

# NUTRITION

## THE TERMS NUTRITION, FOOD AND DIET

**Nutrition** means supply of the essential organic and inorganic chemical compounds to the body. All such chemical compounds are called **nutrients**.

**Food:** Food is any substance which we eat or drink, and which contains the nutrients. Examples: Milk, bread, egg, fish, apple.

**Diet:** The combination of food items which we eat in our meals. **A balanced diet** is one which contains all the principal constituents of food in proper quantity for a particular person.

## Balanced diet of a particular person depends on four factors:

- (i) Age of the person.
- (ii) Sex of the individual.
- (iii) Life style/nature of the work.
- (iv) Special need of a person like -- (sick person, pregnant lady, nursing mother, etc.).

## NEED OF NUTRITION

All living organisms require food. It is needed for six main purposes:

- (i) **Growth:** Building up new protoplasm or cells for growth,
- (ii) **Repair:** Providing material for the repair of worn-out or injured cells,
- (iii) **Energy:** Providing energy needed by the body to carry out various life functions.
- (iv) **Maintenance** of chemical composition of cells

(v) Provision of raw materials for the manufacture of various secretions such as enzymes, hormones, sweat, milk, etc.

(vi) Protection from disease and infection.

## CLASSES OF NUTRIENTS (FOOD SUBSTANCES)

There are six classes of food substances called nutrients. These are carbohydrates, fats, proteins, mineral salts, vitamins and water.

**1. CARBOHYDRATES** are the compounds of carbon, hydrogen and oxygen, with hydrogen and oxygen always in the ratio of 2: 1. They are oxidised in the cells to release energy.

## SUGARS

Sugars are soluble in cold water and taste sweet. Two major categories are:

**A. Monosaccharides or single (simple) sugars** with a general chemical formula  $C_6H_{12}O_6$ . These need no digestion and are straightaway absorbed into the body. Three types of such simple sugars are:

(i) Glucose, popularly known as grape-sugar, is the most common and simplest sugar found in organisms.

(ii) Fructose is common in plants and is popularly called fruit sugar.

(iii) Galactose is another simple sugar found in milk.

**B. Disaccharides or double sugars** have a general chemical formula  $C_{12}H_{22}O_{11}$ . These are also three and require digestion.

(i) Sucrose is our commercial sugar which is commonly obtained from sugarcane.

(ii) Maltose or malt-sugar made up of two glucose molecules.

(iii) Lactose or milk-sugar made up of glucose and galactose.

## STARCH

Starch is an insoluble carbohydrate. Plants commonly store carbohydrates in the form of starch. Potatoes, grains and bread, are chief sources of starch. The starch has a chemical formula  $(C_6H_{10}O_5)_n$  and is called polysaccharide.

Two other insoluble polysaccharide carbohydrates are cellulose and glycogen.

- Cellulose is found in cell walls of plants. It is unused in our body but it contributes in providing roughage for proper functioning of the gut.
- Glycogen is the form in which carbohydrates are stored in animals.

### **ROUGHAGE (Non-digestible cellulose)**

The cells of all plants have cell walls made of cellulose. When we eat fruit, raw vegetables and other plant material, cellulose is not digested in our food canal because we have no cellulose digesting enzyme. The undigested cellulose, being fibrous in nature, acts as roughage.

### **ROLE OF ROUGHAGE**

- Being fibrous, cellulose absorbs a lot of water and retains it, thus helps in keeping the faecal matter soft and prevents constipation.
- The *movement* of the undigested food through the intestine becomes easier.

### **SOURCES OF ROUGHAGE**

Vegetables, fruits, corn, half-crushed wheat (Dalia) are the chief sources of roughage in our food. Cabbage is one vegetable which provides a lot of roughage.

## **2. FATS**

are also composed of carbon, hydrogen and oxygen. The oxygen content in these nutrients is much less. They produce more energy than carbohydrates do-one mole of fat releases 9.45 Kcal of energy. Ex- butter, cream Vegetable oil etc

### **FUNCTIONS OF FAT**

1. Fat produces energy in the body like carbohydrates.
2. It is an important storage form of food.
3. It serves as a solvent for fat-soluble vitamins
4. Fat under the skin protects the body against a rapid loss of heat.

### 3. PROTEINS

are large chemical molecules. They contain carbon, hydrogen, oxygen and nitrogen. Nitrogen is the most essential element in proteins.

- Amino acids are the simple, smaller units of proteins.
- Proteins provide chemical material for the growth and repair of body cells and tissues. In the time of emergency they may also be oxidised to release energy.

Foods rich in proteins include lean meat, fat-free muscles, fish, eggs, milk, cheese, nuts, beans, peas, etc.

Deficiency of proteins leads to weakness but its severe deficiency causes the two diseases Kwashiorkor and Marasmus.

**(i) Kwashiorkor (Hindi Sookha Rog)** - It is a severe protein deficiency disease usually affecting young children. This disease is caused when mothers stop breast-feeding their babies at an early age, and the child is given a diet poor in proteins.

#### Symptoms of Kwashiorkor:

- Underweight.
- Belly protruding out.
- Skin getting dark and scaly.
- Stunted growth.
- Loss of appetite.
- Repeated diarrhoea.



- Enlarged liver and anaemia.

**Control/treatment:** The child suffering from kwashiorkor should be given a protein-rich diet like pulses, milk, egg, fish and meat.

**(ii) Marasmus:** Marasmus usually affects infants below the age of one year, and is due to the deficiency of carbohydrates, fats and proteins in the diet.

### Symptoms:

- Less body weight.
- Degenerations resulting in a very weak body as if formed of muscles, skin and bones only.
- Skin becomes loosely folded.
- Thin face, thinning of limbs.
- Retarded physical and mental growth.
- Ribs appearing prominent.



**Control/treatment:** The child suffering from marasmus should be given a diet rich in proteins and carbohydrates.

## 4. MINERAL SALTS

are needed in the diet in small quantities. Table salt contains mainly sodium chloride. Many other mineral elements are obtained from various foodstuffs such as green vegetables and fruits.

Calcium and phosphorus for strengthening the bones and the teeth. Deficiency- Ricket

**Calcium** is also required in the process of clotting of blood. Deficiency-Rickets

**Phosphorus** is required in various chemical processes, as in the production of chemical energy (ATP) during cell respiration. Rich **sources**: milk, meat, eggs, fish, pulses, vegetables, etc. Deficiency-Soft Bones

**Iron** for forming haemoglobin; its deficiency leads to anaemia.

**Source**: green leafy vegetables, liver, etc.

**Iodine** for proper working of thyroid; its deficiency leads to goitre

**Source**: vegetables, mineral water, etc.

**Potassium and sodium** for cell permeability, especially in nerve cells. Deficiency- Nerve impulse do not get transmitted, Muscle cramps

**Source**: most foods and table salt.

## 5. VITAMINS

are chemical substances needed in minute amounts, which help maintain a healthy body. Most vitamins act as catalysts or enzymes in essential chemical changes in the body.

Some vitamins **(A, D, E and K)** are fat-soluble and can be stored in the body, for a longer period of time but some others are water-soluble and cannot be stored for a longer period of time.

Absence or shortage of vitamins in over a continued period **causes deficiency diseases**.

Vitamin A- Deficiency- Night Blindness, Xerophthalmia

Vitamin B1- Deficiency-BeriBeri

Vitamin B2- Deficiency- Irritation in eyes and Skin

Vitamin B3- Deficiency-Pellagra

Vitamin B5- Deficiency-Fatigue

Vitamin B6- Deficiency-Skin problems

Vitamin B11- Deficiency-Anaemia

Vitamin B12- Deficiency-Pernicious Anaemia

Vitamin C- Deficiency- Scurvy

Vitamin D- Deficiency-Rickets, Osteomalacia

Vitamin E- Deficiency-Sterility in Rats

Vitamin K- Deficiency- Haemorrhage

## 6. WATER is indispensable:

About 2/3 of our body weight is water. It serves **several functions.**

- It acts as a solvent in the body for thousands of substances both organic and inorganic.
- It is used to produce digestive juices.
- It helps in the transportation of digested foods and oxygen throughout the body.
- It is used in the excretion of soluble wastes.
- It is involved in the maintenance of body temperature.

**Loss and replacement.** Water is regularly lost from the body through sweat, urine, and as water vapour in breath. It is gained by as liquid we drink and food we eat.

## BALANCED DIET

A balanced diet is one which contains all the principal constituents of food in proper quantity.

A **calorie** is the amount of heat required to raise the temperature of one gram of water by one degree Celsius.

Adult worker-3500 Cal

A clerk-1800-2500 Cal

A Child(6 years)- 1100 Cal

An adult resting-1600 Cal

A women- resting-1450 Cal.

**Malnutrition** is the condition in which a person suffers due to lack or deficiency of one or more essential elements of food.

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