

VITAMINS:

Vitamins are low-molecular weight organic substances necessary in small amounts in the diet of higher animals for normal growth, maintenance of health, and reproduction.

Vitamins are a group of heterogeneous substances that differ widely in their chemical nature and function. They are classified based on their solubility in water or fats as water-soluble and fat-soluble vitamins. The fat-soluble vitamins A, D, E, K are found in foods in association with lipids. The water-soluble vitamins are the B-complex vitamin and vitamin C.

Function of Vitamins:

- They regulate metabolism
- They help convert fats and carbohydrates into energy
- Vitamins assist in forming bones and teeth.

Distribution in foods:

Vitamins are present in a variety of natural foods. Green leafy vegetables are good sources of most vitamins. Pulses, Nuts and Cereal grains also have a good content of certain vitamins. Animal foods (eg: milk, egg, meat) are also good sources of vitamins except vitamin C.

Fat-Soluble Vitamins:

- Fat-soluble vitamins are generally associated with fatty acids, such as butter, cream, vegetable oil and fats of meat and fish.
- None of the fat-soluble vitamins contain nitrogen in their structure.
- They are more stable to heat.

Vitamin A (Retinol):

It is found in animal materials like meat, milk, fish etc. In animals, the vitamin is found in highest concentration in the liver. Plants do not contain vitamin A, but contain its precursors (provitamin A), the carotenoids. Carotenoids are the orange and yellow pigments of fruits and vegetables.

Function: vitamin A is also necessary for the growth and development of skeletal and soft tissues through its effects on protein synthesis and differentiation of bone cells. It is also required for the proper formation and maintenance of tooth enamel and healthy gums.

Deficiency disorder: Vitamin A deficiency may produce skin changes (dry, scaly and rough), night blindness, keratinization of the cornea, resulting in xerophthalmia.

Vitamin D (calciferol):

Rickets and osteomalacia is a bone disorder and it also occurs as a result of calcium and phosphorous deficiency. Cod liver oil cures this disease. When certain foods are exposed to UV light, they develop the ability to protect animals against rickets.

Best sources of vitamin D are fish liver oils.

Deficiency disorder: rickets , osteomalacia.

Vitamin E (tocopherol):

It is the most widely available of the vitamins in common foods. Wheat germ oil is the richest source of vitamin E. It is also present in other cereals, green plants, egg-yolk, milk –fat, butter, meat, nuts and vegetable oils (soyabean, corn, cottonseed).

Function: Its role in the body appears to be related entirely to its anti-oxidation role to prevent the formation of peroxides. Vitamin E appears to protect the cell membranes from deterioration caused by peroxides and free radicals formed from fats.

Vitamin K:

Two forms of vitamin K occur naturally-vitamin K₁ (phylloquinone) and K₂ (menaquinone) which is formed as a result of bacterial action in the intestinal tract.

The best sources of vitamin K are green leafy vegetables, especially spinach, cabbage and lettuce. Fruits, cereals, dairy products and meat provide lesser amounts.

Function: Vitamin K is an anti-haemorrhagic vitamin. It is necessary for the synthesis of prothrombin and other proteins involved in the clotting of blood.

Vitamin k deficiency prolongs blood clotting time which may lead to internal haemorrhage and uncontrolled bleeding.

Water-soluble vitamins:

B-complex vitamins

Thiamine (vitamin B-1):

The vitamins are widely distributed throughout the plants and animal kingdom. The best sources of vitamin B-1 are cereal grain (wheat) germ layers. polished cereal grains and refined wheat flour are deficient in the vitamin. The vitamin is present in good quantity in pulses, and in nuts.

Thiamine is one of the least stable vitamins. Extensive losses occur in cereals as a result of cooking or baking, and in meats, vegetables and fruits as a result of various processing operations and during storage. Freezing has little or no effect on the thiamine content of food.

Deficiency: fatigue, emotional instability, depression, retard normal growth, loss of appetite and beriberi.

Functions: The most important function of thiamine is its role as a coenzyme.

Vitamin B-2(Riboflavin):

This vitamin is widely distributed in plant and animal foods in small amount. Good sources of the vitamin are milk, cheese, liver eggs and leafy vegetables.

Riboflavin belongs to a group of yellow fluorescent pigments called flavins.

Deficiency: Its deficiency in man results in reddened tongue(glostitis) and scaly, eye disorder such as itching, burning, lacrimation, dimness of vision and cataract.

Niacin(vitamin-B3):

Niacin includes both nicotinic acid and nicotinamide.

Good sources of vitamin are meat, fish, poultry, groundnuts, pulses and whole grain cereals

Deficiency can leads to Pellagra, and this results in dermatitis, diarrhea, depression and dementia.

Pyridoxine (vitamin B-6):

Sources : Meat(especially liver), some vegetables and grain cereals with bran.

Deficiency : depression, greasy dermatitis around the eyes

Function : the vitamin is the cofactor of enzymes involved in the conversation of tryptophan into niacin, release of glucose from glycogen.

Folic Acid:

First isolated from spinach leaves and known to be widely distributed in green leafy plants.

Sources : spinach, green leafy vegetables, broccoli, whole wheat bread

Deficiency:poor growth, megaloblastic anaemia and other blood disorders,

Function : controls macrocytic anaemia of pregnancy.

BIOTIN:

Biotin is a water-soluble, sulphur-containing vitamin. It is stable to heat and light but unstable in strong acid or alkali.

Sources: Egg yolk, Groundnuts, Cereal Grains, Fruits

Biotin plays an important role in the metabolism of both carbohydrates and fats.

Pantothenic Acid:

It is widely distributed in foods and is particularly abundant in animal tissues, whole grain cereals and pulses.

Deficiency symptoms have been produced by the administration of metabolic antagonistic, pain and sensation in the arms and legs, loss of appetite, Nausea and indigestion.

Cobalamin (B-12):

Vitamin B-12 is known by the name cobalamin since it is found as a co-ordination complex with cobalt.

Sources: Milk, Meat, Sea-food, Eggs, Cheese

Function : Cobalamin is necessary for normal functioning in the metabolism of all cells, especially for those of the gastrointestinal tract, bone marrow and nervous tissue and for growth. cobalamin containing coenzymes play an important role in the transfer of methyl groups.

A long-term deficiency of vitamin B-12 results in an anaemia known as pernicious anaemia.

Ascorbic Acid(vitamin C):

Sources: citrus fruits, berries, Guava, Capsicum, Green leafy vegetables, Tomato.

Deficiency: develops Scurvey; it is a fatal disease characterized by a weakening of collagen structure, and results in widespread capillary Haemorrhaging. Other symptoms include weakness, Poor appetite, growth, Anaemia, tenderness to touch, swollen and inflamed gums, loosening of teeth and bone joint diseases.

Functions: It helps in the healing of wounds, fractures, bruises and bleeding gums.

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