5 Food and Nutrition

Living beings need energy for doing biological activities for coping with wear and tear of the body as well as production, growth and development of cells. Energy required by the body is achieved through nutrient constituents. For that each and every living-being gets nutrient constituents in different forms through food. In this chapter we would develop understanding in details regarding nutrient constituents in the food and among them specifically regarding vitamins.

Constituents of the balanced food

There are mainly six constituents of food :

(1) Protein (2) Carbohydrates (3) Fat (4) Salt and Minerals (5) Water (6) Vitamins.

When each and every constituent is obtained by the body in necessary proportion, it is called the balanced food. Among all these constituents, use of any one constituent in more or less proportion harms the body. According to the general belief energy is obtained surely by eating ghee, believing that, it is not beneficial to eat only ghee.

For balanced diet proportion of food is decided by counting calories of different food-substances.

One gram protein contains 4 calories, one gram carbohydrates 4 calories and one gram fat 9 calaries. Now let us know about importance of constituents of food and its (food) sources.

(1) Protein : Protein is assential for creation and growth of tissues (muscles) of the body as well as for constitutions of enzymes and hormones.

Proteins are composed of different types of amino acids. Protein is in good proportion in milk, eggs, soyaben, yeast, pulses etc. By taking protein in required proportion (degree) one can be saved from deficiency-diseases. Daily requirement of protein depends on age and gender. Pregnant women or breast-feeding mothers require more protein.

(2) Carbohydrates : This constituent is the main source of energy in the body and it is an important constituent of food. During digestion, glucose the simple form of carbohydrate-substances is formed and additional quantity of glucose more than necessary gets converted into glycogen and fat. When needed, it turns into glucose form and is made use off. It is required in more proportion for a person labouring much rather than an inactive person sitting idley doing no work.

Carbohydrate substances are obtained from grain, wheat, rice maize etc. Moreover, it is obtained from sugar-cane, beet or sweet fruits.

(3) Fat : Fat plays an important role in the formation of fat cells and tissues. Vitamins A, D, E and K are soluble in fat. Hence for absorption of these vitamins fat is necessary.

Fat is obtained from ghee, butter, eggs and oils. If proportion of fat is more than necessary in blood in the form of cholesterol, then it becomes responsible for heart disease.

(4) Salt and Minerals : Calcium, iron, iodine, phosphorous, magnesium, sulphur, sodium and potassium etc. are constituents of minerals, which are essential for metabolism (metabolic) processes occurring in the body.

Mineral	Source	Functions
Calcium	Milk and its preparations, pulses, green vegetables, sesame seeds, grams, black beans (pulses), corn.	Constitution of teeth and bones, process of coagulation of blood, flow of feelings between the nervous system.
Iron	Palak (spinach), tandaljo, methi (penaugreck), vegetable, coarse grain, bajaro.	Constitution of Haemoglobin. Analysis of hormones in the thyroid gland.
Iodine	Salt containing iodine, fish, sea-food.	Analysis of hormones in the thyroid gland.

Phosphorous	Milk, green leafy vegetables, bajaro, coarse grain, walnut.	Constitution of teeth and bones. Constitution of ATP molecule and creatine.
Magnesium	Corn	Constitution of bones.
Sulphur	Dry fruits	Constitution of amino acid with sulphur.
Sodium	Salt, black beans (pulses)	Flow of feelings balance of acid and base.
Potassium	Orange, coconut water, vegetables	Muscles contraction.

(5) Water : Water is an important medium for bio-chemical processes. In living organisms gases, mineral constituents, nutrient constituents and excretary products flow through water. It helps in maintaining the body temperature. There is 50% to 70% water in the human-body. If amount of total water contained in the body gets a loss of 20%, then 'dehydration' is a possibility and if the loss of water is 40%, then death also becomes a possibility.

The need of water depends on age, season and working style. About 3 litres of water should be taken everyday. More water is required in summer, as well as after doing labour work.

(6) Vitamins : Organic chemical compounds in very meagre proportion, but very essential for the body are called vitamins.

Vitamins are essential for biochemical processes, occurring in the body, general growth and development of the body and for activating cells.

Types of Vitamins : Vitamins are classified in two types according to their solubility.

(1) Vitamins soluble in water : Vitamins B complex and C are soluble in water. These type of vitamins can not be stored in the body for long. Hence these vitamins should be included in daily food. It is very necessary. If these vitamins are taken in much proportion in the form of medicines, then the body becomes dependent on it and the additional vitamins are thrown out through urination, which harms on the whole.

(2) Vitamins soluble in fat : Vitamins A, D, E and K are soluble in fat. This type of vitamins can be stored in the body. If fatty food is taken in less proportion or if fat is not properly digested, then deficiency of this type of vitamins may result. Moreover the deficiency of this type of vitamins can also result due to medicines like paraffin taken for constipation or piles. If this type of vitamins are taken in excess, it harms the body.

Vitamin 'A' Retinole : Vitamin A is very necessary in order to be able to see things even in dim light. A person deficient in this vitamin A suffers from the disease of night-blindness (nycatalopia). In modern times even at night due to electricity we are not used to live in dim light or darkness. Hence even if somebody suffers from nightblindness it has been difficult to find out deficiency in vitamin A. There is also another situation in which light becomes relatively dim, when the vehicle from the opposite side throws very bright light and then it passes away. If the driver of the vehicle has deficiency in vitamin A, nothing is seen for some moments and there is a possibility of accident during this period.

Moreover due to dificiency of vitamin A the proportion of infectious diseases increases in case of skin, eyes, mouth, intestines, respiratory system, urinary tract, womb (uterus), urine-tube etc. due to reduction in strength of inbetween cells of the Epithelial tissues. Especially the proportion of diseases like colds, cough, diarrhoea, abscess (boil), urine burning sensation, conjuctivitis etc. increases. This deficiency results in the outer layer (coat) of eyes becoming dry and wrinkles and some times there ash-coloured spots (Bitot's spots) in the eyes. If this deficiency becomes severe, there is possibility of ulcer in the eye and at times eye-sight is lost for ever.

To take vitamin in excess is also hazardous. If it is given to the pregnant woman in excess, it harms the foetus developing. If it is provided 5000 to 10000 I. U. (International Units), it is very beneficial to the foetus.

The daily requirement of vitamin A is 4500 to 5000 I. U. (International Units). In India more than 30000 people every year become victims of blindness due to the deficiency of vitamin A. Hence in order to prevent this deficiency, vitamin A is provided 1 lac I. U. to the child between 6 months to 1 year and 2 lac I. U. to the child between 1 and 6 years every 6 months. Moreover it is beneficial to give 2 lac I. U. to the mother feeding the child and 5000 I. U. to the pregnant woman daily.

Green leafy vegetables like tandaljo, methi, palak, alavi (arum indicum) drum sticks (leaves), as well as mango, papaiya, milk-cream, ghee, carrot, cod liver oil etc. are rich sources of vitamin A.

Vitamin B Complex : Vitamin B is in fact a name given to a group of many vitamins. Only important vitamins of this group are mentioned here.

Vitamin 'B_1' (Thiamine) : This vitamin is necessary for metabolism of carbohydrate substances. The combustion of glucose in the body can not be performed well due to its deficiency. Lactic acid and pyruvic acid get collected in excess in tissues of the body. Troubles like Lack of appetite, legs-ache, burning sensation in bottom-parts of hands and feet can be caused. The disease like Beriberi is caused due to its deficiency, which is not seen nowadays. The deficiency of this vitamin is caused due to excessive use of alcohol.

The daily requirement is 0.5 mg per 1000 K calorie. Hence the average requirement comes to 1 to 1.5 mg according to this calculation.

Generally this vitamin is found in good proportion in wheat, rice, pulses, ground nuts etc., while the proportion gets reduced in polished rice, mendo (fine flour of wheat) and pulses without husk. The proportion of this vitamin gets reduced due to excessive washing of pulses and rice, adding soda while cooking or by throwing away the surplus water while soaking in water or cooking by boiling in water or with steam.

Vitamin 'B_2' (Riboflavin) : This vitamin is very useful in oxidation at the level of cell in the body and in the process of metabolism for getting energy.

The daily requirement of this vitamin is 0.6 mg per 1000 K calorie. Due to deficiency of this vitamin manyatimes communication between the nervous system and muscles become slow and there is an increasing possibility of cataract, as well as cutting marks in lip-corners are found.

The deficiency of this vitamin is found in children of economically poor class.

This vitamin is obtained in good proportion from milk, pulses, peas (Vatana) groundnuts, pods, yeast, whole eggs, green vegetables, while it is found in moderate proportion in corn and pulses.

Vitamin 'B_3' (Niacin) : Niacin or nicotinic acid is required for metabolism of carbohydrates, fat and protein. It is also required for functions of skin, intestines and the nervous system. The amino acid named tryptophan is needed to make niacin. Niacin is obtained in plenty from ground nuts and asadiya. Niacin is also available in moderate proportion in pulses and grain. Tryptophan available from milk is also useful in making niacin. The acute deficiency of this vitamin is found in people who always eat, maize or juwar. This deficiency can also be found due to excessive alcohol.

The deficiency of this vitamin cause diarrhoea, skin-disease (dermatitis) and loss of memory (amnesias). Moreover it can cause ulceration of the tongue and mouth, depression, irritability etc. It affects the skin of the part of the body open to sun-rays.

The daily requirement of this vitamin is 6.6 mg per 1000 K calorie.

Vitamin 'B_6' (Pyridoxin) : This vitamins plays an important role in the process of metabolism of amino acid, fat and carbohydrates.

This vitamin is available from milk, pulses, grain and vegetables. The deficiency of riboflavin (B_2) and pyridoxine (B_6) harms the surrounding nerves and the bottom-parts of hands and feet have burning sensation.

The daily requirement of this vitamin is 2 mg per 1000 K calorie.

Folate (Folic acid) : This vitamin is useful in making nucleic acid and RBC.

Folate is available from green leafy vegetables, milk, fruits, pulses and grain. The deficiency of this substance results in troubles like paleness of the blood, ulceration of the tongue and mouth and diarrhoea.

The daily requirement of this substance is 100 microgram. Especially the pregnant woman needs this vitamin more. Hence folic acid with iron should necessary be given to the pregnant women regularly.

Vitamin 'C' (Ascorbic acid) : Vitamin C or Ascorbic acid is such a vitamin which diminishes the most due to heat. This vitamin plays an important role in producing fibres named collagen, which are helpful to bones, soft bones (cartilage), connecting tissue and blood-vessels. If this vitamin is deficient, bleeding occurs much e.g. bleeding from teeth, gums. Bones of such a person quickly break and he also feels more fatigue. This vitamin stops formation of nitrosamine in the intestine which causes cancer. This vitamin is very useful in the absorption of iron-elements.

The daily requirement of this vitamin is 40 to 60 mg. This vitamin is obtained in large proportion from amlan (embelic myrobalan), guava, lemon, orange, green leafy vegetables and sprouted mung. The stone of acetic acid can result by taking vitamin in excess for long as medicine and the body becomes dependent one excessive vitamin.

Vitamin D (Calciferol) : This vitamin it very essential in the development of bones and process of metabolism of calcium. It performs the main function of absorbing calcium in large proportion from food through intestine and taking it to blood and then carry it to bones from blood.

Generally this vitamin is especially in cod-liver oil, eggs, milk. This vitamin is produced with the help of ultraviolet rays contained in the sun-light under the skin.

The daily requirement of vitamin D is from 200 to 400 International Units (I. U.).

The deficiency of this vitamin cause deformation in bones, rickets, loss of weight, diseases of teeth and digestion power. There is pain in rib, waist and joints, Bones become soft and brittle, increasing the possibility of fracture.

Vitamin 'E' (α -Tocopherol) : This vitamin is sufficiently available from green vegetables, meat, oil-seeds, tomatoes, maize, butter, sprouted pulses and grain. Generally the deficiency of this vitamin is not produced. Hence it is not required to be taken as medicine.

This vitamin is essential for sexual health. It has good effect on reproduction organs. Vitamin 'E' is called the vitamin of sex. It is useful in strengthening cell walls and preventing the oxidation of vitamin A.

The daily requirement of this vitamin is approximately 10 mg. If it is taken in excess lymphocyte of the person are adversely affected and there is a possibility of lessening immunity.

Vitamin 'K' : Vitamin 'K_1' (Phylloquinone) and vitamin 'K_2' (Menaquinone). Some vitamin 'K'

is produced due to the help of useful bacteria in the intestine. The remaining part is obtained in plenty from green leafy vegetables, palak, soyabean and meat.

Vitamin 'K' is useful in producing pro-thrombin, a substance essential for clotting of blood. The deficiency of this vitamin causes possibility of bleeding. This vitamin is useful for preventing jaundice.

The useful bacteria get destroyed due to excessive antibiotic medicines. Hence the deficiency of vitamin 'K' arises.

Exercise

1. Answer the following questions in detail :

(1) State the meaning of vitamins and types thereof.

(2) Explain : What is meant by 'Balanced diet'. Describe its constituents.

(3) Write notes on two sub-types of vitamin B.

2. Write short notes :

(1) Effects of the deficiency of vitamin A

(2) Why vitamin K is useful ?

(3) Protein.

3. Answer the following questions in one or two sentences :

(1) State vitamins soluble in water.

(2) State vitamins soluble in fat.

(3) Why is vitamin E essential ?

(4) What is the main constituent of food ?

(5) State the constituents of minerals.

4. Answer selecting correct option from the options given below :

(1) How many calories are there in 1 gram protein ?

(A) 1 calorie (B) 6 calories (C) 2 calories (D) 4 calories

(2) Which mineral is essential in the constitution of teeth and bones ?

(A) Sulphur (B) Calcium (C) Iodine (D) Sodium

(3) Which constituent of food is necessary for maintaing the body-temperature ?

(A) Water (B) Protein (C) Vitamin (D) Fat

(4) Deficiency of vitamin A causes the disease.

(A) Beriberi (B) Night-blindness (C) Scurvy (D) Rickettes

(5) The deficiency of vitamin B causes the disease.

(A) Beriberi (B) Scurvy (C) Night-blindness (D) Rickettes