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SRI-VIPRA

Project of 2023:

Report

SVP-2311

"Relationship between diet and disease"

IQAC
Sri Venkateswara College
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SRIVIPRA PROJECT 2023

Title:Relationship between diet and disease

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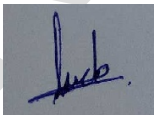
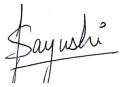
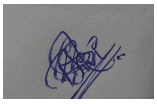
2		ArshaNavas P T	1220041	B.Sc. (H) Biochemistry	
3		AyushiSinghal	Ananya Singh	B.Sc. (P) Life Sciences	
4		BivishithaNaisamudhin	1320035	B.Sc. (H) Biological Sciences	
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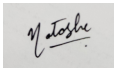
6		Natasha Yadav	1221027	B.Sc. (H) Biochemistry	
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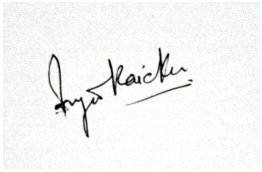
Signature of Mentor

Certificate of Originality

This is to certify that the aforementioned students from Sri Venkateswara College have participated in the summer project SVP-2311titled **"Relationship between diet and disease".** The participants have carried out the research project work under my guidance and supervision from 15 June, 2023 to 15thSeptember2023. The work carried out is original and carried out in an online/offline/hybrid mode.



Signature of Mentor

Acknowledgements

We are proud to share our project report titled '**The Relationship between Diet and Disease'**. Our team worked tirelessly to bring this report to fruition, and we are grateful for the support and contributions of everyone involved. We extend our heartfelt gratitude to our mentor, **Dr. Anju Kaicker**, for her invaluable guidance. Her expertise in identifying research problems, conducting research, and producing accurate results through surveying was instrumental in shaping our project. Without her input, our report would not have achieved the level of quality it has today.

We would also like to thank the coordinators of SRI VIPRA, the Principal and management (Tirumala TirupatiDevasthanams), **Sri Venkateswara College**, **University of Delhi** for giving us this golden opportunity.

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INTRODUCTION

Human beings and animals are constantly performing work- mechanical, chemical, electrical, and osmotic work. All these various works are active processes and require energy. Biological energy is necessary for human life and growth, maintenance, and repair of body tissues. This energy is provided to us by nutrients. Nutrients are chemical substances found in food that are vital to maintain the body's structure and functions. Energy is stored in the form of nutrients which are released on digestion of food in the human body.

Nutrients provided by food can be divided into two groups: (1) macronutrients and (2) micronutrients. The organic macronutrients are carbon compounds synthesized by living organisms. They include carbohydrates, proteins or amino acids, and lipids. Organic macronutrients are required in large amounts and are sources of energy for the body. Micronutrients are essential nutrients required by the human body in small amounts. They include vitamins and minerals.

MACRONUTRIENTS

Carbohydrates are defined as polyhydroxy aldehydes and ketones. They are the most abundant organic components in most fruits, vegetables, legumes, and cereal grains, and they provide texture and flavour in many processed foods. They are the major energy source for humans by digestion and absorption in the small intestine and, to a lesser extent, by microbial fermentation in the large intestine.

The most important carbohydrate fuel in the body is glucose. Glucose is an essential energy source for human tissues; some types of cells such as red blood cells are not able to use other fuels. Glucose may be derived from dietary starches and sugars, from glycogen stores in the body, or by synthesis in vivo from gluconeogenic precursors such as amino acid carbon skeletons. Glucose also serves as a precursor for synthesis of all other carbohydrates including lactose produced by the mammary gland, the ribose needed for nucleic acid synthesis, and the sugar residues that are found as covalently bound constituents of glycoproteins, glycolipids, and proteoglycans in the body.

Proteins, often called polypeptides, are polymers of amino acid residues linked by peptide bonds. Proteins are involved in essentially every process that takes place in cells, and these proteins have a remarkable diversity of functions. Proteins function as enzymes, transcription factors, binding proteins, transmembrane transporters and channels, hormones, immunoglobulins, motor proteins, receptors, structural proteins, and signalling proteins.

In terms of diet, humans and other animals must consume protein to meet needs for amino acids including specific amino acids that cannot be synthesized by the organism. Protein in human diets includes both animal sources, such as meat, milk, fish, and eggs; and plant sources, such as cereal seeds (wheat, rice, maize) and legume seeds (soybeans, peanuts).

Lipids are a diverse set of small molecules which are soluble in nonpolar solvents. The major biological functions of lipids include serving as structural components of cell membranes, serving as a form of energy storage, providing lubrication and conditioning for body surfaces, and functioning as signalling molecules of various types, including activators of nuclear receptors and G protein–coupled receptors and second messengers from phosphatidylinositol and sphingolipids. Lipids also function as receptors, antigens, sensors, electrical insulators, biological detergents, and membrane anchors for proteins. Fats represent a major source of dietary and cellular energy.
Although lipids and fats are used synonymously, the subgroup of lipids known as TAGs (triacylglycerols) are the major component of dietary fats. Fat in animals is stored in specialized cells called adipocytes that contain very large fat droplets that push most of the cytoplasm toward the plasma membrane; fat is also found in smaller lipid droplets in other cell types.
Important animal fats are lard, tallow, and butterfat, and widely used plant oils include those extracted from soybeans, rapeseed/canola, cottonseed, peanuts, sunflower, corn, and olives.

MICRONUTRIENTS

The term micronutrients refers to vitamins and minerals that are needed for the body in trace amounts, since it is needed in trace amounts it is called as ‘micronutrients`. Since our bodies generally cannot produce micronutrients, we must obtain our food to fulfil the requirements of micronutrients, hence it is also called as essential nutrients. As each vitamin and mineral has a specific purpose in your body, an appropriate intake of all micronutrients is essential for achieving maximum health.
The six essential micronutrients are-

- Iron
- Vitamin A
- Vitamin D
- Iodine
- Folate
- Zinc

Vitamins and minerals can be divided into four categories:

- Water-soluble vitamins
- Fat-soluble vitamins

- Macrominerals
- Trace minerals

A) Water soluble vitamins

Most vitamins dissolve in water and are therefore known as water-soluble. They're not easily stored in your body and get flushed out with urine when consumed in excess.While each water soluble vitamin has a unique role, their functions are related. Some of the water-soluble vitamins are listed below:

- Vitamin B1 (thiamine): Helps convert nutrients into energySources: whole grains, meat, and fish
- Vitamin B2 (riboflavin): Necessary for energy production, cell function and fat metabolism
  Sources: organ meats, eggs, milk
- Vitamin B3 (niacin): Drives the production of energy from food
  Sources: green leafy vegetables, beans, meat
- Vitamin B5 (pantothenic acid): Necessary for fatty acid synthesis
  Sources: mushroom, organ meat
- Vitamin B6 (pyridoxine): Helps your body release sugar from stored carbohydrates for energy and create red blood cells
  Sources: fish, milk, carrot, potato
- Vitamin B7 (biotin): Plays a role in the metabolism of fatty acids, amino acids and glucose Sources: egg, almonds, sweet potato, spinach
- Vitamin B9 (folate): Important for proper cell division
  Sources: spinach, beans, peanuts, sunflower seeds
- Vitamin B12 (cobalamin): Necessary for red blood cell formation and proper nervous system and brain function
  Sources: fish, meat, egg, cheese, yoghurt
- Vitamin C (ascorbic acid): Required for the creation of neurotransmitters and collagen, the main protein in your skin
  Sources: citrus fruits, kiwi, bell peppers, and papaya

B) Fat soluble vitamins

Fat soluble vitamins do not dissolve in water. Some of them are listed below-

- Vitamin A: Necessary for proper vision and organ function
  Sources: Retinol (liver, dairy, fish), carotenoids (sweet potatoes, carrots, spinach)

- Vitamin D: Promotes proper immune function and assists in calcium absorption and bone growthSources: Sunlight, fish oil, milk
- Vitamin E: Assists immune function and acts as an antioxidant that protects cells from damage
  Sources: Sunflower seeds, wheat germ, almonds
- Vitamin K: Required for blood clotting and proper bone development
  Sources: Leafy greens, soybeans, pumpkin

C) Minerals

Macrominerals are needed in larger amounts than trace minerals in order to perform their specific roles in your body. The macrominerals and some of their functions are:

- Calcium: Necessary for proper structure and function of bones and teeth. Assists in muscle function and blood vessel contraction
  Sources: Milk products, leafy greens, broccoli
- Phosphorus: Part of bone and cell membrane structure
  Sources: Salmon, yogurt, turkey
- Magnesium: Assists with over 300 enzyme reactions, including regulation of blood pressure
  Sources: Almonds, cashews, black beans
- Sodium: Electrolyte that aids fluid balance and maintenance of blood pressure
  Sources: Salt, processed foods, canned soup
- Chloride: Often found in combination with sodium. Helps maintain fluid balance and is used to make digestive juices
  Sources: salt, celery
- Potassium: Electrolyte that maintains fluid status in cells and helps with nerve transmission and muscle function
  Sources: Lentils, acorn squash, bananas
- Sulfur: Part of every living tissue and contained in the amino acids methionine and cysteine
  Sources: Garlic, onions, Brussels sprouts, eggs, mineral water

D) Trace minerals

Trace minerals are needed in smaller amounts than macrominerals but still enableimportant functions in your body. The trace minerals and some of their functions are:

- Iron: Helps provide oxygen to muscles and assists in the creation of certain hormonesSources: spinach, dark chocolate, egg, and tofu
- Manganese: Assists in carbohydrate, amino acid and cholesterol metabolism
  Sources: pineapple, peanuts, oatmeal
- Copper: Required for connective tissue formation, as well as normal brain and nervous system function
  Sources: Liver, crabs, cashews
- Zinc: Necessary for normal growth, immune function and wound healing
  Sources: pumpkin seeds, dark chocolate, cashew
- Iodine: Assists in thyroid regulation
  Sources: eggs, chicken, fish
- Fluoride: Necessary for the development of bones and teeth
  Sources: Fruit juice, water, crab
- Selenium: Important for thyroid health, reproduction and defense against oxidative damage
  Sources: egg, chicken, turkey

BIOACTIVE COMPOUNDS

Bioactive compounds are extra-nutritional elements that are found in trace amounts in food and offer health advantages above and beyond the product's fundamental nutritional value.
They are phytochemicals that are present in food and are able to control metabolic processes, hence promoting improved health. The physiological, behavioural, and immunological impacts of bioactive substances are currently the subject of extensive research to determine their impact on health.

Examples of bioactive compounds: carotenoids, flavonoids, carnitine, choline, coenzyme Q, dithiolthiones, phytosterols, phytoestrogens, glucosinolates, polyphenols, and taurine.
Since vitamins and minerals elicit pharmacological effects, they can be categorized as bioactive compounds as well.

Various foods may naturally contain bioactive compounds. Antioxidant, anticarcinogenic, anti-inflammatory, and antibacterial activities are present in the majority of bioactive compounds. As a result, a number of epidemiologic studies claim that certain of them also protect against cardiovascular illnesses.

Despite the fact that bioactive compounds are naturally found in many foods, they are often used as additives and processing aids. Foods or food products often have bioactive components added to them to increase their health-promoting qualities. Carotenoids,

anthocyanins, and curcumin are the most well-known coloured bioactive compounds. They are included in several food products as colour additives. Ascorbic acid is one of the most commonly used food additives to stop oxidation. The most obvious application of cinnamaldehyde and vanillin is as flavouring in sweet foods, chewing gums, and beverages.

NUTRITION, UNDERNUTRITION AND OVERNUTRITION

Nutrition refers to the process of obtaining and consuming nutrients from food to support growth, repair, and maintenance of the body's tissues and functions. Balanced nutrition is crucial to maintaining good health. Balanced nutrition can change to overnutrition or undernutrition based on various factors, including dietary choices, lifestyle changes, and individual circumstances.

Undernutrition can be discussed in terms of protein-energy undernutrition and those specific micronutrient deficiencies which are considered of public health significance i.e. vitamin A, iron and iodine deficiency. Body composition, clinical signs of deficiency, physical function, biochemical compounds, metabolic processes or dietary intake are some of the indicators used to measure nutritional status. And the choice of the indicator depends on the question being asked.

The commonly used anthropometric measures are weight and height in combination with age and sex.Three basic indices are used in childhood:

1. Weight for age,
2. Height for age and
3. Weight for height.

In adulthood, since they have stopped attaining height, indices of slimness are more appropriate. The indices used then include Body Mass Index. The reference ranges for these indices are based on the World Health Organization (WHO) Child Growth Standards and the WHO Adult BMI Reference Range. It is important to note that these indices are just a starting point for assessing nutritional status.

Undernutrition is a serious problem that can have long-term consequences for health. It can impair growth and development, increase the risk of infections, and lead to chronic diseases in adulthood. Early identification and intervention are essential for preventing the negative consequences of undernutrition.

Primary undernutrition and secondary undernutrition are two categories of undernutrition with different underlying causes:

1. Primary Undernutrition:
   - This refers to undernutrition that occurs due to insufficient intake of nutrients, calories, and essential elements in the diet.
   - It is mainly caused by inadequate access to food, poor dietary choices, or limited availability of nutritious food
   - Primary undernutrition is often associated with poverty, food insecurity, and lack of access to clean water and sanitation.

2. Secondary Undernutrition:
   - This type of undernutrition results from factors other than dietary intake, which hinder the body's ability to absorb, utilize, or retain essential nutrients effectively.
   - Common causes of secondary undernutrition include various medical conditions, such as chronic diseases, infections, digestive disorders, and certain medications that interfere with nutrient absorption.
   - Secondary undernutrition can also arise from factors like inadequate healthcare, improper feeding practices, or lack of breastfeeding support for infants.

It's essential to address both primary and secondary undernutrition through appropriate interventions, including improving access to nutritious food, promoting health and hygiene practices, and providing medical treatments and support as needed. By addressing the root causes of undernutrition, we can work towards reducing its prevalence and improving the overall health and well-being of affected individuals and communities.

Undernutrition can be categorized into several types, including:
- Protein-energy malnutrition (PEM): A condition resulting from insufficient intake of both protein and calories, leading to weight loss, stunted growth, and weakened immune system.
- Marasmus: Severe calorie and protein deficiency, causing extreme weight loss, muscle wasting, and overall body wasting.
- Kwashiorkor: A type of PEM characterized by a lack of protein intake, leading to edema (fluid retention) in the belly, face, and limbs, along with skin and hair changes.
- Micronutrient deficiencies: Inadequate intake of essential vitamins and minerals, such as iron, vitamin A, iodine, and zinc, which can cause specific health issues like anaemia, night blindness, and impaired immune function.
- Cachexia: A complex metabolic syndrome associated with chronic illnesses, causing muscle wasting and weight loss.
- Stunting is a chronic form of undernutrition that results in a child's height being below the expected range for their age. Stunting is often caused by inadequate food intake, frequent infections, or a combination of both.

- Wasting is a more acute form of undernutrition that results in a child's weight being below the expected range for their height. Wasting is often caused by a recent illness or a period of food insecurity.

Overnutrition, also known as overeating, occurs when an individual consumes an excessive amount of calories and nutrients, often leading to an imbalance in the intake of energy and nutrients compared to the body's requirements. It is defined as abnormal or excessive accumulation of fat in the adipose tissue that may affect the health status of individuals. Hence, it is the sum of overweight and obesity.

Overweight and obese children are most likely to be overweight and obese into adulthood and more prone to chronic diseases like diabetes mellitus, hypertension and cardiovascular diseases e at a younger age, and to develop increased risks of breathing difficulties, fractures, insulin resistance, cancer, asthma, and psychological effects.
Also according to several studies, overnutrition is related to more deaths worldwide than undernutrition.

Factors contributing to overnutrition are foods that are high in fats, sugars, energy dense foods, and increased low-intensity activities due to new modes of transportation and urbanization.

Overnutrition leads to several conditions like:

- Obesity: A condition characterized by excess body fat, often caused by consuming more calories than the body needs.
- Type 2 diabetes: Occurs when the body becomes resistant to insulin or does not produce enough insulin to regulate blood sugar levels adequately. This can be related to excessive sugar and carbohydrate intake.
- Hyperlipidemia: Elevated levels of lipids (cholesterol and triglycerides) in the blood due to a high intake of unhealthy fats.
- Hypertension: High blood pressure, which can result from excessive salt and sodium intake.
- Nutrient toxicity: Overconsumption of certain vitamins or minerals, leading to potential health issues.

It's essential to maintain a balanced and nutritious diet to avoid the negative consequences of overnutrition.

The main effects of overnutrition include obesity, type 2 diabetes, cardiovascular diseases (CVD), metabolic disorders, nutrient imbalances, and an increased risk of certain cancers.

Overnutrition is closely related to CVD and type 2 diabetes, primarily due to obesity resulting from consuming more calories than the body needs. Obesity increases the risk of CVD through adverse changes in cholesterol levels, high blood pressure, and atherosclerosis. It also contributes to insulin resistance and elevated blood sugar levels, leading to the development of type 2 diabetes. To prevent these issues, maintaining a balanced diet, controlling portions, and engaging in regular physical activity are crucial. Consultation with healthcare professionals can provide personalized guidance for managing nutrition and maintaining a healthy lifestyle.

OBESITY

Obesity or overweight is the excessive or abnormal accumulation of fat or adipose tissue in the body. It is considered as a serious issue that can impair our health. Obesity is a prime cause of diabetes mellitus, cardiovascular diseases, hypertension and hyperlipidemia. It is also reason to musculoskeletal disorders such as osteoarthritis, and some cancer including endometrial, breast, ovarian, prostate, liver, gallbladder, kidney and colon. Obesity may require a lifelong treatment. A 5% – 10% reduction in weight improves the quality of life of an obese individual, thus reducing the risk of suffering from diseases and high chances of death.

Body Mass Index (BMI) is a measure of an individual's weight (in kg) divided by the square of the individual's height(m2),for adults. BMI is a measure used to estimate overweight and obesity. The table estimating obesity from BMI of adults is given below:

BMI	CLASSIFICATION	HEALTH RISK
< 18.5	Underweight	Minimal
18.5 – 24.9	Normal	Minimal
25 – 29.9	Overweight	Increased
30 – 34.9	Obese	High
35 – 39.9	Severely obese	Very high
>40	Morbidly obese	Extremely high

Alternative ways to estimate obesity is by assessing skin thickness in the triceps, biceps, subscapular and supra-iliac areas. Dural energy radiographic absorptiometry (DEXA) scan may also be used to assess fat mass.

Pathophysiology

Obesity is associated with cardiovascular disease, hyperlipidemia, and insulin resistance, causing diabetes, stroke, gallstones, fatty liver, sleep apnea, and cancers. Multiple studies shows an association of genetics and obesity. FTO gene is associated with adiposity. This gene might bear multiple variants that increase the risk of obesity.

An adipocyte hormone – leptin, reduces food intake and body weight. Cellular leptin resistance is associated with obesity. Adipose tissue secretes adipokines and free fatty acids. These secretions cause systemic inflammation which in turn causes insulin resistance and increased triglyceride levels. Increased triglyceride is a sole reason of obesity.
Besides total body fat, the following also increase the morbidity of obesity:

- Waist circumference (abdominal fat carries a poor prognosis)
- Fat distribution (Body Fat Heterogeneity)
- Intra-abdominal pressure
- Age of onset of obesity

The distribution of fat in the body is important in assessing the risk for cardio metabolic health. The distribution of excess visceral fat in the body increases the risk of cardiovascular disease.

Data on obesity

- Four million people die every year as a result of obesity, according to the World Health Organization (WHO).The worldwide obesity rate has nearly tripled since 1975 and nearly doubled since 1980.
- In the year 2016, 39% of adults who were at the age of 18 or above were overweight, and 13% were obese.
- Most of the world's population are occupied in countries where overweight and obesity kills more people than underweight.
- 39 million children less than 5 years of age were overweight or obese in 2020.
- More than 340 million children and adolescents of 5 – 19 years of age were overweight or obese in 2016.
- The World Obesity Federation predicts that by 2030, one in every five women and one in every seven men will have obesity.
- Nowadays, more people have obesity than underweight in every region of the world, with the exception of sub-Saharan Africa and Asia, showing how it’s a usual health problem in both developed and developing countries.
- Obesity is a reason to 30% to 53% of new diabetes cases in the U.S. every year, as per research in the Journal of the American Heart Association.
- Obesity is preventable.

Causes of obesity

Obesity is caused mainly as a result of an imbalance between daily energy intake and energy expenditure. As the daily energy intake increases beyond the energy expenditure, it results in excessive weight gain. Obesity is a serious condition, caused by a myriad of genetic, cultural, and societal factors. Multiple genetic studies have shown that obesity is extremely heritable, with numerous genes identified with adiposity and weight gain. Obesity can also be caused due to reduced physical activity, insomnia, endocrine disorders, medications, consumption of excess carbohydrates and high-sugar foods, and decreased energy metabolism.

Some most common syndromes associated with obesity include Prader Willi syndrome and MC4R syndromes.

AIM OF OUR STUDY

Our study aims to emphasize the vital role of diet in maintaining good health and preventing various lifestyle diseases. Overconsumption of calories can lead to obesity, which creates an energy imbalance where the intake of calories exceeds their expenditure. This condition increases the risk of several diseases, such as Type 2 diabetes mellitus, cardiovascular diseases (CVD), hyperlipidemia, hypertension, non-alcoholic fatty liver disease (NAFLD), certain types of cancer, obstructive sleep apnea, osteoarthritis, and depression, all of which can be fatal. Therefore, it is crucial to monitor the quality and quantity of our diet.

We have reviewed how diet can help manage some diseases, including CVD, Type 2 diabetes mellitus, and cancer. Additionally, we conducted a survey to assess the dietary habits of the general public and their awareness of the importance of a balanced diet.

CARDIOVASCULAR DISEASES AND NUTRITION

Cardiovascular diseases (CVDs) stand as the primary cause of mortality worldwide, accounting for approximately 32% of all global deaths. India, with its vast and diverse population, faces a substantial share of the global burden of cardiovascular diseases. Disturbingly, the nation contributes to around one-fifth of all CVD-related deaths

worldwide. The scale of this issue is a cause for concern, not only due to its impact on public health but also because a considerable proportion of these deaths occur in younger individuals, presenting an urgent call to action.

Cardiovascular diseases (CVDs) encompass a wide range of disorders affecting the heart and blood vessels, with some prominent examples being:

- Coronary Artery Disease (CAD): This condition arises from the blockage or narrowing of coronary arteries, primarily due to atherosclerosis. Atherosclerosis is the accumulation of cholesterol plaques on the arterial walls, impeding blood flow and leading to insufficient oxygen supply to the heart muscle
- Heart Attack: Often a consequence of CAD, a heart attack occurs when a coronary artery is completely blocked, cutting off blood flow and oxygen to a section of the heart. Prompt medical attention is crucial to minimize damage and save lives.
- Stroke: A stroke results from the blockage of blood flow to the brain, causing brain tissue damage due to the lack of oxygen and nutrients. This can lead to various neurological impairments, and timely intervention is vital for recovery.
- Other Conditions: In addition to CAD, heart attacks, and strokes, CVDs can encompass various other disorders affecting the heart and blood vessels, such as heart failure, arrhythmias, and peripheral arterial disease.

Atherosclerosis plays a pivotal role in the development of cardiovascular diseases, as it involves the gradual deposition of cholesterol plaques within the arterial walls. Over time, these plaques can lead to arterial narrowing, restrict blood flow, and elevate the risk of heart attacks, strokes, and other cardiovascular complications.

Factors affecting CVD

The most significant behavioral risk factors contributing to heart disease and stroke are an unhealthy diet, physical inactivity, and tobacco use. These behaviors can lead to adverse health effects in individuals, such as elevated blood pressure, increased blood glucose levels, raised blood lipids, and the development of overweight and obesity.

- Unhealthy Diet: Consuming excessive cholesterol leads to the deposition of cholesterol plaques in the arterial walls, including those of the heart. This process narrows the arteries, reducing blood flow to critical organs such as the heart, brain, and kidneys. Diets high in saturated fats, trans fats, and cholesterol have been strongly linked to heart disease. Blood cholesterol consists of two main types: LDL (low-density lipoprotein) cholesterol, known as "bad" cholesterol due to its potential to cause plaque buildup in arteries, and HDL (high-density lipoprotein) cholesterol, considered "good" cholesterol as higher levels offer some protection against heart disease.

- Physical Inactivity: Leading a sedentary lifestyle can lead to obesity, diabetes, and the accumulation of fat deposits, significantly increasing the risk of cardiovascular diseases. Regular physical activity is essential for managing body weight, reducing the risk of diabetes, and preventing the development of fat deposits that can obstruct blood flow through the arteries. Engaging in exercise enhances heart function and circulation, playing a vital role in reducing the risk of CVDs.
- Tobacco Use: Smoking cigarettes is highly detrimental to heart and blood vessel health, increasing the risk of conditions like atherosclerosis and heart attacks. Nicotine from smoking raises blood pressure, putting additional strain on the cardiovascular system. Moreover, carbon monoxide in cigarette smoke reduces the blood's oxygen-carrying capacity, further compromising heart health. Notably, even non-smokers exposed to secondhand smoke face an increased risk of heart disease.

Emphasizing lifestyle modifications and early intervention can have a profound impact on reducing the burden of these conditions and promoting a healthier, more resilient population.

These risk factors come together, forming a convergence of mechanisms that involve oxidation and inflammation within the artery wall. Over time, this complex interplay gives rise to distinctive fatty-fibrous lesions, shaping the course of cardiovascular diseases.
Maintaining a delicate balance between the presence of reactive oxygen species (ROS) and antioxidants is vital for the proper functioning of cells. While a basal level of ROS is necessary for various cellular functions, an excess of ROS can inflict damage upon essential macromolecules like DNA, lipids, and proteins, ultimately leading to necrosis and apoptotic cell death. This oxidative stress plays a significant role in the development of various cardiovascular conditions, with arterial hypertension arising from increased ROS levels, resulting in decreased nitric oxide availability and vasoconstriction.

Moreover, Inflammation, in particular, acts as the trigger for the early stages of the atherosclerotic process, and an upsurge in inflammatory cytokines has been associated with a heightened risk of developing cardiovascular diseases. This includes its contribution to the formation and progression of atheroma plaque, plaque rupture, and the occurrences of post-angioplasty and restenosis. Key players in the development of CAD are various inflammatory mediators, including C-reactive protein (CRP), interleukins (IL)-1, IL-6, IL-8, IL-1β, IL-18, monocyte chemoattractant protein (MCP)-1, and tumour necrosis factor (TNF)-α, among others. These mediators are also considered potential biomarkers of inflammation, and their expression may be indicative of the severity of CAD.

In essence, the intricate interplay of oxidation, inflammation, and immune responses shapes the landscape of cardiovascular diseases. Understanding these multifaceted

mechanisms opens new avenues for innovative therapeutic strategies, targeting oxidative stress and inflammation to improve outcomes in those affected by these conditions

A voluminous corpus of scientific evidence stands as a monument to this proposition, illuminating the compelling impact that dietary choices exert over the destinies of our hearts. Beyond the ambit of CVD prevention, the symphonic interplay of diet unveils its multifaceted role, resounding as a pivotal conductor in the harmonious management of a myriad of risk factors, including adiposity and hypertension.

Dietary patterns work like masterful compositions. The Mediterranean regimen, with its harmonious symphony of olive oil, nuts, and whole grains, plays a virtuosic role in protecting the heart. Meanwhile, the DASH diet conducts a captivating tour de force, skilfully taming high blood pressure and safeguarding heart health.

Mediterranean Diet

The Mediterranean diet is a dietary pattern inspired by the traditional eating habits of people living in countries bordering the Mediterranean Sea, such as Greece, Italy, and Spain. It has gained significant attention from researchers and health experts due to its numerous potential health benefits, particularly in relation to cardiovascular disease (CVD).

Key components of the Mediterranean diet include:

- Abundant Consumption of Fruits and Vegetables: The diet encourages the intake of a wide variety of colourful fruits and vegetables, providing essential vitamins, minerals, and antioxidants. These nutrients play a vital role in reducing oxidative stress and inflammation, both of which are key contributors to the development of CVD.
- Whole Grains: Whole grains like whole wheat, brown rice, quinoa, and oats are staples of the Mediterranean diet. These complex carbohydrates provide sustained energy and are rich in fiber, which aids in maintaining healthy cholesterol levels and promoting heart health
- Healthy Fats: Instead of relying on saturated fats from red meat and processed foods, the Mediterranean diet emphasizes the consumption of healthy fats from sources like olive oil, nuts, and avocados. These fats contain monounsaturated and polyunsaturated fatty acids, which have been associated with improved cardiovascular health by reducing LDL (bad) cholesterol levels and increasing HDL (good) cholesterol levels.
- Fish and Poultry: Fish, especially fatty fish like salmon, sardines, and mackerel, are a significant part of the diet. These fish are rich in omega-3 fatty acids, which have

anti-inflammatory properties and are beneficial for heart health. Poultry is also consumed in moderate amounts, providing a lean source of protein.

- Limited Red Meat and Processed Foods: The Mediterranean diet advises limiting the consumption of red meat and processed foods, which are often high in saturated fats and sodium. Instead, the focus is on plant-based proteins and whole foods.
- Red Wine in Moderation: Some versions of the Mediterranean diet include moderate consumption of red wine during meals. The antioxidants in red wine, such as resveratrol, may offer protective effects for the heart. However, it is essential to consume alcohol in moderation, as excessive alcohol intake can have adverse health effects.

Studies have shown that adherence to the Mediterranean diet can help reduce the risk of developing CVD, including heart attacks, strokes, and hypertension. It may also improve lipid profiles, lower blood pressure, and decrease markers of inflammation and oxidative stress.

DASH Diet

The DASH (Dietary Approaches to Stop Hypertension) diet is a scientifically-proven dietary plan that is specifically designed to reduce high blood pressure (hypertension). However, its benefits extend beyond blood pressure management, as it has shown significant potential in preventing and managing cardiovascular disease (CVD) as well.

Key components of the DASH diet include:

- Rich in Fruits and Vegetables: The DASH diet emphasizes a generous intake of fruits and vegetables, which are excellent sources of essential nutrients, fiber, antioxidants, and potassium. These components help lower blood pressure and reduce the risk of developing CVD.
- Whole Grains: The diet encourages the consumption of whole grains like whole wheat, brown rice, oats, and quinoa, which are high in fiber and other beneficial nutrients. Whole grains contribute to improved heart health by regulating cholesterol levels and promoting healthy blood vessel function.
- Lean Proteins: The DASH diet recommends lean protein sources, such as poultry, fish, beans, legumes, and nuts. These proteins are low in saturated fat and provide essential amino acids necessary for maintaining cardiovascular health.
- Low-Fat Dairy: Dairy products are included in the DASH diet, with an emphasis on low-fat or fat-free options. These products offer calcium, vitamin D, and other nutrients important for bone health and have been associated with a modest reduction in blood pressure.

- Limited Sodium: The DASH diet aims to reduce sodium intake, which is a significant factor in elevating blood pressure. By lowering sodium consumption, the diet can help control blood pressure levels and mitigate the risk of CVD.
- Reduced Sugar and Sweets: Added sugars and sugary beverages are limited in the DASH diet, which helps control calorie intake and maintain a healthy weight, thus contributing to better heart health.

Numerous studies have investigated the impact of the DASH diet on cardiovascular health. Research consistently demonstrates that following the DASH diet can lead to a substantial reduction in blood pressure, making it an effective approach for managing hypertension. As high blood pressure is a significant risk factor for CVD, controlling it can help lower the overall risk of heart attacks, strokes, and other cardiovascular complications.

Similarity between Mediterranean and DASH diets

The Mediterranean diet and the DASH (Dietary Approaches to Stop Hypertension) diet share several similarities, as both are health-promoting dietary patterns that have been extensively studied for their positive effects on cardiovascular health and overall well-being. Emphasis on Whole Foods, Healthy fats, limited consumption of red meat, moderate dairy consumption and significant emphasis of plant based products have been given in both diets.

How do they work against CVD

Plant-based foods have demonstrated the ability to mitigate the risks of cardiovascular disease (CVD) using diverse mechanisms. Here are several ways in which these wholesome plant-derived items promote heart health and diminish the likelihood of CVD.

- Lower in Saturated and Trans Fats: Plant-based foods, such as fruits, vegetables, whole grains, legumes, nuts, and seeds, are naturally low in saturated and trans fats. Diets high in saturated and trans fats have been associated with elevated LDL (bad) cholesterol levels, which increase the risk of atherosclerosis and CVD. By choosing plant-based options, individuals can reduce their intake of harmful fats and promote heart health.
- Rich in Fiber: Plant-based foods are excellent sources of dietary fiber, particularly in whole grains, fruits, and vegetables. Dietary fiber helps lower cholesterol levels by binding to cholesterol in the digestive tract and removing it from the body. By reducing LDL cholesterol, fiber helps prevent the formation of plaque in the arteries, reducing the risk of heart disease.
- Abundant in Antioxidants: Fruits, vegetables, and other plant-based items are rich in antioxidants, such as vitamins C and E, beta-carotene, and polyphenols. Antioxidants combat oxidative stress and inflammation, which play crucial roles in the development of atherosclerosis and CVD.Antioxidants neutralize free radicals

and reactive oxygen species in the body, which are known to trigger inflammatory responses and stimulate the production of IL-1 and IL-6. By reducing oxidative stress, these antioxidants help to dampen inflammation and lower the levels of CRP and pro-inflammatory cytokines. By neutralizing harmful free radicals, antioxidants protect blood vessels and reduce the risk of cardiovascular complications

- High in Potassium: Many plant-based foods, including bananas, oranges, spinach, and beans, are excellent sources of potassium. Potassium helps regulate blood pressure by counteracting the effects of sodium and promoting the relaxation of blood vessel walls. Adequate potassium intake can help maintain healthy blood pressure levels and reduce the risk of hypertension, a major risk factor for CVD.
- Presence of Bioactive Compounds: Various bioactive compounds found in the diet, such as omega-3 fatty acids, lycopene, and polyphenols, have been linked to positive impacts on the progression of atherosclerosis. These compounds collectively contribute to the reduction of LDL cholesterol levels and improvements in markers of inflammation and oxidative stress, offering beneficial effects in preventing atherosclerosis development.
- Favourable Effects on Body Weight: Plant-based diets are often associated with lower calorie density and higher satiety, making it easier for individuals to maintain a healthy body weight. Excess body weight is a significant risk factor for CVD, and plant-based diets can contribute to weight management and reduce the risk of obesity-related heart conditions.
- Anti-Inflammatory Properties: Many plant-based foods possess anti-inflammatory properties, helping to combat chronic inflammation, which is linked to atherosclerosis and heart disease. By reducing inflammation, plant-based items protect blood vessels and support cardiovascular health.

Concluding, adopting a plant-based diet can offer a multitude of benefits for heart health by reducing cholesterol levels, controlling blood pressure, combating oxidative stress and inflammation, and supporting overall cardiovascular well-being. Integrating more plant-based items into one's diet can be a powerful step towards reducing the risk of CVD and promoting a heart-healthy lifestyle.

For individuals at risk of or already diagnosed with hypertension or CVD, adopting the DASH diet and Med diet under the guidance of healthcare professionals can lead to substantial health improvements. However, it is crucial to recognize that diet alone cannot address all aspects of heart health. Lifestyle factors such as physical activity, smoking cessation, and stress management are also essential components of a comprehensive approach to cardiovascular well-being.

DIABETES AND NUTRITION

As individuals strive to maintain a balanced lifestyle, understanding the impact of proper nutrition on heart health has been a cornerstone in preventing cardiovascular diseases. However, a parallel concern that has gained increasing attention is the link between nutrition and diabetes management. As we shift our focus from cardiovascular health to diabetes, exploring the pivotal role of nutrition, becomes essential in empowering individuals to make informed choices. While cardiovascular health focuses on the heart and blood vessels, diabetes poses its own unique challenges, demanding a tailored approach to dietary choices.
By shifting our attention to diabetes and nutrition, we can delve into the key principles and dietary considerations that can positively impact blood sugar management and promote a healthier lifestyle for those living with diabetes. Let's now explore this vital connection between nutrition and diabetes management.

Diabetes is characterised by high blood sugar levels over prolonged periods. If left untreated, diabetes causes many health complications. Acute health complications can include hyperosmolar hyperglycemic state, diabetic ketoacidosis, or even death. Serious long-term health complications include damage to the eyes, cardiovascular disease, and stroke. Diabetes occurs due to either the inability of the pancreas to produce enough insulin, or the body cells improperly responding to the insulin produced.

Types of Diabetes-

- Type 1 diabetes results from the failure of pancreas to produce enough insulin due to the loss of beta cells caused by an autoimmune response.
- Type 2 diabetes begins with insulin resistance, a condition in which the cells fail to properly respond to insulin.
- Gestational diabetes is the third major form, and occurs when a pregnant woman without a previous history of diabetes develops high blood sugar levels.

The classic symptoms of untreated diabetes include unintended weight loss, polydipsia (increased thirst), polyphagia (increased hunger), and polyuria (increased urination). In addition signs and symptoms include blurred vision, slow healing of cuts, itchy skin, headache, and fatigue. Prolonged high blood glucose may cause glucose absorption in the lens of the eye, which results in changes in its shape, leading to changes in vision.

Diabetes management
The management of diabetes focuses on keeping blood sugar levels very close to normal, without causing a low blood sugar level. Learning about the disease and also actively participating in the treatment is very important, since complications are usually less severe and far less common in individuals who have well-managed their blood sugar levels. Per

the American College of Physicians (ACP), the goal of the treatment is attaining an HbA1C level of 7 to 8%. Attention is also given negative effects of diabetes, including smoking, high blood pressure, lack of regular exercise, and metabolic syndrome obesity. Specialised footwear is used widely to reduce the risks of ulcers in at-risk diabetic feet. In some developing countries, many untrained traditionalists claim that some bitter phytochemicals are helpful in the treatment of diabetes.

Healthy diet

Healthy diet provides the body with the essential nutrition: fluid, micronutrients, macronutrients, and adequate calories. Eating a variety of diets and consuming less salt, saturated and industrially-produced trans-fats, and sugars are essential for a healthy diet. A healthy diet may contain whole grains, fruits, and vegetables, and includes little or no processed foods and sweetened beverages. Requirements for a healthy diet can be met from a variety of animal-based and plant-based food.

Low-Fat diet

A low-fat diet is a diet that restricts fats, and often cholesterol and saturated fat as well. Low-fat foods are intended to reduce occurrence of conditions such as heart diseases and obesity, which increases the risks of diabetes and can worsen diabetes in already diabetic patients. Fat provides 9 calories/g while carbohydrates and protein each provide 4 calories/g. Institute of Medicine and many nutritional institutions recommend consuming no more than 35% of the calories from fat. Low-fat diets have been promoted to prevent heart disease and obesity. Lowering fat intake from 35 to 40% of total calories to 15 to 20% of total calories has shown to reduce total and LDL cholesterol by 10 – 20%.

Palaeolithic diet

It is a modern fad diet requiring sole or predominant consumption of foods acknowledged to have been available to humans during the Palaeolithic era. The scientific literatures commonly use the term "Paleo nutrition pattern", which is variously described as:

- Vegetables, nuts, roots, meat, organ meats, and fruits.
- Vegetables (including root vegetables), nuts, fish, meat, eggs, and fruit (including fruit oils, e.g., coconut oil, palm oil, and olive oil), and it excluded dairy, legumes, extra sugar, grain-based foods, and nutritional products of industry (such as refined carbohydrates and refined fats).
- Avoid processed foods, and lay emphasis on eating vegetables, nuts and seeds, fruits, eggs, and lean meats.

The evidence is sufficient enough to recommend the Paleolithic diet for treatment of metabolic syndrome, but it may also be used to reduce the risks of diabetes.

Low Carbohydrate diet

Low-carbohydrate diets, also known as carbohydrate-restricted diets (CRDs) are the diets that restrict consumption of carbohydrate relative to the average diet. Diets high in carbohydrates (e.g., pasta, sugar, bread) are limited, and replaced with the foods containing higher percentage of protein (e.g., meat, shellfish, eggs, cheese, poultry, fish, nuts, and seeds) and fat, as well as low carbohydrate foods, such as chard, collards, spinach, kale, and other fibrous vegetables. A low-carbohydrate diet reduces body exposure to high glucose levels, leads to weight loss, decreases the risk of obesity, and prevents or controls diabetes, and other related metabolic imbalance.

For some people, it may be feasible to adhere to a low- carbohydrate regime in combination with carefully-managed insulin dosing, it can be hard to strictly maintain and there are some concerns about the potential adverse health effects caused by the diet. In general, individuals with type 1 diabetes are advised to maintain an individualized eating plan. The proportion of carbohydrates of all types in a diet is not directly linked to the risks of diabetes type 2, although there is some evidence linking diets containing some high- carbohydrate products, such as white rice or sugar-sweetened drinks, are associated with increased risks of type 2 diabetes. Some evidence indicates that eating fewer carbohydrate foods can reduce biomarkers of diabetes type 2.

A 2018 report on diabetes type 2 by the European Association for Study of Diabetes (EASD) and the American Diabetes Association (ADA) found that low-carbohydrate diets may not be as good as Mediterranean diets for improving glycemic control, and also that although having healthy body weight is vital, there is no single ratio of intake of carbohydrate, proteins, and fat that is optimal for every individual with type 2 diabetes. Low- carbohydrate dieting has no effects on the kidney function of individuals who have type 2 diabetes.

According to the American Diabetes Association, people with diabetes should be developing a healthy eating pattern rather than focusing on individual micronutrients, macronutrients, or single foods. ADA recommended that the carbohydrate in a diet should come from legumes, vegetables, fruits, dairy (yogurt and milk), and whole grains, while sugary drinks and highly-refined foods should be avoided. The ADA also stated that reducing the overall intake of carbohydrate for people with diabetes has shown the most evidence for glycemia improvement and may be applied in a range of eating patterns that meet individual requirements and preferences.

Very low calorie diet

A very-low-calorie diet (VLCD), also called semi-starvation diet or crash diet, is a type of fat diet with extremely or very low daily food energy consumption. VLCD is defined as a diet containing 800 kilocalories (3,300kJ) or less per day [97, 98]. Carbohydrates can be completely absent, or partly substituted for the protein; this choice has significant metabolic effects. Very-low-calorie diets have specific therapeutic application for rapid

loss of weight. Type 2 diabetics who cannot meet the glycemic target or where reducing antiglycemic medication is a priority, low or very-low-calorie diets are viable approaches.

Raw foodism

Raw foodism, also called rawism or following raw food diet, is the dietary practice of consuming only or mostly foods that are unprocessed and uncooked. Depending on the philosophy, or the type of lifestyle and the results desired, raw food diets can include a selection of vegetables, nuts, fruits, seeds, eggs, meat, fish, and dairy products. Also, the diet may include simply processed food, such as cheese, numerous types of sprouted seeds, and fermented foods such as sauerkraut, yogurts, kefir, or kombucha. Raw food diets are diets entirely or mostly composed of food that is uncooked or cooked at low temperatures. When uncooked, many starch molecules are more likely resistant to digestion in the body, thereby reducing the glucose levels. Cooking improves the digestibility of nutrients. The medical authorities have defined raw foodism as a fad diet. The raw food diets, precisely raw veganism, fail to provide the essential minerals and nutrients such as iron, calcium, and protein.

Ketogenic diet

The ketogenic diet is high-fat, adequate-protein, and low-carbohydrate diet. The keto diet was made in 1924 as treatment for epilepsy The ketogenic diet compels the body to burn fats instead of carbohydrates. The carbohydrates contained in food are normally converted into glucose, which is transported around the body and is mainly important in fuelling the brain function. However, if little or no carbohydrate remains in the diets, the liver converts fat into ketone bodies and fatty acids. The ketone bodies pass into the brain and replace glucose as an energy source. Elevated level of ketone bodies in blood, known as ketosis, results in a reduction in frequency of the epileptic seizures. Around 50% of children and young individuals with epilepsy who have tried various forms of this diet had the number of seizures dropped by at least 50%, and the effects persist even after discontinuing the diet. Potential side effects may be constipation, high cholesterol, acidosis, kidney stones, and growth slowing.

The ketogenic diet, low in carbs and high in fat, can potentially change the way the body stores and uses energy, easing the symptoms of diabetes. With the keto diet, the body converts fat, rather than sugar, into energy. The effects of this pattern of eating are also being studied for diabetes type 2. The ketogenic diet may improve blood glucose level while at the same time reducing the requirement for insulin in diabetic people. However, the diet comes with risks.

Lifestyle

Those with diabetes can benefit from the education about the disease and its treatment, dietary changes required, and exercise, with the aim of keeping both the short-term and the

long-term blood glucose levels within adequate and acceptable bounds. Additionally, given the associated higher risk of cardiovascular disease, modifications of lifestyle are recommended to control blood pressure, including healthy eating, regular exercise, and maintaining normal weight (BMI 18 to 25).
Weight loss can prevent progression from the prediabetes to type 2 diabetes, result in a partial remission in those with diabetes, or decrease the risks of cardiovascular disease.

Glycemic Spike
A glycemic spike, also known as a blood sugar spike, occurs when there is a rapid and significant increase in blood glucose levels after consuming foods high in carbohydrates.
This spike is often followed by a quick drop in blood sugar levels, which can leave you feeling fatigued and hungry.
Foods with a high glycemic index (GI) are more likely to cause glycemic spikes because they are quickly broken down into glucose and absorbed into the bloodstream. On the other hand, foods with a low GI are digested and absorbed more slowly, leading to a gradual rise in blood sugar levels.
Continuous exposure to frequent glycemic spikes may have negative health effects, especially for individuals with diabetes, insulin resistance, or metabolic syndrome. It can also contribute to weight gain and increase the risk of developing chronic conditions like type 2 diabetes and cardiovascular disease.
To manage glycemic spikes, it's essential to focus on a balanced diet that includes a variety of nutrient-dense foods, such as whole grains, fruits, vegetables, lean proteins, and healthy fats. Combining high-GI foods with fibre, protein, or healthy fats can help slow down the absorption of glucose, reducing the impact on blood sugar levels. Monitoring carbohydrate intake and being mindful of portion sizes can also be beneficial in managing glycemic spikes. If you have concerns about blood sugar levels, it's best to consult with a healthcare professional for personalized advice.

Glycemic Index
In the past, carbohydrates were classified as simple or complex based on the number of simple sugars in the molecule. Carbohydrates composed of one or two simple sugars like fructose or sucrose (table sugar; a disaccharide composed of one molecule of glucose and one molecule of fructose) were labelled simple, while starchy foods were labelled complex because starch is composed of long chains of the simple sugar, glucose. Advice to eat less simple and more complex carbohydrates (i.e., polysaccharides) was based on the assumption that consuming starchy foods would lead to smaller increases in blood glucose than sugary foods (1). This assumption turned out to be too simplistic since the blood glucose (glycemic) response to complex carbohydrates has been found to vary considerably. The concept of glycemic index (GI) has thus been developed in order to rank dietary carbohydrates based on their overall effect on postprandial blood glucose

concentration relative to a referent carbohydrate, generally pure glucose (2). The GI is meant to represent the relative quality of a carbohydrate-containing food. Foods containing carbohydrates that are easily digested, absorbed, and metabolized have a high GI (GI≥70 on the glucose scale), while low-GI foods (GI≤55 on the glucose scale) have slowly digestible carbohydrates that elicit a reduced postprandial glucose response. Intermediate-GI foods have a GI between 56 and 69.

Glycemic Load

The glycemic index (GI) compares the potential of foods containing the same amount of carbohydrate to raise blood glucose. However, the amount of carbohydrate contained in a food serving also affects blood glucose concentrations and insulin responses. For example, the mean GI of watermelon is 76, which is as high as the GI of a doughnut. Yet, one serving of watermelon provides 11 g of available carbohydrate, while a medium doughnut provides 23 g of available carbohydrate.

The concept of glycemic load (GL) was developed by scientists to simultaneously describe the quality (GI) and quantity of carbohydrate in a food serving, meal, or diet. The GL of a single food is calculated by multiplying the GI by the amount of carbohydrate in grams (g) provided by a food serving and then dividing the total by 100:

GLFood = (GIFood x amount (g) of available carbohydrate Food per serving)/100

For a typical serving of a food, GL would be considered high with GL≥20, intermediate with GL of 11-19, and low with GL≤10. Using the above-mentioned example, despite similar GIs, one serving of watermelon has a GL of 8, while a medium-sized doughnut has a GL of 17. Dietary GL is the sum of the GLs for all foods consumed in the diet.

It should be noted that while healthy food choices generally include low-GI foods, this is not always the case. For example, intermediate-to-high-GI foods like parsnip, watermelon, banana, and pineapple, have low-to-intermediate GLs.

CANCER AND NUTRITION

The connection between diet and cancer is a delicate and evolving area of study. While no single "magic" diet can guarantee immunity from cancer, there is compelling evidence that our dietary choices play a significant role in influencing cancer risk, progression, and even treatment outcomes. According to the research paper by Nutrition and cancer by national library and medicine, it has been estimated that 30–40 percent of all cancers can be prevented by lifestyle and dietary measures to a great extent.

A diet rich in fruits, vegetables, whole grains, lean proteins, and low in processed foods and sugary beverages appears to offer protection against various forms of cancer. Protective elements in a cancer prevention diet include selenium, folic acid, vitamin B-12,

vitamin D, chlorophyll, and antioxidants such as the carotenoids (α-carotene, β-carotene, lycopene, lutein, cryptoxanthin).

Ascorbic acid has limited benefits orally, but could be very beneficial intravenously. Supplementary use of oral digestive enzymes and probiotics also has merit as anticancer dietary measures. Intake of flax seed, especially its lignan fraction, and abundant portions of fruits and vegetables will lower cancer risk.

Conversely, diets high in unhealthy fats, sugars, and excessive red meat consumption seem to increase the risk of certain cancers. Nutrient sparse foods such as concentrated sugars and refined flour products that contribute to impaired glucose metabolism (which leads to diabetes), low fiber intake, consumption of red meat, and imbalance of omega 3 and omega 6 fats all contribute to excess cancer risk. However, it's important to acknowledge that individual factors such as genetics, lifestyle, and overall health also contribute to cancer susceptibility.

Eating too much food is also one of the main risk factors for cancer. This can be shown in two ways: (1) by the additional risks of malignancies caused by obesity, and (2) by the protective effect of eating less food

It was estimated in a recent study, from a prospective cancer prevention cohort, that overweight and obesity accounted for 14 percent of all cancer deaths in men and 20 percent of those in women.

The remarkable complexity of cancer makes it challenging to establish universal dietary guidelines. Still, the evidence underscores the importance of adopting a balanced and mindful approach to eating, along with maintaining a healthy weight and staying physically active. Research continues to uncover the mechanisms through which dietary components interact with our body's biology to either promote or prevent cancer.

In the journey towards reducing the global cases of cancer, public health strategies that highlights education about healthy dietary choices, alongside healthier lifestyle modifications, hold the potential to make important impacts. As science advances, an ongoing commitment to scientific research, public awareness, and personalized dietary recommendations will be pivotal in the ongoing battle against cancer.

CONCLUSION

In this review, we have focused on lifestyle diseases that are prevalent in today's world. We have emphasized how adopting a healthy diet can lead to lasting improvements in population health. A person's diet plays a critical role in their overall health, going beyond

simply providing energy for the body. By following a healthy dietary pattern, people can potentially prevent the current high levels of obesity, cardiovascular disease, diabetes mellitus, and cancer that are affecting people around the world. Additionally, when someone has developed a condition, changes to their usual diet may be necessary to help manage the disease or symptoms. We have discussed the important role that these diets can play in disease management.

SURVEY REPORT

A survey was conducted to evaluate the dietary habits and nutritional knowledge of the general public.

The survey had 208 participants, with 162 of them being aged between 18-25 as shown in figure 1 and living in metropolitan or urban cities. 67.8% of the population lives with their families (figure 2) and hence preferred home-cooked food, which is considered to be more nutritious. However, for individuals living in hostels, PGs, or alone, pre-packaged or restaurant food was their only option. As shown in figure 3, breakfast was the least preferred meal among the participants, with reasons ranging from a lack of time to a lack of hunger in the morning. While individual preferences vary, breakfast has to be considered the important meal of the day because it provides the body with essential nutrients and energy after an overnight fast. It jumpstarts our metabolism, helps maintain blood sugar levels, and supports both our mental and physical functioning throughout the day. Most people chose fruits as their preferred snack between meals (figure 4), which is a healthy option as it provides essential vitamins, minerals, and fiber.

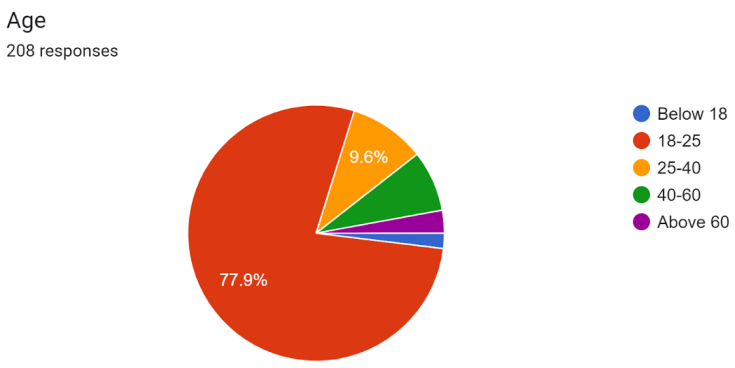

Figure 1

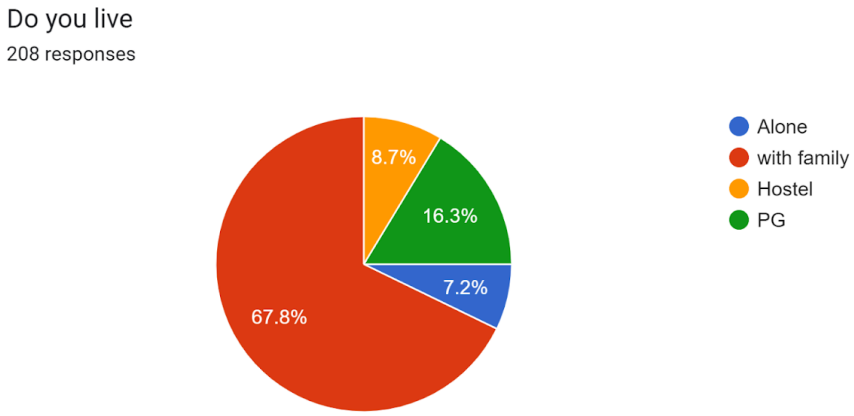

Figure 2

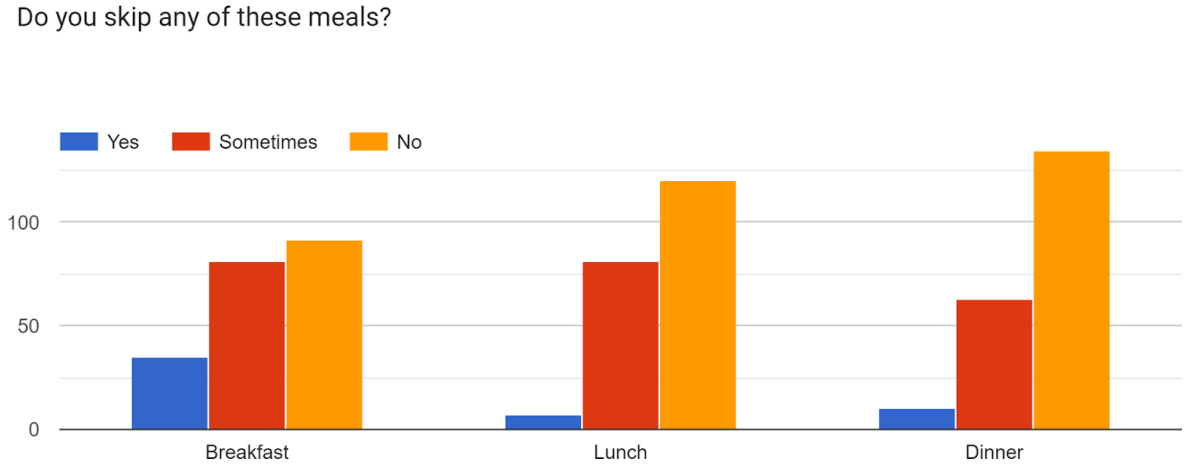

Figure 3

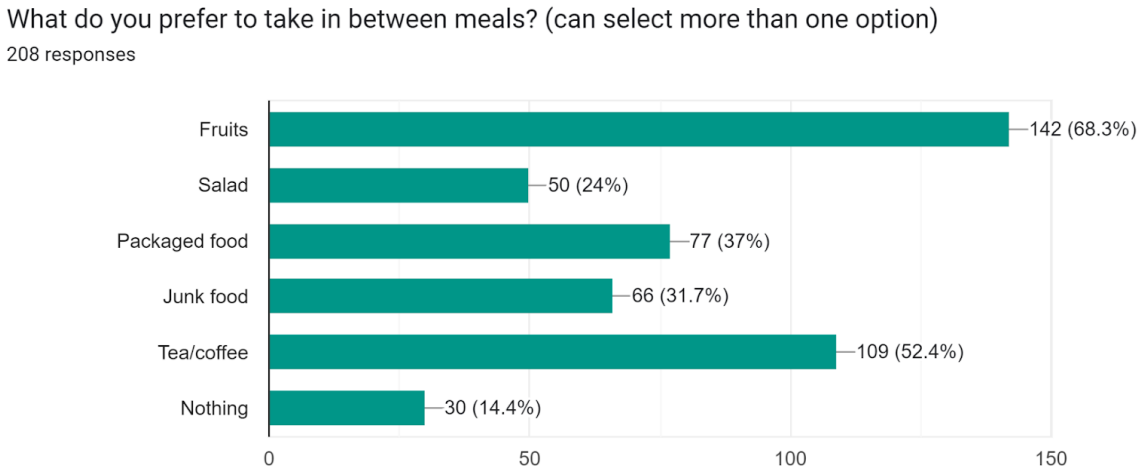

Figure 4

Dinner was usually between 9-10 pm, although the ideal time for having dinner is around 8 pm. Experts suggest having dinner 3-4 hours before sleeping for a proper circadian rhythm, as melatonin, a hormone that plays a vital role in the circadian system, may be affected by late eating and negatively impact glucose metabolism. The younger generation tends to consume dinner late due to delayed school/college or work hours or because of phone usage in bed, which disrupts the sleep cycle.

134 respondents reported fasting among whom 59 were for religious reasons (figure 5), with religious fasting having been shown to improve metabolic health in both healthy individuals and type 2 diabetes patients. Hindus have various fasting practices all through the year, popularly referred to as vrat, viradham or upavasa based on the lunar calendar. The degree of fasting may vary — from skipping a meal a day to eating only one meal a day or for a specified number of days, usually 48 days (Mandalam period for Sabarimala pilgrims). Sometimes, fasting entails sustaining on vegan diets similar to the Mediterranean diet during certain months such as the Tamil month of Purattasi. Selective avoidance of salt (a salt-free diet) on some days is a commonly observed practice. Salt is essential for life, but in excess is injurious to health. Sikhism also has various periods of fasting, and the Langars, or community kitchens, in gurdwaras serve simple and healthy vegetarian food, though Sikhs are not disallowed from consuming non-vegetarian food. Several other religions have their own fasting regimens suited to their region, customs and beliefs. Christians and Muslims, followers of the largest and the second largest religions, respectively, fast for long hours during the religious penitential period of Lent and Ramzan, respectively. Therefore, these practices can aid in lifestyle management.

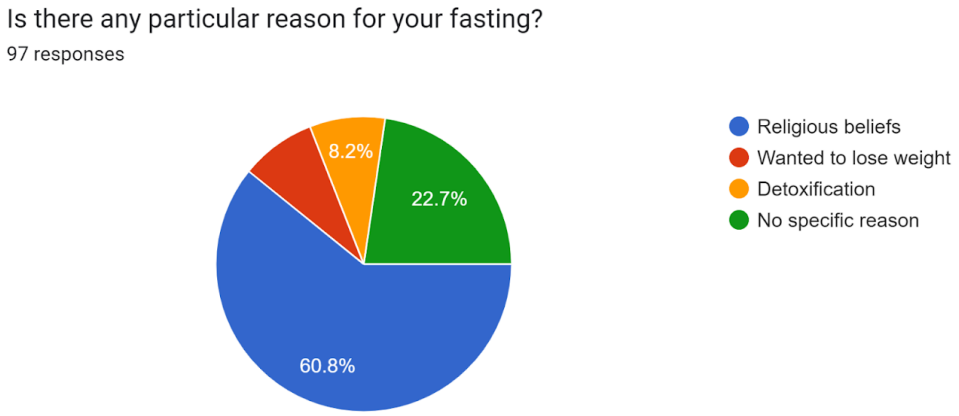

Figure 5

Finally, almost one-fourth of the survey participants followed a specific diet plan for different conditions, including type 2 diabetes, high cholesterol, obesity, and PCOD (Polycystic Ovarian Disease) (figure 6). Among the popular diets followed by respondents were the high protein diet and the keto diet. The ketogenic diet is primarily high-fat, adequate-protein, and low-carbohydrate diet. It changes the way the body stores and uses energy by compelling it to burn fats instead of carbohydrates.

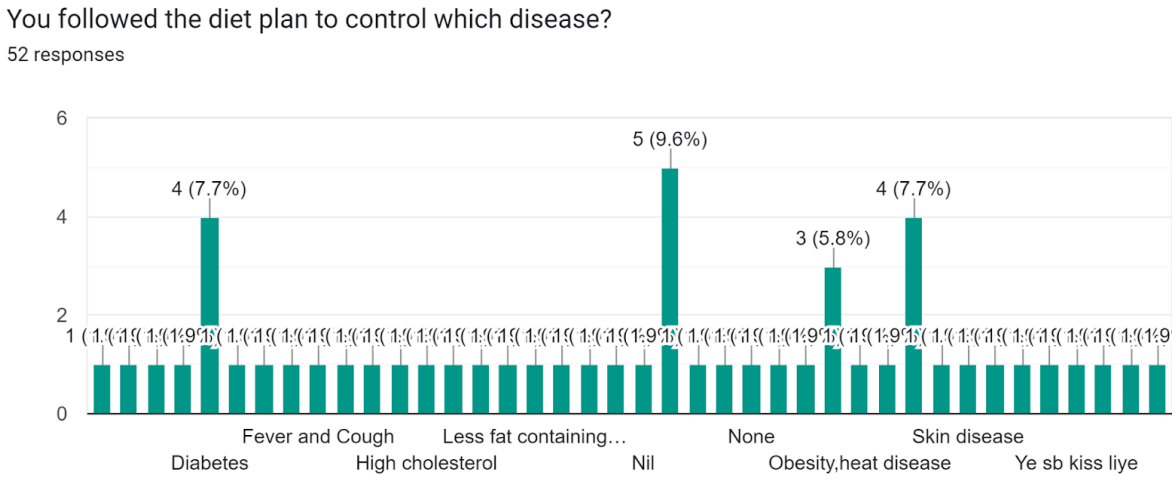

Figure 6

Based on the participants' habits, most of them were getting enough sleep, averaging 6-8 hours per night. However, their water intake was not adequate. The recommended daily fluid intake is 3000 ml for men and 2200 ml for women, yet only 41.8% of people drank

1000-2000 ml per day. Fewer people exercised daily, which suggests an unhealthy lifestyle.

In terms of general knowledge about nutrition, over half of the participants were well-informed about the benefits of a balanced diet in boosting immunity and providing essential nutrients for the body. They were also aware that excessive intake of trans fatty acids can increase the risk of coronary heart disease, and that weight loss through diet and exercise can enhance insulin sensitivity in individuals with diabetes.

Overall, our survey population had a decent level of awareness regarding nutrition and diet, which was reflected in their lifestyle habits. Figure 7 shows that a significant number of people were mindful of the quality and proportions of their meals. This indicates a healthier population with a holistic understanding of their food choices.

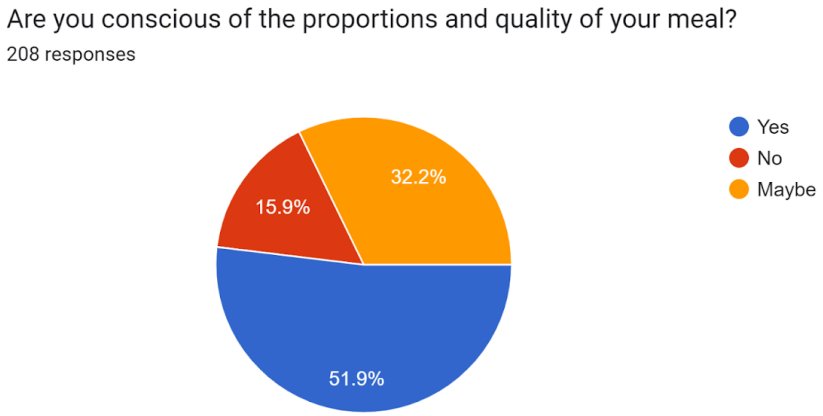

Figure 7

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