

HUMAN HEALTH AND IMPORTANCE OF NUTRITION

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Abstract

In addition to maintaining normal physical processes, nutrition also promotes growth and development and lowers the risk of chronic illnesses. It is necessary for optimum health and vigour that we get a diet rich in essential nutrients and well-balanced. Nutritious food can enhance physical and mental potential. Macro-nutrients and micro-nutrients are the two main categories of nutrients found in a diet. Diet is an important contributor to human health, and public health bodies are issuing guidelines aimed at favouring healthy food choices. Low food intake and infections are the immediate causes of malnutrition.

Many countries struggle with malnutrition or caloric deficits, while others encounter difficulties with caloric overconsumption and micronutrient deficiencies. A multitude of factors contribute to this global problem. Considering the health challenges facing our world population, the need is clear for continually improving recommendations and strategies to promote human health. The purpose of this study was to provide information on the functions of different nutrients, the conditions caused by their deficiency, the components of a healthy diet, and the complications of different types of malnutrition. A lot of research is being done, and new findings are published every day to increase our knowledge about food and nutrition and to find ways to apply this knowledge in choosing the right foods to eat so that our body is well nourished and healthy. For the maintenance of health and growth and to develop greater resistance against infections, one must consume balanced food that contains all the nutrients in the correct proportion.

Keywords: nutrition, nutrients, diet, health, malnutrition

1. Introduction

Everywhere you look, advances in science and technology have taken place over the past decades. Today's generation differs greatly from previous generations in terms of lifestyle and nutrition. Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. Anatomy deals with the form and structure of living organisms. Each part of the body system consists of several organs, tissues, and cells that perform specific functions to sustain life. These organs, tissues, and cells require food nutrients for proper functioning. Physiology, which relates to the function of organs and organ systems and the ways in which the integrated activities of the body systems maintain the life and health of individuals, occurring at different physiological stages in the body is often regarded as diet-related. This suggests that these disorders might result from either insufficient dietary nutrient intake, incorrect dietary nutrient use by the body, or both (Agugo, 2017; Alex, 2020). Pathology involves the study and diagnosis of disease through surgical examination of organs, tissues, biopsy samples, body fluids, and, in certain cases, the whole body (autopsy). A bad state of health arises when sickness interferes with the body's regular operations. In actuality, nutrition is essential for the appropriate management of any disease state at any point in order to promote health. Nature has provided a variety of foods for man to consume and be healthy. Food is the basic necessity of man, and it also plays a vital role in meeting the special needs of pregnant and lactating women and patients recovering from illness (Waugh et al., 2010; Alex, 2020). We consume food for the maintenance of health, growth, and to develop greater resistance against infections. Foods contain substances called nutrients in

varying proportions that are needed for proper growth, a stronger immune system, and the maintenance of life processes. Individuals gain these nutrients by following a healthy diet. Human beings need a balanced proportion of seven vital nutrients: protein, minerals, fats, vitamins, fiber, carbohydrates, and water. Typically, these nutrients perform a specific task in maintaining the metabolic functions of the body. Knowledge of the functions of these nutrients and major food sources is necessary for man to formulate a nutritious diet (John et al., 2004; Boer, 2022).

Nutrition is defined as a science concerned with the role of food and nutrients in the maintenance of health. Nutrition, as defined by Robinson (1982), is “the science of foods and nutrients, their action, interaction, and balance in relation to health and disease, the processes by which the organism ingests, digests, absorbs, transports, and utilizes nutrients, and disposes of their end product.” Nutrients are the constituents in food that must be supplied to the body in adequate amounts (Figure 1) (Wiseman & Jackson, 2004).



Figure 1. Nutrition and the nutrients in food

Good nutrition equates to receiving enough of the macronutrients (proteins, carbohydrates, fats, and water) and micronutrients (vitamins and minerals) so that the body can stay healthy, grow properly, work effectively, and enjoy good health.

As was previously mentioned, the seven nutrients cooperate to preserve the body's general cellular and muscular growth. Examine how diet affects health and helps avoid the diseases that are covered here. Knowing a little bit about how these things work can help someone create a diet plan that incorporates all of these advantages (Maurice et al., 1999; Schlenker & Gilbert, 2015).

Nutrition is a science that deals with the study of the composition of food, nutrients, ways of feeding, nutrition, and its impact on the health and psycho-physical state of man. It defines the principles of proper nutrition and dietary nutrition in healthy people and in sick people. This field studies the chemical composition of the organism, the role of food substances in the organism, metabolism, the composition and division of food, the principles of rational and non-rational nutrition, and the consequences resulting from this.

Nutrition is the combination of catabolism and anabolism and the physiological reactions between food components, cells, organs, and the entire body system (Ruth, 2011).

Good nutrition practice is the bedrock for maintaining optimum health conditions. Nutrition practice is the act of adhering to the principles of nutrition in food choices, meal combinations, preparation, and consumption in order to maintain a healthy nutritional status.

To maintain good health and nutritional status, one must eat a balanced diet that contains all the nutrients in the correct proportion.

Nutrients are the substances found in food that drive biological activity and are essential for the human body.

Macro-nutrients and micro-nutrients are the two main categories of nutrients found in diet. People must consume these nutrients in large amounts, as they provide energy in calories and maintain body functions. Macronutrients are:

Proteins are groups of molecules that formed by the combination of a number of amino acids which through peptide bonds create a protein chain. Functions of proteins are: body building, repair and maintenance of body tissues, maintenance of osmotic pressure.

Synthesis of bioactive substances and other vital molecules. Scientifically, there are nearly twenty aminoacids in the body where ten are absorbed from the diet. Eight of them are deemed "Essential" as the human body is unable to synthesis them and needs to get them from food proteins. Protein demands during feeding should account for 10–15% of daily energy requirements, with 0.75g of protein required for every kilogram of body mass.

These aminoacids generate new proteins, which repair muscle, skin and other tissues. Proteins also help balance body fluids, fight infection and carry oxygen through the blood. Food items like red meat, eggs, dairy, beans, venison, halibut, salmon, scallops, chicken, lamb, beef and nuts are rich sources of protein (Figure 2) (Ruth,2011, Sekovska, 2020).

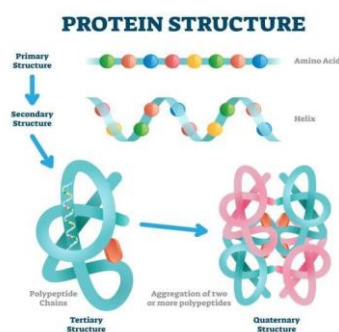


Figure 2. Proteins and protein-rich food

Carbohydrates are the primary energy source for daily activity. The most affordable, widely available, easily attainable, and quickly digested type of nutrition is carbohydrates, namely starches. In plants, carbohydrates are found in large quantities. Foods with carbs are referred to as energy foods. The amount of saccharide (sugar) groups that are present determines the classification of carbohydrates. They may be roughly divided into two categories: simple and complex carbohydrates. Monosaccharides, or single sugars, and disaccharides, or double sugars, are examples of simple carbohydrates. The three types of complex carbohydrates include fiber, glucose, and starch. Cereals, millet, roots, tubers, pulses, sugar, and jigger are significant sources of carbohydrates in diets. They regulate blood glucose and offer energy to the body. Carbohydrates prevent ketosis by breaking down the fatty acids. Moreover, they build macromolecules like RNA, DNA and ATP in the body. Provide a ready source of energy for the body and provide structural constituents for the formation of cells.

Fiber - "Plant polysaccharides and lignin which are resistant to hydrolysis by the digestive enzymes of man" was the old definition of dietary fiber. Resistant starch is included in this definition of dietary fibre. Depending on the food, the phrase "dietary fiber" refers to a wide range of substances in varied amounts, regardless of whether resistant starch is included in that category. From a nutritional perspective, the most significant method to classify the dietary fiber components is according to how soluble they are in water. With certain hemicelluloses, cellulose makes up the majority of insoluble fiber. The latter also contain lignin, a polyphenolic substance that is not a carbohydrate, along with a variety of monosaccharide residues, including glucose, galactose, and xylose. The physiological effects of fiber in the body are determined by soluble fiber, which can include pectin, some hemicelluloses, β -glucanase, and mucilage's.

Dietary fiber helps to promote these advantageous physiological effects, which may include laxation, lowering blood cholesterol, and/or regulating blood glucose (figure 3)(Swaminathan & Rajagopal, 2007)

Carbohydrates- definition, classification with structure and functions

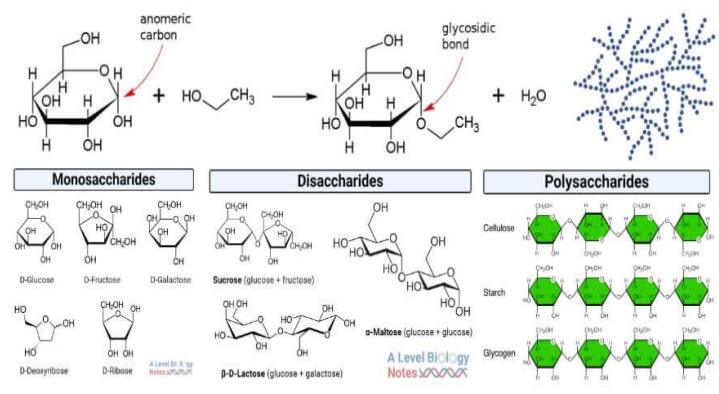


Figure 3. Carbohydrates, Fiber and Carbohydrates-rich food

Fat store the converted energy and supply it to the body. However, fat plays a significant role in a balanced diet. Your diet's fat provides you with energy. Additionally, eating fat makes you feel fuller and prevent overeating. Some foods have almost little fat, such as the majority of fruits and vegetables. There's lots of fat in other foods. They consist of meats like beef, nuts, oils, and butter. The diverse class of materials known as lipids is present in both plant and animal tissues. They all have the characteristic of being soluble in organic solvents like ether, chloroform, and benzene but generally insoluble in water. There are 9 kcal per gram of fat. The body uses fat to absorb vitamins and protects organs from damage. Provides energy for the body, functions as structural components of cells and also as signalling molecules for proper cellular communication. It provides insulation to vital organs and works to maintain body temperature (Peggy et l. 2010) (Figure 4)

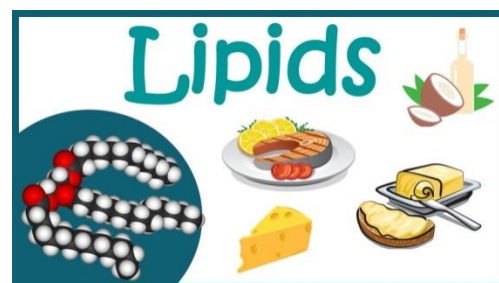
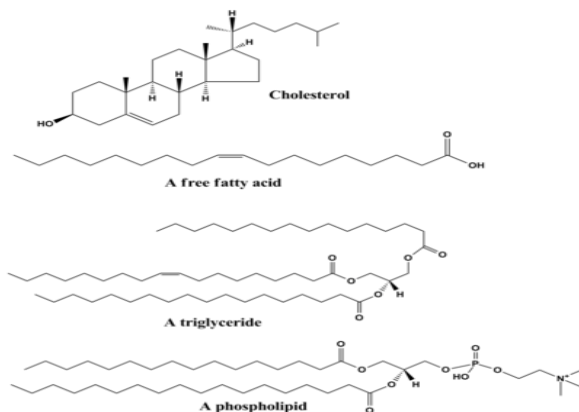


Figure 4. Fat and fat-rich foods

Micronutrition - People need these nutrients in smaller quantities. However, they are still essential for human health. Examples include:

Vitamins are compounds that are needed in small amounts in the diet both to prevent deficiency diseases, to perform a specific metabolic function and to support optimal health.

The term vital denoting is essential for life and amines because these compounds contained an amine functional group. Vitamins are not synthesized by the body and therefore must be supplied through food. They are grouped as water-soluble and fat-soluble. Fat-soluble vitamins D, A, E and K easily travel through the kidneys and get excreted.

Folate, riboflavin, vitamin C, vitamin B12, vitamin B6, niacin and thiamine are water-soluble vitamins stored in the body's cells. The body needs vitamins to support metabolic function and nerve functioning. They work as antioxidants to remove the free radicals that damage cells. Some vitamins also take care of the immune system, bone and teeth growth, mucous membrane and skin health management. Regulate body processes and promote normal body-system functions (Ruth, 2011, John et al. 2004).

Minerals are micronutrients that help in the composition of bone, tissues, teeth, muscles and nerves. They help in the formation of vital body fluids, including blood, for bodily function. Minerals also play a significant role in maintaining a healthy cardiovascular system, supporting healthy nerve function, and regulating muscle tone.

Regulate body processes are necessary for proper cellular function, and comprise body tissue. Sodium, chloride, magnesium, sulphur, phosphorus and calcium are examples of minerals needed in one's body.

The essential minerals are classified according to their recommended intake.

Macrominerals, also called major minerals, there are seven macro minerals; calcium, phosphorus, magnesium, sulphur, sodium, potassium, and chloride. Micro minerals, also called trace minerals or trace elements, and the essential trace minerals are iron, zinc, copper, iodine, manganese, fluoride, chromium, selenium, and molybdenum (Figure 5).



Figure 5. Vitamins and Minerals –rich food

Water- Transports essential nutrients to all body parts, transports waste products for disposal, and aids with body temperature maintenance.

Every human being needs 2 litres of water per day. It helps in the formation of digestive juices, acts as the basis of blood, urine and sweat. In addition, water is required to regulate body temperature, reduce the risk of cystitis, maintain cell health, lubricate cushion joints, and keep the bladder clean from bacteria. Water keeps the body hydrated and supports healthy skin.

The stated information explains the role of nutrition in health management. However, with the availability of instant food, the demand for nutritious food has significantly reduced.

Following this practice can lead to serious health issues. Some of them are discussed below.

Diet refers to whatever you eat and drink each day. A diet is a food usually consumed by a person to maintain health and sustain life. The right combination of different foods nutrients to meet the body's requirements (especially the essential nutrients) is referred to as "adequate diet". An adequate diet can be achieved by eating a variety of foods. Consumption of an adequate diet plays a greater role in influencing the manifestation of diseases in the body, but does not act alone in preventing the onset of diseases. Diets can be normal/regular or therapeutic (Maurice et al. 1999, Waugh, 2010).

A balanced diet is one which includes a variety of foods in adequate amounts and correct proportions to meet the day's requirements of all essential nutrients such as proteins, carbohydrates, fats, vitamins, minerals, water, and fibre. Such a diet helps to promote and preserve good health and also provides a safety margin or reserve of nutrients to withstand short durations of deprivation when they are not supplied by the diet. The safety margin takes care of the days we fast, or the short-term deficiency of certain nutrients in the daily diet. If the balanced diet meets the Recommended Dietary Allowances (RDAs) for an individual, then the safety margin is already included since RDAs are formulated keeping extra allowances in mind (Figure 6).

Recommended Dietary Allowances = Requirements + Margin of safety

It is critical to comprehend the importance of nutrition in health to preserve general well-being and fend against chronic illnesses. A diet full of key nutrients—vitamins, minerals, proteins, and carbohydrates—supports the body's normal functioning and encourages both physical and mental energy (Swaminathan & Rajagopal, 2007, Schlenker & Gilbert, 2005)

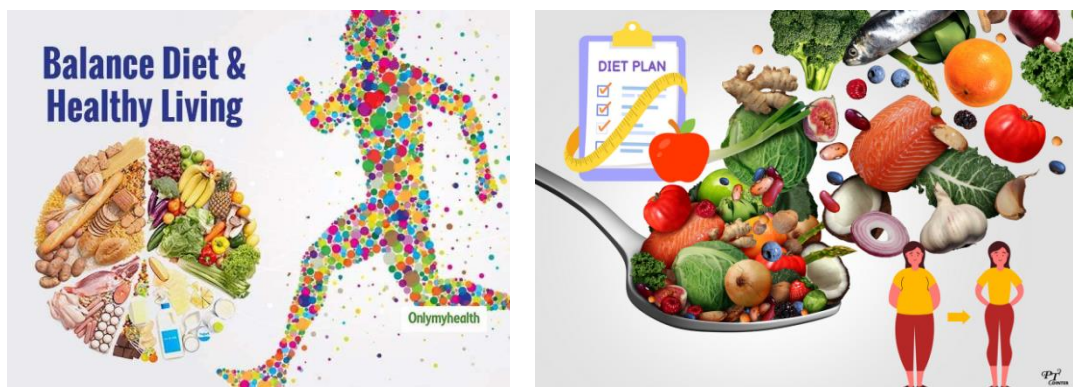


Figure 6. Balance diet

Individual dietary requirements can differ according to lifestyle choices, age, and gender. People may improve their quality of life and longevity while lowering their chance of contracting illnesses like diabetes and cardiovascular disorders by making healthy eating a priority. Dietary strategies that are customized to meet individual needs emphasize even more how important it is to include a balanced diet in everyday living.

The relationship between diet and disease is more complex than that of direct relationship to deficiency disease, and its understanding requires observational studies to quantify dietary and related behaviors and their relationships with health outcomes over time. Nutritional surveillance activities include national surveys of anthropometric (height and weight) and/or dietary intake assessments to quantify the prevalence and trends of nutritional problems, including child stunting, obesity and low intake of specific nutrients.

According to the World Health Organization (WHO), malnutrition is a cellular imbalance that arises between the body's supply of nutrient and energy sources and the physical demand for these components. This imbalance can reduce the body's ability to grow and maintain adequate operation of various bodily functions. As a result, malnutrition can lead to a

compromised health condition and increase an individual's risk of several different health conditions (Mann & Truswell, 2002, Agugo1, 2017).

A nutrient cycle is a biogeochemical cycle involving the movement of inorganic matter through a combination of soil, organisms, air or water, where they are exchanged in organic matter. Energy flow is a unidirectional and noncyclic pathway, whereas the movement of mineral nutrients is cyclic. Without proper nutrient cycling, there would be risk of change in oxygen levels, climate, and ecosystem function.

Nutrient deficiencies, known as malnutrition, occur when an organism does not have the nutrients that it needs.

Malnutrition as defined by World Health Organisation (WHO) is a pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients, this state being clinically manifested or detected only by biochemical, anthropometric or physiological tests. Malnutrition can be further classified into two broad forms, of which include undernutrition and micronutrient-related malnutrition. Undernutrition can be further divided into four forms that include wasting, stunting, underweight, and deficiencies in vitamins and minerals. Comparatively, some of the different micronutrient-related malnutrition conditions include obesity and being overweight, diet-related non-communicable diseases, and an inadequate consumption of micronutrients.

Clinical examination is an important practical method for assessing the nutritional status or malnutrition of a community. Basically, the method is based on the examination for changes, which are believed to be related to insufficient nutrition that can be seen or felt in the surface tissues of the epithelium, especially in the skin, eyes, hair and mucosa.

Biophysical methods are used to evaluate changes in functions associated with inadequate nutrition.

Anthropometric measurements are concerned with measurements of variations in physical dimensions and body composition in life cycle stages and different feeding plans.

It is a field-oriented method that can be easily learned and interpreted.

Basic measurements to be taken in all age groups are weight in kg, length/height and arm circumference in cm. In small children, it should be supplemented with head and chest circumference measurements. (Waugh, 2010, Maurice et al. 1999, Boer, 2022)

Matthias P. and co-authors in their study shows that in German hospitals every fourth patient is malnourished. Malnutrition is associated with increased length of hospital stay. Higher age, malignant disease and major comorbidity were found to be the main contributors to malnutrition. Adequate nutritional support should be initiated in order to optimize the clinical outcome of these patients.

Olaf Müller and Michael Krawinkel (2005) in their study explained that malnutrition continues to be a major public health problem throughout the developing world, particularly in southern Asia and sub-Saharan Africa. Diets in populations there are frequently deficient in macronutrients (protein, carbohydrates and fat, leading to protein–energy malnutrition), micronutrients (electrolytes, minerals and vitamins, leading to specific micronutrient deficiencies) or both.

Malnutrition increases one's susceptibility to and severity of infections, and is thus a major component of illness and death from disease

Undernutrition is a deficiency of nutrients. You may be undernourished if you don't have an adequate diet, or if your body has trouble absorbing enough nutrients from your food. Under nutrition can cause visible wasting of fat and muscle, but it can also be invisible.

Undernutrition can occur either due to protein-energy wasting or as a result of micronutrient deficiencies. It adversely affects physical and mental functioning, and causes changes in body composition and body cell mass. Undernutrition is a major health problem, causing the highest mortality rate in children, particularly in those under 5 years, and is responsible for

long-lasting physiologic effects. Undernutrition can manifest as stunting, wasting, and underweight. Extreme under nutrition can cause starvation, chronic hunger, Severe Acute Malnutrition (SAM), and/or Moderate Acute Malnutrition (MAM) (Marshak et al. 2021).

The signs and symptoms of micronutrient deficiencies depend on which micronutrient is lacking. People who are undernourished often get infections and frequently feel cold.

Undernutrition will be discussed in the study of Ken M. in Malawi in terms of protein-energy undernutrition and those specific micronutrient deficiencies which are considered of public health significance in Malawi i.e. vitamin A, iron and iodine deficiency.

Overnutrition - The World Health Organization has recently added over nutrition to its definition of malnutrition to recognize the detrimental health effects that can be caused by excessive consumption of nutrients. This includes the effects of overweight and obesity, which are strongly associated with a list of non-communicable diseases (NCDs). It also includes the toxicity that can result from overdosing specific micronutrients.

Excessive consumption of energy-dense foods and drinks and limited physical activity causes over nutrition. It causes overweight, defined as a body mass index (BMI) of 25 or more, and can lead to obesity (a BMI of 30 or more). Obesity has become a major health issue worldwide. Overnutrition is linked to chronic non-communicable diseases like diabetes, certain cancers, and cardiovascular diseases.

Hence identifying and addressing the immediate risk factors has become a major health priority (Figure 7) (Swaminathan & Rajagopal, 2007, Stanfield & Hui, 2010, Jeremy et al.,2023,).

Researchers Seidell, J. C. & Visscher T. L. S. provides a brief review of the principles of the assessment of overnutrition, the principles of anthropometric classification of overweight and abdominal obesity, and the prevalence of and trends in overweight. The relationship between excess energy intake (from dietary fat, carbohydrates (sugar and fibre), and alcoholic beverages) and overweight, and on the role of obesity as a determinant of mortality and morbidity among individuals with cardiovascular diseases, type 2 diabetes mellitus, neoplasms, musculoskeletal disorders, respiratory diseases, and work disability.



Figure 7. Undernutrition and Overnutrition

2. Conclusions

Nutrition is food affects the health of the body. Food is necessary for survival because it gives the body the resources it needs to operate and stay healthy.

Protein, carbohydrates, and fats are examples of macronutrients found in food. These substances not only provide the body with calories for energy, growth, development and maintenance but also have specialized functions in sustaining health. In addition to providing energies, food also contains phytochemicals and micronutrients (such as vitamins and minerals) that are essential for the body to function at its best. To maintain good health and nutritional status one must eat a balanced food, which contains all the nutrients in the correct proportion. Good nutrition and balanced diet is one of the keys to a healthy life and in

preventing the onset of diseases. Consuming foods high in vitamins and minerals is recommended. Malnutrition is a pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients, this state being clinically manifested or detected only by biochemical, anthropometric or physiological tests.

Undernutrition and overnutrition are the two main categories of malnutrition, which are frequently observed in chronic and severe diseases and associated with impaired outcome.

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