Task 1

7 components of a Balanced diet and their role or functioning in the body

A balanced diet consists of mainly 7 components and these are *"Carbohydrate", "protein", "fat"," vitamins", "minerals", "fibres"* as well as *"Water"*.

- *Carbohydrate*

  Eating carbohydrates is important as it is the primary source of energy. 1 g carbohydrate provides 4.1 Kcal of energy and as carbohydrate provides the energy it prevents the protein from participating in this function. Instead, protein plays other important roles in the body and this mechanism is called the *"Protein sparing action"* of carbohydrates.

- *Protein*

  1 g of protein when metabolises provide 4.2 kcal energy. However, the main function of protein is to protect the body from disease, and infection, by improving immunity (Jayawardena and Mishra, 2020). . Moreover, the role of the protein is to build enzymes and peptide hormones in the body.

- *Fat*

  Other than providing *9 kcal/g energy* fat plays an important role in the formation of steroid hormones and cell membranes. Moreover, it acts as the insulator by depositing adipose tissues underneath the skin and also as the protective cushioning layer around organs.

- *Vitamins*

  There are two types of vitamins: *"fat-soluble vitamins"* and *"Water-soluble vitamins"*. Every hormone has different roles to play; for example, B vitamins act as the coenzymes and play a crucial role in metabolism. Furthermore, vitamins A, C, and C act as antioxidants.

- *Minerals*

  The role of the minerals is to provide immunity, strengthen bones, maintain the organs in good condition and so on (Lim, 2018). Minerals like Zinc improve immunity and are crucial for wound healing. Moreover, minerals act as cofactors and participate in the metabolism of food.

- *Fibres*

  Fibre gives bulk to the food without the addition of extra calories. It helps to prevent constipation by adding bulk to stool and trapping water in its structure. Moreover, it helps to excrete cholesterol from the body as well.

- *Water*

  The main role of the water is to hydrate the body and it also acts as a lubricant. It regulates body temperature and forms various fluids as well that help in moistening tissue.

Foods are needed to eat to get this requirement

- *Carbohydrate*

  Cereals like wheat, rice, millet, quinoa, oats, etc. and cereal products like semolina, vermicelli, pasta, spaghetti etc are some of the richest sources of Carbohydrates and so they need to be incorporated into the diet.

- *Protein*

  Milk, lean meat, red meat, fish, egg, and tofu are sources of protein.

- *Fat*

  Sources of “Visible fat” are oil, butter, and clarified butter. Moreover, the sources of invisible fat are meat, avocado, fish, whole milk, egg etc.

- *Vitamins*

  Fruits, vegetables, green leafy vegetables, whole grains, fish, meat, egg, and milk are sources of vitamins. In this regard, egg yolk is rich in vitamin A, and green and orange vegetables are rich in Beta carotene, the precursor of Vitamin A. Rice branch oil is rich in Vitamin E. Fruits are rich in Vitamin C; whereas food contains small to high levels of B vitamins. Hence, every

food contains vitamins and in order to reduce deficiency diseases, one must carefully select sources.

- *Minerals*
  All food contains some amount of minerals as well; for example, milk has Calcium and phosphorus. Furthermore, marine fish or shellfish is rich in zinc, and meat, fish, liver, finger millet etc are rich in iron.

- Fibre
  Fruits, vegetables, green leafy vegetables, and whole grains are rich in fibre.

- *Water*
  At the end of metabolism, water is produced as a bi-product. Moreover, drinking water, milk, fruit and fruit juices are some of the sources of water.

Symptoms of deficiencies of 7 components

Carbohydrate deficiencies cause malnutrition particularly undernutrition in people and particularly in children less than 5 years it causes marasmus.
Protein deficiency in children causes kwashiorkor and marasmus and loss of lean muscle in the body (Finn *et al.* 2017).
There are various types of vitamins and for example, if vitamin A deficiency occurs it causes xerophthalmia, night blindness and even blindness. Furthermore, if vitamin C deficiency occurs it causes scurvy.
Iron deficiency causes anaemia and calcium deficiency causes osteoporosis, osteomalacia, and joint pain.
Vitamin D deficiency cause rickets in children and B vitamin deficiencies include cheilosis, glossitis, hair loss, and even loss of appetite.

Recommendations
Carbohydrate - 55% approx

Protein - 15% - 20% approx
Fat (Visible and Invisible) - 25-30% approx
Unsaturated fatty acids should be eaten instead of saturated fatty acids, such as avocado, avocado oil, peanut butter, etc.
Fruits and vegetables must be consumed daily and that should form 60-65% of the total diet as they provide fibres, vitamins, minerals and carbohydrates. Other than the macronutrients like carbohydrates, protein and fat, micronutrients like Vitamins and minerals should be consumed based on *"RDA"* or *"Recommended Dietary Allowances"*. It is recommended to consume carbohydrates as the main source of energy and so it is to be consumed the most (Samaras *et al.* 2021). The focus must be given to consuming invisible fats than visible fats and that should be the second-largest component of the diet. Protein should not be consumed more than 20% of the total diet as it puts extra pressure on the kidneys. Moreover, visible fat should be consumed in a restricted amount to avoid the accumulation of extra calories in the body.

Task 2

Mouth
The mouth is the first part of our alimentary canal system. It is also called the oral cavity. It helps a person to breathe properly, and drink anything (Doyama *et al.* 2021). It helps in talking and tasting foods. Without a mouth, one cannot digest foods properly because it helps to cut down the foods into small pieces and thus helps indigestion.

Tongue
It helps in swallowing the food. Without a tongue, swallowing is almost impossible. Speaking formation, the formation of sounds can only happen on the tongue. The tongue is a necessary organ to chew anything and taste anything properly.

Parotid Gland
Parotid glands are just located in front of the ears. It is also an essential organ for the human body. It secretes saliva, which makes the mouth wet all the time. Secretion of its digestive fluid also helps to digest foods. These digestive fluids make another body part's task easier to digest their respective food easily and smoothly.

Sublingual Gland

It is located under the floor of the mouth. This gland helps to maintain dental hygiene. Secreting saliva from this gland helps to make the mouth clean and wet. It also initiates the food digestion process. It helps to control the pH level in the human body.

Submandibular Gland

It is located below the jaw. It secretes saliva, which keeps the mouth wet and helps in starting food digestion. It helps to smooth the swallowing process.

Pharynx

It is located in the middle of the neck. It is mainly called throat. Air, food, and fluid are carried by it as it is one of the most important parts of the respiratory and digestive systems.

Oesophagus

It is located in the centre of the chest where the first dorsal vertebrae are at the left of midline level and the 10th dorsal vertebrae at the left of the midline. Foods and fluids are carried by it to the stomach from the mouth. It slowly pushes food towards the stomach. Here food digestive enzymes cannot be found.

Liver

It is present in the upper right-hand portion of the abdominal canal. Main functions of its detoxification. It filters the blood and helps in digestion and protein synthesis.

Gallbladder

The gallbladder's location is in the upper right part of our belly. It is the biggest work to store bile. Breaking of fats is done by bile.

Stomach

It is located between the small intestine and the oesophagus. It is one of the most important organs in our human body. Its shape is 'J'. It secretes acidic enzymes, which help in the process of digestion.

Pancreas

It is located on the back part of the abdomen. It helps to make hormones. It travels in the whole body through blood. It makes pancreatic juice, which breaks down sugars, starch, and fats (Jayawardena, and Misra, 2020).

Spleen

It is located on the left upper part of the abdomen. It removes cellular waste from the blood. It maintains fluid levels in our bodies.

Small intestine

It is located in the lower abdominal cavity of the human body. Duodenum, Jejunum, and Ileum are the parts of the small intestine. It helps in food digestion and absorption.

Large intestine

It is located on the waist-down side of the lower abdominal cavity. The colon, rectum, and anus are included in the large intestine. It makes undigested foods into a stool and helps to pass them away from the human body.

Histology of most main parts of a human alimentary canal system

Figure: *Histology of most main parts of a human alimentary canal system*
(Source: Samaras, 2022)

The stomach had four layers. The abbreviation of it is M.S.M.S. M stands for Mucosa, S is for submucosa, M is for Muscularis Externa and S is for Serosa. It is also divided into three regions such as Cardia, Fundus, and Pylorus.

Mucosa layer

It protects the body by creating a barrier and thus foreign particles fail to enter the stomach.

Submucosa Layer

It helps to move mucosa flexibly. It is the second layer of the stomach.

MuscularisExterna
It helps in contraction and peristaltic movement.

Serosa
It helps in lubricated sliding.
Histological layer in duodenum

Histological anatomy of the ileum

Main digestive functions of the liver

Production of bile
The liver continually produces bile, which helps to smooth the digestion process. It also creates substances that help in blood clotting.

Process of bilirubin
It helps to get rid of bilirubin from the body. Excessive bilirubin can cause jaundice in our bodies.

Waste product management
It detoxifies our body by managing waste products.

It controls immune response
Special liver cells destroy foreign bad particles from our body.

Glucose level management
It maintains blood sugar levels in our bodies (Ponce, 2019).

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