

# Research Journal

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

**RESEARCH DEVELOPMENT CELL**



Estd. 1932

**WOMEN'S EDUCATION SOCIETY'S  
LADY AMRITBAI DAGA COLLEGE FOR WOMEN OF ARTS, COMMERCE &  
SCIENCE AND SMT. RATNADEVI PUROHIT COLLEGE OF HOME SCIENCE &  
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**(A Peer-reviewed Journal)**

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## Editorial

Welcome to the new edition of Research Journal, volume 14. This academic research journal is a forum for exchanging knowledge from wide fields, ranging from the very core of human development to technical related fields like applied electronic, interwoven with the subject areas of cosmetic technology, biotechnology, hotel management. It also comprises a paper under interdisciplinary section. It comprises of experimental, conceptual and theoretical inputs from the authors. This journal is an amalgamation of seminal point of view from the research scholars, which will aid in further development in these areas from the professional and education point of view.

This edition includes research papers on the very important human aspect 'stress and resilience'. One of the work published is related to the teaching professionals from various disciplines, who work under stress and are most susceptible to mental illness. On the same lines there is another scholarly contribution on the satisfaction and resilience with reference to gender. These studies are very significant in today's stress full life. Inclusive government policies, take care of the diversified population is the need for the sustainable progress of a nation. Keeping this guide point, a scholarly work on finding the suitable jobs for specially abled employee in hotel and hospitality sector is a part of this issue. The another research paper from the hospitality sector deals with the fusion of traditional Maharashtrian food, so that they are accepted by the guest and the hoteliers both and can be popularized across the wide sections of the guest. The research papers from biotechnology dwells into the indicators in fruit juices responsible for causing food borne diseases, even death. This study is valuable as consumption of fruit juices is regarded as the most preferred beverages across globe. Another paper from the biotechnology observes the storage qualities of guava and strawberry jelly without adding preservatives. The wide scope of this issue can be gauged by the interdisciplinary section paper on Agri-Tourism, projecting this phenomenon of tourism as an economic development activity for our agriculture sector. Safe and secure communication in dealt in the technical paper, from Applied electronics on Steganography for secure communication. The review papers are from the cosmetics subject from the field of Nano cosmeceuticals. This article over views on the Nano materials used in the cosmetics from the safety issue. The second review article of this edition is from the same area of cosmetics, which focuses on the cutaneous chronobiology, giving insights into the needs of skins requirement as per the biological chronology.

Hope this edition adds up to your valuable academic readings.

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Vol. 14, No. (2), 2018  
Research Journal

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# Research Journal

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# **Agri-Tourism : An Innovative Way towards Economic Development of Rural India**

**I. Pawar**

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## **Abstract**

India is known as “Land of villages”. 65% of people lives in rural area and only 35% people lives in urban area. Rural areas are undeveloped as compared to urban areas. Majority of rural India is engaged into agricultural occupation. But farmers did not get enough benefits from agricultural sector. This is the reason people from rural area migrating towards urban area in search of jobs, income source etc. Because of this urban areas becoming more overburden. Hence disparities are instigated between this to areas. To avoid this chaos, there is need to rejuvenate rural areas of nation. This has led many planners to think spatial and economic development in a balanced way.

As we know, Tourism is now well recognized as an engine of growth in the various economies in the world. Promotion of tourism would bring many direct and indirect benefits to the people.

Agri tourism is the most apt key to uplift rural areas as most of the people engaged in agricultural activities. This innovative concept of Agri-Tourism emerged in recent years to complement agriculture sector. Agri-Tourism has a great capacity to create additional source of income and employment opportunities to the farmers.

This paper focuses on agro tourism in India and how agro tourism can help in the economic development of rural society.

**Key words :** Rural areas, Agri-tourism, Economic development, Rural development.

## **Rationale of the Study**

Development and disparities are interlinked. No part of the world exists without this phenomenon. India is also not exception to this. In India there are disparities between urban and rural areas. Rural areas are undeveloped as compared to urban areas. This has led many planners to think spatial, economic development in a balanced way.

India is known as “Land of villages”. Majority of people i.e. 65% of people lives in rural area and only 35% people lives in urban area. Most of rural India is engaged into agricultural occupation. Agriculture is not mere business; but is still the “True Culture of India”. But, today it becomes unprofitable due the irregular monsoon, prices fluctuations of Agro-products,



unawareness of technology, government rules and regulations etc. and some internal weaknesses of the agriculture sector. As a result agriculture is dying, not as in the production of food but as a desirable profession. In some states, farmers are embracing the death through suicide due to their disappointing earnings. This situation is enforcing them to settle down in nearby urban localities in search of better income and better livelihood. Because of this urban areas becoming more overburden. To avoid this chaos, there is need to rejuvenate rural areas of nation through promotion of tourism. Where villager will get adequate number of alternative job scope that can possibly reduce the tendency of leaving native villages and in such way socio-economic condition of rural India can also be improved.

Agro tourism is the sustainable way for the development of rural areas where agriculture is supported with tourism. And farmers get more options to explore.

### **Aim**

Rejuvenate rural areas of India through Agri tourism.

### **Research objectives**

1. To scrutinize the significance and need of Agri Tourism in Indian Context.
2. To understand the socio economic contribution of agri tourism.
3. To highlight the scopes.
4. Finding out the Challenges of agri tourism in Indian Context.

5. Make suggestions to maximize benefits

### **Research Methodology**

The paper is based on majorly secondary data derived from various literature sources which includes various research papers, news articles and thesis. Some data has been furnished from the websites of the government of India and Maharashtra, as well as ministry of agriculture.

### **About Tourism**

The World Tourism Organization (W.T.O.) has estimated that tourism is the world's largest service industry and fastest growing industry in terms of revenue generation and also ensures consequential development of infrastructure at the destination. There is hardly any other field of activity where so many people are involved directly or indirectly. Tourism industry also became an instrument for sustainable human development including, job creation, poverty elimination, foreign exchange, enhancing environment, preserving culture and tradition thereby facilitating overall development. Tourism can give quick relief to the areas where there is higher rate of unemployment.

Tourism is travel for culture, historical, religious, study, recreational leisure or business purposes. Today's tourist is not content with cultural or religious tourism only. People look for some thrill, fun, adventure and something other than the routine. With changing times, interests of tourists

have also changed requiring development of newer varied forms of tourism. And hence some new areas of the tourism have been emerged like Agro Tourism.

As India's main occupation is agriculture, it has large scope and great potential to develop agri-tourism in India. Agri tourism has helped to gain sustainable supplementary income to the farmers.

### **Concept of Agri-Tourism**

Worldwide scenario states that, farmers across the globe are recognizing the need and desire to diversify their farm products and services to supplement their agriculture income. Agri tourism is an innovative agricultural activity related to tourism and agriculture both. Agri tourism represents a significant form of strategy that supports the rural communities and enhancing the sustainable rural development.

Pandurang Taware has introduced agri tourism concept in India, He is the father of this concept. The concept of Agri tourism is very simple, whereby the urban tourists go the farmers home; stay like a farmer, engage in a farming activities, experience the bullock cart, tractor ride, Fly kites, eat authentic food, wear traditional cloths, understand the local culture, enjoy the folk songs and dance, buy fresh farm produce and in turns the farmer maintains home and farm hygiene, greets new tourists, sell his farm produce at a better price, earns a livelihood all year around. It is the home away from home

giving a personal feel of harmony with rural culture.

Agri tourism is a sustainable way of tourism which enhances the village environment, village traditions and culture, custom, village arts and handi-crafts.

### **Significance of Agri Tourism**

In the India, urban population is increasing day by day. Today the urban people's world is restricted in the closed door flats, offices, clubs, television, video games, spicy fast food, computer, internet, and so on. The pace of innovations and technology advances is getting faster and faster and is forcing everybody to compete severely to survive and grow in the city area. People from city areas are unhappy to face traffic chaos and pollution but are helpless. They can see nature only on television or screen of the computers. They are far away from nature and natural beauty. More over some people living in the cities do not have relatives in villages and they never visited or stayed in village. These people want to enjoy rural life but there is problem of such type of facilities. If these people get proper facilities of accommodation, bed and breakfast, they can satisfy their desire to learn about agriculture, taste the bucolic cuisine and enjoy rural life at economical prices.

Hence, it is opportunity to the farmers for the development of the agri tourism centres and it serves them and create additional income source.

## **Economic Contribution of Agri Tourism – Case Study of Maharashtra**

This case study was selected because the state of Maharashtra is the pioneer state to develop and promote agri tourism in the country. Agriculture Tourism Development Corporation (ATDC) is incorporated in 2005 to promoting agri tourism in Maharashtra for achieving income, employment and economic stability in rural areas. It helps to boosting a range of activities, services and amenities, provided by farmers and rural people to attract urban tourists.

Maharashtra starts Pilot Project of Agro Tourism by ATDC under the supervision of Mr. Pandurang Taware in 2005, which was successfully done. Then in 2007, ATDC launched Training and skills development programs with Maharashtra state Agri Tourism Vistar Yojana. Where they implemented 328 agri tourism centres across 30 districts in Maharashtra. These centres helped to gain sustainable supplementary income source and generated local employment.

ATDC was conducted survey in 2014, 2015, 2016 which shows that 0.40 million, 0.53 million, 0.7 million tourists have visited agri tourism centres and generating 35.79 million indian rupees to farmers. Also generated jobs for women and youth in the rural communities. Agri tourism has the capacity to create magnificent circumstances for both the farmers as well as the tourists. The farmers benefit by de-

veloping additional source of income and tourist hunger natural environment is satiated.

The World Travel and Tourism council has recognised the efforts made on this front by Mr. Taware and applauded his work. He is also the recipient of Global Responsible Tourism award for his innovative and pioneering agri tourism concept.

Hence Maharashtra's Agri tourism model is a successful model and can be emulated over various states in totality.

### **Scope of Agri-Tourism**

1. **An inexpensive gateway:** The cost of food, accommodation, recreation and travel and tourism is low, widening the scope of tourism.
2. **Curiosity for the urban about farming industry and life style:** Agri-tourism, which involves villages and agriculture, has the capacity to satisfy the curiosity of the urban segment by providing scope for re-discovering the rural life, which is rich in diversity.
3. **Strong family oriented recreational activities:** through rural games, festivals, food, dress.
4. **Finding solace with nature friendly life style:** Peace and tranquility are in-built in Agri-tourism.
5. **Nostalgia for their roots on the farm:** For tourists it is like returning back to their roots.
6. **Educational value of Agri:** Tourism spreading knowledge about Agriculture science where urban

students are moving with the pace of technology.

### **Challenges to the Agri Tourism Industry**

1. Pull more tourists at destination.
2. Lack of awareness among people about the agro-tourism concept.
3. Poor infrastructure facilities like drinking water facilities, electricity, good telecommunication, safety and security, transportation facilities, medical facilities etc.
4. Marketing agro-tourism as a product effectively and consistently.
5. Differentiating Tourism and agro-tourism
6. Weak communication skill of farmers.
7. Lack of commercial approach of the small farmers.
8. Ignorance of the farmers towards new avenues.
9. Danger of over exploitation of natural resources.
10. Insufficient Financial Support from government.
11. Legislation Problem.
12. Due to seasonal condition.
13. Lack of Trained Human Resource.
14. Poor hygiene and basic requirements considering urban visitors.

### **Key Techniques for Success in Agri Tourism**

To boost agri tourism industry in rural area, some recommendations are suggested –

1. Promote publicity and marketing

strategies.

2. Development of infrastructure at destination.
3. Improve accessibility to tourism destination and wayside amenities.
4. Form Development control regulation for this type of activity.
5. Develop family oriented recreational activities at destination.
6. Promote Public private partnership.
7. Promote cultural programmes at destination.
8. Application of Information technology at destination. Develop website and update time to time for attract foreign tourist.
9. Government should create information kiosks at important places of urban areas like airports, railway stations, bus stand, and many other public places.
10. Creating awareness among people through advertisements.
11. Formulate the guidelines for the safety and security of tourists.
12. Carry out Training and capacity building programme for farmers.
13. Maintain hygiene and cleanliness at the destination.
14. Periodical evaluation of government policies and do changes as per local needs.
15. Coordination and monitoring between different departments related to tourism.
16. Formulate strategic planning.
17. Promote Tourism packages. In-

clude agri tourism centres in tourist circuits.

18. Promote Community participation and leadership.
19. Proper Financing Solution from government for tourism enhancement.
20. Understand about the customers' expectations.
21. Maintain the feedback and comments from tourist about the service and suggestions to more development and modification.
22. Location is most the important factor for success in the agro-tourism.
  - The location of the centre must easy to arrive.
  - It should have a good natural background.
  - Centre should be developed near to other form of tourist places so that it can merge into tourist circuit.
  - It should be near to the urban area, in a radius of 150 kms in a rural setup having a travel time of just 2-3 hours.
  - Develop souvenir shops of their local handicrafts, local produced products.

## Conclusions

India has a great potential to develop of agri tourism.

Agri tourism is a kind of sustainable revenue generating activity that ensures inflow of money from urban to the rural economy and side by side it

also prevents the tendency of migration from rural villages to urban cities in search of better livelihood. Such form of tourism motivates rural community to stay in their own land offering them alternative opportunities of earning.

It is an important instrument for development of rural areas.

Poverty alleviation, employment creation, environmental regeneration, basic infrastructure development of remote areas, advancement and empowerment of rural community especially women and youths are a few of many positive impacts of agri tourism.

Preservance of nature and natural resources, active community participation, strategic planning and marketing strategies are also crucial for flourishing of agri tourism in India.

Extension and advisory services could play a major role in strengthening agri-tourism.

Henceforth with the help of agri tourism, entire rural areas will automatically rejuvenate and create bright future for all villagers.

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# Nanocosmeceuticals a Boon to Cosmetic Industry

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## Abstract

Nanotechnology is one of the fastest growing technologies in all the scientific fields. It is the science of manipulating the atoms at the nanometre scale (1nm=10<sup>-9</sup>), creating a new structure based upon the characteristics, properties as well as behaviour of the material. Now-a-days, nanotechnology in cosmetics is rapidly growing as many of the cosmetic products contain nanomaterial in it and therefore these products are called Nano cosmeceuticals. Majorly two main uses of nanotechnology are seen in cosmetic products: a. Use of nanoparticles as UV filters; b. For delivery of actives. The major classes in Nano cosmeceuticals include liposomes, Nano emulsion, Nano crystals, solid lipid nanoparticles which are majorly used. These Nano carriers have good penetration into the skin, good release of active ingredients, with high and good stability. However, toxicity as well as safety issues have also been raised for its dermal application as a possibility of causing health hazards. This overview on Nano cosmeceuticals focuses on the nanomaterial's used in Nano cosmeceuticals, carriers for novel delivery of cosmeceuticals, some aspects of Nano-cosmetics and toxicity of nanoparticles.

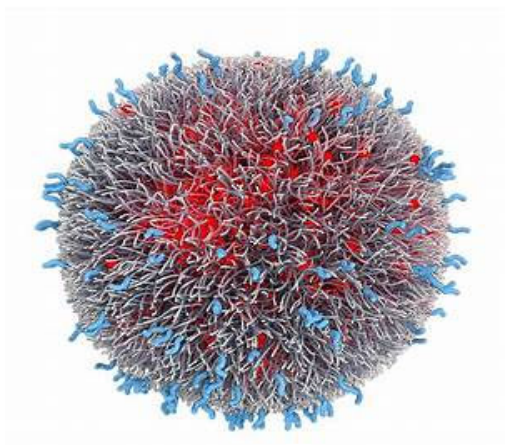
**Key words :** Nano-cosmeceutical, Nanomaterial, Nanotechnology, Toxicity.

## Introduction

Nanotechnology is the science which includes the design, characterization, production and application of structures, devices & systems by controlling shape and size at the nanometre scale ranging from 1 nanometre to 100 nanometre (nm), where (1nm=1billionth of meter). It is rapidly growing science of producing and utilizing Nano-size particles.<sup>[1]</sup> Nanotechnology is skillful technique of manipulating, characterizing, and organizing matter systemically, at the nanometer scale, which has created revo-

lution in many fields. The size of typical accessible structure is in the sub-micrometer range, being within the limit of optical resolution and barely visible with a light of microscope. The scale is about 1/1000 smaller than structure that could be resolved by the naked eye, which is thousands time larger than an atom.<sup>[2]</sup>

The fundamental component of nanotechnology is the nanoparticles. Nanoparticles are particles between 1 and 100nm in size and are made up of carbon, metal, metal oxides or organic matter. The nanoparticles show a



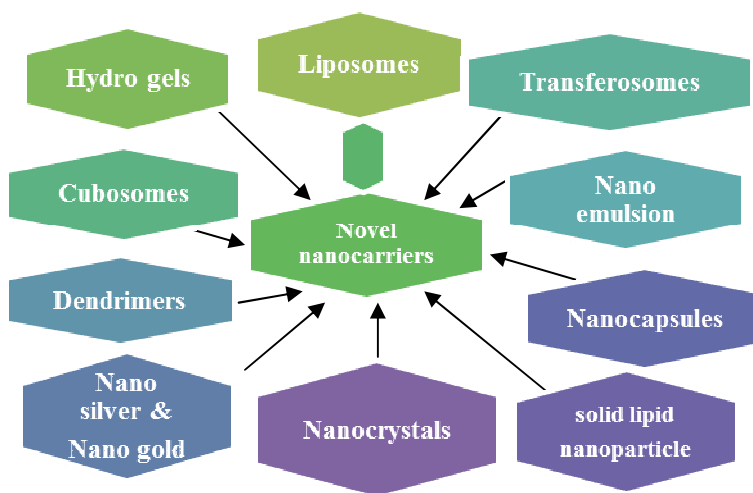
**Fig 1. Structure of Nanoparticle.**<sup>[1]</sup>

unique physical, chemical and biological properties at Nano-scale compared to their respective particles at higher scales. This is because of relatively larger surface area to the volume, increased reactivity or stability in a chemical process, enhanced mechanical strength, etc. These properties of nanoparticles have led to its use various applications. They are of different shape, size and structure which can be spherical, cylindrical, tubular, conical, hollow core, spiral, flat, etc. or irregu-

lar and differ from (1 nm -100 nm) in size.<sup>[4]</sup> The cosmetic industry uses Nano dispersion “encapsulation or carrier systems”, so that agents penetrate into deeper skin layers where they activate skin metabolism with the aim of improving the skin’s appearance. The functions and benefits of these “encapsulation and carrier systems” are:

- The controlled release and optimisation of the availability of cosmetic agents in certain skin layers.
- The protection of sensitive agents.
- Longer shelf life and hence greater product effectiveness.
- A reduction in the amount of agents and additives used in products.

These include: Liposomes, Nano emulsion, Nano crystals, Hydrogels, Dendrimers, Cubosomes, Solid lipid nanoparticles and many more which are widely used in cosmetic industries.<sup>[5]</sup>



**Fig 2. Novel Nano carriers for Cosmeceuticals.**<sup>[6]</sup>



**Table 1. Most Common Types of Nano Materials Used in Cosmeceuticals** <sup>[7, 8]</sup>

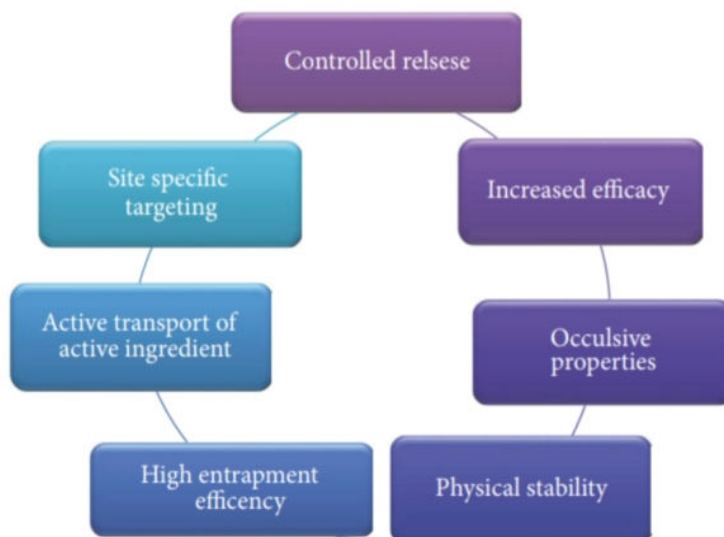
<b>Nano-carriers</b>	<b>Activity</b>
<b>Liposomes</b>	For their enhanced absorption by skin.
<b>Transferosomes</b>	For controlled release and as a carrier for the transport of proteins and peptides.
<b>Nano emulsions</b>	For their ability to prolong shelf life of personal care products.
<b>Nano capsules</b>	For their controlled release.
<b>Solid Lipid Nanoparticles</b>	For their enhanced UV blocking.
<b>Nano crystals</b>	For more effective passage through skin.
<b>Nano silver &amp; Nano gold</b>	For their enhanced anti-bacterial properties.
<b>Dendrimers</b>	For better delivery of active agents.
<b>Cubosomes</b>	For their low cost and potential for controlled release.
<b>Hydrogel</b>	For their prolonged effect on the place of application.

### **Nanoparticles as UV Protective Filters in Sunscreens**

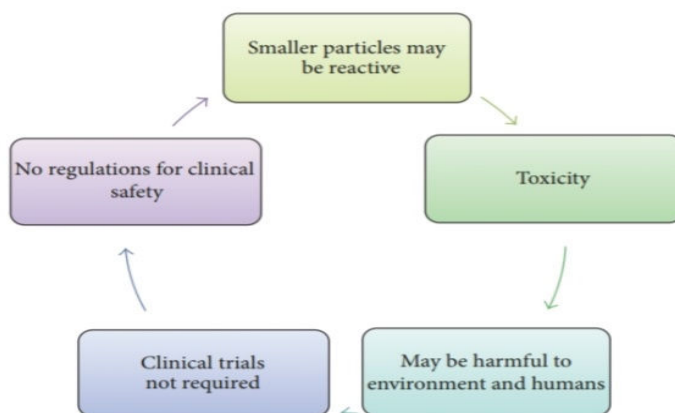
For many years now so-called micro particles of titanium dioxide and zinc oxide have been used in cosmetic products as UV filters. The substances were originally used as traditional white pigments in the micrometre sector. The resulting products however were comparatively thick, sticky pastes which were difficult to administer and were not widely adopted by consumers as they left a whitish film on the skin. By using nanoparticle-sized titanium dioxide and zinc oxide the substances are transparent to the human eye, can be applied more easily on the skin and leave a better skin feeling. In addition, protection against UV radiation has been radically improved as a result of the smaller sized particles. The primary size of the nanoparticles used as UV filters is approximately 40 nm. <sup>[9]</sup>

### **Nano Cosmeceuticals in Cosmetic Products**

Cosmeceuticals are the cosmetic products which incorporate biologically active ingredient having therapeutic benefits on the surface applied. These are utilized as cosmetics as they claim to enhance appearance.<sup>[10]</sup> Cosmeceuticals are chasm between pharmaceuticals and personal care products. These products have measurable therapeutic efficacy on the skin, as drugs and formulations have diversified from skin to body to hair and they are used for the treatment of various conditions like hair damage, wrinkles, photo aging, skin dryness, dark spots, uneven complexion, hyperpigmentation, and so on. Several positive aspects of Nano cosmeceuticals are discussed in Figure no.3.<sup>[10]</sup> As there are some positive aspects there are also some negative aspects of Nano cosmeceuticals they are discussed in Fig 4.<sup>[11]</sup>



**Fig 3. Positive Aspects of Nanocosmeceuticals**



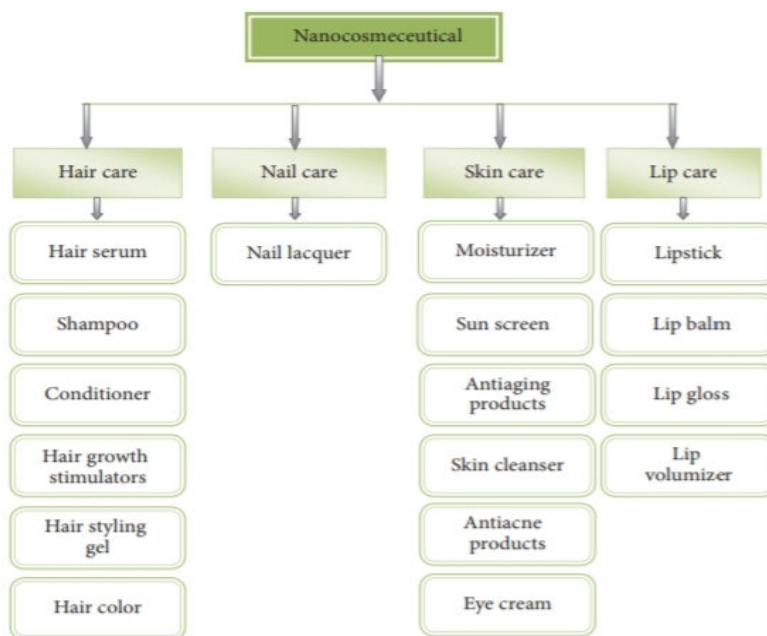
**Fig 4. Negative aspects of Nanocosmeceuticals**

### Major Classes in Nano cosmeceuticals

Cosmeceuticals are contemplated as the fastest growing segment of personal care industry. A plethora of Nano cosmeceuticals are assimilated in nail, hair, lip, and skincare. Major classes in Nano cosmeceuticals are depicted in Fig 5.<sup>[12]</sup>

### Toxicity of nanoparticles

Toxicity of nanoparticles depends on variety of factors like surface properties, coating, structure, size, and ability to aggregate and these factors can be altered and manipulated in the manufacturing process. Nanoparticles having poor solubility have been shown to cause cancer and can exhibit more pronounced.<sup>[13]</sup> Health hazard may arise due to the surface area of nano-



**Fig 5. Major classes in Nano cosmeceuticals**

particles when compared with the same mass concentration of large particles. Toxicity also depends on the chemical composition of nanoparticles which is absorbed on the skin. Health hazard caused by nanoparticles to the humans depends on the degree of exposure and the route through which they access the body.<sup>[14]</sup>

### Applications of Nanotechnology

- a. Nanoparticles in cosmetics as UV filters: The use of nanoparticles such as Titanium dioxide and zinc oxide are the main compounds used as UV filters.
- b. Nanoparticles in cosmetics delivery agents: The use of nanotechnology is for delivery of actives. Liposomes, transferosomes and niosomes are used in the cosmetic industry as delivery vehicles. Newer structures such as solid lipid nanoparticles and nanostructured lipid carriers have been found to be better performers than liposomes and can be used in skin creams and lotions.
- c. In certain skin creams (“anti-aging”), the use of fullerenes as an antioxidant to combat free oxygen radicals which, together with other factors, contribute wrinkle formation. These fullerenes are also called as “buckyballs” which are about 1nm in diameter, spherical in shape and are made of carbon items which are non-biodegradable can also be used in cosmetics.
- d. “Fullerol” the derivative of fullerene is water soluble and degradable compound which can be used in cosmetics and other industries.

- e. Volcanic ash nanoparticles can be used in eye cosmetics, for e.g. in mascara.
- f. Nanoparticles in Skin: The particles ranging 500-1000 nm in size theoretically beyond the realms of nanotechnology can penetrate and reach the lower levels of human skin. Whereas, 128nm and smaller particles are likely to get deeper into the skin. [9,15,16]

### Conclusion

From the literature survey, it has been noted that over past few years the most promising and fastest growing technology in scientific field is Nanotechnology which is widely used in many industries including cosmetics, dermatology, and in biomedical fields. As there is a demand and increase of cosmeceuticals in recent years, researchers invented new technologies for replacing conventional delivery system to novel delivery systems which is the recent trend and currently being used and manufactured by the cosmetic industries. The Nano carriers (for e.g. liposomes, niosomes, transferosomes, solid lipid nanoparticles) have achieved some of the characteristic features such as controlled and targeted delivery, good stability, long lasting action, good loading capacity and good entrapment efficacy. It is also noted that the toxicity and safety of Nano materials plays a vital role and there are many controversies regarding health hazards and risks. So, for Nano cosmeceuticals, manufacturing should be done according to legal and regula-

tory aspects.

### Future Perspective

Nanotechnology is gaining outmost importance in many fields. So it is necessary to work more on some of the parameters such as pressure, temperature, time, pH and other physical and chemical parameters of Nano materials which can be beneficial in knowing and controlling shape, size of Nano materials for a particular characteristic product. Most importantly the method employed should be environment friendly and non-toxic before application of these Nano materials specifically heavy metals which are subjected to health risks and environment hazards.

### Acknowledgment

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# Cutaneous Chronobiology, the Skin Circadian Rhythm - Time to Make Cosmetics Follow the Skin Rhythm

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## Abstract

Giving your skin What it needs when it needs it is the concept of cutaneous chronobiology. Chronobiology, the science of temporal rhythms in biological systems, is a relatively new field. Biological clocks coordinate our physiological and behavioral functions and interactions with our environment. Based on the sun as our primary external synchronizer, the circadian rhythm is probably the most pronounced biorhythm influencing our daily functions. The skin, as the largest organ of our body, also follows a circadian rhythm. Each skin cell contains clock genes that control and synchronize cellular activities for generation of optimal benefits to the skin. This chronobiological phenomenon shows that during the day most of the cellular energy is used to protect the skin while during the night most of the energy is used to restore, repair, recharge, and regenerate skin cells. Unfortunately, because of different factors (i.e., stress, aging) this well-orchestrated mechanism inevitably goes out of sync. The review summarizes the chronobiological rhythms, primarily skin circadian rhythm and the importance of maintaining it in optimal synchronism. This understanding provides opportunities Which leads to new breakthroughs in formulation for the cosmetic industry.

**Key words :** Chronobiology, Circadian rhythm, biological clock, Skin,

## Introduction

Chronobiology is the science of investigating and objectively quantifying phenomena and mechanisms of the biologic time structure, including the rhythmic manifestations of life. Term derived from: *chromos* (time), *bios* (life), and *logos*.<sup>[1]</sup> While the underlying science of biological clocks is intricate and complex and therefore not fully understood, our master clocks are most likely set according to the

world's most reliable time keeper: the sun. This makes the circadian rhythm, the daily cycle.<sup>[2]</sup> Circadian comes from two Latin words; *circa* which means around or about, and *diem* which means day. In humans it is believed this rhythm takes about 24 hours and 11 minutes to cycle through; the same length as a solar day. Each and every cell within our bodies has a circadian rhythm and it's all controlled by our internal biological clock.<sup>[3]</sup> It

can also be affected by light. Our cells are adaptive, so our brain monitors the presence of light and dark and will then adapt if there is a change.<sup>[4]</sup>

Coming from chronobiology, a science that studies the biological rhythms of living beings, cutaneous chronobiology observes the particular rhythms of the epidermis. Like our body, our skin has its own biological clock. Even the skin is subject to certain circadian rhythms. Our body can only absorb and use certain substances at specific times of day, which makes it necessary that these important substances are taken at the correct time according to the chronobiological point of view.<sup>[5]</sup> The cosmetics industry has recognized this for a long time

and developed specific day and night time creams that supply the skin with the nutrients that the skin needs at the correct time.

Now a days chronobiology and circadian rhythm play an integral part in pharmacological and cosmetic studies. That will help to cosmetic technologist to achieve all desired properties of product and their application. This review summaries mechanism, skin circadian rhythm and skin care application.

### Mechanism of Circadian Rhythm

- Circadian clock gives optimal efficiency to each cellular function, which has helped living species to survive for eons. As a consequence

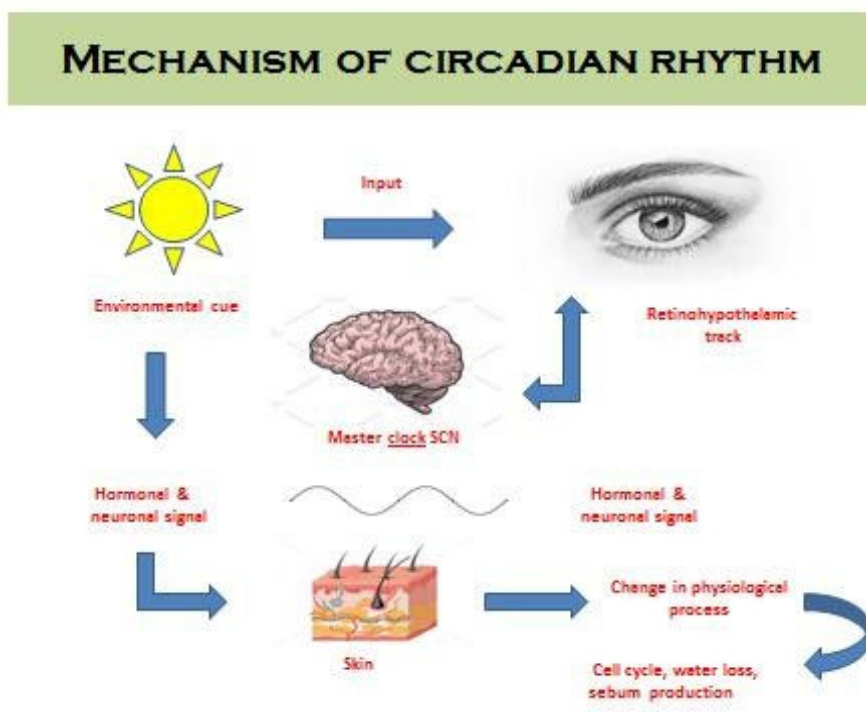


Fig 1. Illustrating mechanism action of circadian rhythm.



**Fig 2. Illustrating different function that are controlled by circadian rhythm**

of the Earth's rotation every 24 hours, organisms are subjected to fluctuations in light and temperatures. There is an evolutionary relationship between our internal physiology and the geophysical earth cycle to help our body adapt to the daily cycle of day and night.<sup>[5]</sup>

- The suprachiasmatic nucleus (SCN) that regulates this 24-hour cycle throughout our body and is composed of neurons that can sense external cues such as light and darkness transmitted through the retina [Fig 1]. The human circadian rhythm is actually a little longer than exactly 24 hours and will be maintained even when the organism is removed from light. However, as soon as light is received by the retina again, the clock will reset itself to match the earth's rhythm of 24 hours. This is because mammalian molecular clocks are not only located in the SCN but also in nearly all cells in our body.<sup>[6]</sup>

### Circadian Rhythm in the Skin

The SCN, circadian system is also composed of peripheral circadian oscillators in many other cells, including the skin. The skin contains circadian clock genes, which play a role in the regulation of the circadian rhythm.<sup>[7]</sup> Circadian rhythm has been identified in various cell type contains a specific circadian oscillator in the skin, including keratinocytes, fibroblasts, melanocytes, epidermal stem cells, sebaceous glands and hair follicles.<sup>[8-9]</sup> Which acts according to a designated activity and to the diversity of skin functions [Fig 2].

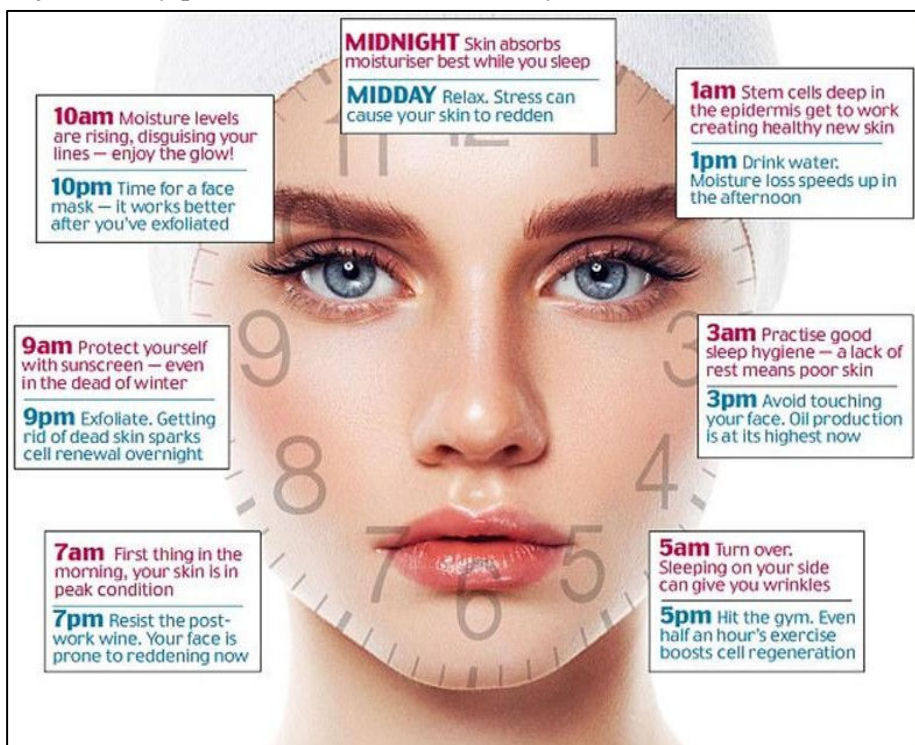
For ex- Sebum production, as assessed on the forehead by sebumeter, peaks around noon .The pH of the skin is lower during the night and is higher during the day and Skin permeability being higher in the evening, in our less active state than in the morning.<sup>[10-13]</sup>

### Cutaneous Chronobiology and Skin Care Application

It is important that nutritional sub-



### Major activity periods for the skin in one day 24 hours, describe as follows -



**Fig 3. Illustrating major activity of skin as per circadian rhythm** <sup>[15-16]</sup>

stances are confirmed to the different needs the skin encounters in a 24-hour day, as the absorption and use of certain substances by the body is only possible at certain times. Some substances work better in the evening, while others have their greatest effect in the morning. In order to reach the best possible outcome, the skin must receive the necessary substances at the correct times. Morning substances should help to cell protection against oxidative stress and support the connective tissue of the skin, whereas evening substances should work to regenerate the connective tissue.<sup>[14]</sup>

### Hair & Nail

Hair and nails also require valuable nutritional substances in order to stay healthy, grow well and look attractive. Environmental factors, stress and poor nutrition do not only have a devastating impact on the body, but also manifest in deficiencies that are quickly discernible in the quality of hair and nails.

If, for example, scalp hair does not have enough selenium, then the hair is in danger of becoming brittle and can even fall out. The B-Vitamin group is also essential to the health of nails and hair. These vitamins directly impact the cells which are responsible for hair

**Table 1. Illustrating summary of protection of the skin through used of active substance in timely manner according to chronobiological standard.**<sup>[15]</sup>

Periods	What is happening to the skin	How does this translate	What do we do	The assets to be favored
Awakening	Lowest hydration level, DNA repair process less active	Redness Local irritation	Use Sunscreen , moisturizing lotion & cream	Glycerin, aloe - vera, rose water, Vit B
The Day	Hydration increases End of the day, Epidermis naturally loses it's vitality	Complexion seems duller, slightly grey	Light skin care, such as a mist or anti -pollution lotion	Hyaluronic acid, rosemary, peppermint, zinc, Hawthorn berry
The Evening	Detox mode, melanin & repair capacity increase	Blurred	Anti-stain serum, Anti-imperfection radiance	Jojoba, Argan, Fruit acid, Evening primrose
The Night	Cell begins their work for detoxification. Skin loses it's water at high speed	Wrinkles	Anti-aging cream, serum and gel.	Essential oils such as lavender, sandalwood

and nail growth. Among other things, they are also responsible for the management of keratin growth.

Due to the rapid growth of hair and particularly nails on the one hand, and the different nutritional needs according to time of day on the other, the use of phytonutrients in accordance with chronobiological standards specially important for healthy hair and nails. In the morning this requires many building substances in order to protect from hair loss and breakable nails, and in the evening lifeless hair becomes glossy. Subsequently, nails and hair receive all the necessary nutrients at the correct times and are strengthened.<sup>[17]</sup>

- Support of hair and nails through the use of active substances in a

timely manner in accordance with Chronobiological Standards given as follows -

- **Substances for the Morning**  
(topical formulation should contain following active ingredients )  
Vitamin B6, Vitamin C, Vitamin E, Selenium, Horse Tail.
- **Substance for evening**  
Vitamin B, Vitamin B2, Vitamin B12, Zinc, Biotin, L-Cysteine, Nicotinamide, Hyaluronic Acid etc.

### Conclusion

Chronobiological effects are having a profound impact on different fields. Many skin functions exhibit chronobiological patterns because of its biological clock and in particular circadian rhythmicity has been studied

to a greater extent. An interpretation of the cutaneous biorhythm in humans suggests that during the day the skin boosts its protective functions to ward off environmental threats. In the evening and at night, the major emphasis is on its renewal and diverse metabolic processes. As skin seems to be more reactive and permeable toward late afternoon and evening, these effects can possibly be used to optimize delivery and efficacy of both cosmetic and medical actives. This current knowledge of circadian rhythm of skin provide better understand, the activity of the skin to better target his needs during the day and thus maintain its balance and beauty, this is the promise of cutaneous chronobiology. This understanding help to choose appropriate active in timely manner according to chronobiological standard for preserve the skin rhythm and ultimately gives best effect on application.

Science of circadian rhythm of skin ensure that our skincare solution are delivering exactly what your skin need at exactly the time it, needs it. So it's time to make cosmetic follow the skin rhythm.

### Future Scope

Mechanism of ingredients those are mentioned above can be studied further to study the effect and application of that particular ingredient at particular time as per circadian rhythm of skin, hair and nail.

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# Life Satisfaction and Resilience as a Function of Meditation

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## Abstract

Human is an objective creature always evaluating his life situation. Life satisfaction is an individual's perception about how well their life is progressing. It is ultimate goal and every human being strives to achieve this goal throughout the life. Resilience means not giving up and standing up again even after a defeat. It is an accepted fact that spirituality makes the human beings better. In this study an attempt has been made to study the impact of meditation on life satisfaction and resilience. The objectives of the study were to study the life satisfaction and resilience among meditators and non-meditators, to compare life satisfaction and resilience among meditators and non-meditators and to assess sex difference with respect to life satisfaction and resilience among meditators and non-meditators. The effective sample of the study comprised of 80 individuals in the age range of 25 to 35 years. Of the 80 subjects 40 were regular meditators i.e. who practiced meditation daily and the remaining 40 were non-meditators. The sample was selected randomly. The tools used were Life satisfaction scale by Dr.Promila Singh and George Joseph and Resilience scale by Wagnild and Young. Descriptive and inferential statistics was used to assess the data. It was found that there exist significant difference among Meditators and Non-Meditators with respect to life satisfaction. Significant difference was also found among Meditators and Non-Meditators with respect to resilience. No significant sex difference was observed among Meditators and Non-Meditators with respect to Life Satisfaction and Resilience.

**Key words :** Meditators, Non-Meditators, Life Satisfaction, Resilience,

## Introduction

Meditation is a way to find one's own self through one's own capabilities and limitations. Meditation helps one assess one's strengths as well as weaknesses. It is a pass-way to connect and converse with the inner mind and possibly reconnect if it is lost.

The effects of meditation as, documented by surveys:

- A well-balanced cardiac autono-

mous nervous system,

- An overall increase in heart rate visibility,
- Better cardiac response during stressful situations,
- Greater brain activity coherence and higher delta band power known to reflect a kind of sixth sense.
- Improved focus and attention spans, better quality of sleep.

Some researches have shown that

regular and daily meditation increases experiences of positive emotions, which, in turn, produce increases in a wide range of personal resources (e.g., increased mindfulness, purpose in life, social support, and decreased illness symptoms). In turn, these increments in personal resources predicted increased life satisfaction and reduced depressive symptoms.

### **Life Satisfaction**

Life satisfaction means as to how a person evaluated his own life, or how much satisfied he feels with his own life. It refers to the overall quality of life he has been able to enjoy during his life.

Life satisfaction is an overall assessment of feelings and attitudes about one's life at a particular point in time ranging from negative to positive.

- *Buetell, 2006*

Some factors responsible for life satisfaction include personality, self-esteem, outlook on life, age, life events and experiences, seasonal effects, values, culture, family, career and social yardsticks

One aspect of satisfaction is that it is directly proportional to the fulfillment of our needs. There are various types of needs in a human's life like physical need (oxygen, food, and shelter), mental need, need for affection, need for security, etc. and when these needs get satisfied (initially the basic ones then the higher ones) then the individual may experience the ultimate potential point or satisfaction with life.

### **Resilience**

Resilience means not giving up and standing up again even after a defeat. It is a quality of not giving up without being rigid. Being flexible in real life situation is an important quality one can have. Flexibility enables one to not be overwhelmed, understand the situation and adapt emotions, physical aspects, intentions, re-think and reframe the goals and strategy to achieve the true goals. The process of resilience starts with accepting one's feelings and emotions in a certain situation, learning the environment, understanding what can one do to make it better and let go of the things which one does not have control over, finally, being innovative to find a solution with the capacity and resources one has.

Resilience is the capacity of a strained body to recover its size and shape after deformation caused especially by compressive stress.

- *Merriam Webster*

It is a psychological phenomenon as it is a perception of inner strength that allows for the physical manifestation of that strength, i.e. the quick recovery from disruptions in functions and return to previous level of functioning. - *Carver, 1998, Steinhardt and Dolbier, 2008*

The factors affecting resilience are social support, realistic plans, one's self esteem, coping skills, communication skills and regulation of emotions.

In other words, resilience is not something people tap into only during

overwhelming moments of adversity. It builds as people encounter all kinds of stressors on a daily basis. Thus, the present study was undertaken to assess the impact of Meditation on Life satisfaction and Resilience.

### Review of Literature

- Akbar M, Akram M, & et al (2014) explored the level of resilience and life satisfaction among nomads. The sample consisted of 100 nomadic (50 males and 50 females) belonging to different profession, age, marital status from Multan and Bahwalnagar. Statistical analysis indicated that the resilience and life satisfaction was positively correlated. The results indicated that there was significant sex difference that male nomadic have higher level of life satisfaction as compared to females nomadic, but there was no significant difference in level of resilience between them.

- Koopmann-Holm, Birgit, Sze, Jocelyn, Ochs, Camaron, & Tsai, Jeanne L. (2013) focused on “actual effect” and “ideal effect” of meditation among meditators and non-meditators and predicted that meditation may even more significantly alter “ideal affect” but the prediction went wrong, there was no difference in ideal or actual excitement, suggesting that meditation selectively increases the value placed on calm.

**Aim :** To study the impact of Meditation on Life satisfaction and Resilience.

### Objectives

1. To study the life satisfaction among

meditators and non-meditators.

2. To assess the resilience of meditators and non-meditators.
3. To compare life satisfaction among meditators and non-meditators.
4. To compare resilience among meditators and non-meditators.
5. To find sex difference with respect to life satisfaction among meditators and non-meditators.
6. To measure sex difference with respect to resilience among meditators and non-meditators.

### Significance of the Study

As the self is being lost in the quest of life, there is a way of experiencing the reconnection with oneself which is the very own source of life that is ‘I’ can be found through meditation. Life’s basic demand is to learn to bounce back and here where meditation is of great help. It helps to realize the issues and learn ways to satisfy them when one is hanging with stress and anxiety due to current life situations. Therefore, this study reflects the vitality of meditation and its existence.

### Methodology

#### Sample Size

The total sample of the study comprised of 80 individuals in the age range of 25 to 35 years. Of the 80 subjects 40 were regular meditators i.e. who practiced meditation daily and the remaining 40 were non-meditators. In both the groups, the male female ratio was 1:1 i.e. 20 males and 20 females.

**Tools**

For the present investigation, following tools were used:

- Life satisfaction scale by Dr Promila Singh and George Joseph
- Resilience scale by Wagnild and Young.

**Variables**

- Dependent variables: Life Satisfaction and Resilience
- Independent variable: Meditation

**Hypotheses**

1. There exists significant difference in the life satisfaction of meditators and non-meditators.
2. Significant difference exists in the resilience of meditators and non-meditators.
3. Significant sex difference exists with respect to life satisfaction among meditators and non-meditators.
4. Significant sex difference exists with respect to life resilience among meditators and non-meditators.

**Statistical Treatment**

To assess the data, initially mean and standard deviation were computed. For further analysis ANOVA was employed.

**Results and Discussion**

The first objective of the study was to assess the levels of life satisfaction of meditators and non-meditators.

**Table 1. Frequency and Percentage of levels of Life Satisfaction.**

	Meditators		Non-meditators	
	Males	Females	Males	Females
<b>Low</b>	Nil	Nil	Nil	Nil
<b>Average</b>	2 (10%)	2 (10%)	13 (65%)	8 (40%)
<b>High</b>	18 (90%)	18 (90%)	7 (35%)	12 (60%)

From Table 1, it is seen that with reference to meditators group 10% males and 10% females experienced average level of life satisfaction and 90% males and 90% females experienced high levels of life satisfaction. With respect to the group of non-meditators, it was seen that 65% males and 40% females revealed average level of life satisfaction and 35% males and 60% females revealed high levels of life satisfaction.

The second objective of the study was to assess the resilience of meditators and non-meditators. The results are displayed in Table 2.

**Table 2. Frequency and Percentage of levels of Resilience**

	Meditators		Non-meditators	
	Males	Females	Males	Females
<b>Low</b>	Nil	2 (10%)	4 (20%)	4 (20%)
<b>Average</b>	12 (60%)	8 (40%)	11 (55%)	12 (60%)
<b>High</b>	8 (40%)	10 (50%)	5 (25%)	4 (20%)

From the Table 2, it is seen that 10% of females of meditators group



have shown low level of resilience, moderate level of resilience was revealed by 60% males and 40% females where as high level of resilience was shown by 40% males and 50% females. With respect to non-meditators 20% males and 20% females revealed low levels of resilience, 55% males and 60 % females revealed moderate levels of resilience and 25% males 20 % females revealed high levels of resilience.

It was hypothesized that there exists a significant difference amongst meditators and non-meditators with respect to life satisfaction. It was also hypothesized that there exists significant difference between males and females with respect to life satisfaction. For this mean and SD was computed. The results are displayed in Table 3.

**Table 3. Mean and SD of Life Satisfaction of Meditators and Non-Meditators**

	Meditators		Non-meditators	
Gender	Male	Female	Male	Female
Mean	144.55	148.25	133.70	136.05
SD	10.10	9.08	10.88	10.56

It can be seen from Table 3 that the data is normally distributed. It is also seen that there are differences in the mean values of meditators and non-meditators and also between males and females. However it cannot be asserted that these differences are significant only on the basis of descriptive statistics and hence the data was subjected to two-way ANOVA. The complete summary of two-way ANOVA is displayed in Table 4.

Examination of table no. 4.4 reveals that the computed ‘F’ value for factors sex is 1.768 (for df=1&76) is less than the table value ( $p > 0.05$ ). This means that there is no significant difference between males and females with respect to LS. Hence, the hypothesis is rejected. The factor of meditators vs. non-meditators has yielded ‘F’ value of 25.66 which is more than the table value at 0.01 level. Hence, it can be confidently asserted that there are significant differences between meditators and non-meditators on the variable of life satisfaction. Observation of mean values suggests that meditators have significantly higher life

**Table 4. Complete Summary of Two Way ANOVA for Life Satisfaction**

	Source of Variation	Sum of Squares	Df	Mean Squares	F	p-value	F critical
Sex (A)	Sample	183.01	1	183.01	1.76	0.18	3.96
M/NM (B)	Columns	2656.51	1	2656.51	25.66**	2.77	3.96
	Interaction (A*B)	9.113	1	9.113	0.08	0.76	3.96
	Within	7867.85	76	103.52			
	<b>Total</b>	<b>10716.49</b>	<b>79</b>				

\*\* $p < 0.01$

satisfaction than non-meditators. Hence, the hypothesis there exists significant differences amongst meditators and non-meditators with respect to life satisfaction is accepted. A similar study was done by Agarwal and Dixit (2017) reported that meditation had significant positive impact on life satisfaction.

To assess whether there are significant differences among meditators and non-meditators with respect to resilience and whether there are significant sex difference between males and females with respect to resilience the data was treated with two-way ANOVA. Initially mean and SD were computed for resilience. The results are displayed in Table 5.

**Table 5. Mean and SD of Resilience of Meditators and Non-Meditators**

Gender	Meditators		Non-meditators	
	Males	Females	Males	Females
Mean	142.95	145.95	129.15	129.75
SD	11.10	18.43	22.43	16.61

From the table it is seen that there are differences in the mean values of meditators and non-meditators. For inferential purpose the data was sub-

jected to two-way ANOVA. The results are displayed in table 4.6

From the above table it is seen that the factor of sex has yielded a 'F' value of 0.209 (for df=1&76) which is less than the table value at 0.05 level. (F= 3.967). Therefore, it can be asserted that factor of sex failed to influence resilience. The factor of meditators and non-meditators yielded a significant F = 14.494 (for df=1.79) at 0.01 level. Hence, it can be confidently asserted that there exists significant differences between meditators and non-meditators with respect to the variable resilience. The meditators revealed higher resilience than non-meditators.

**Conclusion**

The findings of the present study from the statistical treatment and analysis of the data suggests the following:

- Significant difference has been found among Meditators and Non-Meditators with respect to life satisfaction.
- Significant difference has been found among Meditators and Non-Meditators with respect to Resilience.

**Table 6. Complete Summary of two Way ANOVA for Resilience**

	Source of Variation	Sum of squares	Df	Mean squares	F	P value	F critical
Sex (A*B)	Sample	64.8	1	64.8	0.21	0.64	3.96
M/NM(B)	Columns	4500	1	4500	14.49**	0.002	3.96
	Interaction (A*B)	28.8	1	28.8	0.09	0.76	3.96
	Within	23596.2	76	310.47			
	Total	28189.8	79				

\*\*p<0.01

- No significant sex difference has been observed among Meditators and non-Meditators with respect to Life Satisfaction and Resilience.

### Recommendations

- Meditation practice to be included in schools and colleges
- Schools should organize workshops for parents for emphasizing the importance of meditation

### Suggestions

- The study can be conducted on other age groups as well like adolescents, old age, adulthood etc.
- The study can be conducted on a large sample.

### Limitations

- The present study was limited to a sample size of 80 only.

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## Occupational Stress and Resilience of Teachers of Different Faculties

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### Abstract

Teaching is a stressful work and the most susceptible work to mental illness because of constant stress, noise and dealing with the adolescents who are in a transitional phase and in turmoil. The objectives of the study were: to study the occupational stress level of the teachers teaching in different faculties, to assess the level of resilience of the teachers teaching in different faculties and to compare the resilience and occupational stress of the teachers teaching in different faculties. A cross-sectional survey of teachers teaching in different faculties was conducted. The effective sample of the study was 100 teachers belonging to four different faculty viz. Arts, Science, Commerce and Architecture. The sample was randomly selected. The tools used were The Resilience Scale by Wagnild and Young and Occupational Stress Index by Dr. A. K. Shrivastava and Dr. A. P. Singh. Descriptive and inferential statistics was used to assess the data. It was found that there is no significant difference in the occupational stress of teachers belonging to different faculties. Similarly, no significant difference in the resilience of teachers belonging to different faculties was observed.

**Key words :** Teachers, Occupational stress, Resilience,

### Introduction

A person who inspires, encourages one to strive for greatness and see the best in oneself is the role model of one's life and that could be anyone but the people who guide in the right direction is the teacher. Teacher plays a vital role in nation building, who creates, who nurtures the talent and people look to them for advice and guidance for right direction.

In today's scenario with the hustle and bustle in life, stress is the most common thing which we can observe,

reasons could be numerous but sometime the major would be the occupational stress.

### Occupation

Occupation, job, line of work is the principal activity in life that a person does to earn money. Occupation and work have assumed utmost social importance. Not only social but also economic, psychological and human significance. It helps to satisfy material needs. People not only work for money but it is important for mental health as well. Work has great therapeutic quali-

ties for mental health.

Job is important to people on many levels. Doing a job one can enjoy and find satisfaction, can provide a meaningful focus for one's lives, as well as bringing in an income. Individual's standard of living hinges on the money they make, while employment often contributes to their self-image and self-esteem. Work related problems can affect physical, emotional and mental health. Common issues include job dissatisfaction, workplace injury, stress, discrimination and bullying, violence, accidental death and retirement.

Not everyone has the opportunity to work in a rewarding and challenging job. Some people experience job dissatisfaction because they are unhappy or unsafe at work.

### Occupational Stress

Occupational stress refers to the ongoing or progressing stress an employee experiences due to the responsibilities, conditions, environment or other pressure of the workplace. There are different types of occupational stress, depending on the individual employee, their job role and more. Some common occupational stressors include:

1. Strict policies and protocols
2. Conflicts among staff
3. Workforce micromanagement and mismanagement
4. Lack of support
5. Personal, professional or situational issues
6. Poor time management

7. Being overworked
8. Performance expectations

Employees suffering from occupational stress generally exhibit signs of stress response. There are three stages of the stress response, which can be used to identify if an individual is struggling with occupational stress.

1. Alarm (Physical, Emotional or Mental stress)
2. Resistance
3. Exhaustion

### There are many theories of work stress which include

- **The demand-control-support model:** According to the DCS model, work that is characterized by high demands, low decision latitude, and low support decreases health and well-being.
- **The effort-reward imbalance model:** In the model, effort means the demands and obligations the employee is faced with, and reward the money, esteem, and career opportunities (or job security) the employee expects in return, not only from the employer but also from society at large.
- **The person-environment fit model:** The theory behind person-environment fit is that everyone has a work environment with which they are most compatible.
- **Job characteristics model:** The Job Characteristics Model is a theory that is based on the idea that a task in itself is the key to the employee's motivation. In short, a bor-

ing and monotonous job is disastrous to an employee's motivation whereas a challenging, versatile job has a positive effect on motivation.

- **The diathesis stress model:** The theory described that mental and physical disorders develop from a genetic or biological predisposition for that illness (diathesis) combined with stressful conditions that play a precipitating or facilitating role.
- **The job-demands resources model:** JD-R model is an occupational stress model that suggests strain is a response to imbalance between demands on the individual and the resources he or she has to deal with those demands.

**Resilience:** Resilience means the capacity to face and adapt to the events such as tragedy, natural disaster, health concern, and relationship, work or school problem in the life. A person with good resilience has the ability to bounce back more quickly and with less stress than someone whose resilience is less developed.

**According to the American Psychological Association (APA):** “Resilience is defined as the process of adapting well in the phase of trauma or tragedy, threats or other significant sources of stress.”

**Types of Resilience :** According to Genie Joseph, there are three basic types of resilience

1. **Natural Resilience:** It is that resilience one is born with and the resilience that comes naturally. It is a human nature and life force.

2. **Adaptive resilience:** This might also be thought of as ‘trial by fire’. This occurs when challenging circumstances force one to learn and change and adapt.

3. **Restored Resilience:** This is also known as learned resilience. One can learn techniques that help build resilience, and, as a result, restore that natural resilience one had as a child.

**Factors that support resilience include:** To have a positive view of oneself and confidence in one’s strengths and abilities, being able to regularly make realistic plans carry out those plans, being able to effectively and in healthy manner manage feelings and impulses, to have really good communication skills and to have really good problem solving skills.

The concept of resilience can be understood as **the Seven C’s** of resilience **Control, Competence, Coping, Confidence, Connection, Character and Contribution.**

The profession of teaching is a vocation that counts for high standards of ethics, responsibility and accountability. Teachers are called as architecture of the nation. The profession is rewarding and interesting but at the same time requires lot of patience and calm behaviour. Presently teaching profession involves lot of documentation. College teachers have to publish research paper, keep themselves updated, work in various committees and cells, adapt to different methods of teaching etc. Apart from these, the college

teachers have to work with adolescent's developmental period characterized by search of identity, transitional phase, stress and storm.

Hence, in present study an attempt is made to study the teacher's occupational stress and their resilience.

### Review of Literature

- **Gull M (2018)** studied the significance of difference between government and private school teachers on resilience. Results revealed that teachers working in government school scored higher on resilience as compared to teachers working in private schools. Further study revealed a statistically significant difference among the teachers having low and high income as compared to their counterparts. Thus it was suggested in the study to nurture the resilience actively through training and managed through the different phases of their professional's lives in general among the teachers and in particular among private school teachers.

- **Harish K A & B Jeyaprabha (2018)** conducted an empirical study on the stressors of teachers and its impact on occupational stress and job satisfaction of teachers in government and private sectors. The result showed that occupational work stress has found to be high for private school teachers as compared to the government schoolteachers. Amongst the school teachers, female teachers have high amount of occupational stress as compared to male teachers. The teachers working in private secondary

schools are found more level of dissatisfaction in their work profiles compared to their counterparts working in government-aided secondary schools. The female secondary school teachers had significantly lower levels of job satisfaction as compared to their male counterparts. A strong negative correlation exists between the occupational stress and job satisfaction of the secondary school teachers.

- **Navale D (2018)** investigated occupational stress among teachers of private and government schools. The study concluded that some elements of stress were intrinsic while others were situational in the profession of teaching. Thus the researchers suggested that the teachers need to understand how to cope with those which were intrinsic, while the situational ones can be managed with experience and common sense.

- **Singh N & Katoch A (2017)** conducted a study of occupational stress of secondary school teachers to measure the occupational stress of secondary school teachers of district Mandi in Himachal Pradesh. It was found that the secondary school teachers generally had occupational stress having high, moderate and low levels. Further significant differences were found in the occupational stress of male and female secondary school teachers.

**Aim :** The aim of the study was to compare the occupational stress and resilience of teachers teaching in faculties of arts, commerce, science and architecture.

## Objectives

- To study the occupational stress level of the teachers teaching in different faculties.
- To study the level of resilience of the teachers teaching in different faculties.
- To compare the resilience and occupational stress of the teachers teaching in different faculties.

**Significance of the study:** This study can be of use to students of psychology, human development, education and sociology as it is studying the levels of occupational stress and resilience of teachers. It is also hoped the study will be beneficial to the government in framing policies for teachers.

## Methodology

**Sample size:** The sample of the study comprised of 100 lecturers teaching in various colleges of Nagpur City. The sample was purposive random sample. Only those teachers were included in the study who had a minimum of 5 years work experience. The age range of the subjects was from 25 to 45 years. Of the 100; 78 were female and the remaining 22 were males.

**Table 1. Distribution of sample**

Sr. No	Faculty	No. of teachers
1	Arts	25
2	Commerce	25
3	Science	25
4	Architecture	25

**Tools:** For the investigation following tools were used:

- Resilience Scale (RS) by Wagnild and Young
- Occupational Stress Index (OSI) by Dr. A. K. Shrivastava and Dr. A. P. Singh

**Variables:** The independent variables of the study were occupational stress and resilience whereas the dependent variable was the teachers teaching in different faculties.

## Hypotheses

1. There exists a significant difference in the occupational stress experienced by teachers teaching in different faculties.
2. Significant differences exist in the levels of resilience of teachers teaching in various faculties.

**Statistical treatment:** To assess the data, Mean and Standard Deviation were computed. For further analysis 't'-test was employed.

## Results and Discussion

The first objective of the study was to assess the level of occupational stress. The results are displayed in Table 2.

**Table 2. Percentage of perceived OSI by teachers**

Percentage	Arts (%)	Commerce (%)	Science (%)	Architecture (%)
Low	64	68	64	76
Medium	32	32	24	20
High	04	00	12	04



From Table 2 it is seen that 64% teachers of arts faculty experienced low occupational stress and 32% experienced medium occupational stress and 4% teachers reported high stress. 12% teachers belonging to science faculty reported high stress and 4% teachers of architecture reported high stress. In the category of commerce teachers did not experience high stress.

The second objective of the study was to compare the occupational stress of teachers, teaching in different faculties. The Mean and SD were computed and are displayed in Table 3.

**Table 3. Mean and SD of OSI of teachers of different faculties**

Faculties	Mean	SD
Arts	121.96	17.61
Commerce	113.84	20.94
Science	120.68	25.76
Architecture	114.40	15.61

From the above Table 3 it is seen that there are differences in the Mean and SD of occupational stress of teachers belonging to different faculties. However only on the basis of descriptive statistics it is not possible to infer whether the differences are significant or not hence the data was subjected to ‘t’ test. The results are displayed in Table 4.

**Table 4. Matrix of ‘t’ values of OSI**

	Arts	Comm- erce	Scie- nce	Archi- ecture
Arts	X	0.14	0.83	0.11
Commerce	X	X	0.30	0.91
Science	X	X	X	0.36
Architecture	X	X	X	X

Observation of Table 4 reveals that there are no significant differences amongst the teachers belonging to different faculties with respect to occupational stress. The results do not support the hypothesis; there exists no significant differences in occupational stress experienced by teachers of different faculties. Nagra 2013, observed that teacher educators experienced moderate level of occupational stress. No significant differences were indicated regarding occupational stress among teacher educators in relation to their gender, and subject streams while significant results were observed in relation to nature of job.

The next objective of the study was to examine the resilience level of teachers. The results are displayed in Table 5.

**Table 5. Percentage of level of resilience**

Percentage	Arts (%)	Comm- erce (%)	Scie- nce (%)	Archi- ecture (%)
Low	20	12	24	12
Medium	20	36	32	44
High	60	44	40	24

From the results it is seen that 60% of arts teachers had high level of resilience and 24% teachers of architecture had high level of resilience.

For further analysis the Mean and SD were computed and are displayed in Table 6.

**Table 6. Mean and SD of Resilience**

Faculties	Mean	SD
Arts	148.24	23.35
Commerce	141.44	17.06
Science	136.04	25.28
Architecture	139.00	17.82

From the above Table 6 it is seen that there are differences in the Mean and SD of occupational stress of teachers belonging to different faculties.

To assess whether there are differences in the resilience levels of teachers of different faculties the data was subjected to 't' test. The results are displayed in Table 7.

**Table 7. Matrix of 't' values for Resilience**

	Arts	Comm- er- ce	Scie- nce	Archi- tecture
Arts	X	0.24	0.10	0.12
Commerce	X	X	0.42	0.62
Science	X	X	X	0.63
Architecture	X	X	X	X

Observation of Table 7 shows that there are no significant differences in the resilience of teachers belonging to different faculties. The results do not support the hypothesis: there exist significant differences in the resilience of teachers teaching in different faculties. Polat D and İskender M (2018), found that there was no significant difference in teachers' resilience or sub-scales of it in terms of age and experience of the participants.

### Conclusion

The finding of the present study from the statistical treatment and anal-

ysis of the data suggests the following conclusions :

1. 80 to 90 percent teachers have revealed moderate to low levels of occupational stress.
2. 65 to 80 percent teachers have revealed moderate to high resilience.
3. There is no significant difference in the occupational stress of teachers belonging to different faculties.
4. There is no significant difference in the resilience of teachers belonging to different faculties.

### Limitations

- The study was limited to Nagpur City only.
- The sample size was limited to 100 only.

### Recommendations

- Different techniques need to be taught through workshops, seminars or camps to improve the resilience in positive manner.
- Regular counseling of the staff should be done to find the cause of stress and thus training can be provided to handle it or to deal with it effectively.

### Suggestions

- The study can be conducted to compare the difference between male and female.
- Interesting results can be obtained if comparison between the government and private sector is studied

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## **Suitability of Job for Disabled Employees in the Hotels : An Empirical Study**

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### **Abstract**

There are various misbeliefs and prejudices about the disabled in society. These directly affect the employment of disabled persons. The researcher felt the need of undertaking the study as the job suitability is perhaps the main criteria for hiring an employee for employment. The present study focused on to identify the suitable departments for disabled employees in hotels. Suitability comparison of disabled with normal employees working in hotels was the main aim of researcher. This empirical study has quantitative approach and based on the actual evidence from the hotel industry. The self-design questionnaires were administered by researcher for collecting data. Data collected was tabulated and presented in graphs. Descriptive statistical tools were applied to satisfy the objectives and inferential statistics to test the hypothesis. The result of this study showed that the most suitable department for the disabled employees was hotel housekeeping. The further analysis of data using z-Test for comparison revealed the fact that there is significant difference in the proportion of normal and disabled employees on job suitability in the departments Front Office and Hotel Housekeeping.

**Key words :** Hotel, Disabled Employees, Suitable Department, Housekeeping, Front Office.

### **Introduction**

Suitability means the appropriateness of the person to conduct the task required for the job to be done. This is the main criteria of the employer while selecting the employees for the employment. In other words suitability means eligibility, qualification, suitability, fitness and ability. Suitability is the quality of having the properties that are right for a specific purpose. In one of the study conducted by Jenkins

on suitability, the researcher studied what the recruiters searching for new recruit. While there are variations in the suitability, there is a broad understanding of what qualities, characteristics, skills and knowledge required for job. The Australian Government Department of Employment carried out Job Seeker Suitability Study in 2016 discussing the factors affecting the hiring process. Such studies are need of the time to meet the demand for human

resource in every industry.

Disability has been defined differently including social, physical as well as political aspects. In academic field biomedical and social aspects are considered. The present study focused on these aspects defining disability as a physical or mental condition of a person restricting the participation in social life. Social attitudes towards disability restrict their participation in the employment. Individuals with a disability are often discriminated against with respect to employment (W. Inganells, 1991). Assumptions and realities were studied in the research conducted by Inganells in Employment of the disabled in the hotel and catering industry. The researcher tried to identify the attitudes of employers. Comparison were made with the employers in other industry

An exploratory study of fourteen Toronto hotels found that these hotels employ relatively low persons with disabilities. The result revealed the fact that among the barriers many people do not know how effective the person with disability, lack of communication as well as physical layout of the hotels (Groschl, 2005). Identification of these barriers Stefan carried out a study in hotel organisations in major Canadian tourist destinations concluding that the employee selection criteria focusing on physical attractiveness and aesthetic skills need to be reviewed realigned the ethical and non-discriminatory principals and guidelines (Stefan, 2007). In the year 2008 Stefan in his

study provided the snapshot on current human recourse practices affecting the employment of disabled within the small number of Toronto Hotels. The author suggested that the changes and shifts in areas such as communication, awareness and education might lead the participating hotel organisations to proactively recruit and integrate a highly motivated and committed group of employees (Groschl S., 2008)

Extensive literature survey showed that there are many studies focusing on human resource practises and attitudes of employers on hiring disabled. The prior positive working experience with PWD contributed to favourable employer attitude (Qu, 2008). This study concluded that the more positive employers' attitude towards person with disabilities employees, the more likely they are going to hire or continue to hire person with disabilities. The other study provides information about managers' attitude towards persons with disabilities. Manager's age, and years worked for the current organisation had an effect on attitudes related to the importance of training of persons with disabilities (Paola Paez, 2012).

### **Problem Definition**

The emerging challenges of shortage of labour in hotel industry faced by human resources management needs attention. The study examined disability inclusion initiatives as a strategy to gain a competitive advantage, especially in industries with high turnover such as hospitality and retail. Creating disa-

bility friendly culture that is favourable and supportive to employees with disabilities is vital in overcoming biases and stereotypes (Kalargyrou, 2014). An exploratory study of industry leaders used to inform hospitality employers and human resource professionals about best practises surroundings the initiative of disability inclusion plan and set a foundation for future academic research (Volis, 2014).

Hiring of employees should base on suitability. This statement supported by the earlier study conducted to identify some basic principals with respect to the employment of disabled. Hiring employees should be based on merit, suitability and capability of the candidate, regardless of the presence of degree of disability (Murat Benquise, 2011). Another important outcome of this study is that the job or task appointed to person with disability should not deteriorate the disability. However apart from some extreme cases, exports mostly agreed that disabled can fulfil any task in hospitality industry as long as their professional knowledge and skills fit those tasks.

### **Need of the Study**

The present study focused on the suitability of job for disabled in hotel organisations. Researcher studied in details the preferences noted by disabled employees and their co-workers working in hotels. As the study has empirical aspect, is based on the actual evidences from the hotel industry. Researcher revealed the hidden facts from practical world and hence has practical

implication in the real world.

### **Social Relevance**

The outcome of the study will be beneficial to disabled persons, managers as well as employers of the disabled persons. The results will be helpful for disabled to improve their professional knowledge and skills required for employment. The recruiters will be helpful for making right selection and accommodation of disabled in hotel organisation. The employers will be benefited by reduced cost on high turnover of employees.

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

1. To explore the most suitable department for the disabled employees in hotels.
2. To explore the job preferences by normal employees in hotels
3. To compare the job suitability of disabled employees with normal employees in departments of hotels.

### **Hypotheses**

1. There is no difference in the proportion of normal and disabled employees on job suitability to F & B Service.
2. There is no difference in the proportion of normal and disabled employees on job suitability to Front Office.
3. There is no difference in the proportion of normal and disabled employees on job suitability to Hotel Housekeeping.
4. There is no difference in the proportion of normal and disabled em-

ployees on job suitability to Production.

5. There is no difference in the proportion of normal and disabled employees on job suitability to Account.
6. There is no difference in the proportion of normal and disabled employees on job suitability to Store.

### **Research Methodology**

“Suitability of job for Disabled Employees in the Hotels: An Empirical Study” was based on quantitative research approach. This research study has been carried out by using the techniques of descriptive and inferential research designs. Survey method for contacting the target respondents has been adopted by the researcher.

**Sample design:** The target population for this research study was all the employees working in star hotels situated in the cities of Mumbai, Pune and Nagpur. Mix sampling procedure was adopted by researcher to select the hotels and respondents. The sample unit for the present study was the star hotels at Mumbai, Pune and Nagpur city which recruits disabled persons in their workforce. Hence the selection of sample unit was based on purposive sampling technique. To make the sample more representative clusters were formed on the basis of the departments

and the respondents were drawn from all the clusters proportionately. The researcher has taken out a sample of 236 employees, including disabled employees and their co-workers. For final selection of respondents the researcher has adopted purposive sampling method for achieving the aim of comparison.

**Data collection:** A questionnaire has been designed as an instrument of data collection. The researcher has used self-administered questionnaire methods to collect primary data. Secondary data has been collected from published books, journals and online literature available related to the topic.

### **Data Analysis**

First hand data was collected through the data collecting tool i.e. questionnaire designed for the present research study by the researcher. The respondents were asked for the preferences for the departments in hotel organisation. All four operational departments (i.e. food & beverage service, production, hotel housekeeping, & front office) along with the supportive departments (i.e. account & store) were selected for the study. The researcher found that disabled employees were working in these departments during the course of survey for the present study.

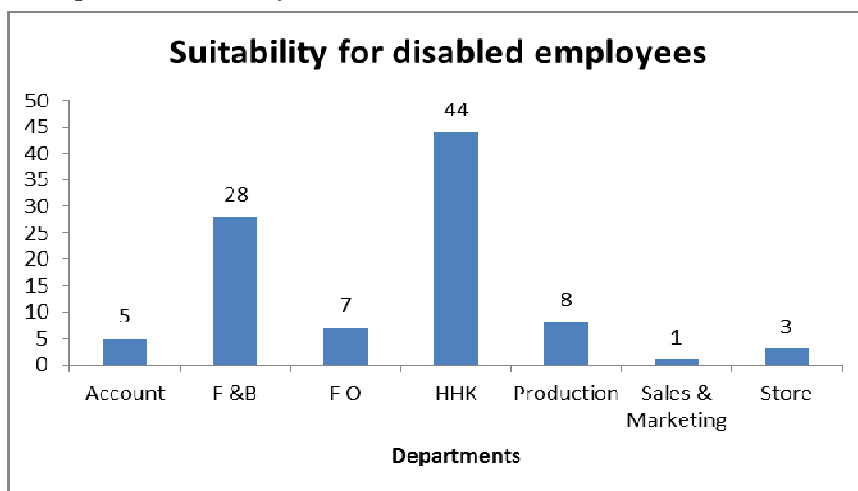
1. To explore the most suitable department for the disabled employees in hotels.

**Table 1. Summary of the data for disabled employees.**

		Department							Total
		Account	F & B	F O	HHK	Produ- ction	Sales & Marketing	Store	
City	Mumbai	1	10	3	14	2	0	1	31
	Nagpur	1	12	4	10	4	1	0	32
	Pune	3	6	0	20	2	0	2	33
Total		5	28	7	44	8	1	3	96
Percentage		5.20	29.16	7.29	45.83	8.33	1.04	3.12	

Above Table 1 showed the summary of the respondents i.e. disabled employees working in the hotels. The total number of questionnaire distributed were 100 out of which 96 respondents replied. The study revealed

the fact that the hotel housekeeping department was most preferred and suitable for disabled employees in the hotels. The same information has been represented graphically in Fig 1.



**Fig 1. Graphical representation for disabled employees data**

2. To explore the job preferences by normal employees in hotels

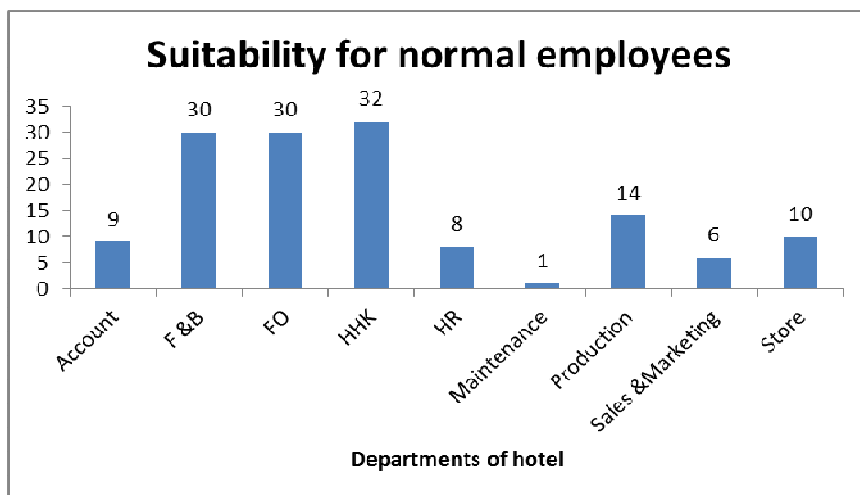
**Table 2. Summary of the data for normal employees**

		Acc- ount	F & B	FO	HHK	HR	Mainte- nance	Produ- ction	Sales & Marketing	Store	Total
City	Mumbai	4	10	10	10	4	0	6	2	4	50
	Nagpur	2	10	10	10	0	1	3	2	2	40
	Pune	3	10	10	12	4	0	5	2	4	50
Total		9	30	30	32	8	1	14	6	10	140
Percentage		6.43	21.43	21.43	22.85	5.71	0.71	10.00	4.28	7.14	



Above Table 2 showed the summary of the respondents i.e. normal employees working in the hotels. The total number of questionnaire distributed were 150 out of which 140 respondents were replied. The study re-

vealed the fact that the hotel house-keeping department was most preferred and suitable for disabled employees in the hotels. The same information has been represented graphically in the Fig 2.



**Fig 2. Graphical representation for normal employees data.**

**Hypotheses Testing**

To compare job preferences of normal and disabled employees working in the hotels following hypotheses were formulated. The each null hypothesis (H0) was tested against the alternative hypothesis (H1).

1. To test H0: There is no difference in the proportion of normal and disabled employees on job suitability to F & B Service.  
( $P_{Normal} = P_{Disabled}$ )  
Against H1: There is difference in the proportion of normal and disabled employees on job suitability to F & B Service.  
( $P_{Normal} \neq P_{Disabled}$ )
2. To test H0: There is no difference in the proportion of normal and

disabled employees on job suitability to Front Office.

( $P_{Normal} = P_{Disabled}$ )

Against H1: There is difference in the proportion of normal and disabled employees on job suitability to Front Office. ( $P_{Normal} \neq P_{Disabled}$ )

3. To test H0: There is no difference in the proportion of normal and disabled employees on job suitability to Hotel Housekeeping.  
( $P_{Normal} = P_{Disabled}$ )  
Against H1: There is difference in the proportion of normal and disabled employees on job suitability to Hotel Housekeeping.  
( $P_{Normal} \neq P_{Disabled}$ )
4. To test H0: There is no difference in the proportion of normal and

disabled employees on job suitability to Production.

$$(P_{\text{Normal}} = P_{\text{Disabled}})$$

Against H1: There is difference in the proportion of normal and disabled employees on job suitability to Production. ( $P_{\text{Normal}} \neq P_{\text{Disabled}}$ )

5. To test H0: There is no difference in the proportion of normal and disabled employees on job suitability to Account. ( $P_{\text{Normal}} = P_{\text{Disabled}}$ )

Against H1: There is difference in the proportion of normal and disabled employees on job suitability to Account. ( $P_{\text{Normal}} \neq P_{\text{Disabled}}$ )

6. To test H0: There is no difference in the proportion of normal and disabled employees on job suitability to Store. ( $P_{\text{Normal}} = P_{\text{Disabled}}$ )

Against H1: There is difference in the proportion of normal and disabled employees on job suitability to Store. ( $P_{\text{Normal}} \neq P_{\text{Disabled}}$ )

Z test is used to test above hypotheses.

$$Z = \frac{p_1 - p_2}{\text{S.D. of } (p_1 - p_2)}$$

where S.D. of  $P_1 - P_2$  is

$$\frac{\bar{p}(1-\bar{p})}{n_1} + \frac{\bar{p}(1-\bar{p})}{n_2} \text{ and } \bar{p} = \frac{x_1 + x_2}{n_1 + n_2}$$

**Table 3. Summary of the comparison of the data for job preferences**

Sr. No.	Department	P <sub>1</sub>	P <sub>2</sub>	$\bar{p}$	S. D. of $\bar{p}$	Z
1	F & B service	0.2143	0.2916	0.24576	0.0570	-1.356
2	Front Office	0.2143	0.0729	0.15674	0.0481	<b>2.9397</b>
3	Hotel Housekeeping	0.2285	0.4583	0.3220	0.0619	<b>-3.7124</b>
4	Production	0.1000	0.0833	0.09322	0.0385	0.4337
5	Store	0.0714	0.0312	0.0550	0.03020	1.3311
6	Account	0.064	0.052	0.05932	0.0313	0.3833

**Result & Discussions**

The first hand data analysed statistically to test the null hypotheses against the alternative hypotheses for each department under study. To draw any conclusion at 5% level of significance, the calculated value of |Z| is compared with 1.96. If |Z| > 1.96, hypothesis is rejected, otherwise accepted.

**Conclusion**

Hypothesis of no difference is rejected at 5% level of significance for the departments Front Office and Hotel

Housekeeping. There is significant difference in the proportion of normal and disabled employees on job suitability in the departments Front Office and Hotel Housekeeping. Hence the researcher can suggest that the housekeeping department is the most suitable for disabled to accommodate in hotel organisations followed by front office. The comparison showed that the jobs carried out in both the departments can be carried out effectively by disabled employees as normal employees.

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## Introduction of Maharashtra Cuisine in Fine Dining Restaurants

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### Abstract

It has been observed that the fine dining restaurants are not serving the local foods and hence the popularization of the regional food is being hampered. None of the five star hotels in the city offer local food in any form. This is the cause of the local food not reaching the global market.

The purpose of this study is to educate people about the lost presence of Maharashtra cuisine, by elevating simple, everyday recipes to fine dining standards. The purpose is to amalgamate age old recipes and ingredients with modern day cooking techniques and ingredients from the new world to create a refreshing yet nostalgic seven course pre-plated menu fit for the global standards. This research paper makes an attempt to find ways of introducing the rustic local vidarbha food onto the platter of fine dining restaurant.

It was observed from the study that the hotels are ready and also the guest are willing to try out local cuisine if presented and prepare as per the global taste buds. The study involves preparation of local Marathi dishes in fusion form.

**Key words :** Local Maharashtra, Cuisine, Fusion, Rustic.

### Introduction

Vidarbha, the north-eastern region of Maharashtra known for its extreme climates and remaining dry almost all year round and also known for its boldness. This region consists of Amravati and Nagpur but here we will reflect more on Nagpur division. Here there are two cuisines 'varhadi' and 'saoji'. Both these cuisines are particularly spicy.

Vidarbha, the north-eastern region of Maharashtra known for its extreme climates and remaining dry almost all

year round and also known for its boldness. this region consists of Amravati and Nagpur but here we will reflect more on Nagpur division. Here there are two cuisines 'variadic' and 'saoji'. Both these cuisines are particularly spicy, that's why I say that it's not for the people who cannot tolerate spicy food. Saoji is a community which is known for its super spicy non vegetarian food, well it does have veg food also but the real fun lies in tasting the non veg. Varhadi cuisine is a little milder than its counterpart saoji

(please note I say little mild but this one is also spicy). On observing we see the that the boldness, and the on your face attitude of locals here reflects on the cuisine here. A particular day in Nagpur would start of with a plate of 'tarripoha', this is basically a very spicy hot curry on top of poha, Some vendors make the chole (kabalchana) or black gram pulse or green / hir-wa vatana, here's a picture of extremely delectable tarripoha.

### **Aim And Objective**

**Aim** - Introduction of maharashtrian cuisine in fine dining restaurants

### **Objectives**

- To study the ever-changing palate of customers.
- To curate a fine dining 7 course menu.
- To display modern cooking techniques.
- To present a well designed menu with detailed costing, ready to be implemented in any.

### **Limitations**

1. The study is limited to the region of Vidarbha
2. The study is limited due to constraints of time and money
3. The number of recipes to be interpreted is limited to seven and selected on the basis of popularity.

### **Review of Literature**

India's unique blend of cuisines evolved through large-scale cultural interactions with neighbouring Persia, ancient Greece, Mongols and West

Asia. New World foods such as chili peppers, tomatoes, potatoes and squash, introduced by Arab and Portuguese traders during the sixteenth century, and European cooking styles introduced during the colonial period added to the diversity of Indian cuisine.

### **Maharashtrian Cuisine**

From the coastal delicacies of the Kokan where fish curry and rice are a staple to the specialties of Deccan plateau and the fiery fare from heat of Vidarbha in the east, Maharashtrian food is truly unique. Wheat, rice, jowar, bajra, lentils and seasonal fruits and vegetables staples. The highlight of this cuisine is the use of peanuts and coconut in most dishes. Maharashtrian meals are based Ayurvedic principles. It is believed that your daily meal should be well-balanced which is why a traditional Maharashtrian thali will have Rice, Chapati, Dry Vegetables, Curry, Lentils, Salad, Pickle, Chutney and a Dessert. All the flavors like spicy, savory, sour, bitter and sweet are packed into one plate.

### **Cuisine of Vidarbha**

Besides the coastal cuisine, Maharashtra is popular for its Vidarbha Cuisine prepared by the people of the Vidarbha region. The interior of Maharashtra, Vidarbha region comprises ten districts namely Akola, Buldhana, Bhandara, Nagpur, Yavatmal, Washim, Wardha, Parbhani and Chandrapur. The people of these districts prepare dishes more spicy and exotic than that of the coastal and southern regions. They mainly use besan, chickpea flour

and ground peanuts. The main difference is that they add powdered coconut in their dishes instead of fresh coconut.

The specialty of this cuisine is the use of freshly ground masalas like Goda Masala and Methkut Masala which is made from the combination of various spices and dals (lentils). "Desh" is known for its traditional bread called Bhakri which is eaten in place of roti or chapatti. It is made with jowar and bajra. This experimental thesis consists of collecting 7 age old Maharashtrian of Vidarbha are from experienced individuals and well known cookbook authors. These recipes are then combined with ingredients of matching flavor profiles and modern cooking techniques to create A7 course fine dining menu. This serves two primary purposes. Shifting current gastronomic spotlight to Maharashtrian cuisine and serving Maharashtrian cuisine in a way that appeals to the modern public at large.<sup>(4)</sup>

### Research Methodology

To achieve the aim and objective of the project, the researcher adopted a practical experiment and demonstration method and to collect the relevant data/ material the researcher used two questionnaires as tool of data collection.

- **Area of Selection:** The area of selection to conduct the experiment and research survey was limited to the city of Nagpur.
- **Sample Selection:** A tasting of the 7-course menu prepared during the ex-

periment was conducted. The number of samples collected were 10. The questionnaire was in the form of a comment card. Method of selection of samples is systematic sampling. The questionnaire formed the basis of the Hypothesis.

- **Random Sample Selection:** A general survey was undertaken to study the popularity and acceptance of Maharashtrian cuisine as a fine dining cuisine. The method of sample selection is random sampling. The researcher used questionnaire as a tool to collect data. The questionnaires formed on the basis of the objectives.

- **Data Collection:** The data collection for the study was

- a) Primary data collection
- b) Secondary data collection

#### A) Primary Data Collection

The primary data collection for the study was information collected in the form of questionnaire form general public.

Primary data was also collected by performing an experiment to create a 7 course menu featuring Maharashtrian dishes in a modern way. A tasting was conducted for the same and information collected there with in the form of comment cards.

#### B) Secondary Data Collection

For the purpose of this research, the recipes were collected from established chefs, housewives and food enthusiasts. cited from famous food websites and applications. The litera-

ture of the study was also collected through other secondary sources.

• **Experiment Conducted:** A fine dining seven course meal inspired by the collected recipes has been formulated. The palate and food choices of customers of various age groups have been taken into consideration while creating the menu. The menu showcases the essence of Maharashtrian delicacies. New techniques and plating styles have been added without interfering with the original flavor profiles. The menu is as follows.

**Menu**

**First Course:** Amuse Boushe

(Shankarpala with cream cheese mousse and cucumber-lemon pickle slaw)

**Second Course:** Soup

(Tomato *saar* with coconut meat & curry leaf-garlic oil)

**Third Course:** Appetizer

(Methijhunka kebab stuffed with *thecha* cheese served with *Am-batchuka* ketchup)

**Fourth Course:** Entrée

(Make your own tortillas- mini *dhirde*, dry *saoji* Mutton, creamy coconut chutney and onion-raw mango *koshimbir*)

**Fifth Course:** Rice

(*Masalebhat* with a biryani twist)

**Sixth Course:** Dessert

(*Puran* cigars with *Shrikhanda* ice-cream, strawberry sauce and *charoli*)

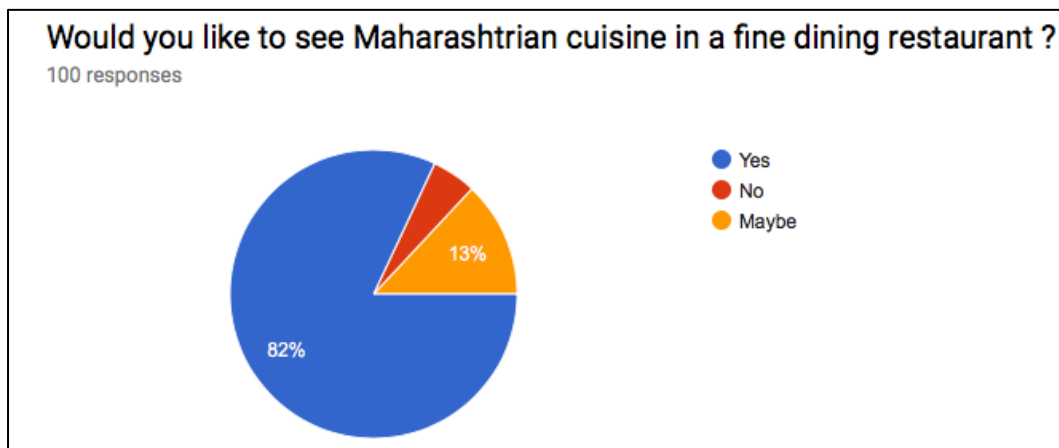
**Seventh Course:** Palate Cleanser

(*Tambul* and beetroot sorbet)

**Result and Discussion**

This research addresses a number of questions which examine the relationship between presentation of food in a Modern way and acceptance of food by customers.

To gather and fulfil the objectives of the study, a questionnaire was prepared by researcher. The answered questionnaires were converted into graphic representations. The results are as follows.

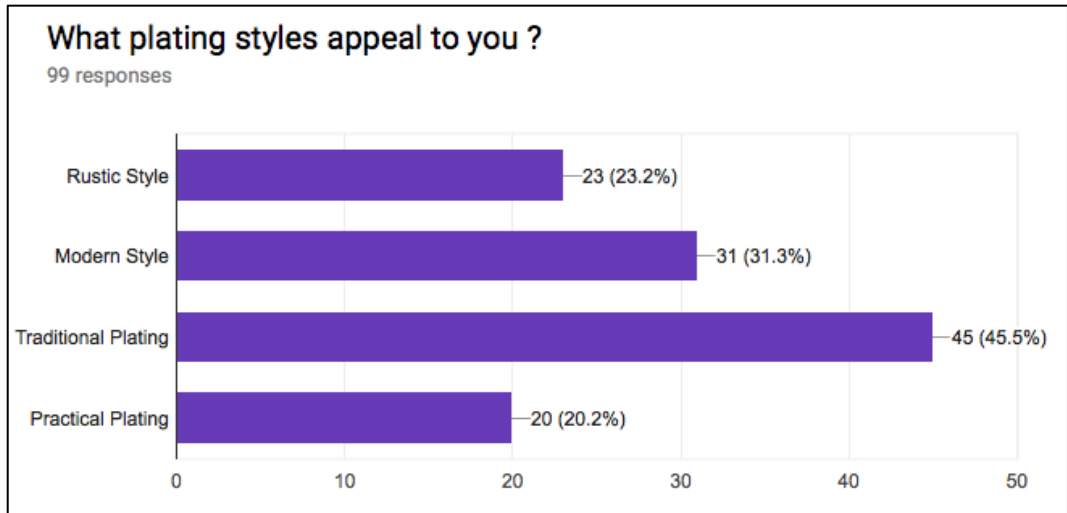


**Fig 1.**

**Acceptance of Maharashtrian Cuisine**

From the above table and Fig 1, 82% respondents will like Maha-

rashtrian cuisine in fine dining restaurant, 13 % are not sure and 5 % wont.



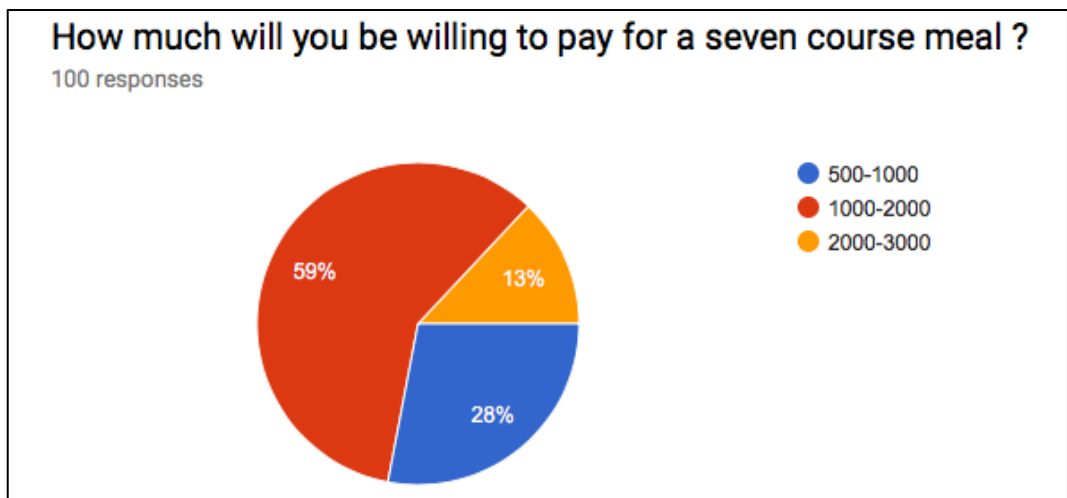
**Fig 2.**

**Preferred Plating Style**

From the above table and Fig 2, 23.2% respondents like rustic style of plating, 31.3% like modern style, 45.5% prefer traditional plating & 20.2% prefer practical plating.

**Table 1. Selection**

S. N.	Taste acceptance	Number	Percentage
1	Familiar taste	34	34.3%
2	Latest trend	12	12.1%
3	New & exciting preparations	53	53.5%



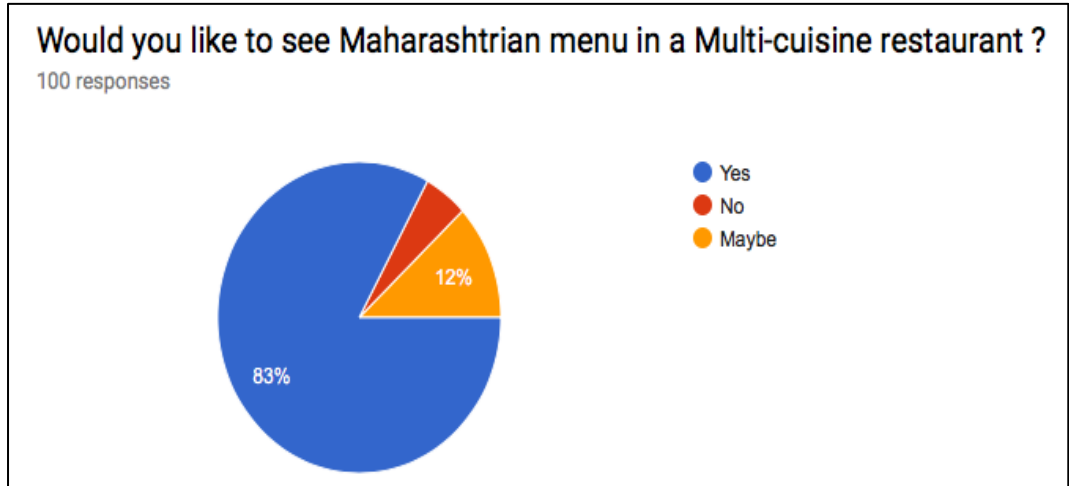
**Fig 3.**



**Accepted Cost**

From the above Table and Fig 3, 28% respondents are willing to pay 500-1000 Rs. For a seven course fine

dining meal, 59% are willing to pay 1000-2000 Rs. & 13% are willing to pay 2000-3000 Rs.

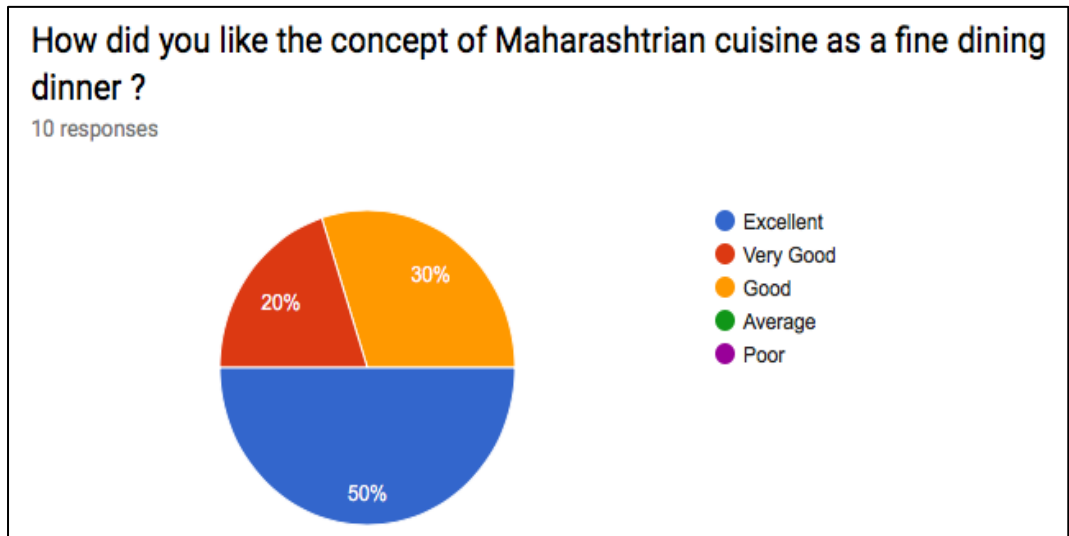


**Fig 4.**

**Entry in Multi-Cuisine Restaurant**

From the above table and Fig 4, 83% respondents would like to see

Maharashtrian menu in a Multi-cuisine restaurant, 5% wont & 12% are not sure.



**Fig 5.**

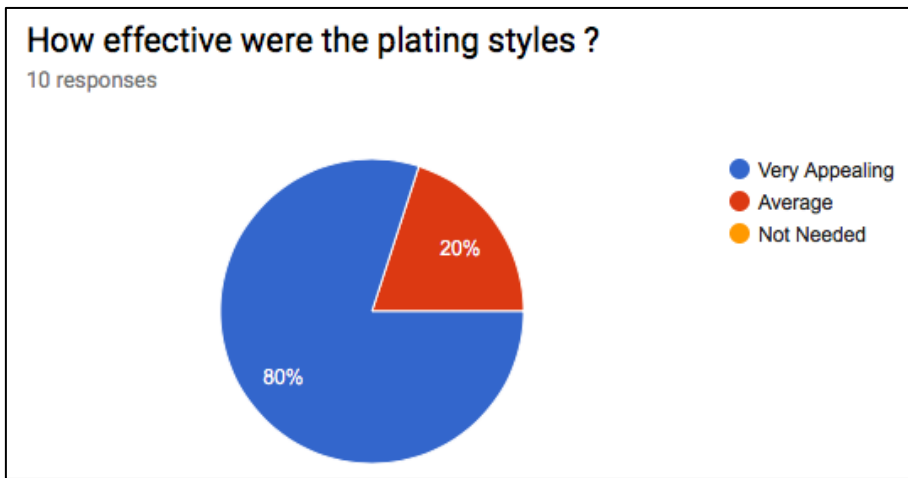
**Result of Testing Pannel**  
**Rating of Concept**

**Table 2. Rating of Flavours**

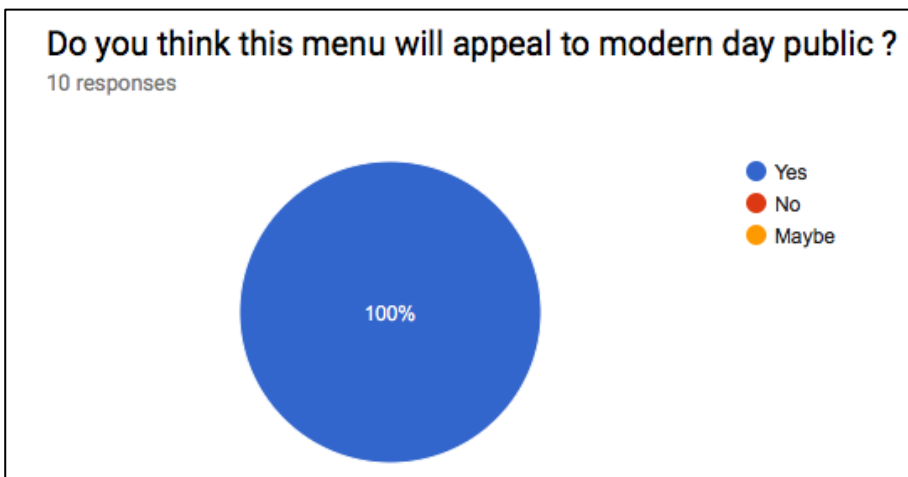
S. N.	Rating	Number	Percentage
1	Delightful	3	30%
2	Satisfactory	6	60%
3	Needs improvement	1	10%
4	Not at all		

From the above table and Fig 5, it is evident that 30% respondents enjoyed the fusion of flavors, 60% think it was satisfactory and 10% think it needs improvement.

**Effectiveness of Plating Styles**



**Fig 6.**



**Fig 7.**

**Table 3. Rating of Amalgamation**

S. N.	Rating	Number	Percentage
1	Good fit	6	66.7%
2	Element of novelty	3	33.3%
3	Not necessary		0
4	Does not fit		0

From the above table and Fig. 7, it is evident that 66.7% respondents think the cooking techniques were a good fit and 33.3% think it was an element of novelty.

### Summary

The research titled “elevating Maharashtra cuisine to fine dining standards”. Specific aims and objectives are focused on to make the study successful. The researcher framed 4 objectives for the same and came to certain conclusions with respect to the objectives. The study and experiment are limited to the city of Nagpur.

The literature required for this study was collected in secondary data from various websites, cooking applications, professionals and through general observation. The study gives us an outline of Indian cuisine. It defines the essence of the food and gastronomy of Maharashtra, specifically Vidarbha. It gives us knowledge of various Maharashtra recipes, the ingredients used and the methods of preparation. It shows that various spices, condiments, grains, pulses and vegetables are used optimally in the preparations to get the best possible outcome.

To gather proper primary data, an

experiment was conducted. The experiment was carried out by the researcher at ZAIKART commercial kitchen, Nagpur. A 7-course fine dining menu was crafted by the researcher. The menu showcases everyday Maharashtra recipes in a modern style. A tasting panel was organised to collect first hand feedback of the menu.

To gather further data, a survey was done by random sampling method.

### Conclusion

In this research, it is observed that due to lack of innovation and commercial exposure, many Non-Maharashtrian people are unaware of the delicacies of Maharashtra cuisine. The survey shows that if Maharashtra cuisine is introduced with innovative presentation and fusion, it would attract young Maharashtra as well as Non-Maharashtrian customers. Seven course fine dining Vidarbhaite menu is an idea that many respondents are looking forward to. It is also observed that fine dining Maharashtra menu is commercially viable to be introduced in modern restaurants. The researcher has demonstrated that Maharashtra cuisine can be elevated to fine dining standards.

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# Steganography for Secure Communication

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## Abstract

Steganography has been a common mode of secret communication in recent years. It is defined as the art of hiding information, data or messages in an image. The purpose is to pass on the information without any regard or knowledge of others safely to the destination. Now a day, maintaining the security of the secret information has been a great challenge. Sending messages habitually through a communication channel like Internet, draws the attention of third parties & hackers, perhaps causing attempts to break and expose the sent messages. Steganography is a promising region which can be used for secure data transmission over any public media. Although the steganographic approach can be carried out in either image, audio or video signals, due to the availability of higher degree of redundant data and easy accessibility in transmission mediums, digital images are the prevalent practice of steganography. The advantage of steganography is that those who are outside the party do not even realize that some sort of communication is being done.

**Key words :** Communication channel, Internet, Transmission medium, Digital image,

## Introduction

Since the rise of the Internet one of the most important factors of information technology and communication has been the security of information. Cryptography was created as a technique for securing the secrecy of communication and many different methods have been developed to encrypt and decrypt data in order to keep the message secret. Unfortunately it is sometimes not enough to keep the contents of a message secret, it may also be necessary to keep the existence of the message secret. The technique used to implement this is called steganogra-

phy. Steganography is the art and science of invisible communication. This is accomplished through hiding information in other information, thus hiding the existence of the communicated information. The word steganography is derived from the Greek words “stegos” meaning “cover” and “grafia” meaning “writing” defining it as “covered writing”. In image steganography the information is hidden exclusively in images. Information, especially photographs, can be reduced in size until it is the size of a typed period. Extremely difficult to detect, a normal cover message can be sent over an insecure

channel with one of the periods on the paper containing hidden information. Today steganography is mostly used on computers with digital data being the carriers and networks being the high speed delivery channels.

Businesses have also started to realise the potential of steganography in communicating trade secrets or new product information. Avoiding communication through well-known channels greatly reduces the risk of information being leaked in transit. For e.g. hiding information in a photograph of the company picnic is less suspicious than communicating an encrypted file. This paper intends to offer a state of the art overview of the different algorithms used for image steganography to illustrate the security potential of steganography for business and personal use. After the overview it briefly reflects on the suitability of various image steganography techniques for various applications. This reflection is based on a set of criteria that we have identified for image steganography.

Steganography must not be confused with cryptography, (any other means of communication) where we transform the message so as to make its meaning obscure to a person who intercepts it. Such protection is often not enough. In some applications, it is enough to hide the identity of either the sender or the recipient of the message, rather than its very existence. The detection of enciphered message between a soldier and a hostile government, or between a known drug-

smuggler and someone not yet under suspicion, has obvious implications; and recently, a UK police force concerned about criminal monitoring of police radios has discovered that it is not enough to simply encipher the trace, as criminals detect, and react to the presence of encrypted communications nearby.

Criminals often find it sufficient for the initiator of a telephone call to be anonymous. Indeed, the main practical problem facing law enforcement and intelligence agencies is "trace selection" deciding which calls to intercept and because of the huge volume of traffic, this must usually be done in real time.

The techniques criminals use to thwart law enforcement vary from country to country. US villains use cellular phones that continually change their identity, using genuine identities that have either been guessed or intercepted. The introduction of GSM, with its strong authentication mechanisms, has led crooks to buy GSM mobile phones using stolen creditcards, use them for a few weeks, and then dispose of them.

Military organisations also use unobtrusive communications. Their preferred mechanisms include spread spectrum and meteor scatter radio, which can give various combinations of resistance to detection, direction finding and jamming; they are vital for battle-field communications, where radio operators are located are at risk of being attacked. On the Internet,

anonymous e-mailers can be used to hide the origin of an email message, and analogous services are being developed for other protocols such as ftp and http.

Techniques for concealing meta-information about a message, such as its existence, duration, sender and receivers are collectively known as trace security.

In Image Steganography method the secret message is embedded into an image as noise to it, which is nearly impossible to differentiate by human eyes. In video steganography, same method may be used to embed a message. Audio steganography embeds the message into a cover audio file as noise at a frequency out of human hearing range. The basic structure of Steganography is made up of three components: the “carrier”, the message, and the key. The carrier can be a painting, a digital image, an mp3, even a TCP/IP packet among other things. It is the object that will ‘carry’ the hidden message. A key is used to decode/ decipher/discover the hidden message. This can be anything from a password, a pattern, a black-light, or even lemon juice. This paper focuses on the use of steganography within BMP digital images using LSB Substitution, although the properties of Image Steganography may be substituted with audio mp3’s, zip archives, and any other digital document format relatively easily.

There are currently three effective methods in applying Image Steganography: LSB Substitution, Blocking,

and Palette Modification.

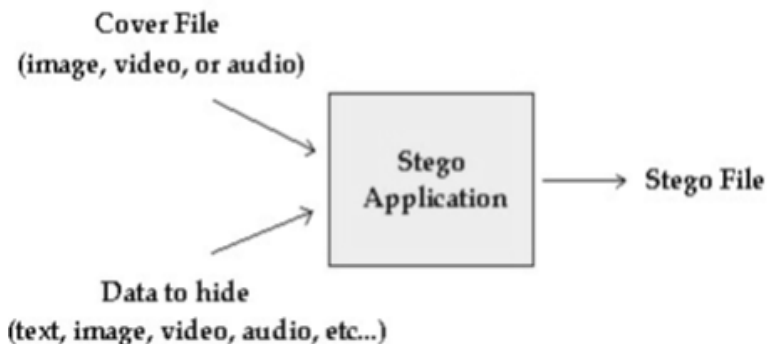
LSB (Least Significant Bit) Substitution is the process of modifying the least significant bit of the pixels of the carrier image. Blocking works by breaking up an image into “blocks” and using Discrete Cosine Transforms (DCT). Each block is broken into 64 DCT coefficients that approximate luminance and colour—the values of which are modified for hiding messages. Palette Modification replaces the unused colours within an image’s colour palette with colours that represent the hidden message.

We have chosen to implement LSB Substitution because of its ubiquity among carrier formats and message types. LSB Substitution lends itself to become a very powerful Steganographic method.

While the purpose of Steganography is to hide messages, it may not be very effective at doing so. There are several attacks that one may execute to test for Steganographed images - they are: Visual Attacks, Enhanced LSB Attacks, Chi-Square Analysis, and other statistical analyses. In performing a visual attack you must have the original image to compare it the Steganographed image and visually compare the two for artefacts. In the Enhanced LSB Attack, you process the image for the least significant bits and if the LSB is equal to one, multiply it by 255 so that it becomes its maximum value.

The text steganography is a method of using written natural language to

conceal a secret message. Although it can be applied with any sort of digital data, it is best suited for the cases where higher degree of redundancy is obtained. Therefore, digital images are considered to be an excellent medium for steganography. Since the alteration of Least Significant Bit (LSB) introduces at best one gray-level distortion in the particular image pixel, detection of this distortion is beyond the visual scope of human. Hence, Image Steganography using LSB has been a common approach. The trend towards electronic communications and humans desire to conceal messages from curious eyes. With rapid advancement in technology, steganographic software is becoming effective in hiding information in image, video, audio or text files.



The steganography application hides different types of data within a cover file. The resulting stego also contains hidden information, although it is virtually identical to the cover file.

What Steganography essentially does is exploit human perception; human senses are not trained to look for files that have information hidden in-

side of them, although there are programs available that can do what is called Steganalysis (Detecting use of Steganography.)

The ability to discern images with secret messages is directly influenced by the size of the secret message and the format and content of the carrier image.

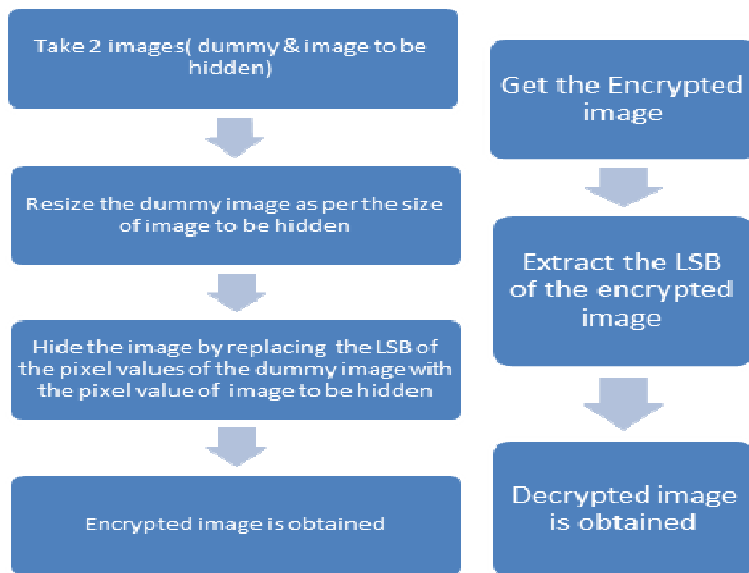
Obviously, the longer the message is, the larger the modification of the carrier image and the higher the probability that the modifications can be statistically detected. Given the complete knowledge of the algorithm including the image source, there is obviously an upper limit on the maximal length of messages that can be transmitted in a secure manner. The choice of the carrier image is also crucial. Natural photo-

graphs with 24 bits per pixel provide the best environment for message hiding. The redundancy of the data helps to conceal the presence of secret messages. Compressed images, such as JPEG files, are more sensitive to small perturbations of the image data and pose a challenge for creating a secure steganographic technique with reasonable capacity.



**Methodology**

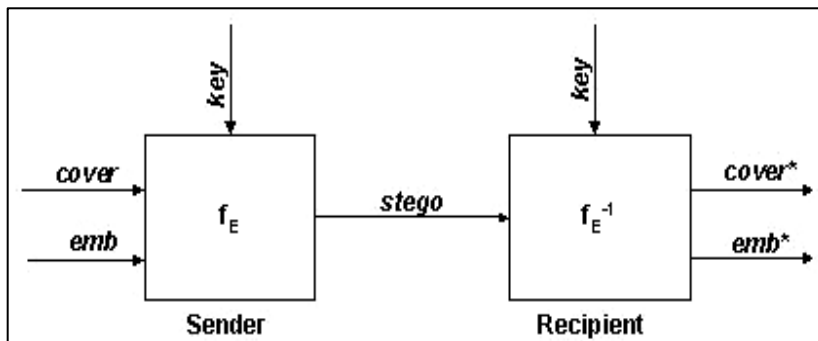
The procedure for encryption and decryption is shown in the flowchart below:



**Encryption and Decryption**

The size of the key image should be less than or equal to the carrier im-

age so that the message to be encoded will not be lost.



**1. Encryption of black and white image to grayscale image:**

The LSB of the carrier image are replaced by the bits of key image to hide the secret image.

Key image: (10110101)

Cover image:

```

(10110111 01001011 00010111
00010100
10110000 010001010 11110000
00101010)
  
```

Encrypted image:

(10110111 0100101000010111  
00010101  
10110000 010001011  
1111000000101011)

For decryption, the bits which were replaced to hide the message are extracted from the received image and the secret image is obtained.

### 2. Encryption of grayscale image to grayscale image:

The number of pixels of grayscale image depends on the size of image. One pixel of gray scale image can be decoded into 8 bit data. So when the image is to be hidden in the same type the LSBs of the carrier image are replaced by the MSBs of key image.

And to obtain the secret image the LSBs of the encrypted image are extracted.

Key image : one pixel (10001010)

Cover image: one pixel (01010011)

Encrypted image: one pixel  
(01011000)

### 3. Encryption of grayscale image to colour image:

When using a 24-bit image, a bit of each of the red, green and blue colour components can be used, since they are each represented by a byte. In other words, one can store 3 bits in each pixel. For grid for 3 pixels of a 24-bit image can be as follows:

Cover image:

(00101101 00011100 11011100)  
(10100110 11000100 00001100)

(11010010 10101101 01100011)

Key image: one pixel (11001000)

Encrypted image:

(00101101 00011101 11011100)  
(10100110 11000101 00001100)  
(11010010 10101100 01100011)

### Benefits

With LSB Substitution it is quite easy to tell if an image has been Steganographed with an Enhanced LSB Attack. A complex image yields a much better Steganographed image that is harder to visually detect Steganography. Chi-Square Analysis can detect Steganography much better than Enhanced LSB's; however, one can still construct an image to account for statistical irregularities so that when applying Steganography to an image, they can make sure to preserve (as best as possible) the statistical frequencies.

### Applications

Steganography includes the concealment of information within computer files. In digital steganography, electronic communications may include steganographic coding inside of a transport layer, such as a document file, image file, program or protocol. Media files are ideal for steganographic transmission because of their large size. Steganography is used by some modern printers, including HP and Xerox brand color laser printers. Tiny yellow dots are added to each page. The dots are barely visible and contain encoded printer serial numbers, as well as date and time stamps.

## Conclusion

With this project we have learned a lot, especially about bit operations and bit masking. This project was fun from the start and only got more interesting as we went on developing it. We became more interested in the subject the more we researched it. We have learned that while implementing Image Steganography is important, thinking of how to detect and attack it and the methods to do so are far more complex than actually doing the Steganography itself. There is a lot of research that is beginning to discover new ways to detect Steganography, most of which involve some variation of statistical analysis. It is interesting to see what other methods will be developed and how accurate they will be at detecting Steganography.

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# Production of Guava and Strawberry Jelly at Lab Scale and Evaluation of Nutrient Status and Shelf Life without Adding Preservatives

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## Abstract

The study was carried out to observe the storage qualities of guava and strawberry jelly prepared in lab without adding any preservative. Both the jellies were stored in three conditions that are in room temperature, in dark condition and in freeze condition. Citric acid was added in jelly preparation to increase acid concentration of guava and strawberry juices. The increased acid concentration of guava and strawberry juices increases the jelly strength at pH 3.4. After preparing jelly, evaluation of the storage condition was carried out, by the analysis of chemical composition which included, pH, titratable acidity, reducing sugar, total sugar, non-reducing sugar. Microbiological estimation was done through bacterial plate count. Standard plate count is used to determine the level of microbes in the stored guava and strawberry jellies. This data was used as an indicator of food quality and predictors for the shelf life of the product. Determination of yeast and mould were done according to the "recommended method for the microbiological examination of food".

**Key words :** Jelly, shelf life, Titrable acidity, Microbiological estimation,

## Introduction

Jelly is semi-transparent confection consisting of strained juices of various fruits with high pectin content. Fruit jellies are available in market with various flavors.

Guava [*Psidium guajava*] is one the most common and important fruit in India. Guava is popular among the people of all social strata due to its comparative low price than some other fruits, nourishing value and good taste and is rich in vitamin C [260 mg/100g of fruit] and pectin which has industrial use for jelly production [Bose and

Mitra, 2011].

Strawberry is the widely grown hybrid species of the genus *Fragaria*. The fruit is appreciated for its aroma, colour and taste. The fruit is a good source of vitamin A (60 IU/100g) and vitamin C (30-120 mg/100g) and also has high pectin (0.55%) content, available in the form of calcium pectate, which serves as an excellent ingredient for jelly making (Mitra, 1991).

The prevention of losses of the seasonal surplus of the fruit by processing and prevention technique at farmer's level and as well as industrial

scale should be warranted. Such efforts will help the development of processing industries in the growing areas of the countries.

Overall objective of this study is how the jellies are beneficial and nutritive without adding preservatives and also to evaluate their shelf life.

### **Materials and Method**

The Experiment was carried out in the laboratory of the Department of Biotechnology at LAD and Smt. R P Women's college, Shankar nagar, Nagpur during the period of February – April' 2019

The experimental materials are fresh fruits of guava and strawberry, sugar were purchased from chemical stores of Nagpur.

### **Preparation of fruit jellies**

Ripened fruits were washed thoroughly and sliced and added in boiling water (1:1.5 w/v). After 30 minutes boiling the mixture was strained. The filtrate was again boiled and the sugar was added (double of the volume of mixture v/w). The mixture was further boiled with continuous stirring till the end point was reached by checking it through drop method. The prepared jellies were immediately transferred into clean capped bottles for further analysis.

### **Chemical analysis of the jelly**

The prepared guava and strawberry jelly were stored in three conditions that are, at room temperature, in dark condition and in refrigeration. The samples of jellies were analysed for

vitamin-C (ascorbic acid), pH, titratable acidity, reducing sugar, non- reducing sugar and total sugar content as per the methods of Ranganna (1992).

### **Determination of pH**

Determination of pH was done through pH strip ranging from 1-5.

### **Titratable acidity**

2g of sample was taken and dissolved it with distilled water. Take 2 ml sample in beaker. The burette was filled with 0.1N NaOH. Two drops of phenolphthalein indicator was added and sample was titrated against 0.1N NaOH with constant shaking. Stop titration when pink color end point was detected. The burette reading was noted. Calculate the acidity in terms of citric acid by using following formula,

$$TA(\%) = \frac{(\text{Normality of NaOH}) \times (\text{mLs of NaOH})}{(\text{mLs of sample}) \times 100}$$

where, TA= titratable acidity

### **Qualitative estimation of reducing sugar by Benedict's Test**

Take 2ml of Benedict's reagent and add in 0.5ml sample in boiling test tube. Heat the test tube boiling and note the colour changes.

### **Quantitative estimation of reducing sugar by DNS Test**

The reducing sugars are estimated by reaction with 3, 5-dinitrosalicylic acid, which is reduced to 3 amino 5 nitro-salicylic acid under alkaline condition to give orange colour.

**For std. glucose curve**

- 0.05gm glucose was dissolved in 20ml dH<sub>2</sub>O as working std. solution.
- Set 7 test tubes was prepared according to the protocol to get std. glucose curve.
- These tubes were prepared in boiling water bath for 5 min. and then cooled to room temperature.
- The O.D. was then taken at 540nm in spectrophotometer.
- Graph was plotted.

S. N.	Reagents in ml	B	1	2	3	4	5
1.	Glucose	–	1	1.5	2	2.5	3
2.	Distilled water	3	2	1.5	1	0.5	–
3.	DNS reagent	1	1	1	1	1	1

**Estimation of reducing sugar**

5g of Jelly sample was taken in a 500 mL Beaker. 100 mL warm water was added and neutralized with 10% NaOH. 2 mL of lead acetate solution was added and it was stand for 10 min. The necessary amount of sodium oxalate solution was added to remove the excess of lead. The volume was made up to 250 mL with distilled water and filtered. 10 mL of a mixed Fehling's solution (5 mL Fehling's solution-1 and 5 mL Fehling's solution-2) were pipetted into a conical flask. A burette was filled with the clarified sample solution and running the whole volume required to reduce the Fehling's solutions so that, 0.5-1.0 mL was still required to complete the titration. The

content of the flask was mixed and then heated to boiling for 2 min. Three drops of methylene blue indicator were added. Then the titration was continued till the color completely disappeared.

**Calculation:**

The percentage of total sugar was calculated by the following formula:

mg reducing sugars per 100mL

$$= \frac{\text{Factor} \times 100}{\text{Titre}}$$

% of Reducing sugar

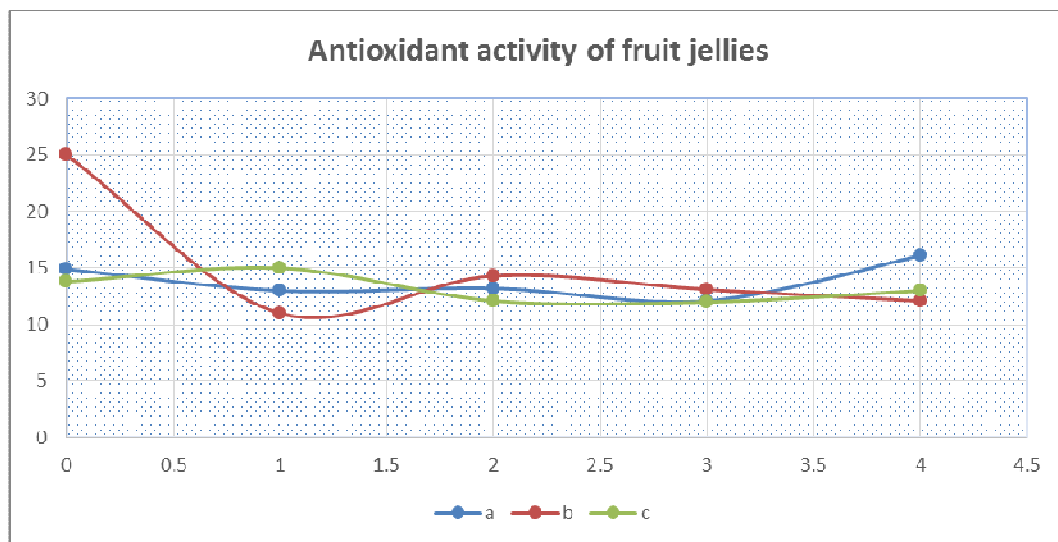
$$= \frac{\text{mg}/100\text{mL} \times \text{Dilution} \times 100}{\text{Weight of the sample} \times 1000}$$

**Antioxidant activity**

DPPH is very stable organic radical with deep violet colour which gives absorption maxima within 515 to 528 nm. 118mg DPPH was dissolved in 5 mL 96% methanol, mixed and volume was raised to 100 mL with methanol.

**Procedure**

- 2mL of 96% methanol was used in labelled cuvettes as control (blank).
- Dilution of sample was prepared in 96% methanol and used as test sample.
- 100µl of blank was used for each sample tubes.
- 0.5mL of prepared DPPH solution was added to control and sample tubes and these tubes were swirled in vortex for few seconds.
- All the tubes were kept in dark for 20 min.



a= Guava, b= Strawberry, c= Ascorbic acid

**Fig 1. Antioxidant activity of fruit jellies**

- The absorbance was observed at 514 nm against blank

**Calculation**

The mean absorbance at each test compound dilution was done by the calculation of percent inhibitory activity -

$$IA\% = [(A_0 - A_s)/A_0] \times 100$$

$$DPPH \text{ scavenging activity } (\%) = \{1 - (abs_{514} \text{ sample}/abs_{514} \text{ DPPH sol}) \times 100\}$$

**Microbiological estimation??**

Microbiological estimation of guava and strawberry jelly were done according to the method as described in the “Recommended Method for the microbiological Examination of Food” (APHA, 2011).

**Determination of yeast and mould count**

The yeast and moulds were deter-

mined by serial dilution method grown by spread plate method. The number of microorganisms present in the particular test sample is determined using the formula:

$$CFU/mL = CFU \times \text{dilution factor} \times 1/\text{aliquot}$$

$$CFU/mL = \frac{(\text{No. of Colonies} \times \text{Total dilution factor})}{\text{Volume of Culture plated in ml}}$$

**Result and Discussion**

**Preparation of jelly**

The jelly of both the fruits were successfully prepared and then checked for its shelf life.

**Chemical analysis of the jelly**

**Table 1. Determination of pH**

Fruit	1 <sup>st</sup> week	2 <sup>nd</sup> week	3 <sup>rd</sup> week	4 <sup>th</sup> week	5 <sup>th</sup> week
Guava	3.5	3.5	3.5	3.5	3.5
Strawberry	3.5	3.5	3.5	3.5	3.5

**Table 2. Determination of Titrable acidity**

Fruit	1 <sup>st</sup> week	2 <sup>nd</sup> week	3 <sup>rd</sup> week	4 <sup>th</sup> week	5 <sup>th</sup> week
Guava	0.4	0.3	0.3	0.3	0.3
Strawberry	0.3	0.3	0.3	0.3	0.3

**Table 3. Qualitative Analysis of reducing sugar by Benedict's test**

Fruit	1 <sup>st</sup> week	2 <sup>nd</sup> week	3 <sup>rd</sup> week	4 <sup>th</sup> week	5 <sup>th</sup> week
Guava	-	-	-	-	-
Strawberry	-	-	-	-	-

**Table 4. Quantitative Analysis of reducing sugar by DNS test**

Fruit	1 <sup>st</sup> week	2 <sup>nd</sup> week	3 <sup>rd</sup> week	4 <sup>th</sup> week	5 <sup>th</sup> week
Guava	25%	25%	24%	24%	24%
Strawberry	26%	26%	25%	25%	25%

**Table 5. Shelf life jellies**

Jelly	Room temperature	Dark conditions	Refrigerator
Guava	Contaminated after 8 weeks	Contaminated after 4 weeks	No contamination
Strawberry	Contaminated after 6 weeks	Contaminated after 4 weeks	No contamination

A physically stable jelly retained its, colour, taste and odour throughout its shelf life in fridge, however the storage qualities of dark were not found suitable after 6 weeks and in room temperature jelly retained its quality. In the microbiological estimation some colonies of moulds were observed in strawberry jelly, as the pectin is less in strawberry fruits which has

acidic pH and serves to protect from microbial contamination. The high antioxidant activity was found when compared with standard ascorbic acid (Andres *et al.* 2001).

## Conclusion

Fruits are valuable sources of vitamins, minerals and carbohydrates. It could be concluded that the investigated jellies without using any preservatives are good for health as they have sugars in the normal range i.e 28% and with high antioxidant activity.

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# Microbial and Nutritional Evaluation of Fresh and Packed Pineapple Juice

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## Abstract

Fruit juices are regarded as the most preferred non-alcoholic beverage worldwide for all age groups. In general, microbial growth in fruit juices is restricted by using preservatives and also through other environmental factors during production. Still, the presence of some indicator organisms in fruit juice is responsible for causing food-borne diseases and even death. So, from public health point of view, it is quite important to know the microbiological quality of the fruit juices available in the market. Primary objective of this study was to assess the microbial quality of fresh and commercially packed available juices collected from different locations of city. Fresh juice sample and two brands of processed fruit juice samples were evaluated for the microbial analysis and nutritional estimation. Physico-chemical composition included pH, titratable acidity, reducing sugar, total sugar, non-reducing sugar. Microbiological estimation was done through serial dilution method, spread plate method, and by using MaCconkey Agar (selective media). Staining methods for identification of different strains of bacteria was done by gram staining, endospore and capsule staining. This data is used as a reference to the study of microbial and nutritional analysis of packed and fresh juice samples.

**Key words :** Beverage, Endospore, Capsule, Gram staining, Coliforms,

## Introduction

Freshly extracted fruit juices, which have always been considered as healthy drink, may not always be safe, owing to the heavy load of microbes. In a situation where storage of juice is indispensable may be for a short duration, then the use of simple processing techniques soon after its extraction is essential for improving the keeping quality to ensure its safety, nutritive quality and acceptability while consumption. Preservation of fruit juice by

pasteurization, refrigeration and sterilization are popular methods used to attain microbiological stability by destroying pathogenic microorganisms and to preserve the color, aroma and taste of fresh juice (Kutama *et al.*, 2010; Mosqueda-Melgar *et al.*, 2012). Fruit juices are available in bottles, cans, laminated paper packs, pouches and cups. In recent years these juices have been included significantly in the diet of most people, irrespective of age. Therefore, maintaining the quality of processed fruit juices is an im-

portant concern. In order to develop awareness among the people about fruit juices, this study attempts to measure nutritional and microbiological quality of industrially processed locally available fruit juices.

### **Materials and Methods**

The experiment was conducted in the laboratory of the Department of biotechnology, L.A.D. and Smt. R.P. Women's College, Shankar nagar, Nagpur, during the period of February-April-2019

The experimental materials were two commercially available tetra packed pineapple juice and a freshly prepared pineapple juice sample. The packed juice and fresh pineapple fruit were purchased from the local market of Nagpur. The relevant materials required for the experiment were received from the laboratory stocks (from regular stockist)

### **Preparation of sample**

Two commercial tetrapack of 200ml pineapple juice were opened under the aseptical condition in the laboratory i.e. Sample I and Sample II. The fresh pineapple juice was prepared with fresh pineapple fruit by using handy juicer and named Sample III.

### **Microbial evaluation**

Determination of microbial load of the samples was done based on the method described by Rashed *et al.*, (2013). Serial dilutions of samples were made to  $10^{-5}$  dilutions with sterile normal saline water. Plates were screened for the presence of discrete

colonies after incubation period and the actual numbers of bacteria were estimated as colony forming unit per ml. The load of specific microorganisms was determined by plating the bacteria on Selective media (MacConkey Agar). Total coliform count (TCC), faecal coliform count (FCC), Total Staphylococcal count (TSC), was also performed on MacConkey agar. Then the microbial colonies grown on the media were studied by different staining processes like Gram staining, Endospore staining and capsule staining.

### **Gram staining**

Gram Staining is a common, important, and most used differential staining techniques in microbiology, which was introduced by Danish Bacteriologist Hans Christian Gram in 1884. This test differentiates the bacteria into Gram Positive and Gram Negative Bacteria, which helps in the classification and differentiations of microorganisms.

### **Capsule staining**

The main purpose of capsule stain is to distinguish capsular material from the bacterial cell. A capsule is a gelatinous outer layer secreted by bacterial cell and that surrounds and adheres to the cell wall.

### **Endospore staining**

Bacterial endospores are metabolically inactive, highly resistant structures produced by some bacteria as a defensive strategy against unfavorable environmental conditions. The bacteria

can remain in this suspended state until conditions become favorable and they can germinate and return to their vegetative state.

**Nutritional Estimation**

The samples of packed and fresh pineapple juices were analysed for vitamin-C (ascorbic acid), pH, titrable acidity, reducing sugar, non- reducing sugar and total sugar content as per the methods of Ranganna (1992).

**Result and Discussion**

**Table 1. Microbial estimation**

S. N.	Sample	Gram Staining	Endo-spore	Capsule
1.	Sample I	Gram -ve bacteria	Present	Present
2.	Sample II	Gram -ve bacteria	Present	Present
3.	Sample III	Gram -ve bacteria	Absent	Absent

From the above Table 1, reveals the presence of gram negative bacteria in all the samples. Whereas, the commercial packed juices contained endospores and capsules of bacteria.

**Table No.2: Total Coliform count found in the sample**

Sr No	Juice type	Total Coliform Count
1.	Sample I	4.75x10 <sup>3</sup> cfu/ ml
2.	Sample II	3.5x10 <sup>2</sup> cfu/ ml
3.	Sample III	00

Table 2 reveals the microbial contamination by counting the colony forming units on cultures grown from

juice samples (cfu/ml). Sample I contained the maximum bacterial contamination, Sample II was found to be less when compared with first sample. However, the fresh samples didn't contain any microbial contamination. From the data presented in the current study, on the basis of microbial evaluation it could be claimed that, consumption of fresh homemade juice was safe than commercially packed juice because commercially packed juice samples collected from Nagpur city were not satisfactory as coliforms were found in the sample.

**Table 3. The freshly prepared and packed pineapple juice was analysed for its Nutritional evaluation and the results are shown in following Table.**

S N	Bio-chemical Test	Sample I	Sample II	Sample III
1.	pH	4.0	4.0	3.5
2.	Titratable Acidity (TA)	1	1.3	2
3.	DNS Test (Reducing sugar)	5%	60%	42%
4.	Ascorbic Acid test	12.5	1.5	33
5.	Fehling's test (Reducing Sugar)	35	38	32
6.	Fehling's test (Total Sugar test)	55	60	48

The above results mentioned in Table 3 reveals the high amount of sugars in both the commercial samples, as they contain added sugars, but

the high amount of ascorbic acid and natural sugars are present in less amount proves that the fresh samples are more healthier.

Ascorbic acid is a chemical compound (C<sub>6</sub>H<sub>8</sub>O<sub>6</sub>) that is commonly found in nature and can be used as an antioxidant food additive (Andres *et al.* 2001). Ascorbic acid is used primarily as an antioxidant, which can provide multiple benefits to food products. Slowing the oxidation preserves color and freshness. The low pH of ascorbic acid can help prevent microbial growth, thereby preventing spoilage and preserving freshness. For these reasons, ascorbic acid is a popular natural ingredient preservative.

### Conclusion

In the fresh juice sample the highest amount of ascorbic acid i.e 33 was found, when compared with tetra packed juice samples. The consumption of fresh juice is more preferable than packed juices. Freshly prepared juices prepared in hygienic condition are free from microbial contamination with good nutritional values. A combination of regular monitoring and proper training could be an appropriate choice in fruit juice industries to minimize the health risks. In addition to this, not only government authorized institution like BCSIR and BSTI but also some strongly active administrative organization should be given more authorization to undertake precautionary investigations to check the microbial and chemical quality of fruit juices.

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