2 COMPONENT OF FOOD

INTRODUCTION

Food is one of the most basic requirements of life. Food supplies us with energy. It is also required for growth and maintenance of the body. It also protects us from diseases.

COMPONENTS OF FOOD

Food contain various chemical substances required by our body. These chemical substances are called **nutrients**. Our body needs some of these nutrients in larger quantities ad some in only very small quantity.

These nutrients can be broadly grouped into the following seven classes.

1. Carbohydrates 2. Fats 3. Proteins 4. Vitamins
5. Minerals 6. Water 7. Roughage

BALANCED DIET

- A balanced diet is one which provides proper amount and proportion of fats, carbohydrates, proteins, vitamins and minerals, needed for the growth and maintenance of the body. A balanced diet should have three main qualities :

1. It should be rich in essential nutrients like minerals and vitamins.
2. It should provide the exact amount of raw materials needed for growth, development, repair and replacement of body tissues.
3. It should provide the right amount of energy required by the body.

CLASSIFICATION OF FOOD

- Food can be classified under three different categories on the basis of its functions:

(i) **Energy giving food :** Carbohydrates and fats, **eg.** cereals, sugars, oils, etc.
(ii) **Body building food :** Proteins, minerals and fats, **eg.** pulses, beans, milk, fish, etc.
(iii) **Protective food :** Vitamins & minerals, **eg.** vegetables, fruits, milk, etc.

BASIC CONSTITUENTS OF FOOD

(a) Carbohydrates :

Carbohydrates are organic compounds of carbon, hydrogen and oxygen.

- They are the main source of energy in our body.
- One gram of carbohydrate yields about 4 kilocalories of heat energy.
- A major portion of our food consists of carbohydrates, **e.g.,** rice, chapatis.
- If excess amount of carbohydrates are present in the body, they are converted into fats and stored under the skin and around various organs of the body.
- The carbohydrates in our food are obtained mainly from the plant sources like wheat, rice, maize, potato etc.
- Starch and sugars are the two carbohydrates which provide most of the energy to our body.

(b) Fats :

- Fats are composed of carbon, hydrogen and oxygen.
- They have a lower oxygen content than carbohydrates.
- They are very important sources of energy.
- One gram of fat yields 9 kilocalories of energy.
- A layer of fat under the skin helps to reduce the amount of heat loss from the body in cold weather conditions.
- Every fat molecule consists of three molecules of fatty acids and one molecule of glycerol.
- Fats are insoluble in water but soluble in organic solvents like alcohol, ether, benzene, etc.
- Fats are supplied to our body by different foods like butter, ghee, cheese, ground-nut etc. All the cooking oils (like ground-nut oil, coconut oil) provide us fats.
- Fats also help in forming of cell membranes and other organelles.
- They help in transportation of fat-soluble vitamins in our body.

(c) Proteins :

The name protein was coined by Berzelius in 1838.

- Chemically proteins are polymers of molecular units called as amino acids.
- The amino acids are linked together by a peptide bonds. There are about 20 amino acids that take part in the formation of proteins. The 20 amino acids are further divided into two groups :
- **Essential amino acids :** They are 10 in number. They are not synthesized in a human body and are obtained from food so they are called as essential amino acids. e.g., Methionine, Leucine and tryptophan.
- **Non – essential amino acids :** They are also 10 in number. They are synthesized in a human body & are thus termed as non – essential amino acids. **e.g.**, Alanine, Asparagine, Aspartic acid and cystine.
- Pulses, peas, beans, nuts, cheese, milk are the important sources of proteins.
- They act as a structural components of cell. They are essential for growth and repair of the body.
- They help to catalyse various reactions occuring in our body.
- They play important roles as hormones, antibodies, etc.
- All the enzymes are made up of proteins.
- Haemoglobin, the respiratory pigment of animals is a conjugated protein composed of globin and haem(pigment).

(d) Vitamins :

Vitamins are organic compounds essential for the growth of the body. They are required by the body in very small quantities. Vitamins are classified into two types.

(A) Fat soluble Vitamins A, D, E, K. **(B)** Water soluble Vitamins B and C.

- These are obtained from fruits, cod liver etc.
- They keep the body healthy and prevent it from diseases. If the diet does not contain the required amount of vitamins, it results in vitamin deficiency diseases.

(e) Minerals :

- Human body requires about fifteen different kinds of minerals, **e.g.-**
  - Calcium and phosphorus are needed for the growth of bones and teeth.
  - Iron is needed for the formation of haemoglobin in blood.
  - Iodine, sodium, potassium and zinc are necessary for a good healthy body.
- Meat, eggs, milk, green vegetables and fruits are rich in minerals.
- Minerals are required by the body in trace amounts and are essential for growth, repair and replacement processes. They form a major part of many body chemicals and tissues.

(f) Roughage :

Cellulose forms the fibre content in food and that fibre content is called roughage. Roughage keeps the digestive system in good working condition.

- It is a plant fibre found in vegetables, fruits, peas, beans, maize and in the barn which surrounds wheat grains.
- It absorbs water and poisonous waste from food during digestion. Food without roughage forms hard dry lumps of waste which get stuck in the gut causing constipation.

(g) Water :

The human body contains 70 % of water. It has no food value but it is still one of the essential components of living matter.

- Water performs the following functions in our body :
  - It transports food materials within the body.
  - It helps in the formation of urine and faeces.
  - It regulates the body temperature.
  - It is an essential part of blood and digestive juices.

TEST FOR CARBOHYDRATES, FATS & PROTEINS

(a) Test for carbohydrates :

Take few drops of iodine solution & add it into boiled rice or potato. The formation of blue-black colour confirms the presence of starch (carbohydrate).

(b) Test for fats :

When ghee / butter rubbed on white paper, that portion of paper turns translucent indicating the presence of fats.

(c) Test for proteins :

Take the few drops of egg albumin in a test tube and add a few drops of concentrated nitric acid to it.

- The white colour of the albumin changes to yellow. Now, pour the acid out of the test tube but keep the white of the egg in the test tube.
- Add a few drops of ammonium hydroxide to it.
- The colour changes to violet which shows the presence of proteins.

DEFICIENCY DISEASES

The main cause of deficiency diseases in our country is poverty. A vast majority of our people are not able to buy quality food items in desired quantities.In the long run they become weak and sick.Its effect on children is more serious.

Diseases due to Deficiency of Carbohydrates:

Carbohydrates are the chief sources of energy for the body. This energy is used by the body for performing various functions.

Deficiency of sufficient carbohydrates in the diet leads to (i) body weakness, and (ii) loss of stamina, as sufficient quantity of energy is not available to the body for performing various functions.

Diseases due to deficiency of Protein :

Proteins are body-building food and causes serious diseases, like kwashiorkor and marasmus develop in case of children if the proteins are not sufficient in their diet. It is for this reason that the children are often advised to take a protein-rich diet – enough milk, pulses, eggs, meat and fish,

- **Symptoms of Kwashiorkor**

(i) Protruding belly
(ii) Dark and scaly skin, brownish hair
(iii) Stunted growth ; usually underweight
(iv) Swollen legs due to accoumulation of water
(v) Loss of appetite
(vi) Anaemia
(vii) Mental retardation
(viii) Reduced resistance to diseases

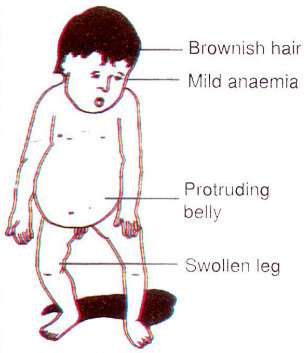

Fig. : Infant suffering from kwashiorkor

- **Symptoms of Marasmus**

(i) Poor muscle development
(ii) Bones showing through the skin ; no fat
(iii) Weak legs
(iv) Loss of appetite
(v) Anaemia
(vi) Grossly underweight
(vii) Mental retardation
(viii) Reduced resistance to diseases

Protein Energy Malnutrition (PEM) is a term used to describe diets which lack proteins and energy - giving carbohydreates.Diseases caused by PEM are common among children.

Fig.: Marasmic child

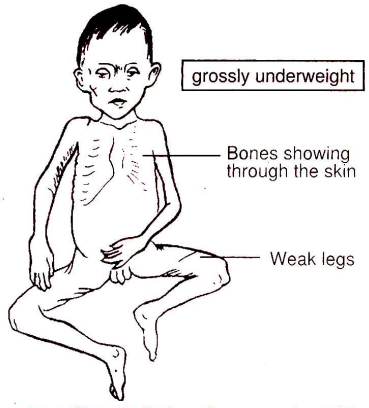

Fig. : Characteristics of a marasmic child

- **Kwashiorkor** and marasmus are diseases which result from PEM.

Vitamin / Mineral	**Deficiency disease / disorder**	**Symptoms**
Vitamin - A (Retinol)	Night blindness	Poor vision in dark
Vitamin - B1 (Thiamine)	Beri-Beri	Weak muscles & very little energy to work.
Vitamin - C (Ascorbic acid)	Scurvy	Bleeding gums.
Vitamin -D (Calciferol)	Rickets	Bones become soft & bent.
Vitamin - E (Tocoferol)	Infertility	Low production of sperm or ova.
Vitamin - K (Phylloquinone)	Clotting time delayed	Bleeding time exceed.
Calcium	Bone and tooth decay	Weak bones & tooth decay
Iodine	Goitre	Glands in the neck appear swollen, mental disability in children.
Iron	Anaemia	Weakness.