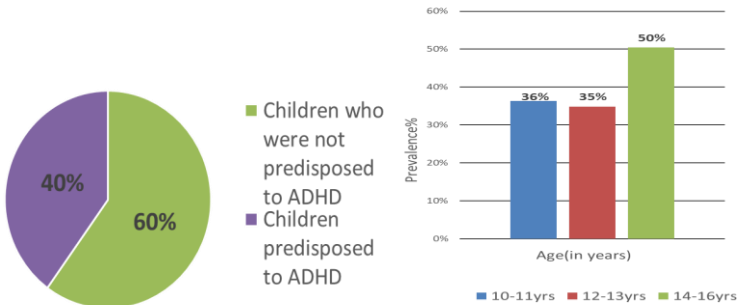


Figure 1: Percentage predisposition of ADHD among secondary school children

Figure 2: Percentage predisposition of ADHD among different age groups (10-16yrs).

### 2) PREDISPOSITION OF ADHD AMONG DIFFERENT AGE GROUPS

The above results suggest that 14-16yrs are more predisposed to ADHD than other age groups surveyed. The chi square test suggests that there is an association between predisposition of ADHD and age of the child. The Z test showed that there is a significant difference in the proportion

of 10 -13yrs and 14-16yrs students predisposed to ADHD. (The Z-Score is -2.3595. The p-value is 0.00914. The result is significant at  $p < 0.05$ ).

### 3) PREDISPOSITION OF ADHD AMONG MALES AND FEMALES

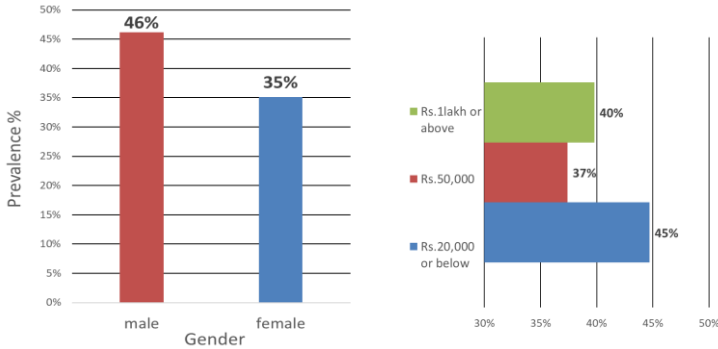


Figure 3: Prevalence of ADHD in males and females.

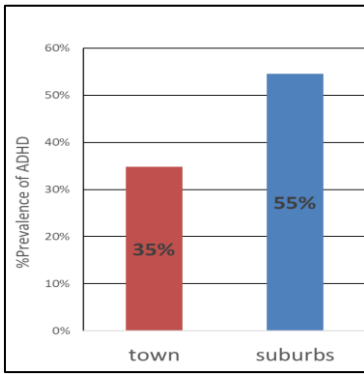
Figure 4: ADHD and socio-economic background.

The above results suggest that males are more predisposed to ADHD than females. The chi square test suggests that there is an association between predisposition of ADHD and gender of the child. The Z test showed that there is a significant difference in the proportion of male and female students predisposed to ADHD. (The Z-Score is 2.2725. The p-value is 0.020137. The result is significant at  $p < 0.05$ ).

### 4) ADHD AND SOCIO-ECONOMIC STATUS

The chi square test suggests that there is no association between predisposition of ADHD in the child and the familys monthly income. (The p-value is 0.473459)

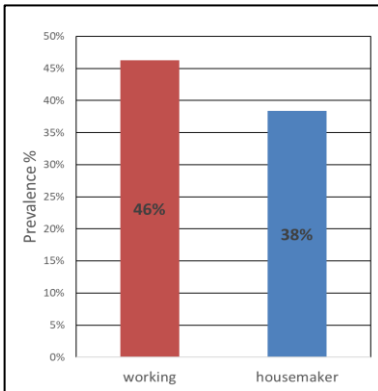
5) ADHD AND LOCALITY



The above results suggest that children living in suburbs are more predisposed to ADHD than those in towns. The chi square test suggests that there is an association between predisposition of ADHD and the locality where the child lives. The Z test showed that there is a significant difference in the predisposition of ADHD in town and suburban children. (The Z-Score is -3.616. The p-value is 0.00015. The result is significant at  $p < 0.05$ ).

Figure 5: Relationship between ADHD and the locality in which the child lives.

6) ASSOCIATION OF ADHD WITH THE MOTHERS OCCUPATION

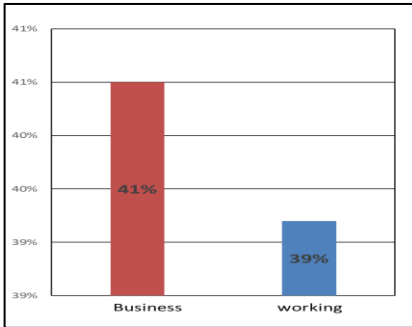


The chi square test suggests that there is no association between predisposition of ADHD in the child and the occupation of the child's mother. (The p-value is 0.207755)

Figure 6: Association between ADHD and the occupation of the mother.

## 7) ASSOCIATION OF ADHD WITH THE FATHERS OCCUPATION

The above results suggest that children whose fathers are in business are more predisposed to ADHD than those whose fathers are working. The chi square test suggests that there is an association between predisposition of ADHD and the father's occupation. The Z test showed



that there is a significant difference in the predisposition of ADHD among children whose fathers are working and those whose fathers are businessmen. (The Z-Score is -9.8231. The p-value is 0.020137. The result is significant at  $p < 0.05$ )

Figure 7: Association between ADHD and the father's occupation.

## AWARENESS PROGRAMME

Due to the social stigma attached with mental health conditions in India, ADHD remains undiagnosed therefore only limited information is available regarding prevalence of ADHD in the India. Thus it becomes essential to undertake programmes to spread awareness about this disorder among the population, as it may lead to adverse effects and development of other mental health disorders. A seminar was conducted in R.B.K school, Mira Road, Mumbai to spread awareness about ADHD among school children and teachers.

## CONCLUSION

Since the percentage Predisposition of ADHD is found to be significantly high (40%) more attention must be given towards spreading awareness about the prevalence of ADHD in secondary school students and abolishing the social stigma attached with mental health conditions in India. The factors influencing the predisposition of ADHD in children were age, gender, father's occupation, residence. Mother's occupation and the monthly income does not affect predisposition of ADHD.

## **ACKNOWLEDGEMENT**

We are deeply thankful to our principal Dr. Hemlata Bagla for her constant encouragement and providing necessary facilities for our project work in the Science Honours Programme. We also convey our sincere gratitude to Dr. Sagarika Damle, Dr. Sheela Valecha and Dr. Anupama Harshal for their support throughout our journey as an SHPian and our mentors, Ms. Anushi Divan, Mrs. Shailaja Rane and Dr. Sejal Rathod for their guidance and help.

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**CHAPTER 8 - ANTIMICROBIAL AND ENZYMATIC  
ACTIVITY OF ENDOPHYTIC FUNGI ISOLATED FROM  
LEAVES OF AVICENNIA MARINA AND  
CHARACTERIZATION OF MANGROVE SOIL**

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**ABSTRACT**

Endophytic fungi from mangroves are increasingly recognized for production of various novel bioactive compounds and the soil properties influence the vegetation, species composition and structure of mangrove forest. In the present study, sampling of healthy leaves and rhizosphere soil of *Avicennia marina* was carried out. A fungal endophyte was isolated from the leaves and was found to be of the genera *Alternaria*. The endophyte showed strong antimicrobial activity against Gram positive bacteria, production of five extracellular enzymes was detected as well. The grayish-black, clay-loam nitrogen rich mangrove soil was found to be alkaline in nature and nutrient limited in potassium and phosphorous. Enzymatic and antimicrobial potential of the fungal endophyte offers a promising source of bioactive compounds. Also, the analysis of different properties of soil is important for mangrove establishment and conservation as they have become endangered. This study paves way to further developmental research as Mangroves acts as a highly productive ecosystem of immense ecological value.

**Key Words:** Endophytic Fungi, Bioactive Compounds, *Avicennia marina*, *Alternaria*, Antimicrobial Potential

## **INTRODUCTION**

Endophytes are micro-organisms that are present in the living tissues of various plants, establishing a mutual relationship without causing any symptoms of disease [1]. They have proven to be rich sources of natural compounds, showing variety of pharmacological and biological activities [2]. There are many reports and studies on the biological activities of endophytes like anti-microbial, anti-neoplastic, antioxidant, antiviral, anti-diabetic, immunosuppressive, anti-thrombotic, anti-inflammatory, anti-Alzheimer's activity etc. [3]. Most commonly isolated endophytes are fungi and bacteria, of which fungi form the dominant group. Recently fungal endophytes have been explored for diverse applications owing to their production of extracellular enzymes [4]. These enzymes are produced as a defense mechanism against pathogenic invasion and for obtaining nutrition from host [5]. Fungal enzymes have vast biotechnological applications in agriculture, biomedical, food and beverage industries [6]. Association of endophytic fungi with mangrove plants is of prime importance. Mangrove forests act as very important tropical coastal tidal ecosystems and grow on nutrient-rich muddy substrates which are low in oxygen and undergo variations in salinity [7]. Mangrove plants have adapted to a unique habitat with muddy saline waters, anaerobic soil, brackish tidal activities and high microbial and faunal competition. Endophytic fungal association with mangrove plants confers protection from adverse environmental conditions and allows them to successfully compete with saprobic fungi decomposing senescent parts [8].

Mangrove ecosystems harbor diverse groups of microorganisms which perform an important role in nutrient recycling and regulate chemical environment of the ecosystem [9]. Various physical, chemical biological properties influence vegetation, species composition and structure of mangrove forest. Mangrove's soil condition is an essential factor for mangrove reforestation and coastal rehabilitation [10]. Thus considering the importance of mangrove endophytic fungi and the mangrove ecosystem as a whole, the current study focuses on the isolation and characterization of endophytic fungi and mangrove soil analysis.

## **MATERIALS AND METHODS**

### **Sample Collection**

Healthy leaves and rhizosphere soil sample of *Avicennia marina* were collected from Soonabai Pirojsha Godrej Marine Ecology Center, Mumbai, in month of September.

### **Isolation of endophytic fungi**

The leaves were washed under running tap water and then cut into 1cm x 1cm pieces without midrib. Surface sterilization of leaves was carried out under aseptic conditions by agitating the leaf cuttings in sterile distilled water for 1 min, 70% ethanol for 1 min, 2.5% sodium hypochlorite for 4 min, 70% ethanol for 30 sec and washing with sterile distilled water thrice [11]. Leaf cuttings were then inoculated on Potato Dextrose Agar supplemented with 100µg/ml Streptomycin. The inoculated petri plates were sealed with parafilm and incubated at 27°C for 1 week in dark conditions.

### **Identification of the fungal endophyte**

The isolated endophytic fungus was identified up to genus level based upon colony morphology, growth pattern and microscopic observation by Lacto Phenol Cotton Blue staining.

### **Preparation of fungal extract**

Secondary metabolite extraction was carried out as described with minor modifications [12]. Endophytic fungal isolates were further inoculated in 100 ml Potato Dextrose Broth and incubated at room temperature for one week under stationary conditions with intermittent shaking for enrichment of the fungus. The broth culture was filtered to separate the mycelia and filtrate. The filtrate was then transferred into separating funnel with equal volume of ethyl acetate. After mixing it well for 10 min, the filtrate was kept still for 5 min till two clear immiscible layers were formed. The upper layer of ethyl acetate containing the extracted compounds was separated using separating funnel. The extract was concentrated by removing the solvent using rotary evaporator.

### **Antimicrobial Assay**

Antimicrobial potency of the fungal metabolites was examined by Agar Cup Diffusion method against five test micro-organisms. Sterile Muller Hinton agar was bulk seeded with 0.3 ml of test culture. Wells were carved in the agar using a cork borer and 200µl of the fungal extract was added into the wells. The plates were incubated at 37°C for 24 hours and the zone of inhibition was measured and compared with DMSO as control.

### **Enzymatic Activity**

Preliminary screening of the fungal endophyte for six extracellular enzymes was carried out by spot inoculation on solid media with specific substrates for respective enzymes- Starch agar for Amylase, Cellulose Congo red agar for Cellulase, Tributyrin agar for Lipase, McCartney's agar for Pectinase, Fraziers agar for Protease and Christensen's Urea agar for Urease. The plates were incubated for 48 hours. After incubation, Starch agar and Fraziers agar were flooded with 1% iodine and 1% HgCl respectively. All the plates were examined for zone of inhibition.

### **Soil Analysis**

Characterization of mangrove soil was carried out with respect to physical, chemical and biological properties.

1. Physical Parameters- Color of the soil was determined by visual observation and soil texture was analyzed by sieve method.
2. Chemical Parameters- Determination of pH and Electrical Conductance of the soil were performed using pH meter and conductometer respectively. Macronutrients like Nitrogen, Phosphorus and Potassium were quantified [13].
3. Biological Parameters- Nitrogen Fixing bacteria were isolated using Ashby's mannitol broth and Ashby's mannitol agar.

## RESULTS AND DISCUSSION

Endophytic fungus was isolated by inoculating surface sterilized leaf cuttings on Potato Dextrose Agar which showed fungal growth around its surface indicating the presence of fungal endophyte. The isolated endophyte was subjected to Lacto Phenol Cotton Blue Staining and was observed microscopically at 400x magnification. Based on the morphology and growth pattern the endophyte was identified as *Alternaria*. *Alternaria* is an important fungus due to its different life style from saprophytes to endophytes which depends upon the host susceptibility. It acts as an important endosymbiont which can stimulate host defence mechanism against various pathogens



Fig. 1: Fungal endophyte on leaf

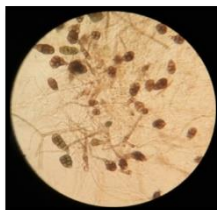


Fig. 2: Endophytic fungus at 400X

The fungal ethyl acetate extract was checked for its antimicrobial activity against five test organisms. Maximum antimicrobial action was observed against the Gram-positive test organisms- *Staphylococcus aureus* and *Corynebacterium diphtheriae*. The extract showed some inhibition against Gram negative bacteria *Escherichia coli* and fungal strain *Candida albicans* as well but no activity was observed against *Salmonella typhi*. Figure 3 is the table showing results of antimicrobial activity.

MICRO ORGANISMS	Zone of Inhibition(mm)	
	Control (DMSO)	Fungal Extract
<i>S. aureus</i>	0	25
<i>C. diphtheriae</i>	0	18
<i>E. coli</i>	13	16
<i>S. typhi</i>	12	12
<i>C. albicans</i>	17	19

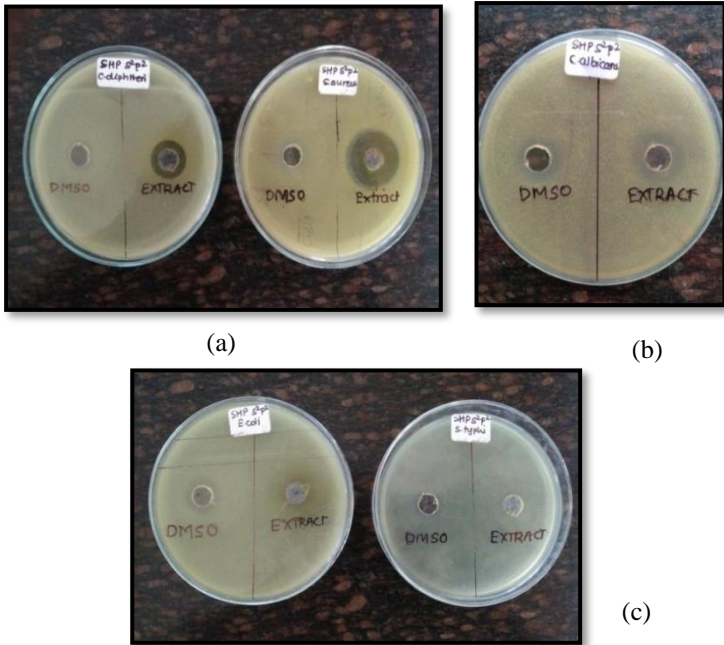


Fig 4: Antimicrobial activity against (a) *S. aureus* & *C. diphthariae*, (b) *C. albicans*, (c) *E. coli* & *S. Typhi*

Production of fungal enzymes was detected using various selective media and the endophyte showed presence of enzymes Amylase, Lipase, Protease, Pectinase, Urease. However, Cellulase was absent since no decolourization was observed around the colony. Figure 5 is the table showing results of enzymatic characterization.

ENZYMES	OBSERVATION
Amylase	+
Cellulase	-
Protease	+
Pectinase	+
Urease	+
Lipase	+

KEY:  
 + = Positive  
 - = Negative

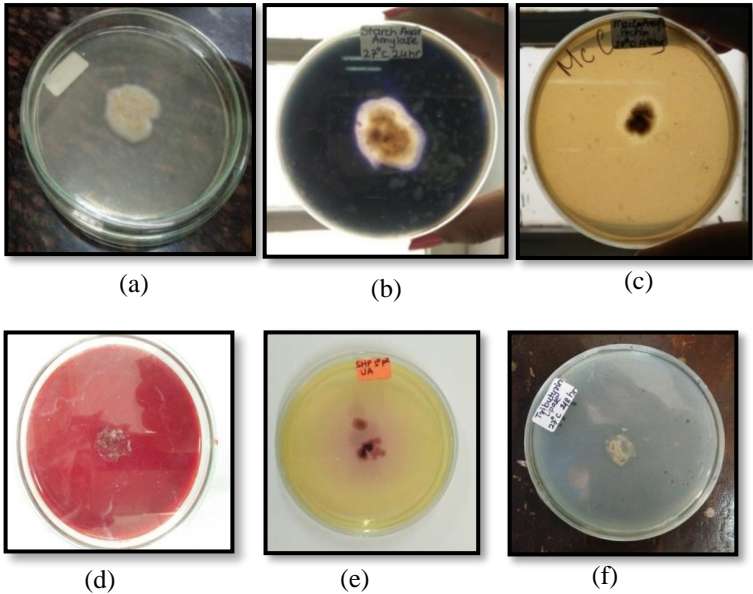


Fig. 6: (a) Protease activity (b) Amylase activity (c) Pectinase activity (d) No Cellulase activity, (e) Urease activity, (f) Lipase activity



Fig 7: Melanin-producing *Azotobacter* colonies on Ashby's Mannitol Agar Plate

The greyish clay loam mangrove soil was found to be alkaline in nature and showed presence of a melanin producing free living nitrogen fixing organism *Azotobacter*, with a low generation time, proving to be an advantage for quick culturing of the organism. Generally, growth of *Azotobacter* requires about 8-12 days but this strain of organism showed growth in about 3-4 days. The soil was rich in nitrogen content while poor levels of Potassium and Phosphorus were seen.

Parameters	Results
PHYSICAL Color Texture	Grey Clay loam
CHEMICAL pH Electrical Conductance Total N Total K Total P	8.3 11.24 mS/cm 57.4% 6.4 mg/litre 0.0897 mg/litre
BIOLOGICAL Nitrogen fixers	Free living Melanin-producing <i>Azotobacter</i> having low Generation time

Mangroves grow in unique swamp regions which are water logged and hence soil plays a major role in the plant development. Since the mangrove environment is under high stress conditions, the micro-organisms growing in it can have great potential for bioremediation [14]. Mangroves provide a unique ecological environment for diverse bacterial communities [15]. Various soil parameters are important drivers for the establishment and persistence of mangrove ecosystem.

## CONCLUSION

The Endophytic fungi are one of the most unexplored and diverse group of organisms that make symbiotic associations with higher life forms and may produce beneficial substances for host [16]. This study shows the presence of endophytic fungus in the leaves of mangrove plant *Avicennia marina*. The enzymatic and antimicrobial potential of the fungal endophyte offers promising source of bioactive natural products that can be used to satisfy demands of pharmaceutical, medical agriculture and industries [17]. The discovery of novel antimicrobial metabolites is an important alternative to overcome the increasing levels of drug resistance by plant and human pathogens. Our results also contribute to the understanding of mangrove plant *Avicennia marina* as an important



source of endophytic fungi and the scope for future investigations on the endophytes for their bioactive potential and industrial applications [18]. The study of mangroves soil plays an important role in understanding mangroves as an important ecosystem with immense ecological value and helps in conservation of this highly reproductive ecosystem at local and global scale.

### **ACKNOWLEDGEMENT**

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## **CHAPTER 9 - STUDY OF PHYTOCHEMICAL AND ANTIOXIDANT ACTIVITY FROM DIFFERENT PLANTS BELONGING TO MALVACEAE FAMILY.**

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### **ABSTRACT**

**Objective:** Hibiscus species have been documented for treatment of high blood pressure, bacterial infections etc. in tribal medicines. We aimed at analyzing the phytochemical profile of *Hibiscus rosa-sinesis* L. and *Hibiscus fragilis* L., to select plant with potential medicinal use.

**Method:** Total Flavonoid and Phenol Content was determined Spectrophotometrically. The antioxidant activity was determined by DPPH assay. HPTLC was performed on TLC F60 plates. Antimicrobial activity was determined by agar cup method. HPLC was performed using C-18 column. Silver Nanoparticles were synthesized using 1mM silver nitrate.

**Result:** Comparable quantities of flavonoid and phenolic were found in all samples along with good antioxidant activity. HPTLC revealed many compounds and antimicrobial activity was not observed even at concentrations up to 1g/ml. HPLC showed presence of Gallic acid in HRL and HFS sample whereas presence of Quercetin in HRL sample. Silver nanoparticles were synthesized and their size were estimated using NTA.

**Conclusion:** *Hibiscus fragilis* L., stem showed highest antioxidant activity and presence of 14 metabolites in its chloroform extract by TLC. HPTLC confirms the presence of Quercetin in Leaves, which, along with good flavonoid and phenolic content can be correlated to its antioxidant activity.

**KEYWORDS:** Hibiscus, Flavonoid, Phenolic, HPTLC, Antioxidant.

## **INTRODUCTION:**

Hibiscus is a genus of flowering plant in the family Malvaceae, native to East Asia. Malvaceae is one of the important family consisting of 82 genera and 1500 species with over 200 species of Hibiscus (U.A. Essiett, E. I. ,2014). Hibiscus rosasinesis is a bushy, evergreen shrub with glossy leaves and solitary, vibrant color flowers ranging from white through yellow and orange to scarlet and shades of pink, with both single and double sets of petals. The study of Hibiscus rosasinesis have been carried out worldwide which showed that the leaves of the plant are used as emollient, anodyne and laxative in Ayurveda. In South-Asian traditional medicine, various parts of the plant are used in the preparation of variety of foods. Different preparations such as tea, decoctions from different parts of the Hibiscus plant have widely used in folk medicine. Hibiscus leaf tea has been found to contain lots of Vitamin C which when consumed helps to build immunity over cough and cold. Leaf tea also helps in regulating the proper menstrual cycle by lowering the levels of oestrogens and thus helps to maintain a balanced hormonal level. Hibiscus leaf tea has also been found to be effective in reducing the blood pressure and lowering the LDL Cholesterol levels. The plant has been known to have several pharmacological properties including anti estrogenic anti-implantation, abortifacient, antidiabetic, hypotensive, anti-inflammatory activities.

Studies have revealed the presence of important phytoconstituents in the plant. The most important class which is the polyphenols. Polyphenols are plant metabolites characterized by the presence of several phenol groups such as hydrolysable tannins, lignans, stilbenes and Flavonoids. Flavonoids include flavonols, flavones, isoflavones, anthocyanidins, among which flavonols are most commonly known for their anti-oxidant and antimicrobial biological activities. The importance of plant phenolic compounds from plant materials is a raising interest due to their redox properties, which allow them acting as reducing agents, hydrogen donors, and singlet oxygen quenchers. These compounds have also been reported to have multiple functions to counteract the free radicals and

also to inhibit different types of oxidizing enzymes Lalita Subedi, S. T. (2014).

Nowadays, there is a growing need to develop eco-friendly processes, which do not use toxic chemicals in the synthesis protocols. Green synthesis approaches include mixed-valence polyoxometalates, polysaccharides, Tollens, biological, and irradiation method which have advantages over conventional methods involving chemical agents associated with environmental toxicity. Selection of solvent medium and selection of eco-friendly nontoxic reducing and stabilizing agents are the most important issues which must be considered in green synthesis of NPs.

Silver NPs are of interest because of the unique properties which can be incorporated into antimicrobial applications, biosensor materials, composite fibers, cryogenic super-conducting materials, cosmetic products, and electronic components (Iravani, et.al, 2014) . The aim of the present study is to evaluate the anti-oxidant activity and the presence of different phytoconstituents present in *Hibiscus rosasinesis*. L and *Hibiscus fragilis*. L along with the quantitative determination of phenol and flavonoid content in the plants.

## **MATERIALS AND METHODS:**

**Selection and collection of plant Materials:** Garden hybrids of *H.rosa sinensis* L. and *H. fragilis* L. were taken for this study. Leaves and stems of the above plants were collected from Mumbai, India.

**Preparation of Powdered Extract:** Leaves and stem of the plants were washed in distilled water to remove any dirt or dust. The samples were dried in an oven at 45°C, till a constant weight was obtained. The dried samples were powdered with the help of a mixer grinder (Hadi Ud Zaman, 2017).

**Preparation of Ethanolic & Methanolic Extract:** Extraction of powdered samples was carried out at 4°C. About 10 g of sample was extracted using 100 mL of cold solvent for 30 minutes in rotatory shaker.

Then, the extract was filtered using Whatman filter paper no. 1 to obtain a liquefied extract (MOHAMMED, 2016).

**Preparation of Aqueous Extract:** About 50mL of above solvent extract was evaporated to dryness using hot air oven at 60°C. The evaporated extract was suspended in 50mL of sterile distilled water (Satheesh Kumar Bhandary, 2012).

**Phytochemical Screening:** The preliminary phytochemical analysis of powdered extract was according to methods described by Godghate(2013) & N. Savithramma (2011).

**Determination of Total Flavonoid Content:** Total Flavonoid Content of ethanolic extract was estimated by aluminum chloride method. Amount of flavonoid is expressed in QE mg/g using Quercetin as standard (Rajalakshmi Padma Vairavasundaram1., 2002).

**Determination of Total Phenolic Content:** Total Phenolic Content of methanolic extract was estimated by Folin ciocalteu method. Amount of phenol is expressed in GAE mg/g using Gallic acid as standard (Anusha Bhaskar Nithya, 2011).

**Antioxidant Analysis:** Free radical scavenging activity of methanolic extracts was determined by DPPH (2,2-Diphenyl-1-picrylhydrazyl) assay. Dilutions of ascorbic acid were taken from 20 – 140 mg/ml . Volume in each tube was made up to 4mL using 1mM DPPH solution. Ability of plant to scavenge free radicals is expressed as % inhibition in mg/mL of plant extract. The scavenging activity was calculated from control sample OD using the following equation.

% of radical scavenging activity =

Absorbance of control – Absorbance of sample

-----×100

Absorbance of control

Finally, IC<sub>50</sub> value was calculated for each sample extract where dilutions of Ascorbic acid were used as standards. High IC<sub>50</sub> value indicates less antioxidant capacity (Prasad, 2014).

#### **Antimicrobial activity:**

Antimicrobial activity of aqueous extract was determined using Agar cup diffusion assay. Samples of concentration 100mg/mL, 500mg/mL & 1g/mL were used for antimicrobial assay. (Olaleye, 2007), (Al-Hashimi, 2012).

#### **HPTLC analysis:**

HPTLC analysis was conducted to study the number of metabolites present in the ethanolic extracts. Stationary and mobile phase used were TLC F60 Plates (10x10) and Toluene: chloroform: ethanol (4:4:1) respectively (Bhradwaj, 2017), (C. Reetesh, 2015).

#### **HPLC analysis:**

HPLC was performed using JASCO BINARY HPLC. Separation was achieved using C-18 reversed phase chromatographic column. Mobile phase used for separation of phenols is water: acetonitrile (80:20) and for separation of flavonoids is acetonitrile: 2% acetic acid (40:60). Standard used for phenol and flavonoid is Gallic acid and Quercetin respectively (Seal, 2016).

#### **Green synthesis of silver nanoparticle:**

10mL of Aqueous extract (1g in 10ml of Distilled water heated at 60 °C for 20 minutes and filtered using whatman filter paper no 1 ) assorted with 1mM of 90 ml of silver nitrate solution and was heated at 50 °C . A change in the color of solution was observed during the heating process. The size of the nanoparticle synthesized was estimated using nanoparticle tracking analysis (Gnanadhas Gnanajobitha, 2013) , (EK.Elumalai, 2010).



## RESULTS

Samples are abbreviated as HRL and HRS for *H. rosa sinensis* L. leaf and stem and as HFL and HFS for *H. fragilis* L. leaf and stem respectively.

### Phytochemical Screening:

Preliminary phytochemical analysis revealed the presence of flavonoids, tannins, phenols, diterpenes, & alkaloids in all samples. The results of phytochemical analysis are showed in table below where “+” indicates presence of phytochemical and “-” indicates absence of phytochemical.

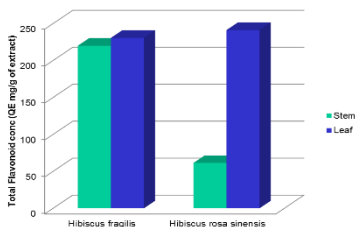
PHYTOCHEMICAL	HFL	HRL	HFS	HRS
Saponins	-	-	-	-
Tannins	+	+	-	-
Phenols	+	+	+	+
Phytosterol	-	-	+	+
Phlobatannins	-	-	-	-
Diterpenes	+	+	+	+
Leucoanthocyanin	-	-	-	-
Steroid	-	-	-	-
Anthocyanin	-	-	-	-
Anthraquinone	+	+	+	+
Carbohydrate (Molish test)	+	+	+	+
Proteins				
- Ninhydrin	+	+	+	+
- Xanthoproteic	+	+	+	+
Alkaloids	+	+	+	+
Coumarin	+	+	+	+
Flavonoids				
- NaOH test	+	+	+	+
- NH <sub>4</sub> OH test	+	+	+	+
Cardial glycoside	-	-	-	-

**Total Flavonoid Content:**

Total Flavonoid Content was found to be highest in *H. rosa sinensis* L. leaf sample. Amount of flavonoid present in all samples is:

	<i>Hibiscus fragilis</i> L. (ug/g)	<i>Hibiscus rosa Sinensis</i> L. (ug/g)
<b>Stem</b>	220.049	61.394
<b>Leaf</b>	230.626	241.2062

Comparative estimation of Total Flavonoid content between two *Hibiscus* sp.

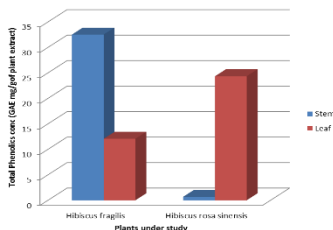


**Total Phenolic Content:**

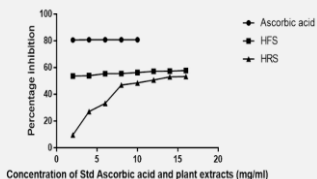
Total Phenolic Content was found to be highest in *H. fragilis* L. stem sample. Amount of phenol present in all samples is :

	<i>Hibiscus fragilis</i> L. (GAE mg/g of extract)	<i>Hibiscus rosa Sinensis</i> L. (GAE mg/g of extract)
<b>Stem</b>	32.50557	0.677321478
<b>Leaf</b>	12.06254	24.32835614

Comparative estimation of Total Phenol content by Folin's method between two *Hibiscus* sps.



Comparative anti-oxidant activity of Stems of *Hibiscus fragilis* and *Hibiscus rosa sinensis*



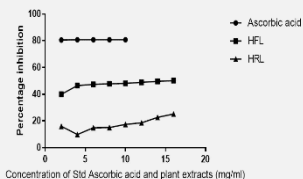
**Antioxidant Analysis:**

Presence of Flavonoids and Phenols affirms the in-vitro antioxidant potential of the different parts of two

species of Hibiscus. The highest antioxidant property was observed in *H. fragilis L.* stem sample. Anti-oxidant property of samples is:

Sample	Ascorbic acid	HFL	HRL	HFS	HRS
IC50 value	<2 mg/ml	13.9 mg/ml	>20 mg/ml	<= 2 mg/ml	11.4 mg/ml

Comparative anti-oxidant activity of leaves of *Hibiscus fragilis* and *Hibiscus rosa sinensis*



**Antimicrobial activity:**

Aqueous extract of plant up to 1g/ml were not able to inhibit the growth the test organism (*Escherichia coli* & *Staphylococcus aureus*). No inhibition is indicated as “-”.

Concentration	HRL	HRS	HFL	HFL	Test organism
100 (mg/mL)	-	-	-	-	<i>E. coli</i>
500 (mg/mL)	-	-	-	-	<i>E. coli</i>
1.00 (g/mL)	-	-	-	-	<i>E. coli</i>
100 (mg/mL)	-	-	-	-	<i>S. aureus</i>
500 (mg/mL)	-	-	-	-	<i>S. aureus</i>
1.00 (g/mL)	-	-	-	-	<i>S. aureus</i>

Positive control: Ampicillin 10mg/ml;  
Zone of inhibition: 10.1mm

**HPTLC analysis:**

Metabolites present in the plant samples were separated and studied using HPTLC.

Sample	Solvent	No. of peaks observed			Peak corresponding to quer-cetin Rf values.
		254 nm	366 nm	After derivitization.	
<b>HFL</b>	Ethanol	4	4	6	-
<b>HRL</b>	Ethanol	11	11	11	0.23 (254nm) , 0.24 (366nm)
<b>HFS</b>	Ethanol	6	3	5	-
<b>Quer-cetin</b>	Ethanol	4	3	2	0.23 (254nm) , 0.24 (366 nm)

**HPLC analysis:**

Gallic acid and Quercetin are distributed in different parts of plants. Plants samples were subjected for the estimation of Gallic acid and Quercetin by HPLC analysis.

Ø Flavonoids.

Standard (Quercetin)	HRL	HFS
<b>No. of peaks</b>	4	4
<b>Retention time similar to that of quercetin</b>	4.875	-
<b>Retention time of Quercetin</b>	4.975 [ Area under peak= 1186162uV-sec]	
<b>Area under peak</b>	28393uV-sec	-

Ø Phenols.

Standard ( Gallic acid)	HRL	HFS
No. of peaks	4	4
Retention time similar to that of gallic acid	2.975	2.992
Retention time of Gallic acid	3.133 [ Area under peak= 2851758 uV-sec]	
Area under peak	356672 uV-sec	141958uV-sec

#### Green synthesis of silver nanoparticle:

The colour change is the preliminary observation which shows the presence of silver nanoparticle whose size was determined using nanoparticle tracking analysis. The size of silver nanoparticle for *H. rosa sinensis* L. leaves was found out to be 306nm and that of *H. fragilis* L. stem was found out to be 179 nm.

#### CONCLUSION:

The results of this study reveal the presence of important phytoconstituents such as the flavonoids, phenols, alkaloids, tannins to be present in different parts of the plant. The Total Flavonoid Content was estimated using Aluminum chloride method. The flavonoid content was found to be highest in the HRL sample (*Hibiscus rosasinesis*. L leaves), Also the Total Phenolic Content estimation was carried out using Folin Cicolteau method and was found to be highest in the HFS sample (*Hibiscus fragilis*. L stem). The presence of these phytochemicals affirms the in vitro anti-oxidant potential of the Plant. The anti-oxidant potential of the plant extracts was determined using DPPH assay. The results obtained confirm the in vitro anti-oxidant potential of the samples under study. High Performance Thin Layer Chromatography was also performed to identify and characterize other phytoconstituents of the plant. The following analysis revealed the presence of maximum number of compounds in the *Hibiscus rosasinesis* leaves sample. Further Quantitative estimation of the phytoconstituents was done using High Performance Liquid Chromatography. It showed the presence of

quercetin and gallic acid in the *Hibiscus rosasinesis* L leaves and the highest amount of gallic acid was found to be present in the *Hibiscus fragilis* L. stem. The anti-microbial activity of the plant extract was also tested using agar well diffusion method against *Escherichia coli* ( Gram negative ) and *Staphylococcus aureus*( Gram Positive) using Ampicillin as a standard .Green synthesis of silver nanoparticles of two plant extracts was carried out using 1mM AgNO<sub>3</sub>. Phytochemicals are potent anti-oxidants, metal chelators or free radical scavengers and hence they own health promoting properties.

In this study the in vitro antioxidant assays indicate that due to the higher in vitro anti-oxidant activity and higher phenol and flavonoid contents, these phytochemicals could be significant source of natural natural antioxidants which might be helpful in preventing the progress of various oxidative stress and stress related disorders. Thus, the use of natural anti-oxidants would help prevent several carcinogenic effects occurring due to the use of synthetic anti-oxidants. Thus, further isolation of therapeutically active constituents is essential for the formulation of new herbal drug. *H. fragilis* L. stem showed promising results as it has high amount of phenol and highest anti-oxidant property. The size of silver nanoparticle synthesised using *H. fragilis* L. stem was of size 179nm which can further be applied in drug delivery system with further purification.

**ACKNOWLEDGEMENT:** We express our sincere thanks to the Principal of KC College for providing us with an opportunity to work under Jigyaasa Science Honors Program and also thankful to Institute of Science Mumbai, Ramnarain Ruia College and Viva College for providing necessary facilities. We also express our gratitude to Star DBT Scheme of Department of Biotechnology, Government of India for providing financial assistance for successful completion of our work.

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## **SECTION IV - MICROBIOLOGY**

### **CHAPTER 10 - SCREENING OF BETA LACTAM RESISTANT ORGANISMS FROM RAW AND DRINKING WATER SOURCES IN MUMBAI**

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#### **ABSTRACT**

The spread of antibiotic resistant bacteria (ARB) in the environment is a major public health issue. Aquatic ecosystems is a major source of ARB, which have entered from human, animal and industrial sources. Beta-lactams are a class of most widely used broad spectrum antibiotics in therapeutics. In the current study, 7 samples from various raw and treated drinking water sources in Mumbai were screened for the presence of beta-lactam resistant Gram-negative bacteria by filtering through a cellulose nitrate membrane and using MacConkey's agar. The isolates were identified by studying the morphological and biochemical characteristics. The resistance of the bacteria towards the beta-lactam antibiotics-Ampicillin, Aztreonam, Ceftazidime, Cefmetazole and Imipenem was evaluated using Kirby Bauer's disc diffusion method. 87.5% of the isolates were found to be resistant to at least one of the beta-lactam antibiotics. The highest resistance rate was found against 3<sup>rd</sup> generation penams (87.5%) and the least was found against carbapenems (12.5%). Thus, the study indicates that aquatic ecosystems in Mumbai can act as reservoir of ARBs, which could potentially be transferred to susceptible bacterial pathogens.

**KEYWORDS:** -Beta-lactam resistant organisms, Kirby bauer's method, antibiotic susceptibility test.

## **INTRODUCTION**

Access to safe drinking water is essential for human health [1]. Water resources are sources of water that are useful or potentially useful. Only 3% of earth's water is fresh water. Most of it is in icecaps and glaciers (69%) and ground water (30%) while all lakes, rivers and Swamps combined only account for a small fraction (0.3%) of the earth's total fresh water reserves. 97% of the water on the earth is salt water. Water is the natural resource which gets easily polluted by recreational activities and sewage disposal. Studies have been done by various researchers to measure the chemical and microbial contaminants in the natural water bodies. [2] Beta-lactam antibiotics are most commonly used for treatment of bacterial infections worldwide.

The most clinically important antibiotic resistance genes are those that encode enzymes that hydrolyze lactams (bla genes) [4]. These traits confer high level resistance to -lactam antibiotics, which are the most widely used antibiotics in clinical and veterinary practice [5,6]. Extended Spectrum -Lactamase (ESBL) is group of enzymes that can hydrolyze a variety of - lactams including cephalosporins like ceftazidime, cefotaxime, and ceftriaxone and monobactams like aztreonam in addition to penicillin but does not hydrolyze cephamycins like ceftiofur. Most of the ESBL also have the ability to hydrolyze fourth-generation cephalosporins including cefepime [7]. The aim of the study was to screen the water samples from different areas in Mumbai for the presence of antibiotic resistant bacteria against five beta-lactam antibiotics by Kirby bauer's disc diffusion method.

## **MATERIALS AND METHODS**

**Collection Of Water Samples:** Clean plastic bottles were used for water sample collection from the site and the samples were transferred to the laboratory for microbiological analysis [3]. The water samples were processed within 2-4 hours of collections, in case of delay the samples were refrigerated at 4 degrees Celsius.

**Isolation by Membrane Filtration.** For all the samples, three volumes of 100ml were filtered through 0.45 µm pore sized filter (cellulose nitrate

membranes, Hi-media) using a water pump. These membranes were aseptically placed upon plates with MacConkey's agar media to select out gram negative organism ensuring that no air bubbles were trapped.

**Identification Of Bacterial Isolates– Cultural, Morphological Characters:** Sub-culturing was carried out on distinct colonies until pure cultures were obtained and were preserved. Individual colonies were purified and identified by morphological and biochemical techniques and further identified by biochemical examination and VITEK 2 compact.[8]

**Antibiotic Susceptibility Test:** Antibiotic Susceptibility testing was performed by Kirby-Bauer test also called as Disc Diffusion test using standard procedure of the Clinical and Laboratory Standards Institute. Beta lactam group of antibiotic discs of standard concentrations were placed on agar plates swabbed with isolated organisms and the susceptibilities of the organisms to the antibiotics were determined. The antibiotics used were Ampicillin (AMP10), Aztreonam (AT30), Ceftazidime (CAZ30), Cefmetazole (CMZ30), Imipenem (IPM10).

## **RESULT AND DISCUSSION**

All the water sample showed a very high bacterial contamination. The cellulose membrane filter placed on selective media was used for isolation and identification of organisms. Table 1 shows the result of identification of the organism. The antibiotic resistance pattern was studied using disc diffusion method. Table 2 shows the results of antibiotic susceptibility test. The graph shows that the 87.5% of the isolate were resistant to atleast one of the beta-lactam antibiotics. The highest resistance rate was found against third generation penams (87.5%) and the least resistance was found against carbapenams (12.25%). Thus, study showed the presence of several gram-negative bacteria in the raw source water that were highly resistant to many beta-lactam antibiotics like Ampicillin and some were also found to be resistant to third generation penams. Also, highly resistant bacteria were also isolated from treated drinking water samples. The sensitivity was also found to be in the intermediate range for a number of antibiotics for all strains studied, raising concerns that there might be a shift towards

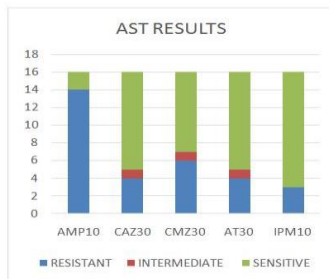
resistance in those organisms. Such organisms pose a grave risk to humans coming in contact with them as an infection caused by such organisms would be virtually untreatable and eventually fatal. This can further compound the problem of antibiotic resistance due to the horizontal intra and inter-genus transfer of plasmids. The presence of antibiotic resistant bacteria in the treated water is possible because water treatment could increase antibiotic resistance and induce transfer of antibiotic resistant genes among certain bacterial population. [9]. Water distribution systems could serve as a reservoir for the spread antibiotic resistance. Further work should identify the presence of biofilms in the distribution lines and develop methods to reduce the ARBs in drinking water [10]. Further studies should be done on the resistant and intermediate resistant strains of organisms to check whether the resistance conferred upon the organisms was plasmid borne or chromosomal, identify the presence of biofilms in the distribution lines and develop methods to reduce the ARBs in drinking water. There is paucity of information regarding beta-lactam resistance in drinking water sources from Mumbai. To the best of our knowledge, this is the first study reporting beta-lactam resistance in water samples from Mumbai.

**Table 1**

CULTURE NO.	ISOLATED ORGANISM BY VITEK 2 COMPACT
1	<i>Comamonas testosteroni</i>
2	<i>Pantoea spp</i>
3	<i>Pseudomonas fluorescens</i>
4	<i>Enterobacter cloacae</i>
5	<i>Klebsiella pneumoniae</i>
6	<i>Pseudomonas oleovorans</i>
7	<i>Acinetobacter haemolyticus</i>
8	<i>Klebsiella pneumoniae</i>
9	<i>Klebsiella pneumoniae</i>
10	<i>Acinetobacter baumannii</i>
11	<i>Klebsiella pneumonia</i>
12	<i>Klebsiella pneumonia</i>
13	<i>Klebsiella pneumonia</i>
14	<i>Klebsiella pneumoniae</i>
15	<i>Acinetobacter baumannii</i>
16	<i>Acinetobacter lwoffii</i>

**Table 2**

Culture no.	Resistance pattern
1	(AMP),(CAZ),(AT)
2	(AMP)
3	(AMP),( CAZ)
4	(AMP),(CMZ),(IPM)
5	(CAZ), (IPM)
6	(AMP), (CMZ)
7	(AMP) ,(CAZ)
8	(AMP),(CAZ), (CMZ)
9	(AMP)
10	(AMP),(CAZ), (AT)
11	(AMP)
12	(AMP)
13	(AMP),(CAZ),(CMZ), (AT)
14	(CAZ)
15	(AMP),(CAZ),(CMZ), (AT)
16	(AMP),(CAZ), (CMZ), (IPM)



**CONCLUSION**

The study indicates that aquatic ecosystems in Mumbai can act as reservoirs of antibiotic resistant bacteria, which could potentially be transferred to susceptible pathogens. It is a health risk to a large mass of population consuming water from these sources. Unmonitored usage of antibiotics should be avoided.

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## **SECTION V - PHYSICS**

### **CHAPTER 11 - HYDROGEN AS REPLACEMENT TO CARBON BASED ENERGY INFRASTRUCTURE**

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#### **ABSTRACT:**

Carbon has been used to produce energy for a long way now. From fossil fuels to wood and biogas, there are different ways to produce energy. While these different processes are quite efficient, they aren't environment friendly and we are currently seeing all sorts of effects of pollution caused by this. Be it global warming or ozone depletion in atmosphere, we are harming ourselves by this current situation. To change that, Hydrogen based Energy System is suggested. With latest developments in different fields regarding hydrogen, there is a need to put all the knowledge from various fields together and utilize it to make clean energy and essentially save ourselves from doom.

#### **INTRODUCTION:**

For thousands of years, Carbon has been circulating in various forms in the atmosphere or essentially the surface of our planet from Carbon dioxide gas to become Carbohydrate in plants to various living or dead biomasses etc. Humans started using more and more Fossil fuels after the Industrial Revolution. As you can see, there are large spikes in the concentration of the gases after the 18<sup>th</sup> Century. The Carbon Cycle was running its due course properly until the modern times. What we have done is we added extra carbon to this cycle. We dug up the carbon from carbon reservoir which were deep underground and threw it up in atmosphere. So right now we are living in a carbon based economy. Most of the energy sources we know, they have their roots in the element carbon. According to the US Energy Information Administration's 2006 estimate, the estimated 471.8 EJ total consumption in 2004 had fossil fuels supplying 86% of the world's energy. The end product of almost all the energy production from carbon contains different compounds of



carbon, mainly the oxides of carbon. Carbon Monoxide gas is a known pollutant and Carbon Dioxide is a greenhouse gas and is the cause of Global Warming. Plus there is always a chance of us using up all the available fossil fuels. The end of this energy production system will be in two ways: One is we will eventually run out of all the fossil fuel. Provided we don't destroy ourselves before reaching this point. Then we will be forced to move to a new energy system. This seems quite chaotic. Or second way is that, before the fossil fuels deplete, we can find a new, viable energy system which is environment friendly and can completely replace current energy production system.

### **REVIEW OF LITERATURE:**

Hydrogen is the first element that formed after the Big Bang. It is the simplest and most abundant element in the universe. Of all the baryonic matter in the universe, hydrogen is about 75%. [2] Finding efficient ways of using the element is also very useful for extraterrestrial expeditions since most of the gases in space are Hydrogen and Helium. On earth, in the atmosphere hydrogen gas is scarce, about 1 ppm by volume. But on Earth's surface, hydrogen is the third most abundant element [3], mainly in forms of chemical compounds. Exploiting this property, we can produce hydrogen gas for different energy mechanisms. In a study done in year 2000, around 95% of hydrogen gas was prepared by Steam Reforming of hydrocarbons. [3] The final product of this process is hydrogen gas and oxides of carbon. This is where the problem lies. Using such hydrogen gas in processes even if they are clean will not entirely be environment friendly. One of the easiest methods of producing hydrogen is electrolysis of water. It is considered very less energy efficient hence steam reforming is preferred over it. But it is the cleanest source of hydrogen provided the electricity used was produced by clean methods. Photocatalytic splitting of water to produce hydrogen gas is also a very clean technique. Research is going on to increase the efficiency.

Solar energy is a good alternative but the problem with that are one needs a large charge carrying battery on which research is going on and it's not quite mobile for certain applications. Instead of waiting for your car's battery to charge up, one can simply refill hydrogen gas and hydrogen

fuel cells or hydrogen internal combustion engines can produce the required energy on the go.

**METHODOLOGY:**

We have to find replacement for carbon energy production system. The suggested candidate is Hydrogen.

1. To investigate all possible mechanisms of production of hydrogen, their efficiency and how much environmentally friendly these processes are. Processes in consideration are Electrolysis of Water, Photocatalytic Splitting of Water.
2. To study possible storage mechanisms of Hydrogen.
3. Energy is produced from hydrogen through certain processes. The aim is to study various energy conversion processes, their efficiencies, their costs and their environmental friendliness. Processes in consideration are Hydrogen Internal Combustion Engine and Hydrogen Fuel Cell.
4. Find drawbacks if any, which will be helpful for future researches.

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## **CHAPTER 12 - USE OF ULTRASONIC SENSORS IN BLIND CANE TO DETECT OBSTACLES IN FRONT OF IT AND AVOID COLLISION.**

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### **ABSTRACT**

A white cane is used by many people who are blind or visually impaired. Its primary uses are as a mobility tool and as a courtesy to others, but there are at least five varieties, each serving a slightly different need. There are different types of cane like guided cane, identification cane or symbol cane, support cane, kiddie cane, green cane. Blind people have used canes as mobility tools for centuries, but it was not until after world war I that the white cane was introduced.

### **INTRODUCTION**

White cane is used by many people who are blind or visually impaired. These canes are made from aluminium, graphite – reinforced plastic or other fiber – reinforced plastic and come with wide variety of tips depending upon user preference. The white cane is commonly accepted as a “symbol of blindness” different countries still have different rules concerning what constitutes a “cane for a blind”.



### **ULTRASONIC DISTANCE MEASUREMENT PRINCIPLE:**

Ultrasonic transmitter emitted an ultrasonic wave in one direction and started timing when it launched ultrasonic spread in the air and would return immediately when it encountered obstacles on the way at last the

ultrasonic receiver would stop timing when it received the reflected wave. As ultrasonic spread velocity is 340 m/s in the air , based on the timing record(t) we can calculated the distance(s) between the obstacles and transmitter , namely:  $S=340t/2$  which is so called time difference distance measurement principle.

### **LITERATURE REVIEW:**

When an object moves the motion can be detected by relatively simple motion sensors which is design to detect the change in luminance at one point on retina and co-relate it with a delayed change in luminance at a neighbouring point on retina. (Reichardt, 1961). Ultrasonic method involves beam of high frequency sound wave that are introduced into material for detection of surface and internal defect. It includes resonance thro transmission and pulsed echo. Ultrasound has ability to detect split, checks, shake, pitch, decay, and knots (Mc Donald, 1980).

### **Methods**

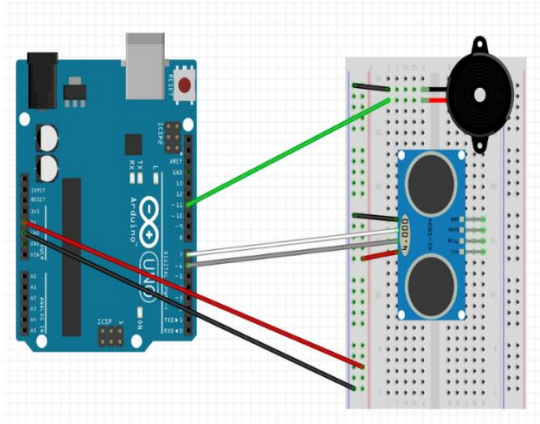
#### **1) Design - Block diagram of blind cane**

#### **2) Instruments required -**

- 1) Ultrasonic sensor HC – SR04
- 2) Arduino UNO ATmega32
- 3) Connecting wires
- 4) Soldering apparatus
- 5) Plastic pipe
- 6) Glue
- 7) Cutter
- 8) Breadboard
- 9) Vibration motors
- 10) LED
- 11) 470 ohm resistors
- 12) 9v batteries

## PROCEDURE

We connect ultrasonic sensors with Arudino UNO ATmeag32 as shown in figure.



Ultrasonic sensor HC – SR04:



## CONCLUSION

This model is helpful to blind people. It consists of ultrasonic sensors which continuously emits ultrasonic waves from transmitter which when returns back when it encountered with the obstacles in the way.

If there is any obstacle near sensor the vibration motor start vibrating and the blind person knows easily that there is an obstacle in front of it.

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## **SECTION VI - PSYCHOLOGY**

### **CHAPTER 13 - INVESTIGATION OF THE RELATIONSHIP BETWEEN PERSONALITY AND MUSIC PREFERENCE**

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#### **ABSTRACT**

In today's world of technology, various genres of music from various parts of the world are easily accessible. Thus, we can say that music is an integral part of every individual's life. However, people do not pay much attention to the impact that music has on us, and most importantly, on our personalities. The purpose of this study was to examine the relationship between personality and music preference. The sample consisted of 60 individuals, 30 males and 30 females, all between the age group of 17-25. The Big Five Inventory (BFI) (1991) was used which scored each of the Big Five personality factors and a self – constructed music preference scale based on the STOMP i.e., Short Test of Music Preferences (STOMP; Rentfrow, P. J., & Gosling, S. D.) was used to measure the music preference of the participants. Data was analyzed using the Pearson product moment correlation method. Results indicated a positive correlation between Extraversion and a preference for Upbeat and Conventional Music, a negative correlation between Neuroticism and a preference for Upbeat and Conventional Music, a positive correlation between Openness to experience and a preference for Reflective and Complex Music. A Negative correlation was found between Extraversion and a preference for Intense and Rebellious Music. The results have important implications as we can examine the relation between individual personality and music preference which provides practical and relevant insight into ourselves.

Key Words: Music Preference, Personality, Big Five Personality Traits

## **INTRODUCTION**

Just as they say ‘you are what you eat’, one could also say ‘you are what you listen to’. Music has always been an important component of people’s lives. ‘Most people acquire their musical taste during adolescence and they carry early preferences right through the grave.’(Sloboda, 1985, p263). A growing number of research studies points towards the correlation between an individual’s personality and their music preference. The findings of such research studies can be applied in various real-life situations. Music therapy is one such area. Music Therapy is an established health profession in which music is used within a therapeutic relationship to address physical, emotional, cognitive, and social needs of individuals. The qualified music therapist provides the indicated treatment including creating, singing, moving to, and/or listening to music. Moreover, music therapy also provides avenues for communication that can be helpful to those who find it difficult to express themselves in words. The therapist uses the genre preferred most by the client, based on the information gathered from such research. Thus, this helps the therapist design the treatment in favor of the client.

Considering the correlation between thinking styles and personalities, knowing what types of music people like based on how they process information could be vital for companies like Spotify and Apple Music. David Greenberg said “By knowing an individual’s thinking style such services might in future be able to fine tune their music recommendations to an individual.” The awareness of musical likes and dislikes can also help to address anxieties and psychological issues that one may have. We can analyze the significance of the types of songs that we dislike just as we can evaluate what our preferences indicate about our personalities.

Rentfrow and Gosling say that, people choose to listen to music that suits their moods and activities. "People who enjoy spending time with others, people who enjoy talking and socializing, tend to enjoy music that is also extraverted--in some ways, party music," says Rentfrow.



People also use music to inform others about themselves. "Adolescents, in particular, use music as a way to fit into groups, as a way to manage people's impressions of them," says Rentfrow. "It's a badge, if you will, of their identity."

**Variables used in research:**

**Personality**

Personality is "the characteristics or blend of characteristics that make a person unique." (Weinberg & Gould, 1999).

It thus refers to the individual differences in characteristic patterns of thinking, feeling and behaving.

**Neuroticism/Emotional Stability:**

Neuroticism refers to the tendency to experience negative feelings. It represents individual differences in the tendency to experience distress. (McCrae & John 1992).

**Extraversion:**

Extraversion is marked by pronounced engagement with the external world. They are also more likely to participate in adventure and risky sports due to their curious and excitement seeking nature. (Serdar Tok,2011).

**Agreeableness:**

Agreeableness is associated with facets such as trust in other individuals, straightforward and honest communication, altruistic and cooperative behavior, compliance rather than defiance, modesty and humility, as well as tender, sympathetic attitudes (Costa & McCrae, 1992).

**Openness to experience:**

Openness to experience is the trait, which relates the extent to which individuals are open to fantasies, aesthetics, feelings, as well as novel actions, ideas, and values (Costa & McCrae, 1992).

**Conscientiousness:**

The six facets that correspond to conscientiousness relate to the degree to which individuals are competent, methodical--preferring order and structure, dutiful, motivated to achieve goals, disciplined, and deliberate or considered (Costa & McCrae, 1992).

**Music:**

“One does not need to have any formal knowledge of music nor, indeed, to be particularly ‘musical’ to enjoy music and to respond to it at the deepest levels. Music is part of human being and there is no human culture in which it is not highly developed and esteemed.” - Oliver Sacks

Very true to this, almost all us of enjoy music on a daily basis, irrespective of whether we have any formal knowledge about it or not. Music is something which is appreciated by people all over the world. But what is it that attracts a particular individual to a specific type of music is the main purpose of this study.

For this purpose, we have assumed that personality of an individual is closely linked to their music preference. That is people having a particular set of characteristic traits are relatively more attracted to a particular genre of music.

**Literature Review**

Previous research has shown a link between personality traits and music preference (e.g., Catell & Anderson, 1953; McCown, Keiser, Mulhearn, & Williamson, 1997; North, Hargreaves, & O’Neill, 2000). These studies, however, have each used different methods of measuring music preference and according to Zweigenhaft (2008) music preference may vary with age and location. It is possible that the links between music preference and personality may vary across samples.

Catell was among the first to theorize how music could help in understanding personality. Catell and Anderson (1953) conducted one of the first investigations of individual differences in music preferences. However, whereas Catell and his colleagues assumed that music

preferences reflected unconscious motives, urges and desires, the contemporary view is that music preferences are manifestation of explicit psychological traits. More specifically, current research on music preferences draws from the fact that people seek musical environments that reinforce and reflect their personalities, attitudes, and emotions.

Our music preference may be developmental. “Most people acquire their musical taste during adolescence among friends of the same age, and they carry early preferences right through the grave” (Sloboda, 1985, p263). There is also a suggestion that we imprint preferences for music between the ages of ten and twelve. While these preferences are not set in stone, there does appear to be a stability of preference throughout life (Jourdain, 1997). There is some indication that these preferences may reflect underlying personality traits (Rentfrow & Gosling, 2003).

Cattell and Anderson (1953) correlated the IPAT music preference test with Cattell’s 16 Personality Factor Questionnaire. They found that several of the personality factors correlated with music preference.

McCown, Keiser, Mulhearn, and Williamson (1997), found a connection between extraversion and a musical preference for songs with exaggerated bass. North, Hargreaves, and O’Neill (2000) indicate that there is a link between music preference and one’s social identity, in addition to one’s self-views and self-esteem.

More recently, Rentfrow and Gosling developed the Short Test of Music Preferences (STOMP) in 2003 that asked respondents to rate 14 different music categories. These 14 categories clustered into 4 groups after a factor analysis. They called these groups reflective and complex, upbeat and conventional, energetic and rhythmic, and intense and rebellious. Reflective/complex includes a preference for classical, blues, folk and jazz. Upbeat/conventional includes country, religious, and soundtracks/themes. Energetic/rhythmic includes dance/electronica, rap/hip-hop, and soul/funk. Finally, intense/rebellious includes alternative, rock, and heavy metal music.

Rentfrow and Gosling (2003) found that these categories correlated with several personality factors. Extraversion correlated with the upbeat and conventional category, as well as with the energetic and rhythmic category. Agreeableness was only correlated with the upbeat and conventional category. Conscientiousness was found to correlate with the upbeat and conventional category as well. Openness to experience correlated with reflective and complex, intense and rebellious, and upbeat and conventional categories. None of the music preference categories correlated with emotional stability. Finally, self-esteem was found to have low, but significant correlations with the upbeat and conventional category as well as with the energetic and rhythmic category.

The genres considered in this research can be classified into the following categories. Each of these groupings portray various spectrums on the Five Factor Model.

1) Reflective & Complex, which consists of preferences for classical, jazz, and blues music. These genres emphasize positive and negative emotions, and are relatively more complex than other music styles because they utilize elements of polyphony and improvisation. This dimension positively correlates with Openness, political liberalism and verbal ability. This dimension may reflect listening preferences of the introvert. Keston and Pinto (1955) found introverts to be particularly analytical.

2) Intense & Rebellious dimension, comprises of preferences for rock, alternative, and heavy metal music, genres which emphasize negative emotions and disobedience themes. This dimension positively relates to Openness, athletic, and verbal ability.

3) Upbeat & Conventional comprises of preferences for pop, and country music. This dimension emphasizes positive emotions, and is relatively less complex than other genres with simpler harmonies and small instrumentation. The Upbeat & Conventional dimension positively correlated with Extraversion, Agreeableness, and Conscientiousness, as

well as with political conservatism and athleticism. It negatively correlated with Openness, social dominance, and verbal ability.

4) Energetic & Rhythmic, which consists of preferences for rap, soul, and EDM. This music focuses on elevated energy levels and themes of self-gratification. It is positively related to Extraversion, Agreeableness, verbal impulsivity, and political liberalism.

### **Personality:**

Trait theories emphasize a surface-oriented approach to personality. One of the earliest attempts to list and describe the traits that make up personality can be found in the work of Gordon Allport. He acknowledged that the way a person reacts to a given situation depends on his/her traits, although people sharing the same traits might express them in different ways.

One of the most well-known trait approaches to personality is the 'Big Five Factor Model' of personality proposed by Robert McCrae and Paul Costa. This model is comprised of five relatively independent dimensions: Neuroticism, Extraversion, Agreeableness, Openness to experience and Conscientiousness.

### **Neuroticism:**

The typical behaviors associated with it include being anxious, depressed, emotional, worried and insecure. People high in neuroticism are emotionally reactive, that is they tend to respond emotionally to events that would not affect most people and their reactions tend to be more intense than normal. Individuals who score less in neuroticism are relatively calmer, emotionally stable and less easily upset. Neuroticism affects a person's perception of a stressor in their life, making them think it is simply too big to cope with. This is a sort of vicious circle, where the perception of the stressor as enormous in turn increases experiences of stress

**Extraversion:**

Extraversion is marked by pronounced engagement with the external world. An individual who scores high on extraversion is characterized by high energy, positive emotions, talkativeness, assertiveness, sociability, and the tendency to seek stimulation in the company of others. In groups they like to talk, assert themselves, and draw attention to themselves. They are also more likely to participate in adventure and risky sports due to their curious and excitement seeking nature. (Serdar Tok,2011). Those who score low on extraversion prefer smaller groups, enjoy quiet, prefer activities alone, and avoid large social situations. However, their lack of social involvement should not always be interpreted as shyness or depression; the introvert simply needs less stimulation than an extravert. The independence and reserve of an introvert is sometimes mistaken as unfriendliness or arrogance.

**Agreeableness:**

Agreeableness reflects individual differences in concern with cooperation and social harmony. Agreeable individuals value getting along with others. They are therefore considerate, friendly, generous, helpful, and willing to compromise their interests with others'. It is also a measure of a person's trusting and helpful nature and whether that person is generally well-tempered or not. Agreeable people are usually better liked than disagreeable people, however agreeableness is not useful in situations that require tough or absolute objective decisions.

People who score low on agreeableness tend to be described as rude and uncooperative and place self-interest above getting along with others. Sometimes their skepticism about others' motives causes them to be suspicious and unfriendly.

**Openness to experience:**

Openness to experience is the trait, which relates the extent to which individuals are open to fantasies, aesthetics, feelings, as well as novel actions, ideas, and values (Costa & McCrae, 1992).

Openness reflects a person's degree of intellectual curiosity, creativity, and preference for novelty and variety. Open people tend to think and act in individualistic and nonconforming ways. Open individuals prefer novel, intense, diverse, and complex experiences (McCrae, 1996).

In contrast, closed individuals prefer familiar tasks and standardized routines (McCrae, 1996). People with low scores on openness to experience tend to have narrow, common interests. They prefer the plain, straightforward, and obvious over the complex, ambiguous, and subtle. Closed people prefer familiarity over novelty; they are conservative and resistant to change.

**Conscientiousness:**

The six facets that correspond to conscientiousness relate to the degree to which individuals are competent, methodical--preferring order and structure, dutiful, motivated to achieve goals, disciplined, and deliberate or considered (Costa & McCrae, 1992). It has been argued to reflect violation -that is, will to achieve and dependability -that is being thorough, responsible and planning carefully. (Barrick & Mount, 1991). The typical behaviors associated with Conscientiousness include being hardworking, achievement-oriented and persevering. (Barrick & Mount, 1991). Conscientious individuals avoid trouble and achieve high levels of success through purposeful planning and persistence. They are also positively regarded by others as intelligent and reliable. On the negative side, they can be compulsive perfectionists and workaholics. Numerous studies have found a positive correlation between conscientiousness and academic success. Individuals who score low in conscientiousness may have a more relaxed approach, are spontaneous, and may be disorganized.

**Music:**

“One does not need to have any formal knowledge of music nor, indeed, to be particularly ‘musical’ to enjoy music and to respond to it at the deepest levels. Music is part of human being and there is no human culture in which it is not highly developed and esteemed.” - Oliver Sacks

Very true to this, almost all us of enjoy music on a daily basis, irrespective of whether we have any formal knowledge about it or not. Music is something which is appreciated by people all over the world. But what is it that attracts a particular individual to a specific type of music is the main purpose of this study.

For this purpose, we have assumed that personality of an individual is closely linked to their music preference. That is people having a particular set of characteristic traits are relatively more attracted to a particular genre of music.

### **Music genres used in questionnaire**

Considering the participants in the research are from the metropolitan city of Bombay we have also included genres of music that does not have its origins in India, along with Bollywood and Indian classical.

#### **1) EDM**

Electronic dance music is a set of percussive electronic music genres produced primarily for dance-based entertainment environments, such as nightclubs, raves, and festivals.

#### **2) RAP/HIP-HOP**

a type of popular music in which an insistent, recurring beat is accompanied with a strong rhythm where the lyrics are spoken, not sung. E.g., Eminem, Lil Wayne, Nicki Minaj.

#### **3) COUNTRY**

A style of popular music that originated in the folk music of the rural population of the southern and western United States.

It is generally simple in form and harmony, with romantic or melancholy ballads accompanied by acoustic or electric guitar, banjo, violin, and harmonica.

#### **4) ROCK**

It is based around amplified instruments, especially the electric guitar and electric bass, and is characterized by a strong bass line and driving



rhythms. More often than not, it is also characterized by anti-establishment lyrics.

E.g., The Beatles, fall out boy

### **5) METAL**

A sub-genre of rock, typically revolves around a thick, heavy electric guitar and drums sound characterized by highly amplified distortion and rapid guitar solos. It is referred to as the most extreme form compared to other rock sub-genres.

E.g., Slipknot, iron maiden

### **6) R&B/ SOUL**

Rhythm and blues is a genre of popular African-American music that originated in the 1940s, characterized by a strong backbeat. E.g., Alicia Keys, The Weeknd.

### **7) JAZZ**

Brass and woodwind instruments and piano are particularly associated with jazz, although guitar and occasionally violin are also used.

### **8) POP**

It is generally characterized by a strong rhythmic element and the use of electrical amplification. E.g., Katy Perry, Ariana Grande.

### **9) BOLLYWOOD**

Bollywood songs, more formally known as Hindi film songs or filmi songs are songs featured in Bollywood films.

### **10) INDIAN CLASSICAL**

Indian classical music is the art of music of the Indian subcontinent. It is monophonic in nature and is based on a single melody, which is played over a fixed drone. The performance is based melodically on particular ragas and rhythmically on talas.

## **BFI TEST DESCRIPTION**

The Big Five Inventory (BFI; John, Donahue, & Kentle, 1991). The BFI is a 44-item measure that yields a score for each of the Big Five personality factors: extraversion (eight items), agreeableness (nine items), conscientiousness (nine items), neuroticism (eight items), and openness to experience (10 items). Each item consists of a short statement, and respondents are required to rate the degree to which they agree with each statement on a 5-point Likert scale (1 = “Strongly disagree” to 5 = “Strongly agree”). The BFI was deemed to be a good choice for the current study as it has strong psychometric properties. For instance, the BFI is known to have clear factor structure, and each subscale has been shown to have satisfactory reliability and validity among Internet respondents (Srivastava, John, Gosling, & Potter, 2003). The test–retest reliability coefficients for each of the five subscales are good, and range between .76 and .83 (Gosling, Rentfrow, & Swann, 2003). The internal consistency coefficients for each of the subscales are also good: extraversion ( $\alpha = .86$ ), agreeable-ness ( $\alpha = .79$ ), conscientiousness ( $\alpha = .82$ ), neuroticism ( $\alpha = .84$ ), and openness to experience ( $\alpha = .80$ ) (Srivastava et al., 2003).

The BFI was well suited to the present research for several reasons. First, the BFI domain and facet scales have previously demonstrated strong internal consistency, retest reliability, convergence with longer Big Five measures, and self-peer agreement (e.g., Benet-Martínez & John, 1998; DeYoung, 2006; John et al., 2008; John & Srivastava, 1999; Rammstedt & John, 2007; Soto & John, 2009a). Second, the BFI is easy to understand; its fifth-grade reading level (Benet-Martínez & John, 1998) makes it accessible to younger respondents (Soto et al., 2008) and to other individuals with relatively little formal education. Fourth, the individual BFI items assess common behaviors, thoughts, and feelings that should be relevant to respondents of diverse ages and backgrounds. Finally, the BFI can be completed in less than 15 min, a clear advantage for a study to which each participant was expected to devote only a limited amount of time.

## **METHODOLOGY**

### **Participants**

The sample consisted of 60 participants between the age group of 16-25 years from Mumbai. All participants gave their assent prior to data collection.

### **Measures**

#### **Personality.**

The Big Five Inventory (BFI) was used to determine the participants' personality. The BFI is a 44-item measure that yields a score for each of the Big Five personality factors: extraversion (eight items), agreeableness (nine items), conscientiousness (nine items), neuroticism (eight items), and openness to experience (10 items). Each item is rated on a 5-point scale by participants, where 1 equals to "strongly disagree" and 5 equals to "strongly agree."

#### **Music Preference.**

A self-constructed test was used to measure music preference of the participants. It is a 10-item scale. Each item is rated on a 5-point scale by the participants, where 1 stands for least preferred and 5 is for most preferred. This scale is based on the Short Test of Music Preferences (STOMP; Rentfrow, P. J., & Gosling, S. D.) (STOMP) is a 14-item scale assessing preferences in music genres. It assesses four broad music-preference dimensions. The STOMPR is a revised version of the scale assessing preferences for 23 genres.

#### **Procedure**

The questionnaire was given to participants throughout Mumbai. Following informed consent, participants were required to complete the two study measures. The time taken by each participant to complete the questionnaire was approximately 20 minutes. While the data was collected, the researcher provided information regarding the objectives of the research, scales and the principle of confidentiality. The students were told not to write their names on the scales ensuring anonymity.

## RESULTS

### Data Analysis

Inferential statistics (correlation testing) was used to analyze the relationship between the participants' personality test scores with their music preference scores. The scores of each of the five personality dimensions were used to correlate with the scores of the four music categories.

**Table 1: Means and Standard Deviation of Personality factors**

	Males		Females	
	Mean	SD	Mean	SD
Extraversion	26.47	5.32	25.60	5.347
Agreeableness	34.44	4.61	34.72	4.748
Conscientiousness	30.38	4.50	29.95	4.767
Neuroticism	23.16	6.32	23.65	6.308
Openness to experiences	36.20	4.58	35.98	4.320

**Table 2: Means and Standard Deviation of music categories**

	Males		Females	
	Mean	SD	Mean	SD
E&R	9.54	3.42	9.5	3.26
U&C	9.02	2.95	9.12	2.81
R&C	5.34	2.30	5.4	2.32
I&R	6.42	2.37	6.27	2.31

**Table 3: Correlation between personality factors and music categories**

Correlation	Upbeat and Conventional	Intense and Rebellious	Reflective and Complex
Extraversion	0.11	-0.09	-
Neuroticism	0.10	-	-
Openness to Experience	-	-	0.16

Figure 1 - Personality: Comparison of means for males and females

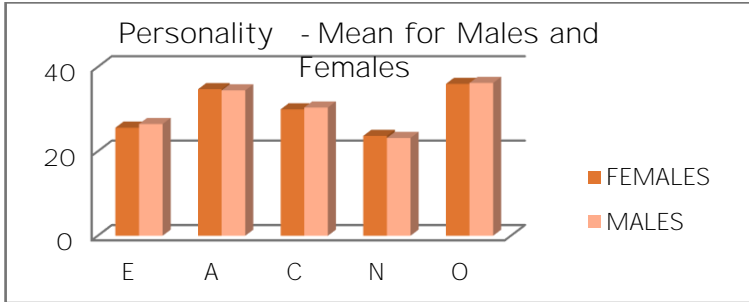
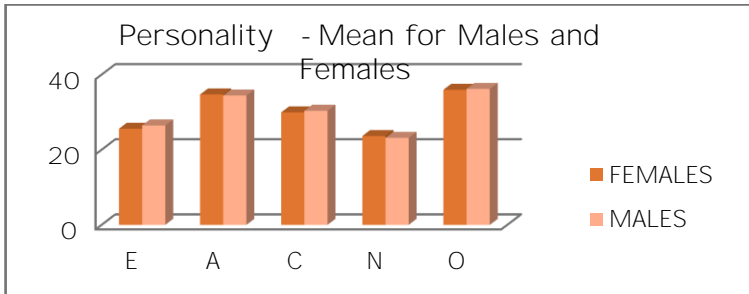


Figure 2 Music Preference: Comparison of means for males and females.



## DISCUSSION

The results of this study provide some support for the existence of the relationship between personality and music preference.

For the first hypothesis, which states, ‘It is expected that, those high on extraversion, would show a preference for upbeat & conventional music’, it was found that there was a positive correlation between extraversion and upbeat and conventional music category. This is consistent with the findings obtained by Rentfrow and Gosling (2003), which states, ‘The external correlates of the Upbeat and Conventional dimension reveal positive correlations with Extraversion.’

For the second hypothesis, which states, ‘It is expected that, those low on neuroticism would show a preference for Upbeat and Conventional music’, it was found that there was little correlation between neuroticism

and upbeat and conventional music, but comparatively higher than other music categories.

For the third hypothesis which states, 'It is expected that, individuals who listen to intense and rebellious music would be low on extraversion. It was found that there is a negative correlation between extraversion and intense and rebellious music category.

For the fourth hypothesis which states, 'It is expected that, individuals high on openness to experiences may show a preference for reflective and complex music.' It was found that reflective and complex dimension positively correlated with openness to experiences. This is also consistent with the findings obtained by Rentfrow and Gosling (2003), which states, 'the Reflective and Complex dimension was positively related to Openness to New Experiences.

## **CONCLUSION**

The results obtained were in line with our hypotheses. But the correlations between the variables were not strong enough. This could be due to our sample size. However similar to most previous studies, nearly all reported correlations are rather weak, as discussed by Dunn and colleagues (2011) (A. Langmeyer et.al, 2014)

## **LIMITATIONS AND FUTURE RESEARCH**

The participants in the study were between the age group of 16-25 and were from the city of Mumbai; therefore, the conclusions of the study cannot be generalized to the larger population. And since musical tastes can vary from region to region as well as between age groups, future research could incorporate these factors and widen the scope of the sample.

Another limitation of this study is that it relied exclusively on the participants' self-assessment and there is no way to check whether the participants answered honestly.

Besides personality, other factors might also influence music preference, such as economic and social background. An individual's economic and

social background might affect what type of music they are exposed to. The present study did not take into account the economic and social background of the participants. Therefore, future research could address this issue and consider the aspect of economic and social background in the study.

Future research could also investigate the significance of the fact that certain individuals avoid or dislike certain types/genres of music.

The influence and non-influence of the western culture on an individual also affects the type of music one is exposed to. Hence, cultural background also affects one's music preference. Future research could further investigate on this aspect.

Another point worthy of future consideration is that research on this topic is hindered by 'genre labels.' Genres can keep changing over periods of time and can be ambiguous. Also, the meaning of a particular genre can be subjective and vary across individuals. Therefore, future research could make the participants listen to the songs and then ask them to rate it.

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## **CHAPTER 14 - A STUDY OF ATTITUDES TOWARD EATING AS A FUNCTION OF WEIGHT**

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### **ABSTRACT**

This study examined attitudes towards eating among average, overweight/obese college students. Four types of psychological attitudes (eating assertiveness, healthy eating motivation, motivation to avoid unhealthy eating and overweight fear) were assessed on 60 college students (males and females belonging to the age group of 18 to 24 years) through four subscales selected from: 'The Multidimensional Psychology of Eating Questionnaire' (MPEQ) given by Dr. William E. Snell Jr. (1997). The t (randomised) was calculated to find out whether there was a significant difference in the two groups on attitude towards eating. The mean scores of obese participants were slightly higher on eating assertiveness, motivation to avoid unhealthy eating and overweight fear. Whereas, average weight participants scored high on healthy eating motivation. Therefore, the t values were found out to be not significant. [Eating assertiveness -  $t(58) = 0.57$ , ns; Healthy eating motivation -  $t(58) = 0.89$ , ns; Motivation to avoid unhealthy eating-  $t(58) = 0.64$ , ns; Overweight fear -  $t(58) = 0.21$ , ns]. Thus, the stereotype that people (especially teenagers) who are overweight/ obese are less conscious and concerned about their eating habits and that the average weight people are not conscious of becoming overweight is really questioned here. The implications for weight management for youth were discussed.

### **INTRODUCTION**

Eating and weight related issues have been on a rise since the last ten years. According to the National Family Health Survey (NFHS-4), the number of obese people in India have doubled in the past ten years. For example, Andhra Pradesh, Andaman and Nicobar, Puducherry and Sikkim

have more than 30% of their population falling under 'obese' category and more than 10% of the population in Bihar, Madhya Pradesh, Meghalaya, Tripura and West Bengal is obese and is doubling since the last National Family Health Survey of 2005-06. Experts believe that obesity is the major reason for the development of different types of diabetes mellitus.

One of the reasons why obesity is rapidly growing is due to the intake of fast food and junk food. A study by Wesslén, Abrahamsson, and Fjellström (1999) reported that people want eating to be fast, tasty and simple to prepare and they are unwilling to give time priority to eating or cooking. These criteria are all fulfilled by fast food and junk food and therefore, people prefer to consume them. Another study conducted by Dave, An, Jeffery and Ahluwalia (2009) found that children and young adults perceived fast food as being fun. Also, public education regarding unhealthfulness of fast food did not influence its consumption.

Research by Grabe, Ward & Hyde, 2009, reveals that exposure to mass media depicting the 'thin-ideal' body is linked to body image concerns among women. Even men have a 'muscular'-ideal' body which is linked to body image concerns among men. This is portrayed in every avenue of the media like films, TV shows, advertisements, magazines, etc. These extreme 'ideal' body expectations lead to eating disorders such as anorexia nervosa, bulimia nervosa and binge eating disorder. These depict extreme emotions, attitudes and behaviors surrounding weight and food issues. They can have life threatening consequences for females and males.

Obesity stigma has also increased along with obesity itself. Past research has found that weight- based stereotypes take place very often. Overweight and obese people are seen as lazy, weak-willed, unsuccessful, unintelligent, lacking self-discipline, having poor willpower, etc. This gives way to stigma, discrimination and prejudice against overweight and obese people at the workplace, in media and also in interpersonal relationships. (Puhl&Heuer, 2009).

Obesity can be caused by various factors but the common masses are not aware of all of them. According to the Food Research and Action Centre, obesity can be caused due to medical conditions like polycystic ovary syndrome or prescription drugs like steroids and antidepressants. Also, inadequate sleep, prenatal and post-natal influences such as smoking or drug abuse during pregnancy, chemical exposure and stress may increase obesity risk. Social factors such as race, ethnicity, gender, age, income, etc. influences weight. Genetics, too, affect obesity.

There is a need to conduct more research to break the stereotypes and stigmas associated with weight. For that purpose, our research is focused on the eating attitudes among college students with respect to their weight.

## **Factors influencing weight gain/weight loss**

### **1. Myths about dieting**

There are many myths regarding weight gain or weight loss. Consuming fat is vital for health. Yet we don't because of the fear of becoming fat. People invest an inordinate amount of time, energy and money trying to avoid gaining weight, losing weight and trying to keep weight that was permanently lost off. The term "fat" is synonymously used to describe how we should avoid looking as well as what foods we should avoid eating. One of the myths about losing weight is 'restricting food intake'. However, restricting food intake is counterproductive to losing weight. Eating regularly and normally is a better way to maintain or reduce weight. Weight loss usually begins with going on a crash diet. However, diets fail in the long term to keep weight off. Metabolism slows to conserve energy when food intake is in restriction mode. Weight gain is fast when a person begins to adjust their eating after weight loss. Because metabolism is still in restriction mode; additional food quickly turns into additional weight.

### **2. Genetics**

Genetics also predict body size and shape. Though one may lose pounds by dieting; the distribution of weight remains genetically predetermined.

So, the area of the body that one may seek to lose weight is generally the last place weight loss will occur, if at all.

### **3. Misinformation about healthy or unhealthy food**

There are many myths regarding carbohydrates and fats causing weight gain. Eating fat is vital for health but it is ignored as discussed in myths about dieting. The myth that not eating fat is a way to lose weight and stay thin is not true. Food rich in healthy fat (ground nuts, walnuts, almonds) takes a longer time to digest, so hunger is decreased. People who eat healthy fat tend to be thinner than those who eat low or no fat or unhealthy fat (butter, cheese). Eating healthy fat is necessary for the production of estrogen, which is responsible for fertility, brain development, organ sustainability and maintaining healthy bones. Not eating any fat or severely restricting it is not reasonable or healthy and not effective as a long-term weight loss measure.

Another prevalent myth about weight loss is skipping breakfast. People who eat breakfast tend to be thinner than those who skip breakfast. (Journal of American Medical Association,2012.).

### **4. Porescophobia (Overweight fear/Obseophobia)**

Porescophobia is the fear of gaining weight. People with this phobia have to be careful because they might develop other psychological disorders, such as bulimia (eating food and throwing it up) anorexia (refusing to eat). Both of these could also be coupled with excessive exercise. Porescophobia is also called Obesophobia. If a person with Porescophobia happens to find out that they have gained weight, even just the smallest amount, they may begin to suffer from a panic attack. For these people, the phobia of gaining weight is very likely to occur. Low self-esteem could also be the cause of Porescophobia. In today's society, beauty is marked by how thin someone is. For those people who really buy into these messages, they will be terrified of gaining weight in relation to the fear of being deemed as "undesirable". General symptoms, though, include avoidance of food, obsession with weight loss, avoidance of scales, guilt when eating, and not feeling hungry. Thus, there are many factors affecting one's weight, but we selected basic

attitudes towards eating. Some of the past studies based on our research topic are as follows.

## **REVIEW OF LITERATURE**

Eating Disorders are not uncommon among teens. Increasingly, clinicians, academicians, teachers and parents of diverse backgrounds and occupations are finding that their children are reporting and experiencing a wide variety of concerns related to appearance, eating and weight. Past research related to Body Image, Eating Disorders and Obesity in Youth (Thompson & Smolak, 2001) revealed how negative psychological and physical factors are associated with eating problems, obesity and body image concerns.

Body Dissatisfaction in young children and adolescents has been researched a lot. The studies have found out that a girl's body dissatisfaction involved the desire to be thinner and boys were unhappy because they desired a larger and more muscular appearance. These gender differences indicated that body dissatisfaction is more common in girls compared to boys. Body dissatisfaction emerges early, as early as 8-10 year range, in girls as compared to boys. Dieting, body dissatisfaction and a desire for reduced weight (or greater muscularity) may be caused by a variety of influences, including factors such as comparing oneself to media ideals and peers, internalizing unrealistic media images of attractiveness, being teased about one's appearance, modelling peer's or parent's weight practices or attitudes, sexual abuse or harassment and early pubertal maturation. (Schur, Sanders, & Steiner, 2000).

Female college students' dieting behaviour survey revealed that females perceived healthy and attractive weights to be lower than their current weight and that media portrayals of the female body pressured them to maintain a certain weight (Malinauskas, Raedeke, Aeby, Smith, & Dallas, 2006).

Weight related concerns and behaviors in adolescents were also investigated. The scholars studied eating patterns, weight-related concerns (perceived weight status, weight disparity, body dissatisfaction

and care about controlling weight) and weight related behaviors (general and specific weight control behaviour and binge eating) of adolescents. The result of this study indicated that weight related concerns and behaviour were more prevalent among adolescent girls (85%) as compared to adolescent boys (70%). Excessive weight-related concerns and behaviors have potentially serious consequences for youth in their impact on psychosocial development, dietary intake, physical growth, and the development of eating disorders. It is essential to be concerned about weight-related behaviors as it might lead to a pressing concern of obesity. More concern is required if youth who are not overweight are attempting weight loss and if unhealthy weight control behaviors are being used by the youth, regardless of their weight status. High prevalence of obesity among youth has potentially serious psychosocial and physical consequences which has made obesity one of the greatest contemporary public health issues. Health educators should promote education and intervention strategies that encourage appropriate weight control practices and dispel unhealthy and ineffective weight loss myths (using laxatives, skipping breakfast). (Neumark-Sztainer, Story, Hannan, Perry, & Irving, 2002).

## **METHOD**

### **Independent variable**

The IV was the weight of the participants. It had two levels:

- 1) Average weight
- 2) overweight and obese

The criteria of BMI was used to classify people into average weight and obese/overweight. After calculating the BMI, those who ranged from 18.5 to 22.9 were regarded to be average weight, those who ranged from 23 to 24.9 were regarded to be overweight and those who were 25 and above were regarded as obese.

### **Dependent variable**

The DV was an attitude towards eating.

Attitudes refer to a set of emotions, beliefs and behaviours towards a particular object, person, thing or event. Attitudes are often the result of experiences or upbringing and they can have a powerful influence over behaviour. While attitudes are enduring; they can also change.

There were 4 DVs.

- 1) Eating Assertiveness: The degree to which I assert my nutritional needs.
- 2) Motivation for healthy eating: The degree to which I am motivated to pursue healthy food.
- 3) Motivation to avoid unhealthy eating: The degree to which I am motivated to avoid unhealthy food.
- 4) Fear of becoming overweight: The degree to which I fear putting on weight.

### **Control variables**

- 1) All participants were students of K.C College from Commerce, Arts and Science.
- 2) All participants were between the ages of 18 to 22.

### **Tools used**

The Multidimensional Psychology of Eating Questionnaire (MPEQ) by Dr. William E. Snell Jr (1997) was used which had adequate reliability and validity. There were 26 subscales related to symptoms of bulimia and a drive for thinness, eating related behaviors and attitudes. But only 4 subscales related to eating attitudes were used for this research, i.e. 1) eating assertiveness, 2) motivation for healthy eating, 3) motivation to avoid unhealthy eating, 4) fear of becoming overweight. Scale consisted of a 5-point Likert format for participants' responses: not at all characteristic of me (0), slightly characteristic of me (1), somewhat characteristic of me (2), moderately characteristic of me (3), very characteristic of me (4).



## **Procedure**

Convenient sampling was used to select participants. Prior permission was taken from teachers for distributing questionnaires in classes. One class consisted of approximately 20 to 30 students. They were first explained about the intention of conducting research and then about how they were supposed to answer the questionnaire. E.g.: answer honestly, don't leave any questions unanswered, etc. Next, they were asked for their verbal consent and questionnaires were distributed. Those who agreed gave signatures on the consent form. Their doubts while filling up the questionnaire were clarified and they were given a detailed explanation about the research after the questionnaires were collected. Participants took 10 minutes on an average to fill up the questionnaire.

## **Participant characteristics**

Sample size for this research was 60 out of which males were 36 and females were 24. They belonged to the age range of 18 to 22. They all belonged to K.C College and came from streams of Commerce, Science and Arts.

## **Hypothesis**

There will be no significant difference in attitudes towards eating between average weight and overweight or obese participants.

## **Statistical Analysis**

A t (randomized) was calculated to find out the difference in eating patterns between average weight and overweight/obese participants.

## **RESULTS AND DISCUSSION**

As seen in table 1 and figure 1, contrary to the expectation, the mean eating assertiveness score of average weight participants (10.33) was slightly lower than the mean score of overweight/ obese participants (10.80).

Table 1: Mean, SD and t values of attitude towards eating between average weight and obese/overweight participants

	Eating Assertiveness		Healthy Eating Motivation		Motivation to avoid unhealthy eating		Overweight Fear	
	A	O	A	O	A	O	A	O
Mean	10.33	10.80	12.10	11.97	10.50	10.97	11.63	13.20
SD	3.28	3.06	3.74	3.83	4.12	3.50	4.89	4.61
t	0.57, ns		0.89, ns		0.64, ns		0.21, ns	

Note: A = Average weight, O = Obese/overweight

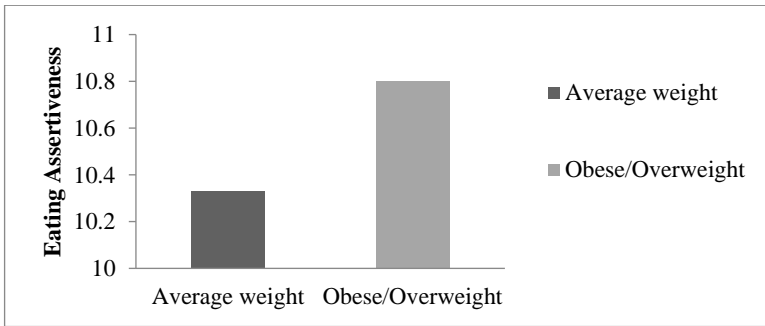


Figure 1: Mean Eating Assertiveness scores of average weight and obese/overweight participants.

However, the difference was not statistically significant,  $t_{(58)} = 0.57, ns$ . Therefore, we reject the alternative hypothesis and retain the null non-directional hypothesis i.e., there will be no difference in average and overweight/ obese participants' assertiveness towards eating. Thus, we can say that there was no statistically significant difference on eating assertiveness between average weight and obese/overweight participants.

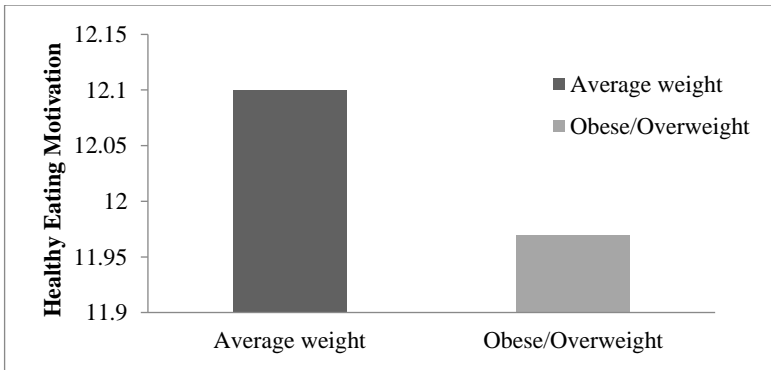


Figure 2: Mean Healthy Eating Motivation scores of average weight and obese/overweight participants.

As seen in table 1 and figure 2, as expected, the mean Healthy Eating Motivation score of average weight participants (12.10) was higher than the mean score of overweight/ obese participants (11.97). However, the difference was not statistically significant,  $t_{(58)} = 0.89$ , ns. Therefore, we reject the alternative hypothesis and retain the null non-directional hypothesis i.e. there will be no difference in average and overweight/ obese participants' motivation towards healthy eating. Thus, we can say that there was no statistically significant difference in healthy eating motivation between average weight and obese/overweight participants.

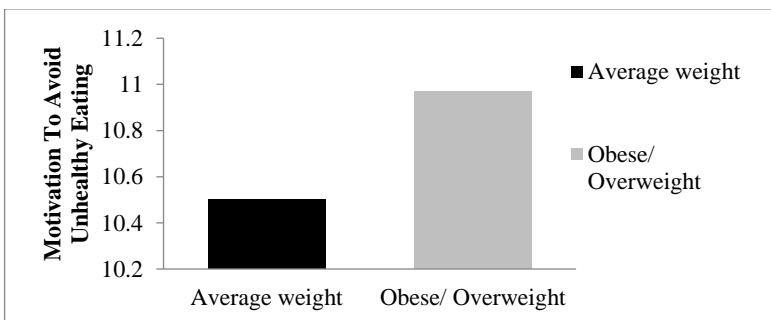


Figure 3: Mean Motivation to Avoid Unhealthy Eating scores of average weight and obese/overweight participants.

As seen in table 1 and figure 3, contrary to the expectation, the mean Motivation to Avoid Unhealthy Eating score of average weight participants (10.50) was slightly lower than the mean score of overweight/ obese participants (10.97). However, the difference was not statistically significant,  $t_{(58)} = 0.64$ , ns. Therefore, we reject the alternative hypothesis and retain the null non-directional hypothesis i.e., there will be no difference in average and overweight/ obese participants' motivation to avoid unhealthy eating. Thus, we can say that there was no statistically significant difference in motivation to avoid unhealthy eating between average weight and obese/overweight participants.

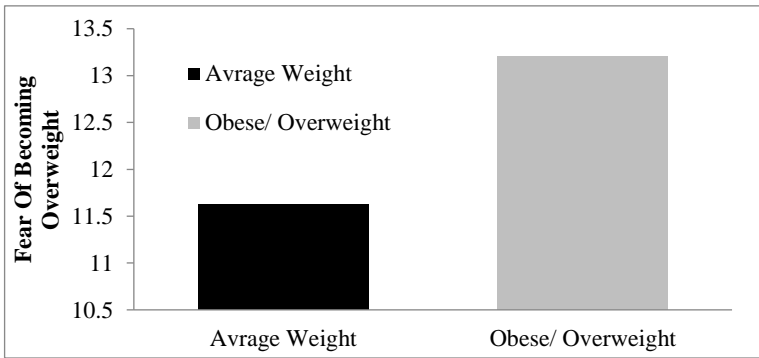


Figure 4: Mean Fear of Becoming Overweight scores of average weight and obese/overweight participants.

As seen in table 1 and figure 4, as expected, the mean score on Fear of Becoming Overweight of average weight participants (11.63) was lower than the mean score of overweight/ obese participants (13.20). However, the difference was not statistically significant,  $t_{(58)} = 0.21$ , ns. Therefore, we reject the alternative hypothesis and retain the null non-directional hypothesis i.e. there will be no difference in average and overweight/ obese participants' towards fear of becoming overweight. Thus, we can say that there was no statistically significant difference in fear of becoming overweight between average weight and obese/overweight participants.

Overall, we can say that obese people were higher on eating assertiveness, motivation to avoid unhealthy and overweight fear. Average weight participants were higher on healthy eating motivation. However, none of the differences were statistically significant.

A past study showed that people who were listed as overweight or obese usually have low self-esteem and decreased motivation to engage in healthy behaviours. Also, the adolescents who were bullied by their peers show unhealthier eating patterns than those who were accepted by their peers. Therefore, the self-esteem of overweight people is more dependent on society than themselves. If society (peers in case of adolescence) accepts them the way they are, they also tend to accept themselves. This study indicated that experiences of weight stigma in people's everyday lives can negatively impact their motivation and eating behaviour. (Lenny, Vartanian & Porter, 2016). Studies have also shown that girls who were teased about their weight by their family (siblings/parents) scored higher on the bulimia subscale (binge eating) than those who were not teased. (Keery, Boutelle, Berg, and Thompson, 2005). Thus, weight does get influenced by eating attitudes.

The past studies on weight were mostly on people with eating disorders. The past research on the relationship between eating patterns and weight were also found to be about many other eating related factors like the role of emotional eating and the unconscious mind. The role of emotional eating was explored in a study by Geliebter and Aversa (2003). The relationship between emotional states and eating patterns was investigated. It was found that emotional states and situations can affect food intake. The study revealed that underweight individuals usually ate less and overweight individuals ate more during negative as well as positive emotional states and situations.

Even the role of the unconscious should be taken into consideration in weight management. Rand and Stunkard (1978) investigated the effectiveness of psychoanalysis on reducing weight among average weight and obese participants. The obese participants selected could not lose weight even after dieting and exercise. However, through the help of psychoanalysts, 47% of obese participants lost more than 9 kg and

19% of obese participants lost more than 18 kg. Thus, the role of unconscious and past unresolved issues should also be taken into consideration for weight management.

## **CONCLUSION**

### **Salient Findings**

In our research study, we tried to find out if there is any relation between people's eating patterns and their weight or to what extent these two factors affect each other. But, we did not find any significant difference on eating attitudes between the two groups. According to our research findings, both; the average weight and overweight/obese participants scored high on eating assertiveness and were highly motivated to eat healthy and to avoid unhealthy food. Both the average and overweight/obese participants were highly fearful of gaining more weight. The t values calculated on all four eating attitudes were statistically not significant.

This could have happened maybe because other factors like drive for thinness, misinformation about what is healthy and unhealthy, crash dieting, lack of exercise – would have influenced weight other than the four attitudes towards eating which were studied here.

So, we actually cannot say that overweight people cannot avoid unhealthy food or vice versa. This study showed that both the average weight and overweight/obese participants had similar attitudes toward eating and having a healthy lifestyle.

## **LIMITATIONS**

The sample size taken in this research for data collection is inadequate and not representative of the population. We did not find an equal number of males and females. Many of the female respondents were not comfortable in sharing their weight and height. Also, many of them may have responded in a socially desirable way because a self-report questionnaire was used and this could be one of the reasons for not getting accurate results. We used a convenient sampling method instead of random sampling which could be another limitation of this study. We

have used BMI for statistical analysis but it is not the only parameter to classify people according to their weights. The other parameters are BAI (Body Adiposity Index), WCM (Waist Circumference Measurement), Waist to Hip Ratio – which were not considered here. Another limitation of the study can be - the other attitudes toward eating were not studied. For example; drive for thinness, eating related emotions (eating guilt, eating anxiety, eating while sad, eating while angry). We only wanted to study their basic attitudes which they imply in their daily lives such as assertiveness, motivation for healthy eating, motivation to avoid unhealthy eating and fear of becoming overweight. There are many other factors which can influence one's eating patterns and weight. Also, we did not consider the fact that the perception of healthy food or unhealthy food may vary from person to person and from culture to culture. For example, in some cultures, food items like Ghee are considered healthy but unhealthy in others. Also, for someone, being a bit chubby means being healthy but for others a zero figure is the perception of a healthy body. These cultural aspects were not considered while conducting the research which could be its limitation.

### **PRACTICAL APPLICATIONS**

This study which is based on the relationship of people's eating patterns and their weights can be useful for fitness trainers in the gyms or health centres to know about their client's eating behaviours so that they can suggest a proper fitness schedule to them. It can also be helpful for the dieticians/ health counsellors to know how much his/her client is motivated to eat healthy and avoid becoming overweight. This study actually breaks the typical stereotype of many people who judge others' eating patterns by only looking at their weight i.e. people tend to think that those who are overweight are not at all motivated to eat healthy food and avoid unhealthy food and vice versa which is actually not true. In our study, we found that even overweight or obese people do have the motivation to avoid unhealthy and eating healthy food just like the average weight people.

Overweight/obese participants scored high on eating assertiveness, so, one cannot actually say that overweight people don't eat healthy food.

The reasons for them being overweight or obese can be a result of not exercising regularly or many other mental or psychological issues that might affect their eating patterns and weight.

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## **SECTION VII - POLITICAL SCIENCE**

### **CHAPTER 15 - THE POLITICAL ECONOMY OF INDIAN STATE: A STUDY OF 25 YEARS OF ECONOMIC REFORMS.**

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#### **ABSTRACT**

This month of July 2016 marks the 25th year of the historic reforms of 1991 that set in motion the irreversible process of opening the Indian economy. 1991 was a watershed year for India; the economic situation was anything but good. But the government found a way out-**liberalization**. The economic reforms of 1991 changed India in more ways than one. Twenty- five years on, the changes continue and India still has a long way to go. This study attempts to give a brief overview of these historical reforms, its impact on Indian polity and economy in the last 25 years and a future perspective of reforms.

There are success stories in certain sectors like IT and telecom. However, much more focus is needed on agriculture, healthcare and infrastructure. An important ‘miss’ in the reforms is environmental sustainability. The paper also highlights how the **middle - class** is the biggest beneficiary of the economic reforms. Finally, it delves into the various suggestions given by economists and politicians and how the government must entirely transform itself in the next 25 years by concentrating on our basic sectors and initiating further reforms.

**Key words:** Liberalization, privatization, globalization, state, reforms, the growth rate, FDI, political economy, middle class, consumption level and urban bias.

#### **INTRODUCTION**

“No power on earth can stop an idea whose time has come.... Let the whole world hear it loud and clear. India is now wide awake. We shall prevail, we shall overcome.” These were the lines from the historic

budget speech of the then Finance Minister Manmohan Singh on 24<sup>th</sup> July 1991. This speech set the stage for a break from the past. The past twenty- five years have been a period of dramatic transformation in the economic reality of our nation. From the brink of defaulting on international payments in 1991, India has emerged as a global economic hotspot. The Indian economy has travelled through an exciting phase in the last two and a half decades. In the post-independence economic history of our country, 1991 stands as a watershed year. This was the year when India embarked upon a journey to unshackle its economy and launched a broad ranging economic programme not just to restore the Balance of Payments (BOP) crisis but to reform, restructure and modernize the economy. The year 1991 signalled to move on to a more market driven economy from a state regulated socialistic economy. From a country that pawned gold to deal with a grim fiscal crisis to the world's fastest growing economy, India has firmly established the position in the elite group of the world's richest nations.

## **OBJECTIVES**

The month of July 2016 marks the 25<sup>th</sup> year of the historic reforms that set-in motion the irreversible process of opening up the Indian economy. Hence, the aim of this study is to give a brief overview of these reforms and their impact on various sectors.

The topic being very vast, the study aims to touch upon the quintessential elements of economic reforms in the last 25 years. This study also emphasizes the interplay of politics and economy and the changing role of the state. It is necessary to take stock of the achievements and failures of the new economic policies. The time when it was introduced, it was more crisis- driven than strategy- based. It is therefore pertinent to evaluate the successes and failures of these reforms in the last twenty-five years.

## **POLITICAL ECONOMY OF INDIAN STATE- FROM NEHRUVIAN SOCIALISM TO THE NEW ECONOMIC POLICY.**

Political economy is the application of economic concepts in

understanding politics, political behaviour of its citizens, decision-makers, interest groups etc. The political economy approach provides an economic explanation of how public policies are created and implemented and how their making is influenced by economic factors. It is an interplay between economics and politics that leads to economic and resource- based outcomes and who benefits from these and how. Foremost, it requires the study of both the subjects together in order to set allocation of resources and manage the welfare of the citizens. <sup>1</sup>

After India's independence in 1947, India had a vision of becoming a democratic, secular and self-reliant nation. India had to overcome the colonial legacy of poverty, underdevelopment, literacy and social inequality. The two major goals were thus nation building and socio-economic progress. After independence India embarked on the path of socialistic economy, which was later known as the Nehruvian model of development. India has come a long way from Nehruvian socialism to New Economic Policy. An understanding of the political economy of India is crucial as there are always political considerations which influence economic reforms.

### **REVIEW OF LITERATURE:**

When the research problem was conceptualized, we started with the review of literature on Political Economy. Two books, Pranab Bardhan's "The political Economy of Development" and Lloyd and Susanne Rudolph's "In pursuit of Lakshmi: The Political Economy of Indian State" are of particular interest in this regard. These writers have analyzed the dynamics of planned approach and the role of various groups in society in influencing the state policies towards economic development. A more contemporary book in this regard is Rahul Mukherjee's "Political Economy of Reforms in India." The book discusses the political economy of the country's growth, globalization and welfare. It finds that the political economy of growth and globalization are intimately connected. And the political economy of welfare is to a great extent, dependent on state intervention. Understanding the political process of economic change is critical for evolving a view about the importance of governments and markets in

economic activity. This book also highlights the critical importance of political economy during the course of development.

‘The Week’ published on February 21, 2016 had a special issue on the twenty- five years of Economic Reforms. Articles by Montek Singh Ahluwalia, C. Rangarajan, Sanjeev Sangal, Kiran Majumdar Shaw, Ela Bhatt, Harsh Mander and Rama Bijapurkar highlighted the political, economic and social aspects of economic reforms. A series of articles were published in the ‘Indian Express’ from 1<sup>st</sup> July onwards. Indian Express spoke to those who unlocked the powers of change. These interviews reflected what then and what now. It included the interviews of: Y.V. Reddy, P. Chidambram, Yashwant Sinha, Rakesh Mohan, Montek Singh Ahluwalia, Arun Shourie and C.Rangarajan. The views of these experts have been incorporated in the present research paper. The latest issue of Frontline (23<sup>rd</sup> July to 5<sup>th</sup> August 2016 has published a special issue on 25 years of economic liberalization: A reality check. This particular issue has made an in-depth analysis of the political, social and economic impact of liberalization. The article by C.P. Chandrashekar in this issue analyzes how the growth in the post liberalization period is a myth and has not delivered any benefits to those steeped in poverty and deprivation. Economic Times also published a special edition on the same on 21<sup>st</sup> July 2016.

### **RESEARCH METHODOLOGY:**

This research tries to explore the historical background of economic liberalization in India and make an analysis of India’s achievements and shortcomings in the last 25 years and on the basis of these, make suggestions for the future. This is a descriptive and analytical research. The study is based on secondary data taken from books, journals/ periodicals, newspaper and websites. However, the main analysis is based on the articles published in the last few weeks by some popular dailies and periodicals.

### **BACKGROUND OF ECONOMIC REFORMS**

Economic liberalization in India ushered in reforms ‘by stealth’ as it was more or less accepted as a *fait accompli* to avoid the massive balance of

payments crisis (BOP) in 1991.<sup>2</sup> India's foreign exchange reserves could afford only two more weeks of imports. They had dropped from \$3.11 billion at the end of August 1990 to \$896 million by mid-January 1991, as the gulf war progressed and the prices of crude oil spiraled. A legacy of short-term borrowing made in the 1980s weighed heavily on the country's credit profile. Yashwant Sinha, the finance minister in the Chandra Shekhar government, had already mortgaged 10 tonnes of gold to the union bank of Switzerland in exchange of \$200 million and presented the interim budget two days before the minority government fell on March 6, leaving India in the middle of a severe BOP crisis.<sup>3</sup>

Apart from the domestic factors, internationally two major events undermined the earlier social consensus regarding developmental strategy. The first was the collapse of the former Soviet Union and their East European satellite states that moved towards market-oriented policy, completely eschewing the model of planned economic development. Second was the spectacular success of 'the socialist market economy' in China with the opening of the economy in 1978. These two outcomes cast serious doubts on India's development strategy.

According to the present Finance Minister Arun Jaitley<sup>4</sup>, three factors together led to the economic reforms in our nation:

**International Dimension:** The economic performance of China which had, at the time, embraced globalization and reforms.

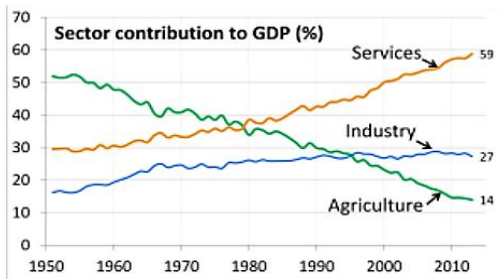
**Domestic Dimension:** India was faring badly in terms of poverty reduction and social indicators.

**The immediate:** The severity of the BOP crisis.

There was also a situation of internal disturbance in the country which needed to be controlled to bring about prosperity and stability in the country. The enormity of the crisis left India with no option but to launch the 1991 Economic Reforms: Liberalisation, Privatisation and Globalisation (LPG). Dr. Manmohan Singh, as the finance minister spearheaded these reforms and it was Prime Minister P.V. Narasimha

Rao who provided the essential political cover.

**The diagram shows how the sectoral composition to the GDP has changed in recent years**



Source: [www.wikipedia.org](http://www.wikipedia.org)

## HOW DID THE REFORMS TAKE PLACE?

The break with the past came in three important directions.<sup>5</sup> **The first** was to dismantle the complex regime of licenses, permits and controls that dictated almost every face of production and distribution. The entrepreneurs can now themselves decide what, how and where to produce. **The second** change in direction was to reverse the strong bias towards state ownership and means of production and proliferation of public sector enterprises in almost every sphere of economic activity and **the third** change was to abandon our inward-looking trade policy. By these reforms, India signalled that it was boldly accepting the challenge and opportunity of integrating into the world economy. The 1991 reforms focused on the following areas:

1. Abolish industrial licensing policy except for a short list of industries related to security and strategic concerns, hazardous chemicals, social reasons etc.
2. Endorse direct FDI up to 51% foreign equity in high priority industries.
3. Withdraw protection of sick public sector units.
4. Remove threshold limits of assets in respect of those companies

functioning under Monopolies and restrictive trade practices (MRTP) act.

5. Banking and major capital market reforms were unveiled and SEBI became a statutory regulator.
6. Tax reforms were introduced.

## **SUCCESS STORIES:**

### **HITS**

#### **Telecom and Media:**

The telecom sector has been the largest beneficiary with an impressive leap as the number of telephone subscribers were 50 lakhs in 1991 which has gone up to about 100 crores now. There are now about 800+ television channels now as compared to only Doordarshan in 1991.<sup>6</sup> Also, the impact of the IT sector and the advent of the internet has increased the number of opportunities as well as the ease of doing businesses online and complete access to information.

#### **Service sector**

There has been a start-up revolution in India as the ease of doing business has vastly improved for the producers and the proliferation of the number of white-collar jobs has put a number of low-income families under the bracket of 'middle class'. Thus, India's per capita income was Rs.11535 in 1991 which has gone up to Rs.88533 in 2015.<sup>7</sup> Also, the launch of private banks such as ICICI and UTI (now AXIS) and other private banks, due to banking reforms improved the situation of banking both in public and private arenas.

#### **Infrastructure**

In Civil aviation about six private operators were granted the status of scheduled airlines, ending the monopoly of Indian Airlines, Air India and Vayudoot. Several new hospitals like Apollo Hospitals, Fortis, Wockhardt hospitals were launched in this booming healthcare sector. Alongside, the Infrastructure development Finance company was



launched in 1997, changing the rules of infrastructure financing.

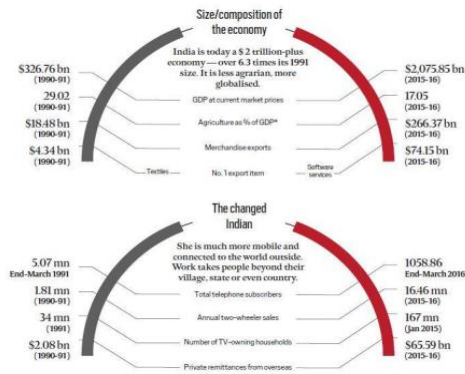
### **Rising Middle Class**

*Liberalization* meant a lot of things for our emerging **middle- class** which has been impacted the most through these reforms. This class is highly aspirational, young and highly aware. The middle class has prospered the most as they neither live in the lap of luxury, nor are they facing the duress of hard living and are earning money through a regular source of income. Since liberalization, the numbers in this class has swelled as consumerism has exploded and the prices of goods have crashed due to competition.<sup>8</sup>

### **SOME REVOLUTIONARY CHANGES**

- The growth rate has increased tremendously to about 7.5% recently in contrast with the annual growth rate of 3.5% in 1980s (add source)
- A market determined exchange rate system was introduced as compared to the fixed exchange rate regime.
- A wide variety of products are now available in the market and there is access to products from all parts of the world.
- India is now a part of the G20 nations consisting of various superpowers of the world. • India has become the fastest growing economy in the world.

**The diagram shows the changes in India since 1991**



Source: Indian Express

**MISSES**

While the industrial sector has benefited the most from the reforms, the agricultural sector has been completely ignored as there has been no major reform there since the green revolution. Also, China’s and India were similarly placed in 1990. And now China’s GDP is five times more than India. Data reveals that autocracy has done better than democracy on human development indices. Even though the private sector has boomed to a great extent, minimal efforts have been made by the public sector authorities to improve their quality of services and they continue to lack efficiency.

An important miss in the reforms is environmental sustainability. In every other field we are making progress, even if we haven’t quite reached our targets. Unfortunately, in the area of environmental protection, there is evidence of deterioration. Whether it is air, water or soil pollution, we need more reforms to do much better and increase their pace with the changing scenario. Many also argue that globalization may not be a favourable strategy in a poor country like India as even though few people have become wealthier, closer integration into the global economy has brought greater volatility and insecurity and more inequality. Hence, the journey into a promised land of economic

prosperity could easily turn into a hellish nightmare of poverty and widening inequality for the majority. A far more serious issue is the rise of crony capitalism. If the purpose of economic reforms was to get rid of the license permit raj, the reforms have failed to create a level playing field with crony capitalism, not just obvious in the case of natural resources such as petroleum, coal, iron and spectrum, but also among industries which have seen the opening up of markets and deregulation. The fact that the banking and finance sector, which was among the first to be opened up, is struggling with non-performing assets is a clear reminder of the perils of unregulated liberalization and crony capitalism<sup>9</sup>

### **WHAT IS LEFT TO BE DONE?**

There is a great deal more to do and some of it is currently in the pipeline, but it's moving too slowly. We need to realize that whereas reforms have produced growth and even reduced poverty, they have been less effective in delivering essential social services to the masses. This is a large failure. A lot of what needs to be done is known and much discussed but it is not being inscribed into the political agenda<sup>10</sup>. A lot hence, needs to be done in the legal and sectorial and infrastructural spheres.

#### **Legal:**

One of the first things that can be done is to improve the judicial process. The bad loans mess is a reflection of the fact that banks couldn't enforce their rights in a timely manner. Hence the delays in dispensation of justice in criminal matters make the process a captive of the rich and powerful. The next generation of reforms must be about transparent laws, quick judicial process and reliable policing.

#### **Sectoral:**

First, there is a need to look at our power sector, infrastructure and logistics. Secondly Improvement should also be seen in our basic sectors i.e., Education, Health and Environment. Also, the productivity of our agricultural sector can be improved through scientific research and improved dissemination of knowledge and the basic principle of reducing barriers and increasing the level of competition should be

extended to all the sectors.

**Infrastructural**

Improvement in the quality of government spending and composition for example: using Jan Dhan, Aadhar and Mobiles for better targeting and efficient use of government money. Focus should also lie on improving our railway network.

Alongside, the introduction of the Goods and Services Tax will also enhance efficiency. And attention must be given to make urban local governments more competent and increase their participation in governance.



Source: Indian Express

**CONCLUDING OBSERVATIONS:**

Two economies, one affluent and the other, predominantly agricultural are emerging and the division can be seen across the social and regional landscape of India. The technology-based export-oriented city-centered economy is flourishing in the new economic environment while the agricultural economy remains backward and those associated with this 'have little expectation of a better future' and remain preoccupied with the daily struggle of livelihood. This can be brought out through the concept of an 'Urban-bias wherein the concentration lies primarily on the urban areas, completely ignoring the rural areas where 65% of our population is dependent on agriculture. Alongside, the gross enrolment

ratio of our country is certainly high; but the learning outcomes are frighteningly poor. However, what is most frightening is our demographic dividend, and there is a real need to focus on our labour reforms. Alongside our emerging rich, there has been a proliferation of slums in our country where people live in sub-standard conditions as jobs in urban areas attract more people from the rural areas.

Reforms have to remain as a part of the continuing agenda. The basic principle of liberalization of creating competitive markets with minimal barriers must be extended to all the sectors. Reforms do not necessarily translate into growth. The investment needs to be carefully nurtured. Equity will remain a dream if we do not spur it with contemporary reforms.<sup>11</sup> While the reforms proved to be a leap for the middle class, significant sectors continue to reject the market led model like poor farmers, tribes and forest-dwellers. With complex social relations, policy alone can't determine India's future. Much more focus is needed on agriculture, labour law, health care, education and infrastructure. There should be greater financial inclusion. In a federal structure like India, initiatives for reforms should also come from states. The states should spearhead reforms in agriculture and health sectors as these are state subjects. Politics will play its native role. However, we should not wait for another crisis to come along to push us to reform. Given the government's stretched resources, it needs to prioritize and focus on essential tasks.

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## **SECTION VII - ECONOMICS**

### **CHAPTER 16 - BREXIT AND IMPACT ON INDIAN ECONOMY**

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#### **ABSTRACT**

Brexit is a term coined for the United Kingdom's withdrawal from the European Union. In June 2016, a poll was conducted to find out the number British citizens who agree with the withdrawal. The result was 52% of the population. In this research of content analysis, we have tried to look into the areas of economic effects, reasons for the UK's withdrawal from the EU, both negative and positive effects of "Brexit", impact of Brexit and its relationship with Indian Economy, areas which will get affected as a result of Brexit on the UK and the EU and how it has created a huge impact on other members/countries of the world. It is difficult to say whether its result will be beneficial or not but the bumpy ride of the UK in the EU will finally end.

"Ties that bind, can also strangle."- Daniela Annette Kroll

**KEY WORDS:** Brexit, Bremain, European Union, United Kingdom, India.

#### **INTRODUCTION**

After the Second World War there was a new movement to create unity between Germany and France, which ultimately laid the foundations for the European Union (EU) four decades later. The EU can trace its origins from the European Coal and Steel Community (ECSC) and the European Economic Community (EEC), formed in 1951 and 1958 respectively by



the Inner Six countries of Belgium, France, West Germany, Italy, Luxembourg and the Netherlands.

French foreign minister Robert Schuman led the formation of the ECSC with the Schuman Declaration in May 1950. The organisation was a forerunner of several other European Communities and what is now the European Union.

The European Union is an economic and political union of 28 countries. It operates as a single market which allows free movement of goods, capital, services and people between member states. Each of the countries within the Union is independent but agrees to trade under the agreements made between the nations.

### **Objectives of the Research Study**

1. To analyse the reasons for Brexit.
2. To understand the impact of Brexit on the EU.
3. To understand its impact on Indian economy.
4. To know the Bremanian perspective.
5. To put across a futuristic perspective for the UK – Brexit or Breman? What next?

### **Rationale of the Research Study**

Economic events are affecting the global economies. After the Eurozone union, new geopolitical developments are bringing a new world economy order based on regionalisation. Britain's exit from EU will be a major political and economic decision affecting the economies all over the world. Hence, this research paper is an attempt to understand how Brexit will affect the Indian economy.

### **RESEARCH METHODOLOGY**

The research paper is based on descriptive analysis of secondary data collected from books, journals, newspapers and research articles.

### **BREXIT AT A GLANCE**

In this context, Britain is used synonymously with the United Kingdom. The UK consists of four countries: England, Scotland, Wales, and Northern Ireland. Brexit<sup>1</sup> is a term coined for the United Kingdom's withdrawal from the European Union. In June 2016, a poll was conducted in order to decide the percentage of British citizens who agree with this withdrawal and the result was 52% of the population. Due to this announcement, there were major changes that occurred in the economic and political spheres in the UK which in turn affected India and the world at large. This decision was taken by the elites which led the common citizens to think it was an unnecessary decision.

### **Reasons for Brexit:**

The United Kingdom had never accepted the European Union fully. For instance, it refused to adopt Euro as its currency. 19 of 28 countries of the European Union have adopted a common currency called Euro to facilitate trade. The UK joined the European Union in 1973. The last referendum was held just two years after its joining in the year 1975. The UK had voted to stay in the EU then. But, since the euro-zone debt crisis (due to the Greece (EU) debt crisis which was a cause of worry) the UK has become more sceptical of the EU. When the United States was caught in the recession, it lowered the interest rates to boost GDP. But, the European Commercial bank chose to increase the interest rates for the EU countries and imposed austerity which led to a double-dip recession. Though the recession did not affect the UK directly (as it didn't adopt Euro), it shook its faith in the European Union.

### **Impact of Brexit on European Union**

Great Britain's withdrawal from the European Union would not only change the internal political climate, but it could have important political repercussions within the EU and also on its relations with other European Community's countries. Also, it could stimulate the other EU Member States to re-evaluate the terms and conditions of their membership. The

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<sup>1</sup>Brexit is the combination of the two words Britain and exit. [Britain + exit = Brexit]

same applies if Great Britain fails to renegotiate these terms and conditions while keeping the status of EU member. A priority for the UK is to maintain close trade relations with the EU, even if politically it would opt for withdrawal. In the event of possible withdrawal from the EU, Great Britain could conclude an agreement with the EU following the example of a customs union (after Turkey's model). In this case, it would not be obliged to contribute to the EU budget or accept immigration from the EU member states.

After Brexit, Britain would not likely be able to decrease EU labour movement significantly if it chooses to rejoin the common market because of political precedents and coercions. Moreover, migration policy will have to remain relatively liberal post-Brexit in order to not hurt economic performance. A solution which might be a flexible; balanced visa policy adjusted not only to skills needed but also for those who have a job offer before finding their way to the UK.

Last but not the least, from a geopolitical point of view, Great Britain's exit from the EU could be seen externally as a sign of decline for the EU which will lose its financial, economic, political and military powerhouse. From this point of view, the European Union itself have a significant political and economic interest to conclude a mutually beneficial agreement with Great Britain considering that it could terminate its EU membership.

## **BREXIT AND INDIA**

Brexit, in the context of India, has undoubtedly had influence at a political level. According to R. K. Jain, an Indian economist (2016), Brexit has influenced a policy whereby India has tended to approach relations with the EU member states separately rather than with the EU as a whole. A new report by consulting firm Deloitte (2016) analyses the impact of slowing growth and a weaker pound on Indian businesses.

Overall, Brexit is not good for India as India will lose a friend within the EU and must also deal with a fairly insular/aggressive new leadership in the UK. There is confusion in some of the pending trade deals: India awaits the EU's stance on Free Trade Association (FTA). The falling

pound also makes it harder for Indian exporters whose profit margins & competitiveness will erode.

The UK has traditionally been among India's closest friends in Europe. Among the western countries, Great Britain is the most positive about India's influence. The UK has thus been a traditional jumping pad for Indian companies entering Europe. When the UK loses a voice in the EU, India loses a partner in the EU.

### **Impact of Brexit on the Indian economy**

It is too soon and almost impossible for chief economists to comment on the long-term effects of Brexit on India with the ongoing series of events unfolding one by one in this game of uncertainties, no matter how precisely they monitor it. However, the short- & medium-term dynamics can be explored as:

#### **1. Currency:**

- Value of Rupees weakened against the Dollar.
- Gold prices shot up.
- Impacted the inflow from Foreign Portfolio Investors (FPIs) to India.

#### **2. Bilateral trade with UK:**

- Some of the projects and negotiations will go on hold as firms would want to wait and watch before implications of Brexit are clearer. India has been negotiating a free-trade agreement with the EU for almost 10 years and now will need to rework its strategy. A separate pact might need to be negotiated with the UK.
- If the UK becomes a member of the European Economic Area (EEA), like Norway, it could be advantageous for India in terms of trade.
- The British government can also cut tariffs and boost trade. If the UK and India finalise a free trade agreement, it will boost trade.

- India will not be able to use the UK as a gateway to the European Union as easily as before, and trade between India and the EU can be hampered by the UK.

### **3. Sectoral Impact:**

- IT Sector:

Indian IT companies with European headquarters in the UK will need to spend on infrastructure and staff for setting up a new office in the EU. (There are approximately 800 Indian companies in Britain)

- Automobiles:

The UK and the EU account for 4% and 16% of India's automobiles exports. For companies manufacturing in the UK, access to the single market is important; products will get uncompetitive if they have to pay duties. In the near term, products will become cheaper but profits will fetch lower amounts.

- Garment exports:

Garment exports accounted for a fifth of India's exports to the UK. Indian garment exporters have already witnessed a 5% drop in demand last year, and can see lower sales due to a slowdown in growth.

- Pharmaceutical:

India's pharmaceutical sector has significant exposure to the UK and the EU, with exports of \$0.46 billion to the UK and \$1.51 billion to the EU. A drop in demand in the UK and the EU will impact profits and sales.

### **BREMAIN PERSPECTIVE**

Bremain is an abbreviation of "British Remain", which refers to the June 23, 2016 referendum by British voters who voted to remain a part of the European Union. The referendum, which ended with Britain voting to

leave the EU shook markets, including currencies, causing the British pound to fall to its lowest level 30 years.

The British people who supported Britain remaining in the European Union believed the economic effect of Britain leaving would be severe and cutting ties with close neighbours and then having to renegotiate trade agreements would put Britain in a position of weakness and cause great harm to its economy. The EU accounts for 48% of U.K. exports and 51% of its imports.

The two leaders of the Brein campaign were British Prime Minister David Cameron and Chancellor George Osborne. Prior to the vote, Chancellor Osborne predicted that an exit from the EU would result in GDP falling 3.6%. He referred to it as a "DIY Recession" (Do it yourself Recession) i.e. Recession of its own making.

## **WHY WOULD BRITAIN REMAIN IN THE EUROPEAN UNION?**

### **Economic Benefits:**

- Currently, 45% of the UK's exports are to the EU, while 50% of imports are from the EU.
- In 2012, UK received around £937billion of Foreign Direct Investment (FDI), while 50% of UK FDI is EU-related.
- Membership of the customs union would ensure goods are not subject to import tariffs or — probably more importantly — to checks that they meet the EU standards.

### **Employment and Workers' rights:**

- Regulated working hours and break times, so people cannot be forced to work more than 48 hours a week.
- Anti-discrimination laws, so people cannot be discriminated against on the grounds of race, ethnicity, religion or belief, disability, age, or sexual orientation.

### **Food and Travel:**

- Most of the UK’s food standards laws originated in the EU, meaning many potentially harmful additives are banned from food.
- It becomes easier than ever for the UK to get away with visa-less travel across the EU.

**Power to curb the multinationals:**

- The EU has taken on multinational giants like Microsoft, Samsung and Toshiba for unfair competition. The UK would not be able to do this alone.

**Influence in the world:**

- As 28 democracies, and as the world’s biggest market, they are strong when they work together. Britain is represented in many international organisations in joint EU delegations – giving Britain more influence than it would have alone. The EU has played a major role in climate, world trade and development.

**Table 1: European Union Referendum Results**

Country	Leave		Remain	
<b>England</b>	15,188,406 Votes	53.4%	13,266,996 Votes	46.6%
<b>Northern Ireland</b>	349,442 Votes	44.2%	440,707 Votes	55.8%
<b>Scotland</b>	1,018,322 Votes	38.0%	1,661,191 Votes	62.0%
<b>Wales</b>	854,572 Votes	52.5%	772,347 Votes	47.5%
<b>Total</b>	17,410,742 Votes	51.9%	16,141,241 Votes	48.1%

Source: [www.bbc.com](http://www.bbc.com), 2016

**THE LONG TERM: A PHOENIX OR A TITANIC FUTURE?**

In the medium and long term, Brexit campaigners argue that the UK's economy would be liberated from the burden of regulation and restriction

that comes with the EU membership. On this basis an end to the EU membership would create a ‘phoenix’ future for the UK.

In this scenario, the UK's diplomatic and political bandwidth would be liberated from the weight of EU institutions, decision-making processes and existing patterns of external relations, allowing the readjustment of the UK's interests and international relationships. The UK would be able to make full use of its diplomatic and military capabilities alongside its soft power, its position as an unrivalled international financial centre and its memberships of the Anglo sphere and the Commonwealth, to seek new international influence, especially with rising powers.

However, as has been suggested above, a less optimistic future—indeed, a ‘titanic’ future—looks more likely for the UK outside the EU. The UK's place in the world would encounter a significant setback. The British government would be confronted with an international diplomatic crisis, forced to counter a perception that Britain's international role and influence would be shrinking. Brexit would also raise questions about the UK's international importance and might lead other countries to ask whether its membership of key bodies, for example its permanent seat on the UN Security Council, is still appropriate. The UK would lose the European Union as a vehicle for providing for significant diplomatic efficiencies. It would lose the ability to address a wide range of foreign policy and security issues via a multilateral format with 27 other European countries. As the current EU foreign policy-making system does not allow non-members to participate in its processes, it would have to find new means and other mechanisms to resolve interstate disagreements, iron out differences and pursue collective positions on issues of common concern.

## **CONCLUSION**

United Kingdom's diplomatic strategy has to well balance out between a phoenix and a titanic and strike the right chord to trade-off with European Union and the rest of the world. The diminishing role of the United Kingdom in the European Union has created a huge impact on the other members of the EU and the world at large. It is too early to say



whether the result of Brexit will be beneficial for Britain or not but for India it will be difficult politically as India will lose a friend; the United Kingdom, and economically it will have to deal independently with the members of the European Union rather than the Umbrella organisation, European Union as a whole.

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## **CHAPTER 17 - DEMONETIZATION AND INDIAN ECONOMY**

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### **ABSTRACT**

Demonetization can be said as a “Surgical Strike” on Black Money, Terrorism, Fake Currency, Unorganized trading, Real Estate, Share market etc. It has been a radical, unprecedented step of the Government of India taken on 8<sup>th</sup> November 2016; the liquidity squeeze has been easing since end of December 2016. There has been both the short-term impact on the economy as well as long run repercussions to be witnessed in future. Demonetization has been an effort to include digitally excluded category into digital phase where the mode payment would become easier and the government would have records of transaction which in turn would help to fight against tax evasions, corruptions, terrorism etc. This move had led to masses becoming tech- savvy and has also helped to eradicate parallel economy.

**KEY WORDS:** Demonetization, Sectoral, Digitalization, Economy, Tech-savy.

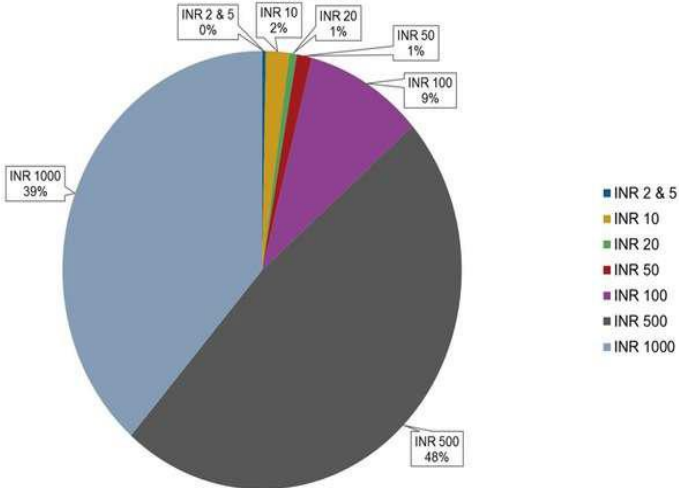
### **INTRODUCTION**

Taka Mati, Mati Taka. (Money is mind and mind is money. – Ramkrishna Paramhansa)

On 8<sup>th</sup> November Indian Prime Minister Mr. Narender Modi announced in broadcast to the nation that Rs. 500 and Rs. 1000 currency notes would no longer be recognized as legal currency. People were given time upto 31<sup>st</sup> March 2017 to exchange the notes possessed by them. These notes were replaced by new denomination i.e. Rs 2000 with a new look. The Prime minister narrated that the move complements the country’s Swachh Bharat Abhiyan. “For years, this country has felt the corruption,

black money and terrorism are festering sores, holding us back in the race towards development. To break the grip of corruption and black money, we have decided that these currency notes presently in use will

**Percentage Share of Denominations in Circulation by Value in  
FY 2015-16**



no longer be legal tender from midnight.” In terms of value, the annual report of Reserve Bank of India of 31 March 2016 stated that total bank notes in circulation valued to Rs.16.42 lakh crores (US\$240 billion) of which nearly 86% [i.e., Rs. 14.18 lakh crore (US\$210 billion)] were 500- and 1000-rupee notes. At one stroke 86% of the cash in the circulation was thereby rendered invalid. Hence, the research paper topic is “Demonetization and Indian Economy.”

The reasons offered for demonetisation are two-fold: one, to control counterfeit notes that could be contributing to terrorism, in other words a national security concern and second, to undermine or eliminate the “black economy”. Similar measures have been taken in the past. In January 1946 currency notes of Rs. 1000 and Rs. 10,000 were withdrawn and new notes of Rs. 1000, 500 and 10,000 were introduced in 1954. The Janta party coalition again demonetized notes of Rs. 1000, 5000 and 10,000 on 16 January 1978 as a means to curb forgery and black money

but there was not significant effect on the economy. In this case 86% of cash was declared non legal tender all of a sudden which is bound to have a serious impact on the economy. Plus, restriction was placed on cash withdrawal.

### **Objectives of the Research Paper**

- a. To study the impact of demonetization on the Indian economy.
- b. To understand the relation of demonetization in leading India into a new digital economy.
- c. To understand the short term and long-term cost benefits of demonetization.

### **Rationale of the Study**

The demonetization could change the face of Indian economy in the upcoming year. India's demonetization is the unprecedented act in international economic history as it was combined with secrecy and suddenness amidst normal economic & political condition. All other incidents of demonetization so far have occurred due to hyper inflation, wars, political upheavals or other extreme circumstances but same was not the case here as the Indian economy has been growing at the fastest chip in the world with stable micro economics and impressive sets of reforms. Hence, such a step by government is bound to have broader implications on the economy.

### **RESEARCH METHODOLOGY**

The paper is based on secondary data. The data has been collected from books, magazines, newspapers etc. Percentile method has been used to analyze the data.

### **REASONS BEHIND DEMONETIZATION**

According to RBI the most important reason behind demonetization was to curb increasing amount of fake currencies in the market and counterfeiting rising amount of black money in the economy generated

by income that had not been declared to tax authorities and the use of high denomination notes for terrorist activities.

### **Black Money**

According to National Institute of Public Finance and Policy (NIPFP), black money amounts nearly 40% of the country's GDP. Thus, the immediate impact of demonetization was seen on black money. The direct effect will depend upon two steps: the Benami transaction Act 2016 and the Pradhan Mantri Garib Kalyan cess 2016. The long-term impact can be more impactful depending upon how government deploys its scheme.

### **Terrorism and Fake Money**

Terrorism is a greater threat to India. Terrorists get money through printing fake money. After implementation of demonetisation, it was noticed that there were no attacks at the border by terrorist camps for the first few months.

### **Election**

Demonetization was implemented when the elections were on head in states like Uttar Pradesh, Goa, Punjab and Uttarakhand. Political parties hold black money and the votes are purchased. Thus, a drastic change was seen in elections.

## **IMPACT ON INDIAN ECONOMY**

The major impact of demonetization was on the economy. In short term, as consumption fell, GDP was affected and indirect tax collection was also lower. Production of goods and services had moved from unorganized sector to organized sector and may prove irreversible. Talking about long term, there could be positive aspects.

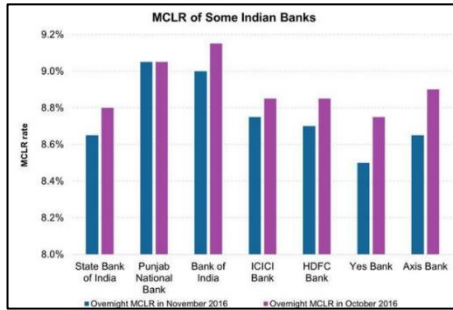
- i.** Loans and borrowings to become cheaper.
- ii.** Real estate and gold prices to fall.
- iii.** Inflation will come down.

iv. Tax – GDP ratio will improve.

v. It will channelize savings into formal sector.

MCLR: Marginal Cost of Lending Rate

In the first three months of 2017, the annualized rate was 6.1% slowing down from previous quarter's 7% rate. The latest figures might have missed estimates, but this doesn't come as a huge surprise. The ban on 86% of bank notes in circulation was expected to have a severe impact on the economy. But the data suggests that the GDP recovery has been quicker than expected. However, the latest figures do not tell the complete story as it does not include the unorganized sector which accounts for 40% of Indian economy.



**Sectoral Impact**

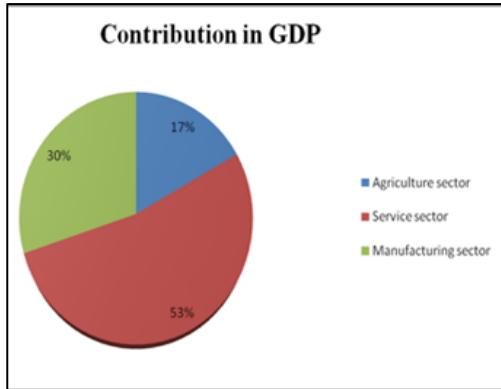
Economy can be bifurcated in three broad segments --- Agriculture Sector, Manufacturing Sector and Service sector all these three sectors contributed in Indian GDP. Agriculture Sector Contribute 17% in GDP Manufacturing Sector Contribute 30% in GDP Service Sector Contribute 53% in GDP after Demonetization all the three sectors faces negative impacts.

**A. Agriculture** Agricultural growth in India contracted 0.2% in 2014-15 and grew no more than 1.2% in 2015-16, largely because of back-to-back droughts. It was expected to grow at 4% in this year as per the CRISIL Report, but due to Demonetization this forecast was proven wrong because farmers are running out of cash to buy seeds, fertilizers, equipment, wages payment to workers and commission to agents etc. Due to cash shortage daily supply transport system has also suffered

which resulted in 25 to 50 % reduction in sales. Following are the main reasons:

I. Farmers are not educated and aware about how to work on E-Payment System, Recent study by RBI says that 78% of the population do not use

internet in which almost 80 to 85 % are Farmers.



II. In most of the village's proper banking system is not developed yet and villagers need to go to the cities for the same because of which most of their time is engaged in exchanging the old notes.

## B. Industrial Sector

As per the IPP, growth in the business sector was 0.7% in October 2016 but after 8th November 2016, demonetisation showed a different picture. Labour turnover increased due to lack of production which was because people were purchasing only if it was necessarily required, for this I have studied on the following business sector. For most of the Brands and Retailers Report, 40 to 60 % drop was seen in sales in the first few weeks after demonetization but from December onwards this drop slightly decreased, but still we can say the impact of this decision has affected the industry in 2017 for at least 3 to 4 months. Consumer expenditures were also affected by the decision because now only those products were purchased which were necessary for daily consumption from the small traders like "kirana store", "small bodies", "thelawala" etc. They all have done their daily transactions in cash and because consumer has less cash in his pockets the daily sells of these traders drop went down by 20 to 30%. It is also a short-term impact. In the future, things may get normal. Demonetization smashed the real estate market and it will result in 50% drop down for more 5 to 6 months. While the short-term impact is

negative, Experts are hoping that the rate cuts in the coming months will boost home sales.

### **C. Service Sector**

Service sector was hit very hard by the demonetization decision in November 2016, the worst slump in nearly three year. The Nikkei India Services Purchasing Managers' Index (PMI), which tracks services sector companies on a monthly basis, stood at 46.7 in November, down from 54.5 in October. The Index slipped into contraction territory for the first time since June 2015 and pointed to the sharpest reduction in output for almost three years. On the other hand if we talk about the banking sector, this is the only sector which has benefited by the decision in many aspects, this move will pull a large chunk of first time users to banks that will have to use the system at least once to exchange their old notes for new ones. According to a study conducted by Moody's, people tend to continue using banking services once they have crossed the 'first-time user' mark. This development will increase bank deposits by 1 to 2 percent compared to what they were before the demonetization scheme.

### **DIGITALIZATION AND DEMONETIZATION**

Cash has many advantages: it is convenient, accepted everywhere, and its use is costless for ordinary people. Cash transactions are also anonymous, helping preserve privacy, which is a virtue as long as transactions are not illicit or designed to evade taxation. In contrast, digital transactions face impediments. They require special equipment, cell phones for customers and Point-of-Sale (POS) machines for merchants, which will only work if there is internet connectivity. Digital transactions help bring people into the modern “wired” era and it brings people into the formal economy, thereby increasing financial savings, reducing tax evasion and levelling the playing field between tax compliments and tax evading firms. There are approximately 350 million people without cell phones (the digitally excluded); 350 million with regular “feature” phones, and 250 million with smart phones.



In wake of demonetization, the government has taken a number of steps to facilitate and incentivize the move to a digital economy. These include:

- Launch of BHIM (Bharat Interface for Money) app for smartphones based on United Payments Interface (UPI) which has created interoperability of digital transactions.
- Launch of BHIM USSD; a product that allows feature phone users to take advantage of UPI.
- Launch of Aadhaar Merchant Pay, aimed at the 350 millions who do not have phones. This enables anyone with just an Aadhaar number and bank account to make a merchant payment using his biometric identification. Aadhaar Merchant pay will soon be integrated with BHIM and the necessary POS devices will be rolled out soon.

As people have started to use such e-payment systems, they have discovered that it is more convenient to conduct financial activities electronically.

### **MAXIMISING LONG-TERM BENEFITS AND MINIMISING SHORT-TERM COSTS**

A number of follow-up actions would minimize the costs and maximize the benefits of demonetisation. These include:

#### **Fast, Demand-driven, Remonetisation**

Supply of currency should follow actual demand and not be dictated by official estimates of “desirable demand” to re-establish internal convertibility.

#### **Inter-convertibility of cash**

There should be no penalties on cash withdrawals, which would only encourage cash hoarding. Internal convertibility is bedrock of every single financial system in the world, for some very practical reasons. Unless people have confidence that the money deposited in bank accounts is freely convertible into cash, and vice versa, they will be

reluctant to deposit their cash. The proportion of low denomination notes should certainly rise at the expense of higher ones. But there should not be any restrictions on aggregate supply. The government windfall arising from unreturned notes should be deployed toward capital-type expenditures.

### **Digitalization**

Public policy must balance benefits and costs of both forms of payments. The transition to digitalization must be gradual; taking full account of the digitally deprived and respect rather than dictate choice. The cost of incentivizing digitization must be borne by government. Cyber security systems must be strengthened considerably.

### **Complementary Actions**

A GST with broad coverage to include activities that are sources of black money creation—land and other immovable property should be implemented. Individual income tax rates and real estate stamp duties could be reduced. The income tax net could be widened gradually and consistent with constitutional arrangements could progressively encompass all high incomes. (After all, black money does not make fine sector distinctions). The timetable for reducing the corporate tax rate could be accelerated and tax administration could be improved to reduce discretion and improve accountability. Action needs to be taken to allay anxieties about over-zealous tax administration.

### **CONCLUSION**

If the money disappears, as some hoarders would not like to be seen with their cash pile, the economy will not benefit. On the other hand if the money finds its way in the economy it could have a meaningful impact. However, experiences from different countries shows that the move was one of the series that failed to fix a debt-burdened and an inflation-ridden economy. The present study shows the impact of demonetization on the Indian economy's different sectors. GDP of the country slightly decreased as compare with the previous year but we cannot say it will be same in future too. This intervention is a one-time draining of the current

stock of black money but unless the root causes of corruption are removed, corruption will continue. It is sort of like a dialysis, more of a short-term cleaning up than a solution to the problem. It needs to be repeated periodically.

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**SECTION IX - COMMERCE**

**CHAPTER 18 - A RESEARCH STUDY TO ANALYZE  
THE NEW TRENDS IN ADVERTISING AND THEIR  
IMPACT ON THE SALE OF THE CONSUMER  
DURABLES IN INDIA, WITH SPECIAL REFERENCE TO  
SOUTH MUMBAI**

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**ABSTRACT**

The research paper presents insights about the latest changes taking place in the field of advertising. The paper discusses the technological adaptation in the advertising industry, it presents details about the new innovative trends in the field of advertising. The research paper also incorporates the comparative study about the changes taking place in the advertising industry in the global arena, wherein illustrations are incorporated so as to present the current scenario of the advertising industry.

**INTRODUCTION**

Advertising is a form of communication process, a business practice and social force that disseminates commercial or sometimes non-commercial messages to a target audience. The practice of advertising dates back to the Christian era. One of the first known methods of advertising was outdoor signs, which would be painted on the wall of a building and which were usually very eye-catching. Archaeologists have found such signs in the ruins of ancient Rome and Pompeii.

In the eighteenth century, modern advertising began, where Great Britain boasted the most modern form of advertising. Signs and billboards were a few of them.

Advertising as we know today began during the last quarter of the nineteenth century. Advertising agencies were relatively unknown then and those that existed had ill-defined responsibilities. The mix of products for which they were placing advertisements was quite different from those in the market at the turn of the century. Quaker Oats itself had not been invented. Thus, the history of advertising in America falls into two eras separated around this turning point.

## **IMPORTANCE**

### ***Advertising is important for the customer***

Just imagine television or a newspaper or a radio channel without an advertisement! No, no one can, on any day, imagine this. Advertising plays a very important role in a customer's life. Customers are the people who buy the product only after they are made aware of the products available in the market. If the product is not advertised, no customer will come to know what products are available and will not buy them even if it was for their benefit. One more thing is that advertising helps people find the best products for themselves, their kids, and their family. When they come to know about the range of products, they are able to compare the variety before buying, so that they get what they desire after spending their valuable money. Thus, advertising is important for the customers.

### ***Advertising is important for sellers and companies producing the product***

Yes, advertising plays very important role for the producers and the sellers of the products, because

- Advertising helps in increasing sales
- Advertising helps producers or the companies to know their competitors and plan accordingly to meet the level of competition.
- If any company wants to introduce or launch a new product in the market, advertising will make a ground for the product. Advertising helps in making people aware of the new product so that the consumers can come and try it.

- Advertising helps in creating goodwill for the company and gains customer loyalty after reaching a mature age.
- The demand for the product keeps on coming with the help of advertising and demand and supply become a never ending process.

***Advertising is important for society***

Advertising helps to educate people. There are also some social issues which advertising deals with like child labour, liquor consumption, girl child killing, smoking, family planning education, etc. Thus, advertising plays a very important role in society.

**OBJECTIVES OF THE STUDY**

- 1) To study the present and future trends taking place in the advertising industry.
- 2) To study the effect of the new trends in advertising on the consumers.
- 3) To study the effect of new trends in advertising on the sale of products.
- 4) To study the different reasons and preferences of consumers towards the latest trends in advertising.

**SCOPE OF THE STUDY**

This study will be focusing on the recent trends which are arriving in the world of advertising. Therefore, the scope of the subject is restricted to the above topic. For the purpose of this study, a sample size will be taken from consumers in South Mumbai.

The study will be limited to students studying in degree colleges in South Mumbai. The study will also include the following factors.

- 1) Customer behaviour of students in South Mumbai.
- 2) Preferences and reasons towards counterfeit products.
- 3) Effect of counterfeit products on the sale of original products.

## **RESEARCH METHODOLOGY**

A proper research methodology should be adopted in order to achieve the set objectives, and wide information was needed to be collected by questionnaire method.

- a) Data collection: The data will be collected by using the following sources –
  - i) Primary data: As the study is focused only in South Mumbai, primary data will be collected from the consumers of South Mumbai.
  - ii) Secondary data: Secondary data will be collected through newspapers, business magazines, and internet sites as well as relevant books.
- b) Research instrument: The data collection will be done using structured questionnaires.
- c) Sampling details: In all, a questionnaire will be administered with consumers in South Mumbai.

## **PRESENT TRENDS**

The present situation of advertising is far different from its history. It is very common and has become an integral part of business. Today, special advertising agencies have come up for this very purpose. These agencies are redefining themselves as communication companies that assist their clients to improve their overall communication effectiveness by offering strategic and practical advice on the many forms of communication. This is because advertisement may work in the sense that communication effects are stored in the memory

Today advertising has come up with all new trends which are certainly out of the box and makes their customers engage more with the product and have loyalty towards the product.

Companies are using different methods to promote their products in their own unique way which has led to new trendsetting at every interval. To start off the trends let us address the most common tools.

### ***Television***

Television has become an integral part of advertising in the 21<sup>st</sup> century, as every household has its own TV. Flashing advertisements on the TV means reaching thousands of potential customers in one go.

For example, during a World Cup Match, hundreds of crores of people are reached if the advertisement flashes in between overs. Also, if it is flashed between a popular TV show, people are reached quite easily. It reaches more public in one go.

### ***Radio***

Although it might seem like an outdated technique, radio is very effective in the sense of reaching even the poorest person residing in a village. It also has equal, if not more reach to people as compared to TV.

For example, our Prime Minister Shri Narendra Modi uses this medium to communicate his messages to masses via radio (Mann Ki Baat), despite TV and media being available.

### ***Advertorials***

A book, specially published for the purpose of advertising, is known as an advertorial. Companies wanting to recruit people for jobs or low scale companies give their advertisements in advertorials.

For example, recently, a new trend of rickshaws in Mumbai had these advertorials kept in them for the purpose of attracting passengers to read them, while also earning the rickshaw walas more income.

### ***Newspapers & Books***

The cheapest, most affordable and mass connective measure can be none other than the newspaper. Also, the publishing houses have had their own advertisements on their books. Since the printing press was invented, newspapers have served as a great source of advertisement.



Moreover, it requires no medium like phones, Internet etc. and by itself, it reaches many, to enhance their connectivity to the public.

Every morning, for example, a person is bombarded with advertisements when he opens the newspaper to read the daily news.

### ***Films & Media***

Recently, there has been an uproar about promoting products through films. There often comes a special trailer or poster of a particular scene of the film where a hero, heroine or even both pose with and talk about the product. It gives the product an exclusivity of being used in the film.

Also, there are media promos wherein the product is taken to a channel and things are discussed over it.

Considering films as an example, the actors go out of their way for publicity and promotion of their films. Unique looks of the characters of films are also carried on in personal life as Amir Khan Did for Dhoom 3. Also, actors appear on Reality shows like Comedy Nights with Kapil, DID, etc. for promotion.

### ***Internet***

The drastic development of computers and the advent of the Internet in the late 20<sup>th</sup> century opened the floodgates for developing new techniques in advertising. There is no denying the fact that today in 2015, and in the years to come, the Internet has and will provide great help to advertisement companies to reach the public.

Online shopping companies like Amazon, Flipkart, eBay, etc, for example, have come up and occupied a major position not just for advertisement or online selling but also for launch of new products.

## **NEW TRENDS**

### ***Digital Advertising***

Digital advertising is the new form of advertising. Digital advertising is an umbrella term for the targeted, measurable and interactive marketing of products or services using digital technologies to reach consumers.

The key objective is to promote a brand, to advertise a product and to increase the sales. The tools of advertising are as follows:

### **A. Social Media Advertising**

Companies have noticed that social media is becoming very popular, so they have started advertising on social media. Advertising on social media will be very beneficial for companies because it will reach thousands of people as many people browse social media on a daily basis.

A Company can, for example, create a page of product and post on Facebook so as to inform people that new product has come

### **B. Email Marketing**

Email Marketing is directly marketing a commercial message to a group of people using email. Here the message is only sent to potential or current customers. It usually involves using email to send ads, create brand awareness or to build loyalty.

An example can be Buzzfeed which uses short and punchy line to advertise a product and to attracts customers to buy that product

### **C. Mobile Advertising**

Advertising through cell phones is one of the smart and customer friendly approaches to reach customers. Companies know that now almost everyone has a mobile phone in their hands so they have started on mobile as well. It includes advertising in the form of Short Message Service, Mobile Games or Multimedia Managing Service.

For example, in 2012, 'Nike' partnered with messaging app 'We Chat' to try and connect with youth audience at Shanghai Festival of sports

### **D. Tele Advertising**

Tele advertising is the act of advertising goods or services to potential customers over the telephone. It is a form of direct marketing. The Marketer uses telecom and call centers to attract prospects and to sell to existing customers.

For example, a company that organizes continuing education conferences for dentists could use tele-marketing to contact a large number of dental practices to raise awareness about upcoming conferences, and encourage dentists to attend.

### **E. Green Marketing**

Green Marketing is the marketing of products that are presumed to be environmentally safe. This concept of green marketing came into existence due to growing concern over environmental degradation. Green marketing involves developing products and packages that are environment friendly or less harmful to the environment. Green Marketing includes many areas ranging from conservation of environment to control of pollution.

Wipro Infotech, for example, was India's first company to launch environment friendly computer peripheral

### **F. Social Marketing**

Social Marketing seeks to influence social behaviors not to benefit the marketers, but to benefit the target audience and the general society. Social marketing concept focuses only on the welfare of the people. Social marketing does not have a commercial angle. This technique has been used extensively in international health programs such as polio vaccination

### **G. Viral Advertising**

Viral Advertising refers to an advertising strategy that focuses on spreading information and opinions about a product or service from person to person. It encourages individuals to pass on the message about the upcoming products to others. Through this advertising, information spreads like a virus to thousands of people.

In Hotmail every email by every hotmail subscriber used to conclude with the tagline "Get your private, free email at <http://www.hotmail.com>"

## **FUTURE SCOPE**

Times are changing and so the demand of the companies to market their product in a different way to catch the customers' attraction every time they show their products and create brand loyalty so that even in the long run, the company does not lose their customers to the rival companies. Sometimes it is association with particular social work like 'P and G' does for 'education in India' or sometimes it's like 'Colgate and Pepsodent' which compares their products to each other and show its advantage to the consumers or like 'Cadbury' which has associated itself to gift for all occasion 'Kuch Meetha Ho Jaye'.

Such tag lines are a must for companies to identify themselves with. Moreover, times are moving towards marketing and packaging over quality. Consumer's trends too are moving towards more luxurious products than just needful commodities. They want commodities which make them feel better along with improving their standard of living. So, here advertising companies have to focus more on giving the product a luxurious feel and a premium sense. India is being seen as the next business hub after China in the coming years. "Made in India" tag itself will sell more products of any company just because of the trust of the world on India's quality and manufacturing sector.

One more trend which could rule the advertising world is cloud advertisement. Today, cloud storage has been growing and all the companies are taking advantage of it. Providing an advertising medium to other companies to advertise could easily set a storm in the market. Now-a-days even Railways, Airways and Public transport are utilized for advertisement via speakers, TV in them and even magazines.

## **CONCLUSION**

Future is here, we just cannot predict what is coming next. Maybe a whole new way which is untouched, unseen, undertaken, underutilized; you just never know. 'All it takes is an 'Uncommon Thinking' from an 'Uncommon Man' of an 'Uncommon Breed' who has 'Uncommon Ways' of looking at very Common Things'

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## **SECTION X - SOCIOLOGY**

### **CHAPTER 19 - GHUNGHAT: A MARKER OF WOMEN'S STATUS**

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#### **ABSTRACT**

The ghunghat, worn by Hindu women in Uttar Pradesh generated a storm of curiosity in me. This study uses the ghunghat to explore men and women's views on the practice of ghunghat in Sultanpur district of Uttar Pradesh and revealed that even those who do not believe in this practice are compelled to practice ghunghat as it marks status and honor of the woman and indirectly that of the family. Interviews with 42 men and women show that younger lower caste men and women (though poorly educated) oppose ghunghat as a matter of loss of personal identity, loss of self-confidence and an age old custom. Similarly, young, well-educated women from upper caste too oppose ghunghat as an age-old custom. On the other hand, there is a large group of men and women largely from the upper caste and a few from lower caste who are comparatively elder and poorly educated supporting ghunghat arguing that ghunghat makes women modest and worthy of respect in society. One case of domestic violence against women was seen in a lower caste family where the wife opposed ghunghat but the husband (38 years old) had Brahmanical ideology of ghunghat. One exceptional case was that of a very well educated, young, upper caste boy –who was seen opposing ghunghat (he is studying in Mumbai for 4 years and is 20 years old). Respondents' answers are translated from Avadhi language to Hindi language.

## **INTRODUCTION**

This report is a result of research on pardah practices prevailing in Uttar Pradesh and other parts of India called as ghunghat. I conducted this research based on the responses of 42 participants. The aim of this research was to observe, understand and analyze the following: Reasons and Perceptions for wearing or not wearing ghunghat, Perceptions, problems and perceived benefits of ghunghat, Rules of ghunghat with regards to Spatial differences and the socio – economic profile of respondents with a feminist view.

This study delves into the experiences of both men and women and their perceptions about ghunghat as to what it signifies? Why is it practiced/not being practiced? How does class and caste play a role here? How does public and private space play a role here? How does education affect?

Ghunghat is also known as ‘ghunghata’ or ‘ghunghut’ in Sultanpur [Uttar Pradesh] where the practice of wearing ghunghat is the one where married woman, in their marital homes, must veil their faces till the neck with the saree’s pallu in front of the male members especially the father-in-law and elder brother-in-law [sassur and jeth]. This marks a symbol of showing respect to them and showing loyalty towards the husband. This practice differs according to various regions and religions. E.g., in Rajasthan, women veil even in front of the mother-in-law and elder sister(s) in law [Abraham, 2010]. Thus, my research work emphasizes on this practice and people’s perceptions related to it as to why the ghunghat is the most powerful symbol of women’s status and thus, indirectly, that of the whole family.

“Purdah” or “pardah” is actually a Persian word meaning curtain [studied from dictionary]. It is an age-old practice where the women cover their bodies especially the face with cloth piece. This cloth piece covering the face can be called as “nakab/nikab” for Muslim women and “ghunghat” for Hindu women. The most modern term replacing the pardah system is called as veiling which came in with the catholic veiling practice.

Pardah is a part of almost all religions in India. However, the way it is practiced is different for different religions.

### **Rationale of the paper**

Feminist gender studies show how deeply sexist and misogynist the society is and has always been since ancient times with respect to women's issues [Chaudhuri, 1999]. The existing literature on gender and veiling has critically examined this practice in various regions of the world. Most of the work is done on Islamic veiling practices where the ban on scarf in America and France is focused more; showing how for some it is oppressive and how for some, it is a symbol of religious identity that many Muslim feminist women choose to veil [*nakab*] [Marshall, 2005]. However, due to different reasons, Hindu veiling practices are not much emphasized. The studies that are done have not included the male participants. Class and caste dichotomy, public and private dichotomies are focused by these works but "What the men think of veiling?" is not asked. I have included both men and women perceptions from the age group of 17-47 years of age in my study along with class, caste and public-private dichotomy.

Literature review of the study shows how *ghunghat* is used as a symbol of modesty, status, honor and respect for the woman. Ideally, women represent the status and honor of the entire family which makes it mandatory for her to wear *ghunghat* as this will lead to increase in social status of the family. It is seen from the works of Mule and Barthel [1992] that veiling leads to social seclusion as it is practiced only by women. This seclusion exists in private space but they are not considered whereas seclusion in public spaces is focused. Feminists argue that any form of veiling is a form of social control [Marshall, 2005] controlling women's sexuality in order to see to it that she maintains her loyalty towards the husband. Similarly, curtailment of women's mobility and freedom is the motive of *ghunghat* [Abraham, 2010] where it is seen that *pardah* includes concepts such as "*nazar ka pardah*" and "*Aawaz ka pardah*" [curtains on eyes and mouth] leading to violation of Human Rights.



Influenced from these works, I wanted to observe and analyze people's perceptions regarding ghunghat in my community through a feminist perspective.

## LITERATURE REVIEW

Under this particular topic, veiling is mostly studied as Islamic veiling where, wearing of hijab, nakab, pardah is focused. It is seen that veiling became a topic of concern only after the western countries like France and America started banning the wearing of scarf [*hijab*] in Public Spaces. However, very few researches are done on Hindu and Catholic veiling practices. The aim of my study is thus, to focus on Hindu veiling practice and understand people's perceptions related to ghunghat.

Women are used as the cultural emblem of the nation [Chaudhuri, 1999] states how the right winged, functionalist ideological minds use women as "*Bhartiya naaris*" [Indian women] as an emblem of the nation's culture. Women carry the burden of representing the Indian culture to the world. Ghunghat is one such so called "great cultural, traditional practice" being followed in parts of India.

*"Given that age and education are the main factors influencing how Maghrebin women in France view the head scarf affair, additional research should examine generational differences on this question"* [Killian, 2003].

The age and educational factor brought up by this study is also evident in mine showing how these factors affect both Hindu and Islamic veiling practice. I have made an attempt to examine the generational differences. However, the context of this study differs from mine but still they are related to each other which I have shown in the data analysis.

An ambiguous difference between Muslim and Islamist is seen in a majority Muslim country like Turkey [Marshall, 2005]. In his study, feminism, feminist and feminist ideology is the whole major focus along with Islam and Islamist ideology. Here, arguments of both religious and feminist perspectives are studied along with role of women in public and Private Spheres with their status. Paid and unpaid work also affects

veiling and head covering practices [Marshall, 2005]. Here, it was seen that the feminists emphasize economic independency of women even if working conditions require high skills and hard work whereas opposition emphasizes on how women cannot work outside the home domain as it is not suitable for her. Perspectives of both Secular Muslim women and Reforming Islamist women are depicted where Islamist women feel that women can work in public spaces but not for money or mere career, it should be in the benefit of the society whereas feminist women argue that women must work in order to help themselves and live a better life which will automatically benefit society. It is seen that progress is different for different women based on their ideologies. e.g., For secular feminist women, following the west's secular feminism is original pathway to progress. For Islamist women, they envision a "true Islam" and argue that progress can only be achieved when we fulfill the obligations of this Islam. I feel the study really brings about very beautifully how women carry patriarchy with misogyny. Stereotypes of women being caring and well-wishers, thinking of the society before themselves is seen coming from reformist religious women. Religious women are headed by religious men, instilling patriarchal notions of religion in their minds [Marshall, 2005]. I feel this acts as an obstacle in achieving gender equality. And on the other hand, Feminism which can actually bring about a positive change does not get support from right winged, functionalist ideology. Another form of this debate is seen in data analysis also.

Tracing the origins of pardah system in India is difficult as "There is no consensus amongst historians about the precise period when pardah originated in Indian society" [Sahai, 2007-TOI]. Many people including historians and scholars believe that this system originated due to the "Muslim invasion" in India. But history shows that the system existed in parts of India [like Rajasthan and Gujarat] among the Rajput since a very long time even before the Mughal rule. "Historian Kegan Paul traces the practice of the custom back to the Vedic period. And anthropologist Patricia Jeffrey says that seclusion and veiling of women was not unknown before the Muslim invasion. It appears that a social ideal recommending when to remain in seclusion to mark their complete

loyalty towards their husband already existed.” [Sahai, 2007-TOI]. This is further evident in the layout of the mediaeval Chittorgarh fort that has separate quarters for women called the ‘jenani deorhi’. According to Sahai, this indicates that patriarchal values had already emerged in pre medieval times and that a family’s honor had already come to reside in the bodies of their women [TOI,2007].

By the 15<sup>th</sup> century, purdah had become an integral part of the feudal etiquette of Rajasthan where women did ghunghat to both insiders and outsiders. Interestingly, women from peasant and working class did not observe ghunghat. This practice later on, spread in north India. We see here how since historic times, only women are associated with the burden of preserving their own and their family’s shame and honor [TOI, 2007].

In 19<sup>th</sup> century, Raja Ram Mohan Roy had abolished the pardah system but still today, after two centuries, it continues. It has been more than twelve centuries that this practice still continues in regions of India. And I saw this happening around me, storming in me the curiosity to know more about this practice and the perceptions associated with it. I have covered the Hindu practices of veiling due to the contemporary controversial issues related to religion where veiling today, has become a source and symbol of religious identity for Islamic women with growing Hindutva ideology in India.

“**Experts lift veil off purdah origin**” [Times of India, 2007] shows how ghunghat is glorified by masses on the basis of shame, honor and respect of the family. It is seen that the motive behind any form of pardah, irrespective of the region and religion is **to control women’s sexuality by controlling her mobility and freedom**. As it is seen that on the first place, women are not allowed to access the public space [Ranade, 2007] on the questions of “why does she *need* to?” because women need a reason to be out unlike men who can just get out and loiter “*Is she safe outside the home?*” because she is assumed to be safe in the home and problems of domestic violence, marital rape, sexual abuse in family, child abuse in family, and many more are just ignored. “What about *her protection?*” “She must be protected by a man because the idea

is women are like small children who always need protection and cannot protect themselves. Unfortunately, these protectors are exclusively males.

“*What will people think?*” Patriarchy rules over women by using notions of ofshame, honor and respect which comes through a woman to the man and his family [Abraham, 2010]. If a woman goes outside the home space for no reasons as such, it is a shame on the male’s family that “**their women**” loiter in public for no reasons [Ranade, 2007]. This further, leads to questions on her character and her loyalty towards the husband. And if she is molested or raped in public space, she becomes “polluted” and a threat to the family’s honor and status. As a result, often such cases go unreported and even if they are reported, the law and police see the women as victims and mostly make the women responsible for her rape and molestation on grounds of her clothes and character [Larcombe, 2002]. And then, the misogynistic attitude which prevails in the society will further pass comments and remarks threatening the honor of the family and spoiling their respect in the society. This made-up threat towards the man’s masculinity and his family’s respect and honor results in violation of the woman’s rights in various heinous forms. Here we see how at first, her basic freedom is curtailed, curtailing her mobility and controlling her sexuality. This is seen in data analysis also.

So, how is pardah related here? It is related as according to the rules of pardah in society, she will cover her face when she is out so that nobody knows who was or is she, maintaining family’s honor and status [Abraham, 2010]. The idea is that a woman’s face may attract the man and tempt him to rape or molest her. So, if the face is covered, there will be no problems.

Pardah does not simply means covering the face, it includes ‘*nazar ka pardah*’ [curtains on eyes] [Abraham, 2010], where woman is not supposed to see anything which will bring threat to the man’s and his family’s honor. The idea here is, her face must be covered so that nobody looks at her with an evil eye and she does not look at some other male which is an act of being disloyal towards the husband. There is ‘*aawaz ka pardah*’ [curtains on voice] [Abraham, 2010], where she must not

speak anything which will disturb the family's peace and harmony. This takes away her freedom of speech and expression from her. Therefore, we see how the cycle of controlling her mobility, freedom and sexuality continues. This is further explained in data analysis.

The basic reason for why it is still practiced remains Modesty [*Sharm, laaj, haya*], respect and honor for both Hindus and Muslims [**Abraham, 2010**]. However, veiling practices differ. Here we see how gender, class, caste and family background also contributes further to more strict or lenient veiling practices only for women. The public and private dichotomy shows how a woman can be dominant only in private space where no one knows that the man is not dominant over her whereas, for women in public spaces, she has to wear *ghunghat* as a symbol of respect and honor towards the elders and also towards the husband. She has to follow his orders and commands. Higher is the class and caste of a woman, stricter are rules of veiling. Employment and Independence of a woman results in lenient veiling or no veiling practice. This relates a lot with my research work. This study is also studied in rural context like mine.

Therefore, we see how veiling is a common practice. But still, people often conceptualize veiling as Islamic veiling whereby women are forced to veil which is not true. Literature shows how for many women, veiling is a symbol of religious identity. Data collection and analysis shows how Hindus also glorify *ghunghat* on the name of modesty, respect and honor.

**Williams and Vashi [2013]** focus on the different perspectives of Second-generation young Muslim women's ideas related to veiling practices. It also focuses on the reasons and beliefs of these women associated to veiling. The whole context revolves around identity. Veiling is used to preserve identity and also forced upon to hide or suppress individual or group identity. For instance, American Muslims/Muslim Americans. Also, it explains how veiling is a general term whereas wearing of *hijab* differs from wearing of *nakab*, etc. This study was done on American Muslim Women and it is seen that in a nation where Islam is considered to be a minority religion, women use veiling as a form of religious identity over national identity. This

argument is used in Indian context also. But in places where the religion is not minority, it is seen that a sense of self identity emerges more strongly over religious identity. However, this cannot be generalized as identity cannot be of the same importance to all, or, everyone may not have the choice and freedom to reveal their identities. This is further explained in data analysis.

Quran has used “hijab” differently [curtain between Prophet and his wife] from what it has become today [Williams and Vashi, 2013]. Thus, we see how patriarchy uses religion and religious practices as their main basis of argument to promote veiling. The work focuses on many perspectives including historical, theological, social, etc. It also highlights the fact that most of the women perceive religion is creating free spaces for women which I feel may be true as the educated religious women read Quran and are able to understand religion in a better way, analyze the existing patriarchal modes of control and implement it according to their convenience. Thus, religion gives them an opportunity to question misogyny.

Veiling affects self-concept and self-esteem [Mule and Barthel, 2013] where on one hand, few women felt that hijab is a threat to their self-concept as they did not believe in the importance of religious identity whereas some women felt that hijab empowers their self-esteem. Self-esteem gets empowered due to society’s stereotypes where women in hijab are perceived to be good and attractive. This is further explained in data collection and analysis where due to wearing ghunghat since a long time and confirming to the demands of patriarchy, some women now find it difficult to talk to other people or raise voice against injustice. They do not feel confident enough and feel a very low sense of self-worth. Thus, it is seen how for some, veiling is a symbol of identity and for some, symbol of loss of identity.

**“Ghoonghat is Haryana’s Pehchaan” [Indian Express, 2017]**, Haryana state’s Chief minister supported ghunghat as “the identity of the state” which of course led to controversies but shows that even today, forms of social control for women like ghunghat is glorified.

It is seen from literature review that both Hindu and Islamic veiling practices differ to a large extent. Islamic women associate veiling with religion whereas Hindu women associate it to culture and traditions. However, veiling for status, respect, modesty, shame and honor is a part of both the religions.

It must be noted that the study does not aim to criticize people who veil in any form. It criticizes the patriarchal, misogynist, functionalist, right winged ideology under which the existence of veiling is rationalized justified, and even professed.

## **METHODOLOGY**

The study employs qualitative method focusing primary data. Qualitative method of research is one where the researcher is interested in knowing what the participant wants to say and not how many participants say something. In qualitative research, respondents are seen as participants of the study and not mere respondents whose information is extracted. Here, both the researcher and participant are of same importance and the study becomes a medium for the participant to express herself or himself. The researcher shares a close bond with the participant as they engage with each other for a long time as compared to quantitative studies. Primary data is first-hand information gathered through different techniques of data collection.

All these characteristics of qualitative method were needed for my research work as I was interested in studying the perceptions related to ghunghat which I had been observing in my villages every summer vacation since a child. Most of the respondents knew me well whereas some were just acquaintances. Some women were really happy to talk to me about ghunghat as it was a time for them to express themselves which they could not otherwise due to social restrictions.

The topic required me to employ qualitative techniques like observation, interviews with both men and women and focused group discussions. I had been observing the female participants wearing ghunghat whenever I go to my village for summer vacations. Curiosity to know the reason

behind it always existed and when questioned to my mother, she would usually say that

*“It is a form of respect towards in laws and family. I do it and you will also need to do it once you get married... So don't bother much.”*

I think at that age, I could not go deeper but today after learning feminism in sociology and being exposed to lot of things around, teaching me patriarchy, human rights violations, control over women, etc. and an opportunity like this where I can do research on any topic of my interest, I got a chance to study it more deeply and to analyze it the way it is. I did one on one interviews with my respondents and in cases where I felt they aren't working, I used focused group discussions and with their permission, noted the points. My data collection process was for about two months. Each interview lasted for about 40 minutes. Group discussions lasted for about 45 minutes.

My mother was the first woman whom I saw wearing ghunghat when my elder uncle would come home in Mumbai. So, while studying on ghunghat, I interviewed her and other family members of my own house. My interest was to study ghunghat from the perceptions of both females and males and I wondered if there were really caste and class differences regarding ghunghat as depicted in the literature that I read. I also interviewed the other classes and castes of the village.

I first did a pilot study to familiarize myself with the research environment and then formulated the interview schedule. The schedule included all open-ended questions. Hindi language is used in schedule as the respondents would understand Hindi better and were comfortable with Hindi. The questions in the schedule covered five broad aspects, Reasons and Perceptions for wearing or not wearing ghunghat, Problems and benefits of ghunghat, Rules of ghunghat with regards to spatial differences and Socio – Economic profile of respondents. Simple Random Sampling method was used to identify respondents within the community.

A detailed explanation on the study explaining its objectives and rationale was given to all the respondents. Each respondent was assured



of anonymity. Most interviews were conducted in their homes according to their consent. All the respondents gave consent for written notes to be taken which was transcript on the same day. The interviews were conducted in an informal atmosphere and the respondents expressed themselves in a free and candid manner. The objective was to spur respondents to talk. In some cases where the respondent did not elaborate on a particular point or seemed hesitant, I made use of prompts and probing questions. An attempt was made to interpret the many clues and underlying meaning that the respondents presented through their behavior and conversation.

### **Data Presentation and Analysis**

As the introduction of the study shows the objective of this research, the collected data can be classified into the following four broad topics: Socio - economic profile of the respondents, Reasons and perceptions for or against ghunghat, Perceptions, problems and perceived benefits of ghunghat, spatial differences.

#### **Socio-economic profile of the respondents**

Khampur village where the research was conducted is an underdeveloped village of Sultanpur district, Uttar Pradesh. The village is dominated by Brahmins whereas non-Brahmins [*kevats, dhobis*] are in the majority. A clear seclusion based on caste is visible in the village. There are houses with low caste but high-class status in the village. However, these houses are not considered to be equal to Brahmins. One Brahmin said, [47/M].

*“So, what if he is a teacher after getting degrees! He cannot be equal to a Brahmin who is born a teacher”*

This shows that the social status of any individual in this village comes from the caste a person is born with.

I interviewed people from 17-47 age group from all castes and class existing in the village. Most of the elder women [around 35-47 years of age] from all castes and class were either illiterate or did not have primary education. Comparatively younger women [around 25-35 years

of age] of upper caste had primary education whereas very few lower caste women from this age group could read and write. And young women [around 17- 25 years of age] from upper caste had received secondary education and few women had also done BA in sociology with correspondence whereas the lower caste women had received primary education and some had received secondary education.

Elder men [around 35-47 years of age] from upper caste and class had received primary education, few Brahmin men were graduates in Sanskrit language whereas the men from lower caste and class of this age group could read and write. Comparatively younger men [around 25-35 years of age] from upper caste and class had received secondary education along with some men being graduates from sciences whereas men from lower caste and class had primary qualifications and few who had lower caste but upper class, had secondary education. And young men [Around 17-25 years of age] from upper caste and class were graduates from science and those from lower castes and upper class had secondary education.

This shows gender, caste and class-based differences with regards to access to education [Abraham, 2010]. Similar finding is also seen in Abraham's work where Rajasthani women are also comparatively less educated to the men due to discrimination faced on the basis of gender, caste and class.

Feminists emphasize economic independency of women [Marshall, 2005]. The female respondents are all economically dependent on their husbands and families whereas most of the men from both lower and upper caste are bread earners. The ones who still do not earn are unmarried. Agriculture is the main occupation of all but some men from lower caste but upper class have left farming and own small grocery shops. One man from lower caste [30 years] is a teacher in government school. These families are economically more powerful than others and thus enjoy a high-class status.

It was seen that the male teacher from lower caste did not support *ghunghat* arguing it to be an age-old custom and one upper caste young

boy [20 years] who studies in Mumbai but spends vacations in this village like me, did not support ghunghat arguing it to be a form of gender-based discrimination. This proves that age and education decide people's views on issues of head covering [Killian, 2003]. Here, I have also shown the generational gap as to how the views are different according to age and education even if both of the respondents oppose ghunghat. This can be an addition to the topic of veiling. Some educated women from upper caste opposed ghunghat [Killian,2003] and most of the lower caste women opposed ghunghat as it was a hurdle to their daily lives [Abraham,2010].

### **Reasons and perceptions for or against ghunghat**

When the respondents were asked about their perceptions and reasons as to why do they do ghunghat? The following were the main reasons:

Ghunghat for “*Sanskaars*” [Rites and Traditions]

Women are used as cultural emblem by the nation [Chaudhuri, 1999] is related to the study as women do ghunghat in Sultanpur since ages. My interviews with them showed that nowhere was this traditional system questioned by anyone and hence, still continue. It was noted that “*Sanskars*” for ghunghat was a reason used by upper caste men and women and also by some lower caste men who supported ghunghat. One Brahmin priest said, [47/M]

*“This ancient Indian practice is our traditional rite.”*

A Brahmin [47/F] said,

*“Wearing ghunghat in front of the father-in-law, elder brother-in-law and all other outsider males is a symbol of a women's modesty”.*

For the lower castes, it is a matter of survival and not status [Abraham, 2010]. This is connected to the work done in my paper as for the lower caste women, *sanskars* were not the reason for ghunghat and they would laugh at it.

*“Religious women are headed by religious men instilling patriarchal notions of religion” [Marshall,2005].*

This statement brings out how patriarchy is carried by women also. It holds true in context to my research work as it is seen that **ghunghat is a part of women’s socialization** also. In the interviews, there were women who lived in urban areas for their education since they were a child but, were married to boys from rural areas. These women are now living in villages. These women were well educated, did not believe in “*sanskars*” which integrated ghunghat and also did not believe in the need for association. But still they did ghunghat because they said, *“My mother has always socialized me in this manner. Even if I do not want to, I have to. There are no choices available.”*

A lower caste [20/F] said,

*“Even if the mother-in-law does not say you to do ghunghat, your mother will for sure teach you to do ghunghat in marital homes.”*

A Brahmin [23/F] said,

*“I do ghunghat because my mother had strictly told me to do so in marital home.”*

Ghunghat is invariably a part of women’s socialization done by mother because she went through it. The society marks status and respect to any family based on the forms of control being placed on women. Therefore, it is seen how ghunghat has continued since ages in India on the name of Shame and Honor residing in women as seen in the literature review [TOI, 2007].

Upper caste and class women practiced ghunghat more comparative to lower caste and class women. Women from low caste but high- c l a s s families were forced to follow strict rules of ghunghat like the Brahmins. Some quotations of respondents showing their perceptions are:

*“Ghunghat is our tradition, custom and ritual. Therefore, I wear ghunghat.” [ Brahmin W/36]*

*“Everybody does. So do I.” [Kevat W/ 20]*

*“My mother and mother-in-law constantly tell me to do ghunghat so I do ghunghat.”* [Dhobi W/19]

*“I am a bride of this house; I must do it.”* [Brahmin W/40]

*“I do not wear ghunghat because then, I cannot see anything and I stumble and hurt myself.”* [Kevat W/43]

*“I have left my husband and I live in my natal place with my children. So, in my natal place, I do not wear ghunghat but at times when I go to Brahmin families to ask for work, I cover my head in front of males.”* [Dhobi W/47]

The above statement shows how being a “low caste” woman, who usually does not wear ghunghat, wears it when she goes to a Brahmin. The idea here may be to showcase similarity for being hired to work. This shows that ghunghat is also a result of the need for association.

*“I do not do ghunghat because there is no use of doing so for the sake of it when the whole village has seen me being beaten up naked!”* [Kevat W/39]

The above statement was said by a survivor of domestic violence. One more case of domestic violence being associated exclusively to ghunghat is seen among the low castes. This shows that though lifestyles of women in low caste homes provide them some leniency with ghunghat, men from low castes are not less patriarchal or misogynistic in nature. In fact, cases of domestic violence are seen more here.

*“I do not veil because both me and my husband don't like this practice where woman has no identity.”* [Dhobi W/28]<sup>2</sup>. It is seen that way of life and personal experiences also determine veiling practices. [TOI, 2007].

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<sup>2</sup>Note: The numbers and alphabets in brackets show age and gender of the respondents.

### **Ghunghat for association**

The majoritarian view also affects ghunghat [Abraham, 2010]. This is seen in my study as people who explained *sanskars* to be a reason for practicing ghunghat, also had another reason supporting ghunghat which is said by almost every second female respondent,

*“Because everybody does, so do I.”*

This was the reason from lower caste women also. A few upper caste young women also supported this as the reason more than *sanskars*. A Brahmin woman [30] said,

*“Sanskars do not matter. It is because everybody does, even I need to do it”*

A non-brahmin [25/F] said,

*“[Laughing] Ghunghat does not makes you modest. It is because everybody does and so we have to do so.”*

Therefore, it was seen that the lower caste women who did ghunghat, specified that we do ghunghat but not for *sanskars* but because everybody does. I feel this done for associations in society so that one is not considered as an outsider or outcaste in the society but as an integral part of the Brahmin dominated society. And as a result, in order to achieve social status for the family, women from lowercaste imitate the traditions of upper caste women. This kind of analysis is also brought

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*M=Male and F=Female. The statements of respondents are translated from Awadhi language to English language without changing the meaning of the sentence.*

*Dhobi, Baniya and Kevat - are considered as the lower castes of the village.*

up by Abraham [2010] as discussed earlier that for the lower castes, it is a matter of survival to associate with the upper castes.

Thus, my analysis connects to that of Abraham's work [2010] showing how in both Rajasthan and Uttar Pradesh, forms of controlling women through ghunghat is a common practice done by the upper castes to preserve their honor which lies in their women's modesty and loyalty. This is also imitated by other castes to increase their status and respect in society.

Also, it is interesting to know that the upper castes, who depict the most amount of modern and western material culture, are actually the perpetrators of orthodox and oppressive thinking against rights of women. Whereas the lower castes are more practical in their approach and their leniency towards ghunghat comes from the practical problems like it causing hindrance to daily work [Abraham, 2005].

This shows how the society respects women from one group whereas humiliates those of low caste groups [Abraham, 2010].

### **Ghunghat and spatial differences**

Seclusion is also a major factor to be noted. Veiling implies not just covering body but also covering eyes and voice – "*Ankhon ka pardah*" and "*Aawaz ka pardah*." Veiling is a masquerade which violates a woman's rights and choices [Abraham, 2010]. This is evident in my study also as ghunghat is affected by the space in which it has to be practiced; it changes with change in space.

At first, I saw **the rural urban divide** whereby both men and women of all castes agreed that ghunghat is practiced more in rural areas compared to urban areas. People believed that in urban areas there is actually no ghunghat but in rural areas, ghunghat is a must. If a woman does not do ghunghat in rural areas, she is considered to be a deviant and character less. These women's husbands are given low status in the society.

People associate shame with rural places and for the urban places, they assume that cities follow a shameless culture. A young Brahmin [17/M] said,

*“Women will do fashion in cities or ghunghat!”*

Another Brahmin [17/F] said,

*“It is nice in cities; only here in villages all this happens.”*

Urban women who would come to the villages during vacations said that, *“We wear ghunghat more in rural areas and in urban areas, we wear ghunghat only if our in laws arrive.”*

The relationship between shame and urban spaces as assumed by men in rural areas is cited below. This shows of how patriarchal and misogynist thinking related to women prevails in Indian societies.

According to men in focused group discussion,

*“Ghunghat hardly remains. Earlier it will cover the whole face but over a period of time, it is limited to the forehead. After few years it becomes difficult to recognize who is your daughter and who is your daughter in law. Today, Indian culture is under threat. In villages, still women are in limits as compared to the women in urban areas. In urban areas what are they going to be ashamed of? Nothing, everything is considered to be alright under the name of being new and modern. In urban areas, women are more educated and we see how these so-called educated women do not respect the Indian traditions and imitate American style of living. How many female politicians do ghunghat? None! Because the more educated a woman is, the more modern she goes on becoming and once she starts earning, she does not listen to us. In villages, the whole family lives whereas in urban areas, mostly nuclear families live where there is no one to whom ghunghat will be worn.”*

Deep rooted misogyny prevails in villages with regards to women in urban spheres. Another dialogue between men was as follows:

*“Urban women want to show their bodies and this is what rural women are learning from them. They also go to cities and learn all this and then practice it here in front of us. This is taking away the rural culture from us and it is shameful”*



Secondly, **differences** were seen **in women's natal home and marital home [Sasural and Mayka]**. As studied in the literature review about curtains on eyes and voice [Abraham, 2005], it was studied that women in sasural must not speak directly to her father-in-law, elder brother-in-law and other male members outside the family. This shows that she can hold no stand as she cannot speak loudly, look into eyes of other person, not even mother-in-law or older sister-in-law [Abraham, 2010]. This is directly connected to my study where all these points appeared in people's perceptions regarding ghunghat. In Abraham's work [2010], veiling is looked with spatial perspectives stating how for a woman, her *sasural* is beyond her *sasural's mohalla* as there are fictive kins in neighboring *mohallas*. This holds true for my study also as the female respondents of upper caste answered saying,

*"Once we are out of the marital village, we do not bother about ghunghat as we are now going to our mayka but, even in our mayka, we wear ghunghat if in laws arrive."*

Another upper caste woman [30] said,

*"Father-in-law, brother-in-law, customs and traditions do not change if we go to natal place; ghunghat remains."*

However, lower castes do not practice such rigid regimes. One respondent [29/F] said,

*"I wear ghunghat in front of the sasural because I am a bahu here, why will I veil him in my natal home where I am a daughter?"*

Age does not necessarily blunt the relationship of a woman with her marital village [Abraham, 2010]. This is exclusive to upper caste women and not to lower castes. It was studied that upper caste women irrespective of their ages, wear ghunghat in marital homes following a strict regime. The lower caste women usually did ghunghat when they were newly married and as they grew older, ghunghat did not matter but in case of lower caste but upper-class families, rules of ghunghat are strictly followed by Brahmanical ideology.

Thus, it was studied that according to traditions and cultures of the village, ghunghat is done in *Sasural* and not in the *mayka*. However, presence of in laws inmayka brings the practice of ghunghat in mayka also.

Upper caste and higher-class men along with some higher-class low caste men, glorified acts of ghunghat in mayka stating them as

*“These women are Modest and worthy of respect.”*

According to some young upper caste and lower caste women in group discussions,

*“Sasural is a place where we are constrained and subordinated. When we were new bahu, we felt suffocation under ghunghat but now, we are used to it. Bahu does not have power in sasural in front of her sassur [father-in-law] and saas [mother-in-law] No matter how much people fake, daughter in law is never treated as a daughter.”*

**Differences between veiling practices and public / private spaces** exists [Abraham, 2010]. My study shows how this dichotomy is different for different women based on caste and class. I asked my respondents if ghunghat was practiced even outside their homes and it was noted that restrictions remained outside the home for upper caste women. The lower castes had no restrictions as such in the public space. The idea here which is always seen in a cyclical pattern is that ghunghat marks your status. Because the upper castes enjoy more status, they have more restrictions on ghunghat. As discussed earlier, low caste but high-class men desire the same respect and status as an upper caste gets. This they feel this is possible through economic power and through their wives. As a result, they have left farming and engaged in small, self-owned businesses and have placed strict rules of ghunghat on women. A lower caste [32/M] says,

*“As ghunghat in house gives respect, ghunghat outside the house will also give more respect.”*

However, my study shows that controlling women’s sexuality at the hands of men for his status and respect is not accepted by many lower

caste women. The greed for status and honor puts a lot of restrictions on the lower caste women as seen from the above statement. Contradicting and opposing this ideology, a low caste and class woman [27] says,

*“No. I do not wear ghunghat in public spaces or in the absence of my father-in-law because, when I am supposed to wear ghunghat as a form of respect to him and my elder brother-in-law who are not in front of me, why should I then wear ghunghat in front of other women’s father in laws and brothers in law.”*

As shown in the literature review, women’s mobility is controlled through veiling practices [Marshall, 2005] as patriarchal and misogynist ideology dominates the society. In group discussions, Brahmin men said,

*“Women must do ghunghat even outside the house in public spaces as you never know; there can be some relative there.”*

Opposing this a few low caste and class men said,

*“In public spaces, why will she wear ghunghat? It is her choice there.”*

Not a single woman from lower caste wears ghunghat in public space whereas among upper caste females, most of them did. A few from upper castes who did not wear ghunghat in public spaces were given the freedom to make a choice about this by their husbands as the father-in-law was no more alive and since they were in their 40’s, for them it was “OK” to not to wear ghunghat in public spaces.

Two young boys, one from high caste and another from low caste [around 25 years] said,

*“Women, who cannot show their bodies in private spaces, show their bodies in public spaces and walk in such a way that we feel ashamed.”*

### **Ghunghat: Perceptions, Problems and perceived benefits changing with age.**

Society hinders the spaces of women socially, culturally and also in terms of power [Abraham, 2010]. This is evident in my study also as while interviewing I noted that even though women continued ghunghat,

they had a lot of problems with it. These problems were different based on caste and class. Very few men acknowledge these problems faced by women whereas the others did not even feel that women have any problems due to ghunghat. The various problems included stumbling and falling down as a result, hurting themselves, suffocation during summer especially when they had to cook in front of the *choolah*, loss of identity and self-confidence, no freedom of speech and expression, control on mobility and sexuality. A Brahmin educated women [24 years] said,

*“First of all, face always needs be covered and top of its suffocation and shame are even more problematic.”*

A typical male response from the teacher who opposed ghunghat said,

*“How can ghunghat be problematic to women? In fact, it benefits them.”*

This shows the attitude of a low caste man who is oppressed by upper caste men and thus opposes ghunghat which is an upper caste phenomenon stating it as “*an age-old custom*” but does not feel that ghunghat can lead to problems. He himself, being a man, behaves in a very patriarchal and misogynistic way at home. When I interviewed his wife, she [30/F] said,

*“He is a teacher and a man who is head of the family. He is proud of himself and wants that pride to be nurtured by me. As far as ghunghat is concerned, I do ghunghat since I am in this house and I have no choice. He never expressed ever that he opposes ghunghat.”*

This shows that may be the teacher would have opposed ghunghat verbally but deep down, he enjoyed male privileges and status, respect coming from his wife’s ghunghat. As a result, he never told his wife to not to do ghunghat.

One case of **domestic violence** was also seen among the interviews. This was seen in a low caste but high-class family where the husband beats up his wife if she does not follow his orders. Wearing ghunghat is one of those orders given by him to his wife. He [35] says,

*“If she wears ghunghat, not only her own respect will increase, but also mine and my family’s respect will increase in society.”*

This shows how class mobility puts more restrictions on women in society [Abraham, 2010].

However, there were age differences whereby the elder women did not find any problems with ghunghat but found benefits in this practice. Ghunghat for them has become a habit. Since their minds are ruled by patriarchal ideologies, they don’t understand the fact that hesitance to talk to others outside their comfort zone is actually a result of loss of confidence due to being in continuous control.

While looking at how women negotiate with veiling, it is important to understand how do they use veiling to their advantage [Abraham, 2010]. Upper caste women have no choice regarding ghunghat but to practice it. Lack of development, feminist perspective and education in society makes conditions for women even tougher. However, it is seen that there are some situations where women rationalize ghunghat. In group discussion, they said,

*“I am happy wearing ghunghat as now, I don’t need to talk to any stranger and also nobody is watching our faces so we can laugh and giggle whenever we feel like without fearing of what will people think. Also, we can eat and sleep under the ghunghat.”*

Respondent’s perceptions revolved around ghunghat being a marker of women’s status and indirectly, the status of the whole family [Abraham, 2010]. As discussed earlier, men and women of upper caste as compared to the men and women of lower castes, perceived a woman who does ghunghat to be more worthy of respect than those who do not do ghunghat. Deep patriarchy and misogyny are seen from their perceptions. E.g., The man who was an oppressor of his wife’s rights said,

*“I will respect women if she is worth it.”*

Another similar kind of regressive ideology can be seen in women too. A woman [32] said,

*“Respect of a woman lies in the hands of her own. Therefore, she must keep herself covered.”*

The young upper caste boy who lives and studies in Mumbai said,

*“Ghunghat takes away identity from women. Face is your identity. Faces are hidden by those who commit crimes.”*

Another example of perceived benefits of ghunghat is seen in this statement:

*“Here, marriage happens the whole night. My husband was awake whereas I took small naps in between.” [28/F/Brahmin].*

In group discussions when the respondents were asked about how do they negotiate these problems? Lower caste women said,

*“Ghunghat has made us very shameful and lowered our self-esteem. We cannot talk properly to strangers or male members. To solve problems of ghunghat, you need to go and remain in your room. These cannot be changed. They will remain as they are.”*

On the same question, Brahmin man [25] said,

*“There are not so many problems that they need to be faced!”*

One man [35/ Baniya] admitted that,

*“I beat my wife black and blue if she does not follow my orders. I force her to wear ghunghat because I know how she is.”*

This statement points out how masculinity is under threat if a woman does not wear ghunghat. Ghunghat in this context is evidently a mechanism to control women. However, counter argument was made by a man [36/dhobi]. He said,

*“If she is my wife and I can only suggest her, not force her. And I do not even suggest her to veil because I do not like all this, I like to see her face.”*

In observation method, it was found that due to his daily life experiences in his family, the man had developed a different perspective from that

of all other men of his caste and his wife [33/dhobi] was really happy about it saying,

*“I love him for this! Since I have to go on farms to work and look after the house, it is not always possible for me to do ghunghat. He never told me to wear ghunghat.”*

This shows how personal life experiences also affect ghunghat. Hearing at his argument, some upper caste men said,

*“We never told our wives to wear ghunghat, they do it by themselves and it is good to see them doing so.”*

When asked to women, apart from the ones who did not wear ghunghat, most of the young daughter in laws of high-class families said,

*“Our mothers in law keep telling us continuously to wear ghunghat in front of others and our mothers also keep telling the same thing as the mother-in-law calls up complaining our mothers that we don't wear ghunghat. So, even if we don't want, we have to wear it.”*

This shows how age plays a role in controlling women in patriarchal setup where the mothers in law want to enjoy the privileges of patriarchal system by enforcing control mechanisms on their daughters in law.

Few low caste men and one upper caste boy along with many low caste women and some young upper caste women expressed ghunghat should stop whereas majority of men of all castes and elder women of upper castes expressed ghunghat should continue.

Therefore, we see how people perceive ghunghat as a symbol of respect and honor. Ghunghat shows respect. A daughter in law who shows respect to her father-in-law and elder brother-in-law are considered to be modest and loyal women. Having such women in family is therefore something to be proud of. The *izzat* [honor] of the family resides in its women. This honor must not be threatened as honor is the result of continuous efforts and hard work in life. Lack of effective education and presence of extreme patriarchy and misogyny in society gives rise to such mindsets. And as Marshall [2005] says,

*“Religious women are headed by religious men instilling in them patriarchal notions of religion.”*

Similarly, in this study it is studied that Patriarchal women are headed by patriarchal men instilling in them patriarchal notions of Modesty, Shame, Honor and Respect.

Women face more problems than benefits of ghunghat. As Chaudhuri [1999] says, *“Women are used as cultural emblems of the society”*

In this study it is studied that ghunghat acts as an oppressor of women’s basic Human rights, controlling her freedom of speech and expression, mobility and sexuality in order to ensure her loyalty towards the husband.

## **CONCLUSION**

Abraham [2005] notes that, “Ghunghat is a masquerade that violates women’s rights.” It is a strong social symbol of modesty, shame, respect and honor in society. This ideology is followed by both men and women especially from upper caste. Age and education are basic factors influencing ghunghat. The elder a woman is, the less threatening she is perceived by men and the lower is the education of a woman, the more vulnerable to oppression and violence she is. I argue that this kind of deep and extreme patriarchy, misogyny and functionalism is harmful for women development and future generations. Due to different lifestyles and seclusion based on caste, class and gender, it is studied that low caste women have some space to follow individual autonomy as compared to upper caste women. High caste and upward mobility in class results in more strict forms of restrictions on ghunghat [Abraham,2010] and on women. For upper castes, ghunghat is for sanskars and morals whereas for lower castes, ghunghat is for need of association and a tool for upward class mobility. This does not mean that lower caste men in any way are less patriarchal or misogynistic than the upper castes. In fact, forms of oppression and domestic violence are seen more amongst them. Upper caste women find ways to rationalize ghunghat. The number of people opposing ghunghat is less in villages. Most of the men especially upper caste expressed their view as ghunghat should still continue whereas most of the women especially young women expressed their



view as ghunghat should now stop. Gender awareness and gender sensitivity among people does not exist. However, change is happening at a very gradual and subtle speed being initiated by the young educated generation and there is a scope for betterment in such communities.

## **LIMITATIONS**

I was collecting my data in an underdeveloped village called khampur which was 35km away from the main city Sultanpur which is a district in Uttar Pradesh. I go here every summer vacation since my childhood. People here [my respondents] were being interviewed for the first time in their lives and it seemed as though this made them feel weird. They thought I am crazy to note down whatever they were saying and as a result, did not answer my questions with any seriousness or interest. This happened for the first few interviews.

When I first tried to interview a low caste woman, who worked as a sweeper in the house, it became a big chaos. As my house belonged to high caste and class people whose culture was marked by caste and class divide which needs to be maintained. And I being a girl was seen as a threat that was disturbing the division and was crossing my “limits”.

Next was while interviewing some lower caste adult men who stated themselves too superior to even be a part of this research which focused on ghunghat. For them, ghunghat is a feminine subject and thus males should not be asked about such things. These men earned comparatively more than other men of the same caste as they were not farmers. However, number of such men was not very high. The due to economic superiority, enjoyed comparatively high status.

My gender, caste and class of being an urban Brahmin girl affected attitudes of my respondents. Men in general found it uncomfortable to talk to me whereas some upper caste women and some lower caste and class women gave “Socially desirable responses.” They had fear of speaking against ghunghat and upper castes as this could result in negative consequences for them.

In some homes, presence of male members in the room while interviewing newly married women affected interviews negatively as women would then not speak anything.

## **RECOMMENDATIONS**

From conclusion, it is studied that ghunghat acts as a barrier for women development and it is also noted that people are not aware of gender awareness and gender sensitivity. People don't have basic education. Majority of the women lack access to education and are dependent on the males for daily necessity. Women are not aware of their rights. As a result, I feel effective education for all can really bring change. Also, some recommendations according to me are as follows:

At national and state level, the government should see to it that education to all is provided in an effective manner.

Education system must introduce and include feminist ideologies and feminist studies for all.

Proper trained teachers are needed in schools for unbiased teaching.

Government should understand that ghunghat is actually a barrier which the nation needs to overcome at grass root level.

Gender studies should be a part of school curriculum from basic level. Text books need to be regulated with gender friendly chapters.

At community level, regular gender sessions should be held where children will attend those sessions with their parents.

Initiatives working in favor of economic empowerment for women should start soon in communities itself like. E.g., *Mahila Bachat Gadh* where women learn to make different things like jewelry, incense sticks (agarbatti), perfumes, candles, door mats, etc. and their handmade articles are sold at good prices in market.

Women should be a part of Panchayat and gram Sabha where efforts are made at grass root level to discard regressive policies and thinking in villages.

Future studies can be made to understand religious differences within the pardah system of the same village.

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