Theme of this book is highly concerned with different aspects of food, nutrition and agriculture where various awareness and development projects are essential for upliftment of the community. The disciplines of food science has undergone tremendous changes in the past few decades reading to today's scientific farming that is emerging as boon to economy all over the world. This book is bringing valuable information/ guidance towards the dream vision of Respected Prime minister 'Shri Narendra Modi' of India. This will be a very useful book for research scholars, students, community development Professionals, entrepreneurs, policy makers, economists and anyone who has a desire to make sustainable and self empower community.

Dr. Khushboo Gupta, a freelance Dietitian who is the keynote speaker and founder of YouTube channel "Dietitian ki Salah". She is a profound speaker and writer and presently working as Assistant Professor in Sikar (Rajasthan). She won many awards in different International and National Conferences for her contribution in relevant field of scientific world.

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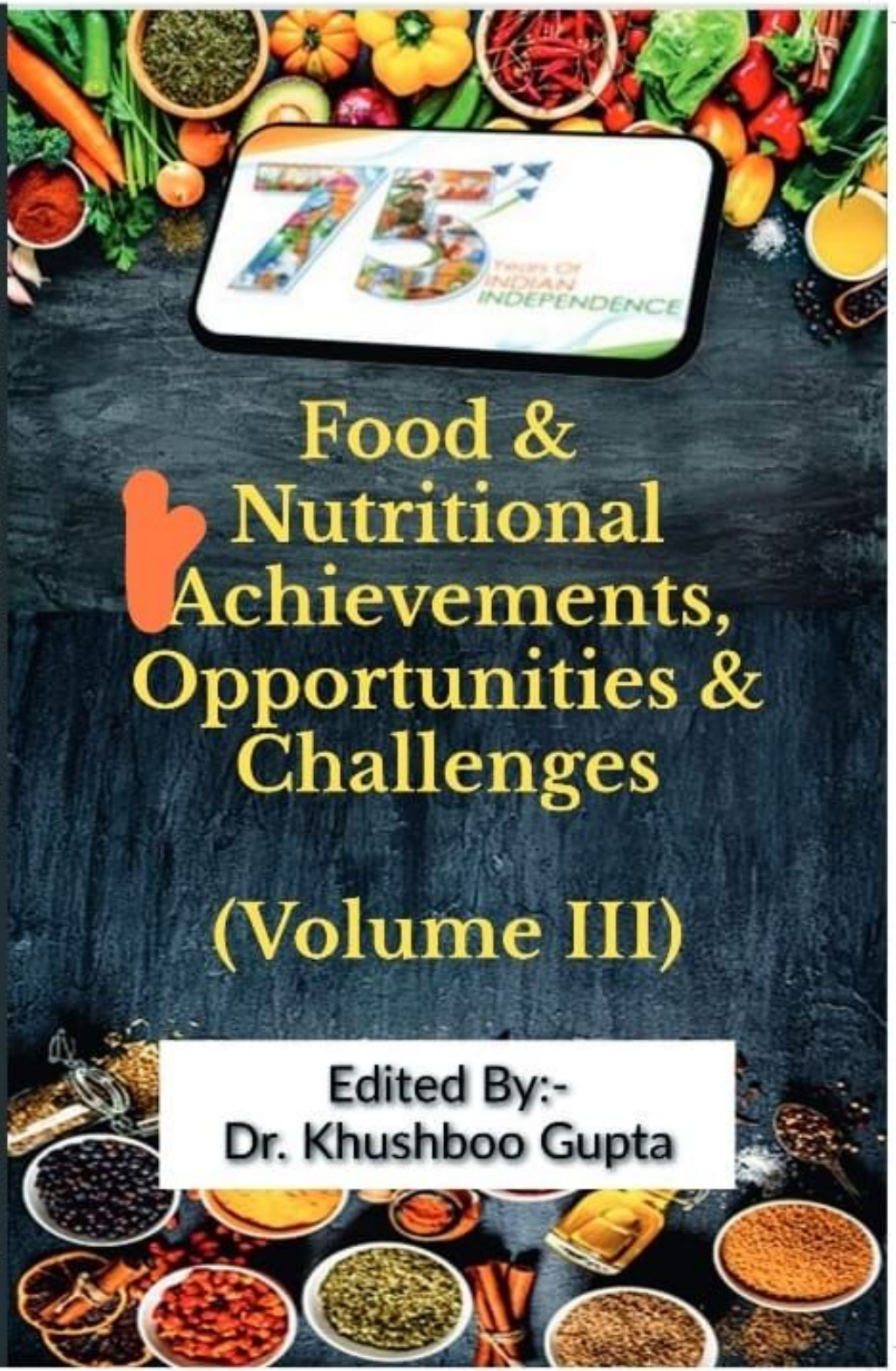
75 Years of Indian Independence: Food and Nutritional Achievements, Opportunities and Challenges (Volume III)

Dr. Khushboo Gupta



Food & Nutritional Achievements, Opportunities & Challenges

(Volume III)

Edited By:-
Dr. Khushboo Gupta

75 years of Indian Independence: Food and Nutritional Achievements, Opportunities and Challenges (Volume III)

DR. KHUSHBOO GUPTA

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CONTENTS

Preface _____ *vi*

Acknowledgements _____ *ix*

Editor Biography _____ *xi*

List of contributors _____ *xiii*

1. Food Security _____ **1**
Ms. Sneha Sarkar[1], Dr. Aditya Lama[2]

2. Home Garden: A Promising Strategy To Increase Household Food Security And Well-Being _____ **17**
Ms. Charu Mendiratta[1], Dr. Shilpi Sharma[2], Mr. Mandeep Singh[1]

3. Formulation Of Fresh Fruit Jams And Their Quality Assessment Through Organoleptic Analysis By Hedonic Test _____ **46**
Khushboo Gupta[1], Mamta Tiwari[2] and Gunjan Sanadya[3]

4. Synergic Impact Of Food, Nutrition And Health On Tourism In India _____ **58**
Pankaj Jangid, Dr. Reema Ningthoujam and Dr. Harish Kumar Dhingra*

5. Journey Towards Malnutrition To Wellness ___ **68**
Dr. Deepti Singh

6. Role of Dietitian in the Treatment of Lifestyle Diseases _____ **85**
Jhansi Vadlamudi[1] and Dr K Anuradha[2]

7. Psychological Issues And Challenges Related With Food And Nutrition _____ **96**
Ranjana Sinha[1], Dr Deep Shikha Pandey[2]

8. Comparison Between Nutritional And Health Status Of Hosteller And Non-Hosteller Adolescent Girls _____ **109**
Tripti Kumari[1] and Anita Chandola[2]

PREFACE

Food and Nutrition Science is a science that deals with numerous aspects of food and nutrition, i.e., assessment of quality, their use, utilization, processing and their uptake in vivo or vitro. Food is the basic need of an individual without which survival of a person is difficult. In India it is believed that "stomach is a way to reach the individual's heart", hence a lady should know different techniques to prepare healthy, tasty and mouth watering food. But food is not only used to serve this purpose. If one consumes it properly, food can work as medicine or vice- versa. Thus aspirants of this field are now becoming nutritionists, dietitians as well as starting their own food processing set-ups.

In present era, the field of food and nutritional science is experiencing much more awareness, new information and new developments. Old information needs to be revised and some new information needs to be added, therefore, this book has been designed and structured to update the current developments in subject areas.

This is the third volume of the title "75 years of Indian Independence: Food and Nutritional Achievements opportunities and challenges" which deals with food security, new food product development, psychological issues and challenges with food, home gardening and impact of food on tourism, etc. Apart from that why wellness is necessary and how life style diseases can be treated using food and nutrition.

This book will be very useful for students all over in India and Abroad, academicians, public health specialists, community science specialists, community development

professionals, programmers of national and international agencies, entrepreneurs and aspirants of new start ups/ enterprises as well as libraries of relevant collages and institutions.

This book should be of interest to policy makers, bureaucrats, economists and community scientists and can be a reference material development industry.

This is my fifth book in the series of community upliftment. The first book titled as "Vridhopayogi Vyanjan: Vridhjano ke liye Upcharatmak Pak Vidhiyan (year 2016)" which contains more than 65 healthy food recipes developed, prepared and clinically verified by myself alone, tailored with the nutritional needs of the geriatric population.

Second book titled as "Community Science and Sustainable Community Development" that provides excellent research data related to different aspects of community which will be helpful to strengthen the sustainability of a community in terms of health, nutrition, wellness and economy.

First Volume of the book titled as "Food and Nutritional Achievements, Opportunities and Challenges" is the third book published in the series of community upliftment, which deals with general aspects of food science. That are very essential for food and nutritional security as well as sustainable development of a community research provided in this book not only enhance the knowledge regarding how to attain sustainability but gives knowledge in the area of agriculture, food habits, effect of climate change, health, wellness and nutrition. Chapter of this volume particularly based on the topics related to food security; food habits during COVID pandemic; role of information and

communications technology; organic farming,; farming and mental health issues; climate change and human health.

Second volume of the title "75 years of Indian Independence: Food and Nutritional Achievements opportunities and challenges" is the forth book published in the series of community upliftment which deals with the importance of nutrition in different lifespans as pregnancy is a phase where a new child develops in the uterus of the mother, at this stage intake of appropriate nutrients is very essential. Deficiency of any nutrient may be fatal, hence, chapters of this book are related to the different researches related to the importance of nutrition in adolescent girls and young women. How malnutrition affects the bearing capacity and what is the role of mother after delivery of a child.

With great pleasure, I would like to extend my sincere thanks to all the learned contributors for the magnificent work they did in making sure that their timely response, excellent devoted contributions to detail and accuracy of information presented in this text along with their constant support and cooperation has made my task as editor a pleasure.

It is hoped that this book will stimulate discussions and generate helpful comments to improve future projects.

Happy reading and feedback awaited.

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It is indeed a great pleasure for me to express my profound gratitude to these eminent yet approachable personalities who helped me to bring this humble endeavour to its fruitful completion.

I am grateful to almighty God, who provided me an opportunity and ability to accomplish the great task, who in every moment of my life, always blessed me beyond my imagination, helped me in every difficult time and gave me strength and perseverance. Whatever I am today is just because of them.

I deeply recognize the efforts by all authors for their contribution without whom this book will not look like what it is today. They deserve a special round of applause.

Finally, I acknowledge the sincere efforts of my family which has been the nucleus around which all my efforts have crystallized. No one can conquer without a strong base. I bow my head with great respect to my grandparents and hope that this work makes you proud. Thanks for your blessings. Words would fail to express my heartfelt veneration and deep sense of admiration to my loving siblings Er. Surbhee Gupta and Er. Saurabh Gupta for their love, affection, moral support, encouragement and help in every possible way to complete my work. Their unwavering faith in me has always been a source of constant inspiration for me.

I express deep and heartfelt obligation to my parents Mrs. Archana Gupta and Dr. Lok Mani Gupta for their patience, cordial affection, will power, blessings, moral support and for being my driving force. Their love

provided inspiration and motivation, without which this work would not have been completed. They are the real architects of my life. They inspired me to build castles when all I had was a fistful of sand. They always stood by me during all thick and thin. Without their support, patience, sacrifice, forebearance and unalloyed love, this work would never have seen the light of the day.

I want to express feelings of utmost gratitude towards my parents-in-laws for their blessings. I owe Heartfelt thanks to a very special person my husband CA Dinesh Agrawal for being there for me at every step of this writing journey. My husband's good spirits, patience, constant support and encouragement made it possible to accomplish this task. I appreciate my kids, Hemakshee Agrawal and Devansh Agrawal for abiding my ignorance and the patience they showed during this endeavour. Their cute smile inspired me to go forward and their playful and naughty activities relaxed me during my tough times. Words would never say how grateful I am to both of you.

In the end, I want to express my sincere and deepest gratitude to everyone who, in their own way, directly or indirectly, have helped me to complete this book but could not have found separate names, so just in case: thank you to whom it may concern.

Dr. Khushboo Gupta

Ph.D. (Food and Nutrition)

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Dr. Khushboo Gupta is a PhD Home Science (Food Science and Nutrition) from Banasthali Vidyapith, Newai, India. She has been teaching subject including food chemistry, food analysis, therapeutic nutrition, human nutrition, human physiology and community nutrition, etc. Presently she is working as Assistant Professor in Trilok Singh TT College, Laxmangarh, Sikar, Rajasthan.

She is MSc Gold medalist and had cleared UGC-NET and RPSC-SET examination. Dr Gupta holds Advance Diploma in French Language from Banasthali Vidyapith; Diploma in Naturopathy and Yoga (NDDY) from Gandhi Smarak Prakritik Chikitsa Samiti (Regd.), New Delhi; Certificate in Homeopathic Medicinal System conducted by Vardhman Mahaveer Open University, Kota and Certificate in Statistical Techniques and Applications. She has featured in several programs of All India Radio and Radio Banasthali (FM 90.4).

Dr. Khushboo is actively involved in community activities especially those concerned with self-employment, health and wellness, optimum nutrition and how to improve quality of life of a person and family. She is the keynote speaker and founder of her YouTube channel “Dietitian Ki Salah” through which she provides education related to optimum health, wellness and nutrition to masses. Dr. Gupta has published about more than 30 research papers in reputed national and international journals; 4 book chapters

in four different edited books, several news paper and magazine articles related to health, nutrition and new food product formulation. She authored one book related to elderly nutrition; edited a book related to community science and two books related to food science for upliftment of the individuals of the society. She presented her research work in more than 25 national and international conferences. Her research is primarily in the area of food processing entrepreneurial skill Inculcation and geriatric nutrition and her research on food formulation using RSM has culminated into the successful filing of a patent that has been published.

In past she had worked as Assistant Professor (Food and Nutrition) in Modi University, Laxmangarh, Sikar; worked as Master Trainer in Agriculture University, Kota. During her PhD she had worked as UGC- SRF in Banasthali Vidyapith, Newai. One feather in her cap is that she had worked as regular trainee dietitian in dietetics department of Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and got her short-term attachment certificate. She won many awards in different seminars and conferences for her contribution in scientific world. Apart from them, she is rewarded with Teacher Honour award by Lions Club Kota South (September, 2017) and 'Award of Honour' given by All Rajasthan Qualified Homoeopathic Doctors Association in Homoeopathic Scientific Seminar, 2017

She is the life member of many reputed institutes i.e. Nutrition Society of India, Indian Dietetic Association, The Indian Science Congress Association and Institute of Scholars and giving her services for upliftment of community.

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If readers have any query related to any chapter of the book, kindly contact with the corresponding author of the chapter. Authors of the chapters are responsible for their work.

1

FOOD SECURITY

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Abstract

This chapter seeks to link trade, food security, and economic concerns for developing countries within the context of the Doha Round debates. It includes some indications and forecasts of changes in the overall situation of food security in addition to describing the growing conceptual foundations of food security. The techniques to ensure food security at the household level and the frameworks for examining the many factors that might have an impact on food security at this level of disaggregation are covered in the next section. Make sure there is enough food on hand, that supplies are mainly stable, and that every one has access to food in order to ensure food security. It is feasible to see buying power as having an impact on food security, among other things, atleast at the household level, if not the national one. The latter, in turn, is affected by economic growth and the distribution of resources and income. Simply stated, this shows that for many developing countries, justice and food security are two sides of the same coin.

Keywords: food security, economic growth, household-level, developing countries

1. Introduction

As seen by the many efforts at characterization in research and policy applications, food security is a changing objective. There were around 200 definitions in published publications ten years ago (Maxwell, S.*et al.,* 1992). It is essential to concentrate on when a concept is present in a study's title or aims to assess if a description is provided openly or implicitly. (Maxwell, S. 1996)

A broader understanding of the complexity of the technological and policy issues at hand is reflected in the ongoing evolution of the term "food security" as an operational phrase in public policy. The most recent conscious repositioning of food security in the global conversation occurred at the World Food Summit (WFS) in November 1996. Here are the official publications from the World Bank and FAO (Food and Agriculture Organization) from the middle of the 1980s, as well as the accepted definitions of food security from 1974 and 1996. Each major change to the concept is noted. Considering these two definitions demonstrates the substantial advancements in food security accomplished by the government over the preceding 25 years. These declarations also highlight the policy studies that have changed how we think about food poverty as a problem that needs both local and international solutions.

The term "food security" did not appear until the middle of the 1970s, at a time of widespread famine. At first, the focus was on making sure that basic goods were available both inside and outside of the country and that, to some extent, their prices were stable. Changes in the global food market led to supply-side, international, and

institutional problems, which in turn caused the crisis. . International negotiations led to the 1974 World Food Conference and a new set of institutional structures for sharing knowledge, accessing tools for enhancing food security, and debating the most pressing issues in food policy. (ODI. 1997)

2. Concerns from the government about food security

In 1974, worries about the state of the world's food supply and its reliability were the main themes of discussion. The 1974 World Food Summit placed a strong emphasis on food security: “sufficient global food supplies of essential commodities available at all times to maintain a steady rise in food demand and counteract changes in output and pricing”. (United Nations. 1975)

In 1983, the FAO expanded its definition of food security to include protecting vulnerable groups' access to food reserves and making sure that both the supply and demand sides of the food security equation are given equal attention: “ensuring that all people have physical and economic access to the fundamental foods they need at all times” (FAO. 1983)

The World Bank's 1986 research "Poverty and Hunger" (World Bank. 1986) examined the temporal dynamics of food insecurity; its findings were very influential. Food insecurity may be either temporary, as in the case of heightened pressure due to natural catastrophes, economic ruin, or war, or permanent, as in the case of persistent or structural deprivation and low incomes, as shown. These additional points are added to the notion of food security:

"access of all people at all times to enough food for an active, healthy life".

By the middle of the 1990s, people on all levels of society and the global community had begun to see food security as a pressing problem. However, there is a growing need for adequate food supplies, highlighting the persistence of protein-energy malnutrition. Concerns about food composition and the bare minimum dietary needs for an active and healthy life led to an expansion of the idea to encompass food safety and nutritional balance. Food preferences that are impacted by social or cultural factors are being taken into consideration more often. Due to the fact that the concept could be very different depending on the situation, it had become too complicated and was no longer a goal in and of itself. Instead, it was a collection of behaviors that help people live an active and healthy life.

One's own ability to provide for their own nutritional needs might be considered a separate concern from that of the general population. The ultimate concept is the nutritional state of every member of the household and the risk that each person will not achieve or maintain an acceptable nutritional status. The second danger is that the situation will have a big impact on certain people. The aforementioned criteria suggest that vulnerability may be either a transient or permanent condition. Below are some explanations and helpful working definitions.

The state of being in which everyone, at all times, has the means (financial, social, and physical) to get nourishing food that allows them to enjoy active, healthy lives is known as food security. This concept is applied to the whole family in the context of household food

security, with an emphasis on planning and education on everyone's part.

Food insecurity occurs when individuals have trouble meeting their dietary needs for any of the aforementioned reasons.

3. Measures of households with an emphasis on persistent hunger and poverty

Inadequate dietary intake leads to sub-nutrition, which is characterized by chronically low body weight and low metabolic rate. This mood is occasionally deemed comparable to the more emotive expression of hunger in official publications.

Consumer expenditure, the distribution of national wealth, and food balance sheets are often used as measuring methods. We can put a number on food insecurity by looking at the accessibility and apparent consumption of basic foods or calorie intake. This allows us to connect hunger and malnutrition with insufficient dietary intake. (FAO, 2002). This score is consistent with prior, more restrictive definitions of chronic food insecurity (World Bank. 1986).

National estimates are based on the typical quantity of staple foods or food that a person eats when international cross-sectional and national time-series comparisons are done, as in SOFI 2001. Food spending information by income level may also be considered for countries lacking consumer expenditure surveys. Since the World Bank's and other deprivation lines are partly based on estimates of dietary energy intake, these estimates and explanations

of poverty and severe poverty are inextricably linked. (FAO 2002).

Estimates of chronic food insecurity at the national level use data from national food balance sheets on trade in vital commodities and reflect trends in food production over time (basically, grains). These comparisons show how different food security is in low-, middle-, and high-income countries at different stages of development.

No one has been able to describe these changes in the number of people who are undernourished over time and between different types.However, SOFI 2001 draws the following outcomes: "... The search for a single, straightforward reason for either excellent or poor performance is rarely particularly helpful. Periodic differences in a nation's performance are heavily influenced by sets of variables that represent shocks and the rise of agricultural production. When just a few variables are employed to explain shifts in what might be very different and even uniquely presented at the national level, the picture becomes skewed. (FAO 2002).

A single dependent variable that depicts persistent food insecurity is linked to proxies for nation distinctiveness and changes in agricultural trade policy, supporting this type of statistical investigation. These, however, are inapplicable to analyses of commerce and food security.

Inaccurate data on the display and unrecorded trade are problems that can't be avoided and pose serious risks in many of the sub-Saharan African countries that suffer from the greatest rates of food poverty. The current crises in Southern Africa have shed light on this topic. As compared to the other 10 countries, Malawi has made the

most progress toward greater food security since the early 1990s. (FAO 2002). A lot of people are talking about how reliable food production figures are, especially for tubers and roots grown in this nation. Long-term trends cause uncertainty for countries that depend a lot on a few commodities, especially for survival and comparing with other countries.

The national and individual judgments of food insecurity now differ significantly, and this difference is often represented in averages calculated as ratios of national aggregates or national survey estimates. Larger nations like Brazil, India, Nigeria, and Russia are severely harmed by this imbalance. As in India, where agriculture is growing faster in Punjab and Haryana States, or temporarily in Northern Nigeria, where there is a drought, the structure and dynamics of food security can also change a lot within a country. It can take some time before national food security and poverty levels change. As a consequence, the potentially tremendous diversity within bigger economies should be taken into consideration in any analysis of a process like trade liberalisation that incorporates cross-country comparisons. This suggests that regional assessments are necessary to support national-level research. Guatemala is an example of a country that isn't taken into account when figuring out a country's food security. (FAO 2002).

Inadequate biological utilisation and absorption are two indicators of undernutrition, which is defined as the body's inability to use enough nutrients. Ignoring these elements would be the most reasonable place to start for an agricultural economic study. The present issue in Southern Africa serves as a reminder that these

characteristics and how they develop may vary substantially across nations. Since 25% of economically active people in Southern Africa have HIV/AIDS, TB is on the rise, and malaria is making a comeback, the nutritional quality of the area may be getting worse.

4. A nationwide status of food security (Morrison, J.A. *et al.,* 2000)

The level of global food insecurity has become critical. Even though the amount of food available for direct human consumption has grown by 19% between 1960 and 1994–1996 (to 2,720 kcal/day, compared to an estimated minimum daily energy requirement of 2,200 kcal/day), access is still not equal. This has led to a number of modern projects, the most important of which is the World Food Summit (WFS), which aims to make it easier for poor people to get food. Even if it has increased from 2 050 kcal to 2 150 kcal over the last 30 years, the average daily caloric intake in sub-Saharan Africa (SSA) remains low. While this was happening, South Asians were able to boost their daily calorie consumption from 2000 to 2350.

Despite this, in the 1990s, there was a decline in the rate of increase of agricultural output per person around the world. Around the world, cereals are used as an example (cereal output is often used as a proxy for food production, given data and aggregation problems). From its 1980s high of 342 kg per person to a 1993–1995 low of 311 kg per person, followed by a further rise to a 1996–1998 high of 323 kg per person. (FAO. 1999).

From 1995–1997, the FAO estimates that 820 million people were undernourished, with 790 million of them being in developing nations. Because of this fact, it is easy

to see how this data will affect things. Whereas there were 40 million reductions in undernourishment in developing countries between 1980–1982 and 1995–1997, this improvement was not uniform; while 37 countries had a reduction of 100 million in undernourishment, the other countries saw an increase of 60 million. Also, the absolute drop isn't enough to reach the WFS goal of halving the number of undernourished people by 2015, because 20 million more undernourished people would have to drop continuously until then. (FAO. 1999).

5. Food security indicators

There are roughly two types of attempts to measure changes in variables that are thought to show food security (OECD, 2002): those that look at consumption needs directly and those that look at whether or not those needs can be met.

The United States Department of Agriculture (USDA) evaluates food distribution and availability (USDA, 1999) and projects trends through 2009. 67 countries that have received or may receive food assistance were included in the most recent study. Food supply projections are made using two main indicators: the Status Quo gap and the nutrition gap, using a base period of per capita consumption from 1995–1997. (Food assistance is not included in the prediction of consumption). We may calculate the status Quo gap by comparing the quantity of food that is expected to be produced with the amount that is needed to achieve minimal per capita nutritional criteria.

The Nutrition Gap indicator conducts a comparative analysis of wellbeing, whereas the Status Quo indicator

provides net safety requirements. Commercial imports are insignificant compared to the severity of the food shortages in certain regions, but if imports grow a little faster, the expected gaps may be filled (for example, in North Africa, Latin America, and the Caribbean). The nutrition gap in Sub-Saharan Africa is estimated to be 229 percent, but only about 20 percent in Asia. The gap is not likely to be filled. By 2009, SSA will need to boost imports by 10% annually, while Asia will need to increase imports by 4.7%.

The FAO Committee on Food Security analyses the global grain market and looks at six factors to gauge food safety. Despite these signs, (see Figure 1.1) are limited to cereals, the argument is that because cereals make up a large portion of the global food basket, they provide insight into the global food situation and circumvent the challenge of aggregating distinct food entities when determining the total food supply and food implications.

5.1. FAO's food security indicators

- The proportion of global cereal stocks to global cereal consumption
- According to estimates, a ratio of 17–18% is the bare minimum required to protect global food security.
- The supply-to-demand ratio among the top 5 exporters
- The ratio of the closing stock of the top five exporters to their total sales in both their home country and abroad is

- Cereal production in the three main importers (China, India and CIS).
- Production of cereal in underdeveloped nations with a food shortfall (LIFDC)
- China and India are not included in the LIFDC's production.

(Source: FAO. 1999. Assessment of the Impacts of the Uruguay Round on Agricultural Markets and Food Security. CCP 99/12 Rev. Rome, FAO. October 1999)

The lack of consideration given to a country's ability to meet tighter import limits is a major weakness in these indicators. Some countries laws may place limits on their capacity to access foreign currencies. However, imports may not be able to completely fill the gap between global production and demand due to budgetary constraints. If commodity prices are low, for instance, export earnings are less likely to materialize. According to the USDA(USDA. 1999), there is a positive correlation between an increase in foreign currency availability and a corresponding increase in food imports, with an increase in foreign exchange availability being related to an increase in food imports of between 1.3 and 2%.

The second group of indicators for food security shows that there is hope for fixing the problem of food scarcity, which points to shifts in the international food market. Both how often and how much food prices rise around the world are important leading indicators.

These things also affect how likely it is that the food import bill will be changed to deal with changes in food security.

To discern the effects of a poor supply response in agriculture in some developing nations, two indicators may be helpful:

Changes in the ratio of total income from agricultural exports to the need to import grain, which is defined in terms of value as the need to eat less than what is grown locally.
Grain import requirements are estimated as consumption needs minus domestic production in terms of the total quantity of items.

In countries where the agricultural sector is less flexible than other sectors and is more likely to respond to larger incentives, the first indicator is likely to rise faster than the second. To find out if agriculture could make more money from exports, it is important to look at changes in the total value of agricultural and merchandise trade, as well as their share of total exports and how the portfolio of exports has changed. A first look at potential indicators shows that those that include the ability to pay for food needs, like export profits, are more likely to be accurate measures of food security than those that use trends in inventories and flows in global grain markets or the primary indicators of price status or price fluctuations.

6. Research aspect

From this viewpoint, wellness is more than just the absence of disease. A person's capacity to climb Maslow's Hierarchy of Needs depends on their physical, mental, and spiritual health. (Maslow, 1970). With enough food on hand, you may meet the needs of people at every level of this hierarchy, from the most basic to the most critical,

and engage in (i.e., access to a safe, acceptable, and adequate source of food).

A staggering 13% of American children and 23% of American adults are food insecure, according to recent figures. (Alaimo, 2005); the majority of these households are black and Hispanic (CDC, 2006b). Canadians consider food insecurity to be a major social problem. (Thrasuk, 2005). As one of the methods to enhance general nutrition, Heahby People 2010 addresses this issue (Objective 19-18: Increase food security among U.S. households) (CDC, 2006a, 2006b).

More than half of all Americans between the ages of 20 and 65 will need food stamps at some point, according to the research, raising concerns about the possibility of food insecurity in old age. One indicator of food insecurity is participation in the Food Stamp Program. (Rank and Hirschl, 2005). As the primary decision-makers for food purchases in many households, women are understandably worried about the issue of food insecurity. In 2003, food insecurity affected fourteen million females worldwide. Since adults often make trade-offs between their own health and that of their children, it is more likely that an adult woman in a food-insecure home would neglect her own nutrition to meet the needs of her family.

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2

HOME GARDEN: A PROMISING STRATEGY TO INCREASE HOUSEHOLD FOOD SECURITY AND WELL-BEING

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Abstract

There is a constant need to boost food production and buffer reserves due to the growing world population. In this situation, nations all over the world are turning to a variety of tactic,

To satisfy the rising demand and prevent famine and food insecurity, mainly in rising nations where starvation and foodstuff shortages are new regular. In order to lessen the negative impact of world wide foodstuff shocks and food stuff charge volatility, present has been aboost in curiosity in modern years in increase and escalating neighboring foodstuff manufacture. As a result, home gardens are receiving a lot of attention as a technique to improve household food security and nutrition. Home gardens have stood the test of time and are an essential

component of provincialfoodstuff systems and the farmingcountryside of increasing nations all over the globe.

During a thorough study of the literature, this reading first looks at the definition and individuality of residence gardens before giving a broad summary of their Advantages to communities in diverse socioeconomic circumstances in terms of the social, economic, and ecological aspects. The study and experiences of emerging nations in Africa, Asia, and Latin America are frequently shared in the writings on home gardens. These studies identify home garden's advantageous effects on alleviate food anxiety and malnutrition as well as their provision of other advantages like earnings and occupation options for resource-moneyless community and the stipulation of a variety of flora and fauna services. This review also explores the home garden experiences of India, where home gardening has been done for millennia, while giving a general summary of some of these research. While highlighting several advantages, we also draw attention to the drawbacks of growing food in a residence garden.

Keywords: food insecurity, home gardens, food security, livelihood

1. Introduction

People who are famished and half-starved make up a large section of the inhabitants in risingnations (1). More than five hundred million citizens universal knowledge never-ending chow diffidence 2050, the world's people is anticipated to go above nine billion, necessitate continuing increases in food invention and safeguard stocks to assure the growing claim and successfully manage fluctuations in

foodstuff yield and value. The standard day by day caloric claim of the world's residents in 2050 is forecasting to necessitate a seventy raise in worldwide cooking productivity. Moreover, the requirement for interventions is emphasized as the where withal presented for foodstuff manufacture, such as land, water, toil, and praise, are more and more limited and expensive.

The increasing troubles of environment modify and the reduction of ordinary capital further complicates the require for farming modernization. The matter of foodstuff manufacture and food protection must be address from beginning to end a multiplicity of ways. The social, political, and financial environment presently in place as well as the resources available to expand and carry out the intercession will decide whether strategies are practical. It is understood from the journalism that home estate are employ widely as a treatment to improve appetite and under nourishment in the look of a global food disaster in several undersized country (2).

Residenceprivate grounds have been acknowledged as a important additional source that chains livelihood and worldwide groceries and nutritional security. The original and most importunate structure of agricultural is the manufacture of foodstuff on small plots after that to human being settlement (3) Worldwide, home gardening is a long-established and popular activity. Residenceprecincts are categorized as eachassorted, kitchen, patch, farmyard, multifarious,(4-7)how family unit gardens have fared in mounting nations and specifically examines India’s situation. The following sections provide a summary of the fundamental traits of

home gardens as well as the relativepersona, compensation, and drawback mentioned in the journalism.

2. About home gardens

Actually home gardens are ordinary in both countryside and city locations (8). Subsistence assembly systems, which got their begin in smallbackyard plots nearby the home, are careful to be the former form of up to datecultivation. (9). Depending on the situationthe research's objectives, the term "home gardens" is clear in a selection of way that highlight diverse characteristics.The narrative of residence gardens as a assorted crop system that includes a plantation, veggies, and fruits crops, seasonings, herbs, decorative, and pharmacological plants, also livestock that can be used as a backup supply both food and money. Gardens are giving us benefits as a fruits, vegetables, source of energy, food for animals and source of earning .we can earn capital and wood , source of energy and we can safe soil. Gardens make Healthy Weather (10)

3. Definition of home gardening

“The domestic backyard is low-scale production method that provides foodstuff and effective produce that are out of stock, prohibitively costly, or simplynearby through vend marketplaces, countryside farming, and hunting, meeting and take - home payservice. For reasons of safety, convenience, and special maintenance, household gardens are typically found close to homes. They work on land that is not used for significant home economic activity and occupy land that is not used for agricultural production. (10-11)

4. Characteristics of a home garden

The bodily confines of the home grounds can consist of hedge, fences, ditches, or boundaries that have been fixed upon by all parties.

Five innate character of garden listed by Michelle and Hanstad Gardens are very important full source of income but some time observed that some family has no place no land for farming or gardening they can grow food and vegetable by new techniques garden s are boon for human its source of earning. Even those with very little land or no land at all can now garden at home because of new developments and techniques (42).

5. Experiences of home gardens from developing countries

In developing nations all throughout the world, home gardens have been a crucial component of the local food systems. Many studies describe and analyse home gardens in developing Asia, Africa, and Latin America and point out the many advantages they provide for families and communities.

They embody the perpetual smallscale subsistence farmin g systems in place by the households to obtain and supplement the food demands. Chris Landon-Lane [59] outlines the advantages of family gardens and describes gardens as a 'place for innovation' with the potential to enhance livelihoods in periurban and rural communities. We extensively categorized advantages of domestic gardening into 3 components: (1) social; (2) economic; and (3) environmental advantages. These advantages are provided and definedthrough the

significant stories on domestic gardens from developing countries across the world.

5.1. Social benefits

It enhance food and nutritional security- The improvement of food and nutritional security in many socioeconomic and political contexts, the improvement of family health and human capacity, the empowering of women, the promotion of social justice and equity, and the preservation of indigenous knowledge and culture are just a few of the numerous social benefits of home gardens. [19]

Home gardens directly contribute to household food security by increasing the availability, accessibility, and consumption of food products, which is the most fundamental social benefit they may provide. In both rural and urban areas, home gardens are kept up so that fresh plant and animal food sources are readily available. Food products from home gardens significantly increase the family's ongoing nutrient and energy needs. Success in home gardens is directly related to households' nutritional status, according to later research on Javanese backyard gardens [60], and effective home gardens are also associated with an increase in households' food consumption. Success in home gardens is directly related to households' nutritional status, according to later research on Javanese backyard gardens [60], and effective home gardens are **Improves health**

Plants has been helping in medicine for people for long time plants are giving the remedy to people as well as plants are helping in making medicine for animals. Now in these 80% people are Founding garden in their homes and

earning also .Plants are founding in all world and medicine are made from plants for crops ,insects.(88)For instance, Perera and Rajapksa in their learning of Kandyan gardens in Sri Lanka.

5.1.1. Uplifts women's status

Women add extensively to food manufacture in much civilization, yet intermittently their importance is questioned. They involve youdynamically in home farming as well, although this action is regularlyinclined by sociocultural norms [19]. In most cases, women make a significant concern to the foodstuff manufacture in the home, but this does not mean that women are suspiciously concerned in home farming. Gardens in private homes encourage community maturity and change. Among the Achuar Indians living in the upper Amazon, a woman's ability to maintain a thriving home garden reveals both her agronomic prowess and her social standing [103].

5.1.2. Preserves indigenous knowledge and build integrated societies

The components and species found in home gardens symbolise the social and cultural features of many societies. The choice of plants and animal species, as well as the farming methods employed by the local community, are ways that this rich indigenous culture and communal knowledge base are conveyed through home gardening [15, 69]. A useful resource for passing down production knowledge, skills, and native crop and animal species from one generation to the next is home gardens [108–110].Social status and links between the household and the community are created and strengthened via interactions in and around the home garden. For social,

cultural, and religious reasons, home gardeners frequently trade or give away seeds, vegetables, fruits, leaves, medicinal plants, and herbs [108,109]. The development of social capital and social integration depend on such contacts. Home gardening's social component has not yet been adequately investigated.

5.2. Economic benefits

Some countries are earning source from selling of fruits, vegetables, and animals' foodstuffs from their own backyard. Papu New Guinea, Thailand and Nepal these countries are taking initiatives and to pay for superfluous food stuff economy, edification and others services. Home gardening are earning advantages afar ensure foodstuff and dietetic safety and nutrition. According to learner explore, home garden give confidence private enterprise and countryside growth while also generate income, humanizing livelihood, and family circle financial comfort [110,111],

5.3. Environmental benefits

Several ecological returns come from residence gardens. They act as the majorassociation that develops and implements environmentally sustainable methods of food production while preserve biodiversity and natural resources.

Manyflora and fauna services are offered by residence precincts, as well as enhanced pollination, and habitat for natural world [120]. The house grounds solid fix inhabitants offers the wonderful environment [121]. Home gardens offer a diversity of ecological unit services, as well as the condition of first-class food,

insectorganization, and pollination, according to Calvet-Mir et al. [111].

A very helpful nutrient cycling scheme is facilitate by the accessibility of plant and mammal dissipate and the continuing recycle of natural earth substance.

Nitrogen, potassium, and phosphorus can all be significantly bigger in the earth by additionfarm animals and poultry fertilizer. [124].

6. Kitchen gardens in India

Actually mostly gardens are located in humid, raining area in Kerala northern eastern side as Andaman isobar islands. They also exhibit important multiplicity, but area variations can be seen based on the agro environmental conditions and the farmer's practical requirements. Tropical home gardens are distinctive agro ecosystems that have developed over many generations as agriculture has become more intensive around the residences. The risk to the reality of humid Home precincts as a entire is generally brought on next to sell forces and commercialization (124).

Home gardens have been a way of life for the households in India for centuries as marked from the olden Indian epic Ramayana and Mahabharata. The epics consist of a narrative of ‘Ashok Vatika’, a form of today’s home backyard (125).

7. Conclusion

Overall, the literature evaluation is in favor of including and promoting backyard gardens as a sustainable agricultural practice that will increase food security and

boost the economy. Home gardens differ depending on the region in terms of their design, purposes, and contributions. Home gardens meet social, cultural, and economic demands while offering a variety of ecological services, according to the literature.

These advantages are not mutually exclusive, while being extensively distinguished here for greater illustration. Home gardening projects are made even more appealing by the fact that there is a lot of overlap and dependency between the numerous advantageous components in the actual world. The importance of improving and developing local food systems has grown in the face of a worldwide food crisis and skyrocketing food prices. In this setting, there is a renewed focus on improving livelihoods and food production through backyard gardens. However, additional research and documentation are required to show the usefulness and significance of backyard gardens in conflict and post-conflict environments.

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3

FORMULATION OF FRESH FRUIT JAMS AND THEIR QUALITY ASSESSMENT THROUGH ORGANOLEPTIC ANALYSIS BY HEDONIC TEST

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Abstract

Ministry of Agriculture, Government of India stated that the estimated production of fruits in year 2017 is 92 million tones which are more than 2% compared to year 2016. Among these amounts only 2.2% of produced fruits and vegetables were processed in food processing sector in India. In our country people prefer to consume fruits directly. Rest of the produce material destroys due to various factors. The present study was conducted with

the aim to increase the use of agro produce in processing and to reduce the waste, in which fresh fruit jams were formulated incorporating fruit pulp of apple, papaya, amla, pineapple and mango. Prepared six different fruit jams namely apple jam, papaya jam, amla jam, pineapple jam, mango jam and mix fruit jam were subjected to two groups and their organoleptic attributes were assessed. Nine (9) point Hedonic rating scale was used for organoleptic analysis of fresh fruit jams. Each group had 30 panel members. Results revealed that various organoleptic attributes, i.e. app., colour, taste, flavour, consistency and overall acceptability of all six jams obtained ≥ 7 hedonic scores by both groups indicating that the jams were liked moderately to very much by them. The taste, flavour and acceptability of these jams were very good. These jams were acceptable among both the study groups. Thus, it can be concluded that these products can be used as spreads and one can consume them with bread, chapati or parantha and refresh himself/ herself with the tasty and tangy flavours of fresh fruits.

Keywords: Fresh, Fruits, Hedonic test, Jam, Organoleptic attributes

1. Introduction

In India fruits and vegetable are produced in abundant amount. According to Ministry of Agriculture, Government of India the estimated production of fruits in year 2017 is 92 million tones which is more than 2% than the last year but only 2.2% of produced fruits and vegetables were processed in food processing sector in India. Fruits are perishable in nature and destroy easily

due to various factors. These fruits can be stored for longer duration after changing their form and properties. Several technical aspects that supports product improvements, quality improvements, customer requests (upgradation/ acceptance) and cost saving initiatives are involved in formulation of novel food processing (Vijayan and Prabhat, 2015).

Fruits contain various micronutrients and are rich source of soluble dietary fibre that imparts several therapeutic benefits to human beings. Value addition of these different fruit not only made them available throughout the year but also improves the nutritional availability to the consumers. According to the nature of fruits, they can be used in production of jam, jelly, squashes and beverages.

Fruit jams are very popular among all age groups specially children. Bread with jam is the common breakfast of most of the population worldwide. Preparation of fruit jams can be an effective technique to relish the fruits round the year. Apples are very significant sources of flavonoids and phenolic compounds. Due to their phytochemical profile they exert various health benefits to the individuals (Boyer and Liu, 2004). Mango (*Mangifera indica. L.*) is known for its exotic flavour and delicious taste in all over the world. Due to its excellent micro nutrient content, chemical properties and nature, it can be used in desserts, jam and beverage preparation (Ravani and Joshi, 2013). Consumption of papaya provides therapeutic benefits to peoples due to its rich phytochemical profile including polysaccharides, vitamins, minerals, enzymes, proteins,

alkaloids, glycosides, fats and oils, lectins, saponins, flavonoids, sterol, etc (Krishna et al, 2008).

Pineapple is good source of B-vitamins, copper and dietary fibre. It aids in digestion and boost immunity (Hossain et al, 2015; Gupta et al, 2017). It is very popular due to its excellent flavour, taste, colour and nutritive values (Inam et al, 2012). Amla has been used in Ayurveda for treatment of several disorder, i.e. common cold, scurvy, cancer and heart disease (Jain et al, 2016). Due to the therapeutic potential and nutritional profile of these six fruits, namely apple, mango, papaya, pineapple and amla they were used in preparation of jams in present study. Six different fruit jams were formulated incorporating fresh fruit pulps in this endeavour and their organoleptic attributes were assessed.

2. Objectives

1. To formulate 6 different fresh jams from fruit pulps
2. To assess the organoleptic quality of formulated 6 jams by group A
3. To assess the organoleptic attributes of formulated 6 jams by group B

3. Material and methods

It was a laboratory based trial conducted within a month of preparation of particular jam during that particular season in the year 2016-2017. Different fresh jams, i.e., apple, papaya, amla, pineapple and mango were prepared incorporating pulp of these fruits. Mix fruit jam was also prepared using pulp of mango, apple, papaya and banana.

3.1. Formulation of jams using fruit pulp and extracts

Firstly washed fruits were pealed and chopped into small pieces. These chopped fruits were boiled till they became soft. After boiling these soft fruit pieces were grinded to make their pulp using hand grinder or by machine. Then they were individually weighed by weighing balance. According to the amount of fruit pulp, sugar was taken and mixed in the pulp. The mixture was brought to boil and the hot mixture was filled in sterilized glass bottles. Then the prepared jams was analysed by subjects for their organoleptic properties.

3.2. Organoleptic analysis

According to (Jellink, 1985) organoleptic analysis or sensory evaluation is a scientific discipline that analyses and measure human response to the composition of food or product made by the sense of taste, smell and touch when food is eaten. Two groups, i.e., group A and group B were selected for organoleptic analysis using triangle test each group had 30 panel members thus the total sample size was 60.

Group A was consisted with Home scientists, Horticulturists, Agronomists and Entomologists of Agriculture University, Kota.

Group B was made with the common people who did not have the appropriate knowledge of different jams. Nine point Hedonic test was used to judge the different organoleptic attributes, i.e., appearance, colour, taste, flavour, consistency and overall acceptability of the six prepared fruit jams-apple jam, papaya jam, amla jam, pineapple jam, mango jam and mix fruit jam. In this test

panel members of both groups A and B were asked to measure the degree of pleasurable and unpleasurable experience of jams on a nine point Hedonic rating scale i.e., like extremely to dislike extremely.

Table 1: Mean hedonic scores of organoleptic attributes of jams by group A

n=30

Attributes	**Apple jam**	**Papaya jam**	**Amla jam**	**Pineapple jam**	**Mango Jam**	**Mix fruit jam**
	Mean±SD					
Appearance	8.5±0.51	7.5±1.00	7.9±0.96	7.8±1.14	8.0±1.07	8.8±0.91
Colour	8.1±0.96	7.2±1.21	8.1±0.71	7.5±0.94	8.0±0.96	8.7±1.12
Taste	8.0±1.04	7.7±0.65	7.6±1.23	7.2±0.30	8.2±0.76	8.9±0.79
Flavour	8.0±0.92	7.6±1.31	7.4±1.31	7.0±0.79	7.9±1.28	8.9±0.91
Consistency	8.1±0.72	7.2±0.91	7.5±1.05	7.5±0.94	8.0±1.00	8.8±1.28
Overall acceptability	8.5±0.64	7.3±1.02	7.9±0.96	7.5±0.94	8.3±1.02	9.0±0.00

The former carried a score of 9 while latter was scored as 1. In this scale scores were categorized as 9-Like Extremely, 8-Like Very Much, 7-Like Moderately, 6-Like Slightly, 5-Neither Like nor Dislike, 4-Dislike Slightly, 3-Dislike Moderately, 2-Dislike Very Much, 1-Extremely Dislike.

Mean and standard deviation were calculated for each attribute of organoleptic analysis.

4. Results and discussion

Table 1 reveals that mean hedonic scores of apple jam were ranged between 8.0 to 8.5 all the organoleptic attributes were marked with more than 8 hedonic score indicating that appearance, colour, taste, flavour and consistency were liked very much by the panel members of group A. The testees liked extremely the overall acceptability of this product. Standard deviation (SD) indicates the dispersion from mean value. For example, higher SD value means the dispersion was high from the mean value. The appearance, colour, taste, flavour, consistency and overall acceptability of papaya jam were liked moderately by the group A as the mean scores of these attributes were more than 7. Panel members of group A gave more than 7 scores to all attributes of amla jam except overall acceptability. The mean hedonic scores of appearance and overall acceptability were near to 8 on 9 point hedonic scale illustrating that these attributes were liked very much by the group A panel. The colour of this jam was liked very much by the testees. All organoleptic attributes of mango jam received hedonic scores near to 8 or more than 8 indicating that this jam was liked very much by the panellists of group A. Appearance and overall

acceptability scores of amla jam were near to 8 indicating that the product was liked very much for these two attributes. Hedonic scores of taste, flavour and consistency of amla jam ranged from 7.4 to 7.6 depicting that these attributes were liked moderately by the panel group A.

Table 2: Mean hedonic scores of organoleptic attributes of jams by group B

n=30

Attributes	Apple jam	papaya jam	Amla jam	Pineapple jam	Mango jam	Mix fruit jam
	Mean±SD					
Appearance	8.5±0.45	7.7±0.45	8.2±0.68	7.9±0.71	8.4±0.30	8.8±0.51
Colour	8.1±0.55	7.2±0.92	8.1±0.51	7.6±0.50	8.2±0.47	8.8±0.41
Taste	8.0±0.51	7.5±0.85	7.9±0.79	7.6±1.04	8.3±0.47	8.8±0.51
Flavour	8.0±0.76	7.6±0.94	7.3±0.80	7.2±0.89	8.2±0.41	8.6±0.50
Consistency	8.0±0.61	7.2±0.89	7.5±0.51	7.8±0.76	8.5±0.50	8.6±0.50
Overall acceptability	8.5±0.61	7.5±1.14	8.0±0.55	7.5±0.68	8.2±0.41	8.9±0.50

Pineapple jam got mean hedonic score more than 7 on 9 point hedonic scale indicating that the product was moderately liked by the testees. The hedonic scores ranged from 7.2 to 7.8 for pineapple jam. Mix fruit jam received highest hedonic score for all attributes. The scores were near to 9 (ranged from 8.7 to 9.0) depicting that this product was liked very much by testees of group A for all organoleptic attributes.

Table 2 indicates the mean hedonic scores of organoleptic attributes rated by group B. All attributes of apple jam got hedonic score more than 8 indicating that this jam was liked very much by all the panel members of group B. Organoleptic attributes of papaya jam got ≥7 hedonic score illustrated that this jam was liked moderately. Hedonic scores of organoleptic attributes of amla jam ranged from 7.3 to 8.2. The scores of appearance, colour and overall acceptability were higher than 8 on 9 point scale whereas scores of taste were neat to 8, thus these attributes were liked very much by the group B. Hedonic scores of pineapple jam ranged from 7.2 to 7.9 on 9 point hedonic scale illustrating that the product was liked moderately for its different organoleptic attributes. All organoleptic attributes of mango jam were higher than 8 illustrating that this jam were liked very much by group B. The hedonic score of attributes of mix fruit jam ranged from 8.6 to 8.9. These score were near to 9 indicating that the products were liked extremely by the panel members of group B.

Overall results indicated that jams, like apple jam, papaya jam, amla jam, pineapple jam, mango jam and mix fruit jam were liked equally by the panel members of both group A and group B. These jams were tasty and palatable.

Testees said that the products were appealing, mouth watering and had higher palatability. They said that these jams were not only had higher acceptability but they contained various therapeutic benefits also as well as they are time, money and energy saving. Apart from high acceptability, these are the rich source of energy and contained various micro nutrients due to addition of fruit pulp. These jams were highly nutritious and have the added advantage of therapeutic potential of individual food items. These can be best food items for energy deficit individuals.

5. Conclusions

Delicious jams of fruit pulps (apple, papaya, amla, pineapple, mango and mix fruit) were formulated in present study. It was observed that both group A and group B liked all the fruit jams. On the basis of overall acceptability, it can be asserted that apple jam, mango jam, amla jam and mix fruit jam were liked very much by the panel members whereas pineapple jam and papaya jams were liked moderately by them. Likeability of these fresh fruit jams were very high.

Mix fruit jam to received highest score because it had the flavour and fragrance of all the fruits making it most likeable product among all of them. These developed fruit jams can be use as spreads and fruit marmalade and individuals can consume them with bread, chapatti or parantha. People can refresh themself throughout the year with the tasty flavours of seasonal fresh fruits in the form of tasty and healthy fruit jams.

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4

SYNERGIC IMPACT OF FOOD, NUTRITION AND HEALTH ON TOURISM IN INDIA

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Abstract

Tourism is the crucial part for economy of India. Food and nutrition are the key ingredients of the tourism. Synergic impact of food, nutrition and health increases tourist's interest towards the destination. Healthy foods leave a significant benchmark on economy of a country. Food is one of the most important parts of the tour as it adds some extra spices in our experience. In India, every state, every city has its own local dishes and tastes which attracts the whole population and tourists a lot. Food is the fuel for our body which provides nutrients to each and every cell to function properly. Trying out new food gives more positive nutrients in the body. Every food has its own specific taste. The aroma spices and nutritive value of authentic dishes makes the journey unforgettable for the tourist. Knowing the nutritional value of the local food gives a clear indication regarding the dishes which helps in increasing that tourism. The taste of good food is always unforgettable for everyone as after leaving the city the taste always remains in the mind which becomes one of

the reasons to take a next visit or tour the city. Thus, food plays an important part to the neophiletravellers but the hygiene standards and health considerations should be maintained at the same time.

Keywords: Tourism, Food, Nutrition, Health

1. Introduction

Since immemorial times, food and tourism have always been closely integrated. In India, food is praised as an art that is enduring like a legacy and is unmatched by the tastes of other nations. Additionally, the hospitality of Indians is described as legendary, completely adhering to Sanskrit literature. Indians take seriously the famous phrase "Atithi Devo Bhava," which suggests that "the guest is genuinely your god."

The availability of local foods can be a motive for travelling, an astounding experience with positive memories. Tourists are always drawn to a destination by its food and nutrition (Tommy et al., 2017).Some authentic foods are remarkable and lead to traveler satisfaction and the intention to revisit the destination. Food with high nutritional properties, such as foods with lots of proteins, fiber, vitamins, and few calories from fat, has a positive effect on tourists' health and draws them to a certain location (Quan et al., 2004).One such element is native food, which we typically define as food produced inside a certain geographic location and having qualities derived from the region's terroir, production customs, or contemporary principles (Eriksen et al,., 2013). In order to increase the growth of a local economy, promoting local cousins can be another factor (for example, farmers' shops, farmers' markets, and restaurants).Offering local

goods and culinary traditions to tourists from other countries enhances the destination's image and generates more economic activity there and nearby (Rana et al., 2018). Local foods of a particular region generally feature unique aromas and flavors because of which, it plays an important role in improving the tourism. Culinary tourism are observed as a biological need because every tourist needs to satisfy the need for food (Aslimoski et al., 2012). Understanding the food service and its hospitality is indeed of the most salient activity that draws the tourists attraction. As a result, traditional foods are attracting lots of tourists and are more valued. The majority of tourism statistics show that 25% of overall visitor expenditures are typically spent on lodging and eating out. Dissatisfaction with meal service might result in a negative perception of the entire travel experience, which would be a major deterrent for travelers from returning to a location. As a result, food quality ensures that tourists will be in good health (Kannan et al., 2019). Healthy foods leave a significant benchmark on economy of a country. Food is one of the most important parts of the tour as it adds some extra spices in our experience. In India, every state, every city has its own local dishes and tastes which attracts the whole population and tourists a lot. International travelers are becoming more and more enamored with the unparalleled range of traditional Indian cuisines, which gives the nation the opportunity to capitalize on its long-standing culinary traditions (Maitra et al., 2021).Synergic impact of food, nutrition and health increases tourist's interest towards the destination. There are several methods to make food and tourism work together. First, cuisine expresses a destination's intangible cultural legacy, adding value to a fundamental tourism offering. Second,

it's believed that using food as a strategic management tool can help preserve or improve tourist flows to a destination while also helping to (re)create its image. Third, food can be considered a stand-alone tourism offering for travelers who purposefully look for food-related activities and experiences (Hrelia et al., 2015).

2. Food tourism

One of the most important aspects for human existence is food and nutrition. It is an unavoidable aspect without which there will be no tourism.

Food tourism is a practice that offers opportunities for consumers to enjoy eating and drinking while also learning about the history, culture, and ecology of a particular localeor to travel for a taste of a location in order to gain a sense of a place.

Exploring the cuisine of other places is the major goal of food tourism. Food tourism is also known as culinary tourism or gastronomy tourism. One of the subcategories of cultural tourism, food tourism, is rapidly growing as a niche that supports other ways to experience a destination's culture.Cuisine and gastronomy are terms that denote various food preparation techniques and, correspondingly, "the art or science of healthy eating." As opposed to this, "culinary" is an adjectival form of "cuisine," which means it also encompasses "cuisine," or various methods of food preparation, as well as taking into account the social context in which food is bought, prepared, and consumed. In particular, culinary refers to materials, prepared foods, beverages, food production, justifications for participating in specific activities, institutional frameworks, and food tourism itself

(Updhyay et al.,2014).The term "culinary tourism" can also be widely applied for food- and beverage-related activities designed for tourists that also include an investigation of the local cuisine. Culinary tourism may also include visiting fruit orchards, visiting farmers market, purchasing foods from roadside stall, farm holidays or promoting agricultural festival.

Culinary tourism is a very complex phenomenon as it involves marketing strategies such as selling products to consumers and also giving information about the products they are purchasing.

There has been extensive research on the behavioural effects of food consumption at travel places. The majority of travelers' motivations to travel can be summed up by the fact that eating involves enjoyment, excitement, escape, education, status, and lifestyle (Cardello et al., 2010).Demands for new foods unquestionably improve a nation's marketing.

3. **Traditional food's impact on tourism**

Eating is not only a physiological requirement, but also a cultural and social practice.When visitors eat at a location, they do more than just sate their hunger—they also get a taste of the local way of life and get to know their hosts. However, the level of demand for local cuisine from tourists varies. Some visitors come for the region's cuisine alone; others see local cuisine as a byproduct of their cultural experiences; still, others choose to bring home some of their favorite foods with them when they travel. As a result, there are disparities in how tourists approach eating local cuisine. Tourists' overall experiences are greatly influenced by the local cuisine."Local food" refers

to both regional delicacies at a particular location and food produced using local customs and ingredients, though not necessarily local methods.

The justification for examining the important elements shaping visitors' memories of local cuisine was that it influences travelers' choice of destinations, can influence how they perceive a place in general, and improves their wellbeing (Bjork et al., 2019; Sthapit at al., 2019).

4. Food quality and healthy diet

Our lives have changed so drastically that we no longer have much time to stop and consider whether or not what we are eating is a healthy diet. One's eating habits have been significantly impacted by globalization, which has compelled many individuals to eat upscale quick foods with high calorie counts, or "junk food," as they are commonly known. A dangerous consequence of an improper diet on a person's life includes obesity, food poisoning, dehydration, and cardiac issues. Tourists placed a strong emphasis on consuming nutritious cuisine of excellent quality so that they could stay healthy throughout traveling and enjoy their trip. Along with their trip, tourists emphasized the importance of eating well.

Food quality and a balanced diet can boost tourism. A food's nutritional worth, such as the amount of protein and high vitamin content, determines its quality.Food is the fuel for our body which provides nutrients to each and every cell to function properly. Between the time you take a meal and the time the leftovers of that bite leave your body, the foods you eat go through millions of changes as they pass through your digestive tract. Your cells, particularly your mitochondria and DNA, receive

information from the nutrients that are digested and absorbed by your intestines. The functioning of the human body, a complicated system, depends on accurate data. The improper kind of information (such as artificial substances) or a lack of excellent information (such as nutrient-poor foods) in your diet may cause your body to start acting up overabundance of knowledge (i.e. excess nutrients)(Kapoor et al., 2021).Trying out new food gives more positive nutrients in the body. Every food has its own specific taste. The aroma spices and nutritive value of authentic dishes makes the journey unforgettable for the tourist. Knowing the nutritional value of the local food gives a clear indication regarding the dishes which helps in increasing that tourism. The potential for the growth of food and nutrition-based tourism is enormous, especially when combined with the sociocultural and touristic quirks of a particular travel location. The reason for this is that modern travelers are quite curious, and the majority of them want to experience the flavors and aromas that local cuisine has to offer. That is undoubtedly, in part, a reflection of globalization, but it is also true that, since the development of tourism as a contemporary phenomenon, choosing where to eat has been a significant factor in deciding where to travel and stay (Ghanem MS 2019).

5. Synergy: food, nutrition and health

Tourism was significantly improved by a holistic approach to nutrition, cuisine, and health. Obstacles relating to health problems during travel can be avoided by eating well. Visitors are drawn to a location by the very nutritious local cuisine. When someone had a positive experience somewhere, they desire to return there in the future.Due to the cuisine's quality, variety, and service,

tourists are positively impacted by food, nutrition, and health.The economy of a country is heavily reliant on tourism. The location and its abundant natural resources serve as the foundation for the tourism industry. A key component of the tourist product may also come from new food sectors that promote healthy eating. Therefore, the tourism sector may not only be dependent on it but also profitable for the food businesses (Andersson et al., 2017).

6. Conclusion

Due to the fact that the body is the primary sensory centre, tourism is a practice that respects bodily desires. In a manner, tourism is related to our aesthetic or sensual existence. Nutrition and food are essential components of human survival. Globalization and post- modernization have a significant impact on the growth of global tourism, as a results food are becoming most prominent and are rapidly growing.Tourism is boosted by food, nutrition, and their effects on health. Tourists' main priority is maintaining a healthy diet, thus it is crucial to offer them nutritious cuisine. Local cuisine boosts a nation's economy and draws tourists to a location. The relationship between local cuisine, diet, and health has a significant impact on tourism. The fact that food intake can be made into a tourist attraction as the peak, or a component of the peak touristic experiences has various implications for destination marketing and development. Food plays an important part to the neophiletravelers but the hygiene standards and health considerations should be maintained at the same time.

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5

JOURNEY TOWARDS MALNUTRITION TO WELLNESS

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Abstract

India's independence in 1947 was marked by two major concerns. One was the fear of famine and drought resulting severe starvation and low agricultural productivity. It is also affect the food distribution system, which contributed to the country's food security. Poverty is most likely to result in chronic energy and micronutrient insufficiency, as well as a high prevalence of recurring illnesses due to limited purchasing power and inadequate nutritional consumption. A resolution passed by the UN General Assembly on April 1, 2016, established a UN Decade of Action on Nutrition from 2016 to 2025. With the goal of eradicating all forms of malnutrition and ensuring that everyone has access to better, more durable food, this Era of Action will move up efforts to tackle hunger. This policy brief discusses the cohabitation of non-communicable disorders and under-nutrition. Non-communicable diseases (NCDs), obesity, or other non-communicable disorders connected to food as the dual malnutrition burden that many nations are now suffering.

U N (United Nation) that many nations are currently experiencing, which is defined by the coexistence of under-weight, obesity, or non-communicable illnesses linked to food and non-communicable diseases and under-nutrition (NCDs). In COVID-19 epidemic, which keep going to draw attention in the present food and healthcare systems, is partly responsible for these increases. Because of that, there is now more hunger in the world, and during lockdown the people had less active, which caused an increase in under-weight and obesity.

Keywords: malnutrition, over-nutrition, under-nutrition, obesity and non-communicable diseases

1. Introduction

According to estimates, one in three people worldwide suffered from different types of malnutrition, which is directly linked with insuffiency of food. According to WHO (2021) 1.9 billion adults are under-weight or obese, while 462 million are under-weight. The prevalence of under-nutrition is higher in developing nations. Compared to rural regions, slums in cities have a higher prevalence of stunting. According to different studies on malnutrition, where the population is divided in the several categories, along with newborns, children under the age of five, kids, teens, pregnant mothers, adult man or women, and the elderly people. Incidence of the under-nutrition reported in various research varies as a result of the use of various growth benchmarks in various investigations.

Malnutrition happens when a person receives either too few or too many nutrients, which can lead to health issues. In particular, "a shortage, surplus, or disproportion of calories, proteins, and other minerals" has a negative

impact on the tissues and shape of the body. Under-nutrition and over-nutrition fall under the umbrella term of malnutrition. Lack of nutrients causes under-nutrition, which can cause under-weight, wasting, and stunted growth. Overnutrition, which can lead to obesity, is brought on by an excess of nutrients. Malnutrition is typically used in clinical investigations to describe under-nutrition. However, when the term "malnourishment" is used in place of "undernourishment," it is difficult to differentiate the two. Overnutrition is a kind of malnutrition that is less well-known. In light of this, The Lancet Commission advised in a 2019 research that the definition of malnutrition be expanded to include "all its symptoms, particularly obesity, undernourishment, and related nutritional issues."

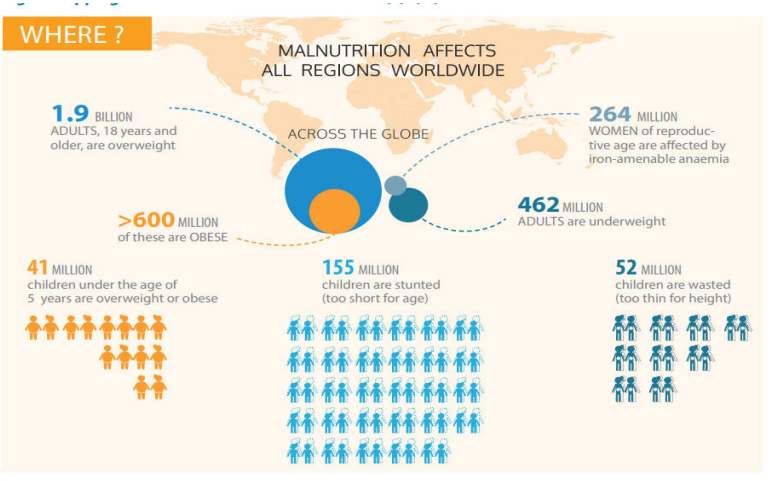


Figure 1 Malnutrition status in worldwide

2. Childhood period

Children under the age of five are most likely to be undernourished. In 2020, there were 149 million stunted children 45 million wasting children , and 38.9 million under-weight or obese children under the age of five. The subsequent year, it was thought that undernutrition was a contributing factor in 45 percent of child fatalities. (WHO, 2020)

India has one of the highest rates of children wasting in Asia. One-third of children below the age of five suffered from vitamin A deficiency globally, which causes 670,000 fatalities and between 250,000 and 500,000 incidents of blindness.

3. **Adulthood period**

462 million individuals were under-weight as of June 2021, while 1.9 billion individuals were over-weight or obese category. In 2017, there were two billion iodine deficient cases worldwide. 900 million women and children experienced anaemia in 2020, which is frequently brought on by iron deficiency.

Certain demographics, such as the elderly and women, have higher incidence of under-nutrition. Even in affluent nations, under-nutrition is a growing health issue for adults over 65, particularly for those who dwell in acute care hospitals and nursing homes.

In the elderly people, physical- psychological factors , and social factors , rather than insufficient of food - are more frequently to blame for under-nutrition. Major causes of under-nutrition in the older population include age-related reduced nutritional intake brought on by swallowing and chewing issues, taste deterioration,

despair, an imbalanced gut bacteria, destitution, and loneliness.

4. Recently increased

Over the past ten years, there has been an upsurge in global hunger. Almost one in ten individuals on the planet or 795 million people, were malnourished in 2015.820 million people worldwide—or one in nine persons—were undernourished in 2020.

In COVID-19 epidemic, which continues to draw attention to the flaws in the present food and healthcare systems, is partly responsible for these increases. Worldwide hunger has increased as a result of it, and the reduction in physical activity that resulted from overall lockdowns has also contributed to a rise in under-weight and obesity in individuals. Scientists predicted that the pandemic might cause the number of individuals people at risk of experiencing short term hunger to double.

5. Under-nutrition

Under-nutrition can be brought on by micronutrient deficiencies or protein-energy waste. It affects body composition, decreases body cell mass, and has a detrimental effect on the both mental and physical well-being. A major health problem, under-nutrition has a high rate of death in children and long-lasting physiological effects. The whole physical and mental development of children is hampered by it. Undernourishment manifests itself as stunting, wasting, and under-weight. Long-term problems with mental and physical growth may result from undernourishment throughout pregnancy or prior to the age of two years. Severe under-nutrition can lead to

mild acute malnutrition, persistent hunger, and/or severe acute malnutrition (SAM).

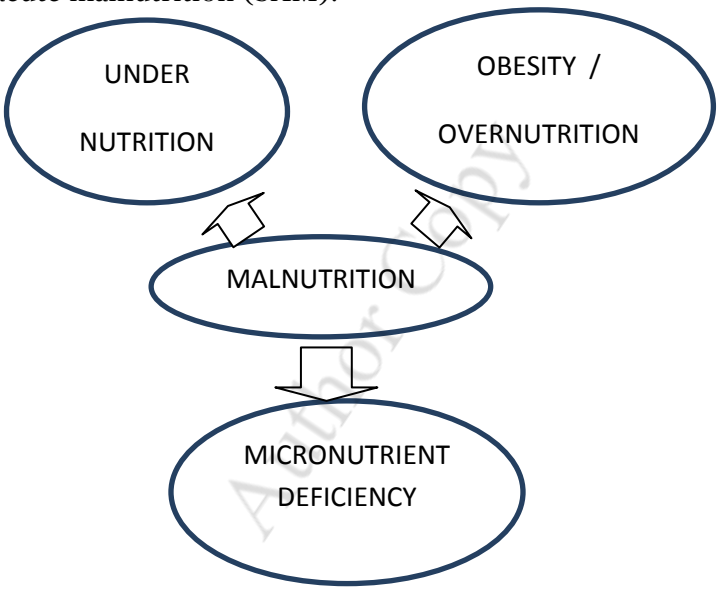


Figure 2 Relation with malnutrition

6. Micronutrient deficiencies

Depending on whether vitamin is deficient, there are specific indications and symptoms of micronutrient deficiencies. However, those who are undernourished are frequently small and skinny, have low levels of energy, and frequently have swelling in their legs and belly. Undernourished people commonly get illnesses and become chilly. Insufficient vitamin and mineral consumption leads to micronutrient deficiency. Vitamin A, iodine, and iron deficiency are most prevalent in worldwide. Low-income nations have a particularly high risk of micronutrient deficiencies in children and pregnant women.

Anemia is most frequently brought on by an iron shortage, however it can also be brought on by other disorders and micronutrient deficiencies. There may be serious health repercussions from this syndrome. The condition known as the double burden of malnutrition occurs when micronutrient deficits coexist with overnutrition.

7. Protein-energy malnutrition (PEM)

Protein-energy deficiency is also explicitly referred to as "undernutrition" (PEM). Micronutrient deficits as well as an unbalanced protein intake and energy expenditure contribute to this disease. The difference between it and calorie restriction is that calorie restriction might not have a detrimental impact on health. One cause of undernutrition is hypoalimentation (underfeeding).

Kwashiorkor and marasmus are two types of PEM that frequently coexist. A child in the United States has symptoms of kwashiorkor, a lack of protein in the diet. The main contributor of kwashiorkor is a lack of protein consumption. Edema, wasting, enlarged liver, hypoalbuminaemia, and steatosis are some of its signs; the illness may also result in darker pigmentation of the skin and hair. The illness can also be recognised by the patient's typical belly swelling, which hides their undernourishment. The term "Kwashiorkor," which is taken from the Ga languages of coastal Ghana in West Africa, meaning "displaced child." It alludes to the disease that the newborn experiences when the next child is born.

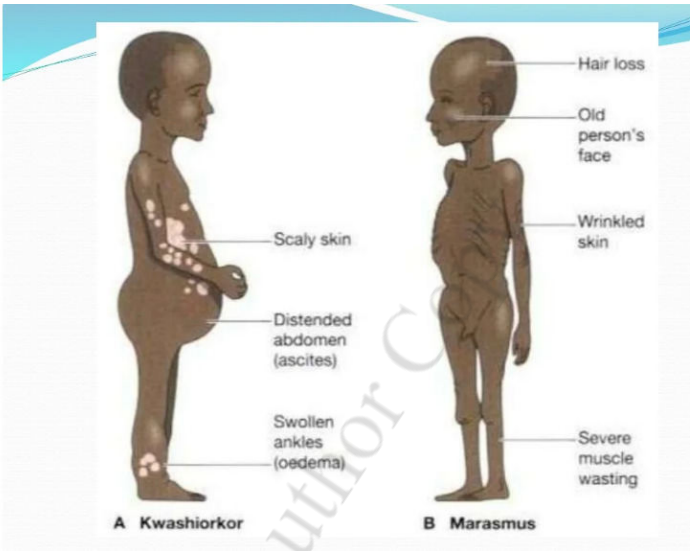


Figure 3 Sign and symtoms

Marasmus: which means "to waste away," can be brought on by a meal which is consistently low in both protein and calories. Their metabolism changes as a result to extend their existence. Severe wasting with little to no edoema, limited subcutaneous fat, and abnormal blood albumin levels are the main signs.

8. Overnutrition

Overeating is a disorder brought on by consuming too much energising foods and drinks and not getting enough exercise. It can result in obesity and produces under-weight, which is indicated by a (BMI) of 25 or above (a BMI of 30 or more). Globally, obesity has emerged as a serious health concern. Chronic non-communicable illnesses including diabetes, certain malignancies, and cardiovascular conditions are all associated with

overeating. beginning So it has become a top health priority to identify and manage the immediate risk factors According to current research, diet-induced obesity in mothers and fathers around the of pregnancy has a detrimental programming effect on future generations health.

9. Causes and risk elements

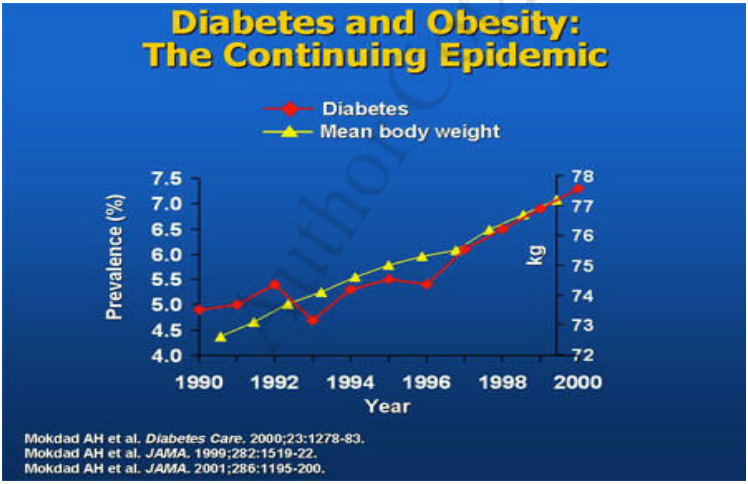
9.1. Political and social

People's health is significantly impacted by the state of society. The social determinants of undernutrition are primarily a lack of women's empowerment, illiteracy, poverty, and illness load. Undernutrition may be permanently eliminated by identifying and treating these variables, because malnutrition in children under five is a serious public health issue. According to the study by Ghattas et al. (2020), households with higher incomes are substantially more likely to have overnutrition than are families with lower incomes. A significant barrier preventing low-income households from purchasing nourishing meals is high food price. Malnutrition may also be a result of food shortages in less technologically advanced nations. However, according to estimates from the Organization for Food and Agriculture , 80 percent of malnourished children in the poor world reside in nations with food surpluses.

9.2. Infectious Diseases and conditions

Infectious diseases that increase dietary needs, such pneumonia, gastroenteritis, malaria, and measles, can cause malnutrition. Some long-term illnesses, particularly HIV or AIDS can have a similar effect. Additionally,

persistent small intestine diseases like Crohn's or untreated coeliac disease might cause irregular nutritional loss due to diarrhoea. Increased energy use can lead to secondary malnutrition. Lack of breastfeeding might cause a newborn to be undernourished. Malnutrition can also result from bariatric surgery and anorexia nervosa.



10. DIETARY PREFERENCES

10.1. Undernutrition

A million children are thought to die each year from undernutrition brought on by inadequate nursing. Illegal breast-milk replacement advertising lasted for three decades despite being prohibited by the World Health Organization International Code of Marketing Breast Milk Substitutes in 1981, which contributed to malnutrition. A baby's poor health or mortality may also be caused by maternal malnutrition. Deficient foetal growth in the mother's pregnancy has resulted in over 800,000 infant deaths. Malnutrition results when a person consumes too much food at one sitting or eating nearly nothing but rice,

potatoes, and corn. This could result from a lack of knowledge about optimal nutrition or from having only one type of food available. The risk of death can also be increased by certain nutritional deficiencies such a lack of iron, zinc, or vitamin A.

10.2. Overnutrition

Graph displaying the relationship between diabetes and obesity throughout time. Malnutrition also includes overeating as a contributing factor to over-nutrition. Today, more than half of all individuals in the United States are under-weight, a state that, like starvation, increases the risk of developing illnesses and disabilities, lowers work efficiency, and shortens life expectancy. Since the majority of Americans have sufficient access to food, overeating is considerably more prevalent in this country. In developing nations, there is also an over-nutrition problem. It has emerged in areas of developing countries where incomes are increasing. This is a problem everywhere where there is still hunger and poverty. Economic growth, rapid urbanization and changing eating patterns have increased the burden of over-nutrition in low- and middle-income countries. Many life-threatening diseases, including heart disease and diabetes, are caused by overeating.

10.3. Agriculture Productivity

Lack of fertile land, adverse weather conditions, and/or less competent farmers can all contribute to local food shortages (like inadequate crop rotation). In places that lack the resources or technology necessary for the higher yields found in contemporary agriculture, they can also exist. These materials consist of irrigation, machinery,

insecticides, fertilisers, and storage facilities. Farmers and governments are unable to supply enough of these resources due to the pervasive poverty, which would increase local yields.

Developing nations have also been under pressure from the World Bank and certain affluent donor nations to adopt free market policies. While heavily subsidising their own agricultural inputs, such as fertiliser, the United States and Europe urged developing nations to reduce or do away with subsidies for agricultural inputs. Few (if any) developing-nation farmers could survive without subsidies.

10.4. Future risks

Numerous things could potentially disrupt the world's food supply in the future and lead to widespread hunger. Food security is affected by global warming. The tropics or subtropics, where the environment is comparatively constant, are home to 95% of the world's starving population. Temperature increases in these areas are "highly likely," according to the most recent reports from the Intergovernmental Panel on Climate Change. Extreme weather conditions can often occur with even small changes in temperature. Drought is an example of an extreme weather event that has a major impact on agricultural production and nutrition.

10.5. Food Security

The Green Revolution, which took place in the 1950s and 1960s, intended to introduce contemporary Western agricultural methods to Asia (such as nitrogen fertilisers and pesticides). Agriculture-related investments, such as those in seeds and fertiliser, enhanced food yields and

hence increased food output. As a result, food costs and malnutrition dropped.

10.6. Imported Ready to Use

In northern Nigeria during the Green Revolution of the 1950s and 1960s had used to Therapeutic foods to alleviate malnutrition. The fight against undernourishment has a lot of potential thanks to new agricultural techniques, It facilitates cultivation, increasing agricultural outputs. This could lessen poverty by raising farmer incomes. Additionally, it would free up land that farmers might utilise to diversify their crops for domestic consumption. medical facilities. Increasing access to medical services in rural areas of the world is another potential long-term solution to malnutrition.

10.7. Breastfeeding

In 2016, estimations showed that increasing the prevalence of breastfeeding might avert nearly 823,000 deaths of young children per year.In addition to reducing infant mortality, breast milk provides a critical supply of micronutrients that have been scientifically proven to strengthen children's immune systems and provide long-term prevention against non-communicable and allergic disorders. Breastfeeding helps children's cognitive development and has a positive relationship with each child's academic success.

11. Conclusion

After getting independence, many problems like starvation, malnutrition like under-nutrition,

overnutrition, PEM (protein energy malnutrition) arose in the country. In today's time people are suffering from various problems like under-weight, under-weight, etc. In this way we can say that if proper nutrition is taken care of right from conception then every person will be healthy

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6

Role Of Dietitian In The Treatment Of Lifestyle Diseases

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Abstract

In this modern era, people habituate to the sedentary way of dwelling with growing urbanization and industrialization. This leads to lifestyle diseases so-called diseases of affluence or chronic diseases or non-communicable diseases globally and turns into a serious public health challenge. Lifestyle diseases can result in years of disability or death. World Health Organization (WHO) reported around 71% of mortality is due to lifestyle diseases. Hence more than half of the disease burden is from lifestyle diseases such as cancers, cardiovascular diseases, diabetes, chronic respiratory diseases and obesity. Over the past few decades, there is a great transition from communicable diseases to lifestyle diseases mostly affecting the economically productive age group i.e, 26 to 59 years which in turn hampers the development of the country. Among the modifiable and non-modifiable risk factors unhealthy diet, physical

inactivity, pollution, stress and awful addictions are the major cause of Lifestyle diseases. Since lifestyle changes have come to be a basic cause for the increasing incidence of lifestyle diseases in recent decades, proper nutritional interventions are necessary for the multidisciplinary healthcare system. To tackle the risk of lifestyle diseases special dietary modifications and changes to a healthy lifestyle are the main factors to prevent diseases. The core objective of this review article is to discuss common lifestyle diseases and the role of dietitians in preventing lifestyle diseases.

Keywords: Lifestyle diseases, Chronic diseases, Risk factors, Dietary treatment.

1. Introduction

Lifestyle diseases are related with the manner a person exists in his daily life. These are a kind of chronic diseases which starts in the first phase of life, retain and advance leading to illness and unexplained death if not intervened properly. Lifestyle diseases mainly refer to cancer, diabetes mellitus, hypertension, cardiovascular diseases, obesity and more. They are collectively ruled by a group of dangerous elements like usage of tobacco and alcohol, unhealthy diet, lack of physical activities, pollution and stress (Thilagavathi Ramamoorthy et al., 2022).

ICMR along with the Public Health Foundation of India (PHFI) and the Institute for Health Metrics & Evaluation (IHME) reported an increase in lifestyle diseases between 1990 and 2016.

According to World Health Organization (WHO) report in India, approximately 5.8 million humans die

from lifestyle diseases each year before attaining the age of 70. In 2017, India witnessed 61.8 per cent of deaths because of an unhealthy lifestyle and deaths from lifestyle diseases will boom to 55 million a year through 2030.

Over the past twenty to thirty years there was a drastic transition in the lifestyles of people. People were habituated to ready-to-eat foods and sedentary lifestyles. This has led to many diseases. Hence risk of lifestyle diseases can be reduced by correcting the irregularity and abnormality in human lifestyle patterns.

2. Lifestyle diseases

2.1. Cardiovascular diseases (CVD)

Cardiovascular diseases are a cluster of diseases that damage blood vessels in the body and heart. Heart attacks and strokes are generally acute and are caused because of a blockage that forestalls blood into the heart. Cardiovascular diseases are the main cause of mortality representing approximately 30 percent of all deaths worldwide (Pappachan MJ, 2011). It is anticipated that by 2030, CVD could be answerable for extra mortality in economically developing countries than contagious diseases, obstetric conditions, and dietary problems together. Lifestyle diseases like hypertension, diabetes mellitus, dyslipidaemia and obesity are the risk factors for CVD. The vital behavioural risk factors of coronary heart disease and stroke are an unbalanced diet, sedentary lifestyle, usage of tobacco and dangerous alcohol encompass poverty, stress, sleeping problems and hereditary factors. Research reveals that good nutrition can prevent mortality from CVD deaths or can even back-pedal the condition.

2.1.1. Dietary Treatment

The role of the dietitian is important in the management of risk factors and a good diet plan helps in combating disease. Variety foods promote a greater degree of beneficial effects compared to single nutrient supplementation. The contemporary body of evidence indicates that wholesome nutritional patterns, which include high consumption of fibre, mono and polyunsaturated fatty acids, micronutrients, antioxidants and polyphenols, with reduced salt intake, refined foods, saturated and trans fat and low glycemic index foods should be encouraged. This interprets an excessive consumption of fruits and vegetables, legumes, nuts, seeds, whole grains, vegetable oils, seafood, and dairy foods. Sodium and potassium are important in maintaining blood pressure and heart rate. Hence intake of less salty foods and excessive consumption of potassium-rich foods can also drastically decrease the hazard of cardiovascular disorder.

The intake of whole grains, legumes, nuts, seeds, fruits and vegetables is related to decreased inflammation while red meat increases inflammation. In addition, microbiota in the gut is also involved in cardiovascular health. It is known that diet impacts the make-up of gut microbiota and Dysbiosis which is concerned with the development of CVD can be prevented through the consumption of prebiotic foods. Studies propose that compounds found in animal foods such as L-carnitine and betaine when acted upon by gut bacteria produce trimethylamine N-oxide which increases the risk of disease. The National Institute of Diabetes and Digestive and Kidney Disorders advocate that if someone loses 5–10% of body weight, they will

reduce their threat of growing CVD. The American Heart Association (AHA) endorse doing one hundred fifty minutes of moderate-to-intense physical activity each week. Finally, consumption of unpolished grains and potassium rich foods can alleviate cardio vascular problems.

2.2. Cancer

Cancer is a genetic disease resulting from changes in genes that manipulate the manner the cells function, particularly the way they grow and divide. India has over two million registered cancer patients. This lifestyle disease is particularly a result of chemicals in tobacco smoke, unhealthy food plan, lack of physical activity and stress that leads to diminished immunity and inability to combat viruses and other infections along with human papillomavirus (HPV) and hepatitis and radiation from the sun. The occurrence of most cancers increases with age, as cell repair mechanisms will be diminished as a person becomes older. Cancer is the chief cause of global deaths, with nearly 10 million deaths in 2020 (WHO).

Researchers have determined that increased blood levels of glucose are associated with breast, lung, colon, rectum and prostate cancers (Wenijie Li et al., 2019). Elevated insulin and blood glucose are treated as cancer threat elements. Insulin stimulates cell division and rise in blood glucose and insulin can make contributions to sensitivity in the body. For a prolonged time, this can cause the abnormal cell multiplication and probably contribute to most cancers.

Around one-third of deaths from most cancers are due to tobacco usage, high body mass index, alcohol intake,

lower intake of fruit and vegetables and an inactive lifestyle.

A big review of studies discovered that excessive consumption of processed meat around 20 – 50 percent improved chance of colorectal cancer, compared to folks that had less (Raphaelle L Santarelli et al., 2008).

Several observational pieces of research have indicated that high dairy intake might also boom the threat of prostate cancers (Isabella Preble et al., 2019). Obesity also accelerates cancer risk.

2.2.1. Dietary Treatment

Dietitians should encourage and educate the masses about healthy diet habits. Since prevention is better than cure knowledge of foods that fight cancer with special properties should be known. No single superfood can save from cancer. Rather, an integrated dietary method is more useful. Eating the most suitable diet for cancer might also reduce the threat by up to 70 percent and could help recuperation from cancer as well.

Higher consumption of plant-based meals reduces the danger of most cancers. Research shows that individuals consuming a vegetarian diet have less threat from most cancers. Antioxidants, phytochemicals, polyphenols, lycopene, carotenes, selenium, and vitamins C and E protect cells from damage.

Dietary fibre adds bulk to stool. Fibre enables growth and nourishes microbes residing within the digestive tract. A healthy microbiome has been connected with lower cancer risk.

Beans and legumes are high in fibre, and some studies advise that better consumption of these may additionally defend against colorectal cancers. In a study people consuming legumes had a 50percent decrease threat of all kinds of cancers (Dagfinn Aune et al., 2009).

Eating nuts regularly can be linked to a lower chance of varieties of cancers. In a meta-analysis consumption of nuts decreased the threat of cancer (Jieyi Long et al., 2020). Many types of research display a link between olive oil and reduced cancer threat (Markellos C et al., 2022). Flaxseeds had been related to protective consequences in opposition to certain cancers and may even lessen the spread of cancer cells. Allicin in Garlic, curcumin in turmeric and cinnamon help protect from cancer.

Moderate intake of dairy products and eating fish gives protection against most cancers, probable because of wholesome fats which could decrease inflammation. As previously stated prebiotic, probiotic foods, selenium rich foods, phtochemicals and antioxidants play a vital role in the prevention of cancers.

2.3. Diabetes Mellitus

Diabetes is a situation which weakens the body's ability to handle glucose levels. The elevated degrees of glucose is a consequence of diminished insulin creation and activity. At the point when the glucose ascends in the wake of taking food, insulin produced by the pancreas neutralizes by upgrading the utilization of glucose by body cells. In individuals who are impervious to insulin, the body gradually neglects to respond to the insulin which results in high blood glucose levels. According to the insights of the International Diabetes Federation (IDF), more than

425 million individuals in 2017 were diabetic, with a normal ascent to 629 million by 2045 (Pouya Saeedi et al., 2019). Seventy nine percent of individuals with diabetes are living in middle-income and low-income countries.

Diabetes is acquiring a situation of the pandemic at a quicker rate in India. In 2000, India stood first on the planet with the largest number of individuals with diabetes. In India, the aetiology of diabetes is multivariate and contains hereditary variables connected with natural players like obesity, urbanization, increasing living standards and lifestyle changes. Of the different elements that add to diabetes, sedentary way of life and inappropriate intake of food, high intake of refined foods, and lack of vitamin D comprise the significant ones.

2.3.1. Dietary Treatment

A diabetic diet just means eating the best food varieties in moderate amounts and adhering to standard eating times. The calories should come from nutritious food varieties. Complex carbohydrates, fibre-rich food sources, fish, unsaturated fats and good fats containing monounsaturated and polyunsaturated fats like nuts, avocado, and olive oils should be preferred. Fruits, vegetables, whole grains, seeds, and low-fat dairy products should be included. Avoid foods and beverages with added fats, sugars, trans fat, saturated fat, and sodium. To sum up, diet for diabetes should include low glycaemic index foods, fibre foods and good fat.

2.4. Obesity

Obesity is an intricate disease including an unreasonable measure of body fat. Obesity isn't simply a restorative concern. A clinical issue which builds different diseases

and medical conditions like coronary disease, diabetes, hypertension, cancer, osteoarthritis and certain diseases. Obesity is treated as an epidemic by experts. According to World Health Organization annually, at least 2.8 million people are prone to death from complications related to overweight. Reasons behind becoming obese are genetic factors, junk food, overeating, hormonal changes and sugary foods.

2.4.1. Dietary Treatment

Dietary interventions should include whole grains, vegetables, whole fruits mainly seasonal fruits with soluble and insoluble fibres in addition to vitamins, minerals and antioxidants, nuts, seeds, beans, plant oils (olive and other vegetable oils), healthful sources of protein (fish and poultry) and water or few beverages that are naturally calorie-free in plenty. Avoid junk food, refined simple sugars and trans fats.

A study recommends DASH eating design with diminishing consumption of unhealthy fats and keeping out fat admission to under 25% in the routine diet, as well as expanding the extent of low-energy-dense food varieties, like vegetables and fruits (9 to 12 servings/day) and low-fat dairy items (2 to 3 servings/day). Finally, low calorie diet is necessary to overcome obesity (Alissad D. Smethers et al., 2018).

3. Conclusion

Changes in lifestyle in the past few decades have brought many diseases with them. A convenient lifestyle with everything in hand is making one lazy. Even though many are aware of the hazards of change in lifestyle toward

chronic diseases no proper steps are being taken. A dietitian along with dietary advice should also focus on changing the lifestyle patterns of individuals through proper education. Since lifestyle diseases are on a rise affecting the young population care should be taken to prevent them. This in turn helps in the development of the country.

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7

PSYCHOLOGICAL ISSUES AND CHALLENGES RELATED WITH FOOD AND NUTRITION

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Abstract

Nutritional psychology is an interdisciplinary area that emphasises the study of psychology, neurology, nutrition psychology, food science, and education to get a deeper knowledge of the psychological food link. This heightens our awareness of the complex and intertwined ways in which food, nutrients, and eating behaviours affect our psychological growth, experiences, and functions. One in six people, according to a survey, has experienced a common mental disease like anxiety or despair. The relationship between diet and mental health, the advantages, and disadvantages of the elements in our food, and a strategy. An integrated approach considers the interaction of biological factors and more general psychological, emotional, and social ideas of mental health is vital to reducing the prevalence and suffering caused by mental health concerns. Several of the psychological problems society is facing, such as nutrition, cannot be entirely explained by individual choices and behaviours.

Keywords: Food, Nutrient, Mental health, Psychological.

1. Introduction

One should feel well after eating. It is delicious and nourishing for bodies. However, our health and quality of life may be impacted if the food is consumed too little or too much. This might make one feel unfavourable about food. By controlling one's hunger, one may also have sensations of serenity, lots of energy, and alertness after eating. Deep-seated unhealthy eating patterns can be changed for a variety of reasons, including:

- An improvement in focus and energy.
- A more optimistic outlook on eating.
- Better health.
- Simpler movement.
- Better body image.

It's important to comprehend the function of food. The advice on nutrition can come out as complicated and inconsistent. But things are starting to shift Neurons, the main brain cells, are impacted by the food we eat. Unhealthy foods high in fats and carbohydrates in the brain lead to neuronal inflammation and prevent the growth of new neurons. If food having healthy nutrients like Omega-3 fatty acids is good for brain health, this can alter how the brain functions and contribute to mental illnesses like depression [3] (*Home - PMC - NCBI*, n.d.).

With the aid of nutrition, one can better comprehend how what eating affects all our feelings, including our emotions, moods, sensations, motivations, and

experiences (expressions). Professionals in mental health already address the psychological, cognitive, and behavioural factors that contribute to good mental health. From vitamins and minerals to good fats and fibre, all nutrients are essential to brain health and performance. Following a balanced eating and exercise routine is connected to better stress management, better sleep, higher focus, and overall better health.

It is already observed that people eat in reaction to societal pressures and requirements as well as their physiological needs. We can now include a third component of psychological demands to these. Emotional needs are closely related to appetite and hunger. Emotional states like yearning, wanting, and compulsion cause eating habits that are judged to be in response to stress or worry, to offer security and comfort, or to make other people angry and frustrated. [1] (Psychology, 2022)

Many people turn to eat as a coping method to handle emotions like stress, boredom, anxiety, or even to prolong happy feelings. While doing so could be beneficial in the short run, eating to cope with negative emotions frequently results in regret and guilt, which may even worsen the negative feelings. Negative emotions like anxiety and despair are linked to erratic eating patterns and using food as a diversion to unwind or feel better. Stress is linked to desires for foods heavy in fat and carbohydrates, especially in women. Men are more likely to have stress-related eating behaviours.

While mood determines one’s desires and the types of food they select, food greatly affects how they feel. Emotions influence what one eats, and food's nutritional value influences how the brains processes emotions and

mood. Certain nutrients can have an impact on mental and emotional functions. On the other hand, a negative psychological state may be made worse by a deficiency in vitamins, fatty acids, vitamin B, minerals, and amino acids, which are precursors to some macronutrients (protein, carbs, and lipids). Neurotransmitters, tyrosine to dopamine and tryptophan to serotonin, are among the nutrients that are most frequently deficient in mental disorders. Tryptophan and serotonin are known to enhance happiness, while diets high in carbohydrates stimulate their synthesis [6] (*The Factors That Influence Our Food Choices | Eufic*, 2006). One's mood may be improved by paying closer attention to the daily diet and consuming the right nutrients in the right amounts. The psychological co-morbidities of autism spectrum disorders, anxiety disorders, and depression have all been connected.

2. What is mood?

A psychologically complicated human mental state called "mood" can change depending on a number of internal, external, biological, and other circumstances, including food. The neurological response is influenced by specific substances, which might result in a happy or poor mood. Some meals have evolved to be mood boosters by releasing the correct neurotransmitters in the brain and reducing stress. Peptides, probiotics, minerals, blood sugar levels, micronutrients including carbohydrates and amino acids, and vitamin supplements are a few examples [2] (*Department of Health Media Releases | Queensland Health*, 2021).Food is a psychological and complex human mental situation that fluctuates depending on several central peripheral, biological, and other extraneous factors,

including food. A good or bad mood results from certain chemicals influencing the neural response. Some foods have improved to be mood enhancers by getting desired neurotransmitters released in the brain and stress relieving. Peptides, probiotics, micronutrients including carbs and amino acids, minerals, blood sugar levels, vitamin supplements, etc., are examples of bioactive elements that have been shown to have mood-enhancing characteristics [5] (Botyriute, n.d.). For healthy people, foods that are known to elevate mood include chocolate, ice cream, and hot and cold beverages. Good mood foods will, therefore, probably develop specialty markets in the future [1] (Psychology, 2022). A relatively recent area of interest for the food industry is the development of foods that are explicitly intended to influence mood, mental health, depression, or cognitive functions.

3. How does the food affect our mood?

The nutritional value of food affects mental processes associated to emotion and mood. Food may spark rapid feeling through sensory stimulation such as taste, savour, smell, or relief of hunger, but it can also influence mood by slower changes in brain chemistry.

According to a study, the entire brain releases a considerable number of endorphins, like after eating pizza (high calories food) [5] (Botyriute, n.d.). Surprisingly, after ingesting the bland nutritious drink, even more were discharged. The amount of the endorphins release did not depend on how enjoyable eating was.

It is a widespread belief that a bit of chocolate can give us a boost of happiness and improves mood, while a sip of coffee energizes and creates alert. On the other hand,

hunger induces changes in mood, perceptions, and reactions. This happens mainly because the glucose levels trigger the release of hormones that may bring along certain emotional dispositions. At the same time, some psychologists state that hunger can be experienced as a negative high arousal state and that a modified mood is the result of metabolic processes.

Food greatly affects mood, but the state of mind controls desires and the nutrients. Emotions influence what one eats, while food's nutritional value influences how brains process mood and emotion [1] (Psychology, 2022). The menu options constitute an intricate circuit. Numerous mental diseases are positively impacted by food choices. Specific nutrients can help to treat mood and mental illnesses because it has been demonstrated that dietary deficiencies have a negative impact on mental sanity.A negative psychological state may be made worse by a shortage of vitamins, fatty acids, minerals, and some macronutrients (protein, carbohydrate, and lipids), whereas nutrition can alter cognitive functions and emotions [1] (Psychology, 2022). Foods high in carbohydrates have been shown to have an impact on mood and behaviour. While GI diseases are frequently predictors for psychological co-morbidities, functional Gastro Intestinal tract (GI) disruptions have been connected to anxiety, depression, and autism spectrum disorders. The daily diet is receiving greater attention and consuming the right nutrients in the right proportions may improve moods [3] (*Home - PMC - NCBI*, n.d.).

4. Psychological issues related to food and nutrition

Even though we frequently have the best intentions, eating healthily is a difficult task. The perception of dietary nutrition and eating habits can be influenced by a variety of circumstances. Food choices are not exclusively influenced by psychological or nutritional requirements. Some other factors that influence food choice such as:

Individual: --biological factors as thirst, appetite, and taste. Physical factors include time, access, education, and talent (cooking)

Economic status: — Economic factors like price, income, and accessibility

Attitudes, beliefs, and knowledge about foods.

Psychological: —Psychological variables like mood, stress, and guilt.

Social: —Social determinants like culture, family, peers, and eating routines.

Evolutionary: -- The awareness of nutritional food

Behaviour is the subject of psychology. Studying how and why people behave in a certain way or favour certain things: --

Behaviour—in behaviour, determining the person's eating habits and how to alter them.

Identification of self-defeating thought processes that contribute to management (weight) issues.

5. Psychological challenges related to food and nutrition

Feeding the brain with food that contains enough of the complex in it. Water, essential lipids, carbohydrates, minerals, and amino acids can support appropriate neurotransmitter function. It can shield the brain against oxidant impacts, which research has shown to negatively affect mood and mental health [6] (*The Factors That Influence Our Food Choices | Eufic*, 2006). Evidence of nutrition's protective properties can be seen throughout the life course. Numerous studies have demonstrated that giving kids breakfast improves their academic performance. A balanced diet has long been linked to academic success. Numerous general studies have revealed that children who are hungry behave poorly at school; nevertheless, when nutritious meals are supplied, fighting and absenteeism are reduced, and concentration is increased. Research shows that eating foods high in essential fatty acids and low in saturated fats can protect the brain by delaying the onset of memory loss and other cognitive issues. [5] (Botyriute, n.d.).

5.1. Two groups of food can harm brain functions

- One group induces a rapid change in mood by tricking the brain into producing neurotransmitters that we may be deficient in (like caffeine and chocolate) [4].
- And the other group harms the brain by impeding the process by which other foods are transformed into the nutrients the brain needs (like butter, such as saturated fat, palm, and lard oil).

A study examines how people's eating habits have changed as more manufactured meals have taken their place. Poor mental health in children and teenagers is correlated with eating more foods high in saturated fat, refined carbs, and processed food. Food of poor quality has a high sugar, fat, and carbohydrate content [6] (*The Factors That Influence Our Food Choices | Eufic*, 2006).

Vegetables and fruits: The study found that consuming fruits and vegetables was the behaviour risk factor that was most consistently connected to both low and high mental well-being in both sexes [3] (*Home - PMC - NCBI*, n.d.).

Vitamins, minerals, acids: These are called micronutrients; perform many essential functions. They play a crucial part in maintaining mental health because they function in turning carbohydrates into glucose, fatty acids into healthy brain cells, and amino acids into neurotransmitters. Micronutrient deficiencies have been linked to several mental health issues, including depression, difficulty concentrating, and memory issues [2] (*Department of Health Media Releases | Queensland Health*, 2021).

Psychological issues, poor physical and mental health, and socioeconomic concerns like poverty can all be caused by a variety of inequities. As seen below, there is a complicated relationship between both inequality causes and poor nutrition [1] (Psychology, 2022).

Relationship between the "epidemics" of obesity and mental health issues and the steps we need to take in response to the current conditions that allow these to

develop into significant public health difficulties. [4][5](Botyriute, n.d.)

Poor physical health is a risk factor for the emergence of psychological issues. Industrialized farming, additives in processing, and other changes in food production methods have all been directly linked to severe physical health issues, like; coronary heart disease, some cancer, osteoporosis, and dental disease.

Poverty: The setting in which we decide what and how to eat is influenced by various psychological, social, cultural, and economic aspects. A major risk factor for both mental and nutritional health is poverty. Income, knowledge, skills, availability, and quality of food, as well as time, health, and convenience, all impact nutrition. While high-quality foods have a higher energy density, people with lower socioeconomic positions and less disposable income tend to consume nutrient-poor foods more frequently [7] (*Healthy Eating | Eufic*, n.d.).

It is necessary to investigate how nutritional issues affect these groups' psychological well-being.

Obesity: There is a complicated link between obesity and psychological issues. Unhealthy eating practises may contribute to obesity and depression: The most prevalent psychiatric ailment is depression. Those with low intakes of folate or folic acids were much more likely to be diagnosed with depression than those with higher intakes, according to a recent study analysing the relationship between low fish intakes by country and high prevalence of depression among its population. Studies have examined the addition of micronutrients to conventional treatments and the low levels of zinc, B1, B2, and C.

Schizophrenia: Studies have shown that people with schizophrenia have lower levels of polyunsaturated fatty acids and antioxidant enzymes in their bodies than the general population.

Dementia: Specific types of dementia are prevented by a low intake of vitamins and minerals. Greater fat consumption and higher rates of dementia in people over 65 were shown to be associated with low levels of vitamin C and E, respectively [7] (*Healthy Eating | Eufic*, n.d.).

According to studies, people who struggle with mental health issues frequently don't get enough of specific nutritional elements, such as Omega-3 fatty acids, critical vitamins, and minerals. Omega-3 fatty acids, Vitamin B, minerals, and amino acids are the nutritional deficiencies most frequently linked to mental health issues [2] (*Department of Health Media Releases | Queensland Health*, 2021).

Numerous factors can lead to nutrient deficits. Like [4]: —

- Food groups are avoided because of allergies, intolerances, or preferences
- Physical restrictions
- Lack of variety in the diet
- Poor absorption bought on by drugs or bacterial overgrowth
- Poor appetite
- And food instability

6. Conclusion

Individual decisions and behaviours don't fully explain nutrition. A few of the problems with mental health that society is dealing with. There is a shortage of information

regarding simple food production and consumption rules. People need to understand how diet and mental health are related. The possibility is that an inadequate diet would contribute to or maintain psychological problems and poor mental health. Recognize the function that eating serves in life and develop cognitive and behavioural coping mechanisms to regulate eating and weight to succeed.

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8

COMPARISON BETWEEN NUTRITIONAL AND HEALTH STATUS OF HOSTELLER AND NON-HOSTELLER ADOLESCENT GIRLS

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Abstract

Adolescence is important period of life span. Girls in their adolescence period require macro and micronutrients to support their growth spurt and lack of nutrient prone them to greater risk of various deficiency diseases and reproductive related complications. The objective of the present study was to assess intake of energy, protein, iron,fat, vitamin C and the folic acid in respondents by twentyfour-hour recall method. The study was conducted in college of Home Science of NDUAT Kumarganj, Faizabad (now Ayodhya) district of Eastern Uttar Pradesh. A total of 100 adolescent girls (50 Gomati Girl's Hostel and 50 University campus) within age of 17-19 years were selected purposively. A self-structured interview schedule

was used for gathering data. BMI was calculated by measuring weight and height. Assessment of anaemia was done by Haemoglobin estimation in laboratory. The collected data was analysed in terms of frequency and percentage, standard deviation and chi square. Non-hosteler were more anaemic compared to hostelers. Severe anaemia was prevalent among the underweight adolescent girls. The findings of chi-square test elucidate that low BMI was associated with iron deficiency anaemia. The chi square ($\chi 2$) results also show the significant association between dietary habits and anaemia among hostellers. The intake of protein and energy was lower in hostellers than hostellers. There is need to plan intervention strategies and efforts to increase adolescents and their family awareness regarding their knowledge, attitude, and practices to reduce the anaemia for improving their quality of life.

Keywords: Adolescent, Girls, Anaemia, RDA, Nutrients, BMI.

1. Introduction

Adolescence is a crucial phase of life especially for growth and building dietary habit in this phase life leads a healthy life in future. World Health Organization (WHO) defines adolescence year are 10–19 (WHO,2001)).As per the UNICEF,2016Asia occupies more than half of the world's adolescent's population whereas in India as per Census 2011, about 20% of India's population are adolescents. Adolescence period is generally divided into two phases: early adolescence (10–14 years) and late adolescence (15–19 years) (Patton, 2016).

Nutritional requirements increased during adolescence period due to increased growth rate and several changes in body composition which are associated with puberty (Das et al.,2017). The dramatic increase in energy and nutrient requirements in these years coincides with other factors that may depends on adolescents' food choices, nutrient intake, and nutritional status. Factors, like quest for independence and acceptance by peers, increased mobility, greater time spent at school and/or work activities, and preoccupation with self-image, contribute to a lot for erratic and unhealthy eating behaviours that are common during adolescence (Spear,2002).Faulty eating habits in adolescence period contribute towards undernutrition, overnutrition and micronutrient deficiency.

Adolescents are in that phase of lifein which where they may be considered as nutritionally vulnerable for several reasons as they require increased demand for nutrients as a result of increase in physical growth and development. However, change in the lifestyle and unhealthy eating habits like eating too much, not eating enough, or restricted eating can affect adolescent health and wellbeing negatively.

Girls in their adolescence period are often more prone to iron deficiency anaemia because of increased requirement of iron which in turn caused by abrupt increase in lean body mass and total blood volume, and menstrual blood loss (Kumari et al., 2017). BMI is one of the useful assessments of body fitness in adolescents in their crucial period of life span. BMI is defined as body weight in kilograms which is divided by the square of height in meters (kg/m2), is a weight-for-height index

that meets to assess the underweight, normal weight, overweight and obese adolescents (Lindsay et al., 2001). World Health Organization categories BMI-based fatness as underweight (BMI < 18.5 kg/m2), normal weight (18.5–24.9 kg/m2), overweight (25.0–29.9 kg/m2) and obese (≥30.0 kg/m2) (Sperrin et al., 2016). The common interpretation represents an index of an individual's fatness. It also is broadly used as a risk factor for the development of or the occurrence of several health issues and extensively used in determining public health policies (Nuttall, 2015).Teenage girls especially underweight, overweight and obese are often prone to IDA (Bose and Bisai ,2008). IDA in adolescents is label as serum ferritin below 12 ng/ml and Hb level below 12g/dl for females (Anand et al.,1999).

The adolescent psychology also has an impact on eating habits, such as leaving time to eat, overeating, taking supplements, and having favourite foods (Stang and Marry, 2005). Changes in eating habits in adolescents are caused by low nutritional knowledge and inappropriate dieting behaviour. Released national report of the Comprehensive National Nutrition Survey (CNNS) 2016-18 on birth to adolescence report by Ministry of Health and Family Welfare, provides unparalleled new insights into all types of macronutrients and micronutrient malnutrition, dietary habits, life skill behaviours, access to services (school, health and nutrition) and physical activity throughout adolescence 10-19 years and for both boys and girls.

Adolescence is a critical phase in a women's life. Health and nutritional status during this phase arecrucial for the physical maturity (Sharma et al,2005). Therefore, the

requirement of energy as well as proteins increases considerably during this period of life. The peak in energy and protein requirements coincides with the peak in growth of adolescents (Karkera et al,2020).

2. Materials and Method

The study was done in Kumarganj, Faizabad (now Ayodhya) district of eastern Uttar Pradesh. Purposive selection of hostel and campus were made due to familiarity with the girls and time constraint. The main target population of study were adolescent girls from gomti girl hostel(hosteller) and campus (non-hosteller)from NDUAT, university campus who were selected purposively in view of convenience of survey work. The sample comprised of 50 Undergraduate adolescent girls from gomti girl's hostel and 50 from NDUAT university campus within age ranged of 17-19 years. Dietary habits were assessed through self-structured interview schedule, twenty four-hour recall method, and assessment of anaemia was done by Haemoglobin estimation in laboratory.

3. Results and Discussion

Relationship was measured between BMI and Haemoglobin concentration in terms of frequency and percentage. BMI below 18.5 kg/m2 was associated with severe anaemia in both hosteller and non-hosteller adolescent girls. Chi-square test reveals significant association, among BMI and anaemia both in hosteller and non-hosteller girls. It was found that low BMI in adolescent girls is associated with iron deficiency anaemia.

Table 1 Relationship Between BMI and Anaemia in Adolescent Girls

Non-Hostellers							
S. N.	**BMI (Body Mass Index)**	**Number of respondents**	**Haemoglobin level in respondents (g/dl)**				**Chi square ($\chi 2$)**
			Normal (>11)	**Mild (9-11)**	**Moderate (7-9)**	**Severe (<7)**	
1.	Underweight Less than 18.5 kg/m2	4	0	0	1(25)	3(75)	*30.11
2.	Normal (18.5–24.9 kg/m2),	34	3(8.8)	18(52.9)	10(29.41)	3(8.8)	
3.	Overweight (25.0–29.9 kg/m2)	12	7(58.33)	4(33.33)	1(8.33)	0	
	Total	**50**	**10**	**22**	**12**	**6**	
Figure in Parenthesis indicate Percentage ****Significant 5% Level***							

Table1 shows that most of the non-hostellers (75%) with low BMI ((<18.5 kg/m2) were severely anaemic.

Table 2: Relationship Between BMI and Anaemia in Adolescent Girls

Hostellers							
S. N.	**BMI (Body Mass Index)**	**Number of respondents**	**Haemoglobin level in respondents (g/dl)**				
			Normal (more than 11)	**Mild (9-11)**	**Moderate (7-9)**	**Severe (less than 7)**	**Chi square ($\chi 2$)**
1.	Underweight Less than 18.5 kg/m2	7	0	2(28.57)	2(28.57)	3(42.85)	*21.02
2.	Normal (18.5–24.9 kg/m2),	28	11(39.28)	9(32.14)	7(25)	1(3.5)	
3.	Overweight (25.0–29.9 kg/m2)	15	9(60)	6(40)	0	0	
	Total	**50**	**20**	**17**	**9**	**4**	
Figure in Parenthesis indicate Percentage ****Significant 5% Level***							

However, most of the non-hostellers with BMI between (25.0–29.9 kg/m2) had normal Haemoglobin level (58.33%). Next to this 52.9 % were mild anaemic and possible reasons may be skipping meal, diet quality, faulty eating habits like consumption of fast foods etc. (table 1).

Similar findings were found in the case of adolescent hostellers' girls (Table 2) where maximum girls (60%) had normal Haemoglobin level with (25.0–29.9 kg/m2) BMI followed by 42.85% who were severely anaemic with low BMI (<18.5 kg/m2).

Andrews et al., (2009)in a study found that low BMI is associated with iron deficiency anaemia and IDA is one of the most common nutrition-related problems in Iran and many other parts of the world and is categorized by a wide range of haematological and non hematological symptoms. The findings are also supported by another study by Gupta et al.,(2011)which reflected that anaemia females had low BMI (91%).In another study Pal et al.,(2011)also highlighted that the occurrence of anaemia was high in persons with low BMI.

Association between dietary habits and Haemoglobin concentration was measured and for this Chi square ($\chi 2$) showed significant association between dietary habits and anaemia among hostellers. However, the result was found to be non-significant for non-hostellers.

Table 3 shows that more than the half (59.25%) hostellers with correct dietary habits had normal Haemoglobin level.

Table 3: Association Between dietary habits and Anaemia among Hosteller Adolescent Girls

Hostellers							
S. N.	**Dietary Habit**	**Number of Respondents**	**Haemoglobin level**				**(χ2)**
			Normal (more than 11)	**Mild (9-11)**	**Moderate (7-9)**	**Severe (less than 7)**	*10.764
1	Correct	27	16 (59.25)	8 (29.62)	2 (7.40)	1 (3.70)	
2	Incorrect	23	4 (17.39)	9 (39.13)	7 (30.43)	3 (13.04)	
Total		**50**	**20**	**17**	**9**	**4**	
Figure in Parenthesis indicate Percentage ****Significant 5% Level***							

However, most hostellers with incorrect dietary habits were mild (39.13%) and moderate anaemic (30.43%). The reasons could be skipping meal, loss of appetite, lack of time or interest in the diet, peer influence and media advertising etc. The chi square ((χ2) results show significant association between dietary habits and anaemia among hostellers. In this connection it was reported by Beard, (2000) that adolescents with less than three meals

in a day tend to have inadequate intakes of nutrients especially iron and girls in this phase are particularly prone to iron deficiency anaemia as of increased demand of iron for haemoglobin, myoglobin and to make up the loss of iron due to menstruation and poor dietary habits.

Table 4: Association Between dietary habits and Anaemia among Non-Hosteller Adolescent Girls

Non –Hostellers							
S. N.	**Dietary Habit**	**Number of Respondents**	**Haemoglobin level**				**(χ 2)**
			Normal (more than 11)	**Mild (9-11)**	**Moderate (7-9)**	**Severe (less than 7)**	7.36
1.	Correct	38	8 (21.05)	19 (50)	9 (23.68)	2 (5.26)	
2.	Incorrect	12	2 (16.66)	3 (25)	3 (25	4 (33.33)	
Total		**50**	**10**	**22**	**12**	**6**	

Non-Significant

In a study by Gaikwad (2013) it was also found that adolescent girls were found to be more vulnerable to the effects of malnutrition, stunting, anaemia etc, because of

frequent erratic eating pattern, lack of nutritional knowledge and faulty dietary habits. Another study done by Rodrigues P et al., (2017) highlighted that skipping a meal is often associated with a low-quality diet and high intake of low nutritious food items.

Similar findings were found in the case of non-hostellers adolescent girls (Table 4) where maximum (50%) had normal Haemoglobin level with correct dietary habits followed by 33.33% who were severely anaemic with incorrect dietary habits. The reasons could be skipping breakfast and lunch to control weight, fear of gaining weight, taking snacks between meals, faulty eating habits like consumption of fast foods etc. However, chi square ((χ2) results show non-significant association between dietary habits and anaemia among non-hostellers.

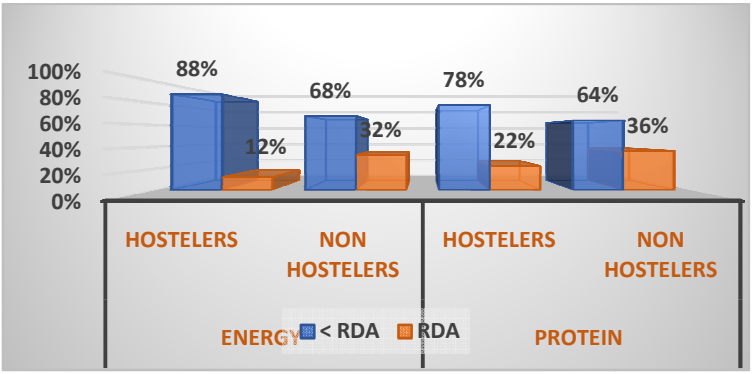

Figure 1 Energy and Protein

Figure1 clearly shows that hostellers were more deficit in calories and protein than non-hostellers. The data with reference to dietary pattern reflected that the intake of energy and protein was found to be low when compared to RDA for adolescents.

Although both hostellers and non-hostellers were aware about nutritional deficiency, yet they were not following the normal eating behaviours and because of this, their diets were remains deficient in energy, protein and the possible reason for this might be unhealthy eating behaviours like habit of frequent skipping of meals in whole day, snacking between meals and frequent dieting with the purpose of losing weight, less consumption of fruits and vegetables, etc. The findings of the study are also supported by Srinivasan et al, (1995) who found that distress and disorder in eating habits and attitude towards the body weight among the adolescents in Chennai, the southern part of India. Later, study by Srinivasan et al. (1998) revealed that very few adolescents (11%) developed a milder form of eating disorder with the fear of fatness.

4. Conclusion

The findings of the study conclude that non-hosteler girls were more anaemic as compared to hosteller girls. The severe anaemia was found among the underweight non-hosteller as well as hosteller girls. So, it is necessary to do efforts to increase adolescents' and their family awareness regarding their knowledge, attitude and practices by focusing on nutritional intervention to combat anaemia and to improve the quality of their life. Nutrition interventions are needed with respect to current dietary trends. Parents and teachers should be aware about behaviour change related to eating disorders like anorexia nervosa or bulimia nervosa. There is need to focus on nutrition education for adolescents so that they can understand the importance of being healthy, consuming healthy diets, and to take care of themselves.

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