

**Q. 13. Describe Vitamin C or Ascorbic acid.**

Vitamin C or ascorbic acid is known as anti-scorbutic vitamin because it prevents to occur scurvy disease. This is isolated by *Szent-Gyorgyi* in 1928 and synthesized by *Reich-Stein* in 1933.

**Sources :** The different sources are :

**(a) Vegetable Sources :** Citrus fruits like orange, tomato, bannana, amloke, pineapple, litchi, green mango, lemon, etc. are rich sources of vitamin C.

**(b) Animal Sources :** Supra-renal cortex, corpus luteum, mother's milk and cow's milk contain a good amount of vitamin C.

**Chemistry :** Vitamin C is chemically known as L-ascorbic acid. It dissolves in water giving as acidic solution with dextrorotatory properties. It may be destroyed by oxidation, increased exposure to air and process of cooking or heat. It can act as a reducing agent when it is heated with phenylhydrazine, it forms phenylhydrazone. It forms many metallic salts.

**Properties :** It is a white crystalline compound, soluble in water and

insoluble in fats and oils. The synthetic preparation is known as ascorbic acid. It may be dextro or levorotatory. It is very sensitive to oxidation particularly in the presence of copper ions. It is almost stable in weak acid solution but readily destroyed in alkaline media. It is destroyed by prolonged heating or cooking. Anaerobically, it can be preserved for a long time.

**Absorption :** Dietary L-ascorbic acid is mainly absorbed from duodenum and jejunum of the small intestine with the help of a specific limited capacity transport system.

**Deficiency Signs :** The deficiency of vitamin C results in capillary haemorrhage, delayed healing of wounds, defective teeth and bone formation and looseness of teeth in adults. Death may occur due to infection rather than haemorrhage. Ascorbic acid deficiency leads to a disease known as *scurvy*. In this type of disease, there will be the failure to deposit intercellular cement substances like collagen, osteoid and dentine, swelling and tenderness in bones and joints, enlargement of the junction of the ribs and bone lesions and haemorrhages of the gums and loosening or breaking of the teeth, subcutaneous haemorrhage upon mild injury, dyspnoea, oedema and anaemia. A loss of weight and a marked pallor are also noted. In infant, the symptoms include irritability, fretfulness, tenderness, swelling of joints, degree of apathy and pallor and a desire to remain quite motionless.

**Physiologic functions :** (1) Ascorbic acid is intimately concerned in the normal productions of supporting tissues like osteoid, dentine and collagen which are mesenchymal in origin. (2) It takes part in oxidation-reduction system, probably by acting as hydrogen transporter. (3) It increases iron absorption from the intestine of the humans and animals. (4) It is essential for proper formation of red cells, haemoglobin and platelets. (6) It has been implicated in the enzymatic oxidation of DPNH. (7) It may be related to the synthesis of hydroxyproline and hydroxylysine from proline and lysine respectively in collagen molecules. (8) It helps in the formation of carnitine in the liver by hydroxylation of  $\gamma$ -butyrobetaine. (9) It may have some role in steroid hormone synthesis probably in some hydroxylase reactions. (10) It may help in the normal metabolism of phenylalanine and tyrosine as a co-factor. (11) It serves as a co-factor for dopamine  $\beta$ -hydroxylase and thereby it helps in the hydroxylation of dopamine to norepinephrine.

**Daily Requirements :** The human requirement of ascorbic acid becomes 45 mg. for adults, 60 to 80 mgm. during pregnancy and lactation and 30 to 45 mg. for children upto 12 years of age.