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Scurvy - Rediscovering a Forgotten Disease

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Abstract



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Scurvy is a long-documented dietary deficit that results from inadequate vitamin C. Because of its part in the metabolic events of connective tissue production, it results in a diverse presentation that affects numerous organ systems. Prominent signs and symptoms include ecchymoses, arthralgias, skin pigmentation, decreased wound healing, and gingival bleeding. Due to increased consumption as well as supplementation of vitamin C, the incidence of scurvy has drastically decreased in contemporary times; yet, isolated cases still arise. It is primarily identified in the elderly and malnourished in industrialised nations, and it is linked to drinking, a low socioeconomic status, as well as unhealthful eating habits. Among other GI symptoms, gastrointestinal (GI) bleeding has been reported to be an uncommon cause of scurvy. Vitamin C supplements can effectively treat and prevent it. A crucial redox co-factor in the systems of plants and animals is ascorbic acid, sometimes known as vitamin C. Although ascorbic acid is produced in sufficient amounts by most species, it functions as a real vitamin in those that lack the enzymes needed for synthesis. A crucial component of several metabolic pathways is ascorbic acid. Ascorbic acid must be obtained by humans from diet. People who eat ascorbic acid-deficient diets get scurvy.

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INTRODUCTION

Scurvy, which dates back to ancient times yet is still present today, was documented as a sickness among soldiers in Eber's Papyrus, a medical scroll. Scurvy has been a major historical concern for human communities for many ages. Comprehensive accounts of the clinical manifestations and symptoms of scurvy were found in the writings of the ancient Egyptians, Greeks, and Rooks [1]. The European and British

Renaissance explorers were destroyed by scurvy. In most of Europe, scurvy was a major cause of illness and death during the Great Famine, the American Civil War, the North Pole expedition, and the California Gold Rush. Captain James Cook was among the first to demonstrate how a diet rich in vegetables may help sailors who spent months at sea prevent scurvy. A recurrent illness from antiquity, scurvy can be fatal as well as severely impair several bodily processes, including the production of collagen, wound healing, and iron absorption [2]. Although there are differences in the water-soluble vitamin C, sometimes referred to as L-ascorbic acid, which is susceptible to heat, UV light, and oxygen, it is an essential part of diets. Ascorbic acid is implicated in prevalence estimations; according to certain research, 7.9 per cent of Americans are thought to be scurvy sufferers [3]. These people are at risk for the condition due to several variables, including obesity, nutritional deficiencies, and long-term alcohol consumption. Because scurvy affects different physical functions, its clinical appearance can vary.

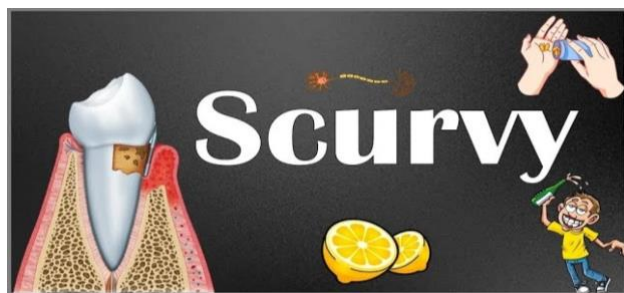


Figure 1: Scurvy

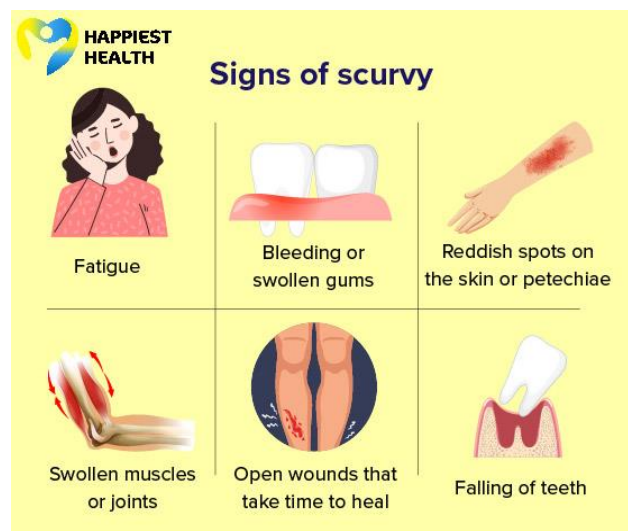


Figure 2: Signs of Scurvy

Signs of Scurvy [4]:

Individuals could encounter

Pain areas; muscles, Body as a whole; exhaustion, fever, appetite loss, or malaise.

Mouth; bleeding gums or missing teeth,

Skin; rashes, or spots of redness

Brushing, coiled hair, irritation, muscle weakness, swollen gums, as well as weight loss are also frequent symptoms.

Biochemistry and Metabolism:

The enolic form of alpha-keto lactone, ascorbic acid, is identical to glucose. Ascorbic acid as well as vitamin C are two groups of chemicals that share comparable biological functions. Except for primates, fruit bats, and guinea pigs, which are devoid of the vital enzyme L-gluconolactone oxidase, most animals can synthesise vitamin C from glucose. A daily turnover rate of 45–60 mg, or about 3% of the body's total stored vitamin C, occurs from the 1500–2500 mg reservoir that the body stores. Vitamin C has a half-life of 10–20 days [5].

An active transport mechanism is responsible for the absorption of vitamin C in the ileum. Low vitamin C intake causes scurvy because it is essential for collagen synthesis. The strength and stability of the body's connective tissues depend on collagen, a crucial structural protein. Since the enzyme L-Gluconolactone oxidase (GULO) is necessary for the final stage of vitamin C production, all animals that are susceptible to scurvy lack it. constantly feeling weak and tired. constantly being depressed and agitated. legs, muscles, or joints hurting. Gums that bleed and swell [6].

Pathophysiology:

For primates, ascorbic acid is a necessary vitamin in their diet.

Collagen Synthesis:

The prolyl hydroxylase and hydroxylase enzymes catalyse processes that result in the production of hydroxyproline and hydroxylysine, respectively, from proline and lysine residues in the collagen structure. This process is necessary to make the collagen found in the skin, blood vessels, and soft tissues [7]. Ascorbic acid is the electron donor

used in this process. The growth of teeth, fibroblast activity, and wound healing are all negatively impacted by the inability to complete this stage of collagen synthesis. Moreover, a lack of ascorbic acid results in hypermethylation of epigenetic DNA as well as inhibits the transcription of specific collagen types [8].

Neuro Transmitter Synthesis:

The enzyme enzodopamine-beta-monooxygenase, which hydroxylates dopamine to create norepinephrine, requires ascorbic acid as a cofactor [9].

Nitric Oxide Synthesis [10]:

Ascorbic acid stimulates the formation of nitric oxide, a potent vasodilator.

Fatty Acid Transport:

The production of carnitine requires ascorbic acid as an electron source. The process of transporting long-chain fatty acids across the mitochondrial membrane is dependent on carnitine. Scurvy causes a variety of symptoms, including damage to the skin and its appendages, poor wound healing, dental and gingival disease, brittle bones, and bleeding associated with the disruption of blood vessel integrity. These symptoms are explained by the extensive role that ascorbic acid plays in the development and maintenance of soft tissues [11].

Scurvy Symptoms:

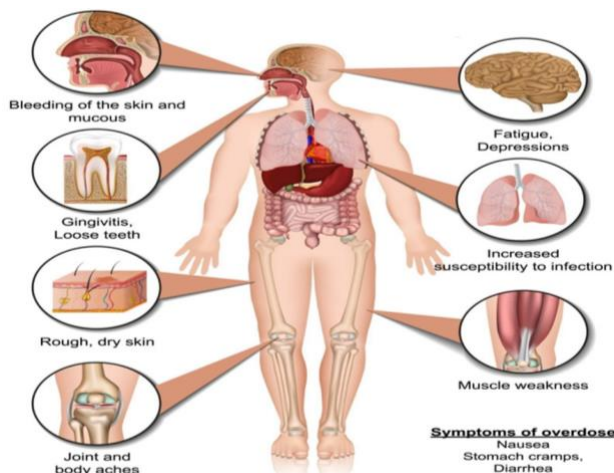


Figure 3: Symptoms of Scurvy

Risk Factors:

people who consume foods low in nutritional content and have poor eating habits. The inability to purchase or restricted availability of fresh

produce. Only breast milk was given to infants; smoking was shown to be a substantial risk factor in the NHANES. poor socioeconomic standing; elderly people who just drink tea and toast. Mental illness and eating disorders. Affected gut absorption by abdominal procedures, such as bariatric surgery or small bowel resection [12].

Diagnosis [13]:

Scurvy symptoms might mirror those of other illnesses, making diagnosis difficult. The diagnosis of scurvy is usually made by a combination of physical examination, medical history, dietary history, as well as laboratory testing. Scurvy diagnosis confirmation can be aided by laboratory testing. Vitamin C levels can be measured via a blood test; scurvy patients usually have low vitamin C levels. In contemporary medicine, vitamin C insufficiency is uncommon.

The symptoms might vary from mild, mother-specific indications to obvious bleeding, such as gum bleeding, ecchymosis, and more severe haemorrhage. The majority of these patients were seen in patients undergoing neurosurgery and cardiovascular care. Notably, previous to surgery, poor oral nutrition was seen in 7 out of 12 patients who suffered widespread bleeding.

Treatment:

Scurvy is treated with vitamin C supplements and by treating the underlying diseases that cause the insufficiency. Success has been achieved with a broad variety of replacement dosages. Typically, adults receive treatment for one month at a dose of 300–1000 mg daily. It is more difficult to treat scurvy-related haemorrhage by correctly detecting the illness than it is to stop the bleeding directly [14]. High doses of vitamin C are an effective treatment for suspected cases of scurvy. Initial intravenous ascorbic acid dosages of 1000 mg per day for three days are advised as part of a recommended treatment plan. If vitamin C cannot be obtained by diet, further supplementation at doses of 250 to 500 mg per day for one month following discharge, or longer, is advised [15].

Prevention:

Vitamins that are soluble in water, like vitamin C, are only partially stored by the body and need to

be replaced by diet. The eyes and certain other body areas have the highest concentration of ascorbic acid. In contrast to fat-soluble vitamins, which exhibit prolonged stability in the body, water-soluble vitamins are rapidly eliminated through the urine. 40 mg up to six months, as breast milk is typically provided; 50 mg from seven to twelve months; 15 mg from one to three years; It is advised that pregnant women take 85 mg of vitamin C daily; during lactation, this should increase to 120 mg. Compared to non-smokers, smokers need an extra 35 milligrams of vitamin C per day [16].

Toxicity:

In a few instances, excessive vitamin C dosage or consumption has also been noted. Numerous ascorbic acid adverse effects have been documented in the literature. Consequently, regular vitamin C intake is not advised for men, particularly for those who are prone to developing oxalate stones. Rarely, people with iron excess who consumed high doses of ascorbic acid have been reported to experience fatal ventricular arrhythmias. Patients may want to refrain from using pharmacologic dosages of ascorbic acid supplements [17]. As per the findings of the LOVIT (Lessening organ dysfunction with vitamin C) trial, patients in the intensive care unit who were septic and got a 4-day intravenous vitamin C course were at a higher risk of dying or developing persistent organ dysfunction as compared to those who were given a placebo.

Therefore, clinical professionals must understand that quitting ascorbic acid therapy abruptly can simulate a severe deficiency and result in worse outcomes [18].

CONCLUSION

As a nutritional deficiency that has been present for millennia but is increasingly being identified in the modern era, scurvy is important to recognise and comprehend for healthcare providers. Poor eating habits, drunkenness, low socioeconomic level, obesity, and abdominal operations are some of the key causes of this rise in occurrence. Scurvy is a condition that can impact multiple organ systems since it is involved in multiple metabolic events that alter the structure of tissues. When an

uncontrollable bleeding mucosa is the cause of gastrointestinal bleeding, a strong index of suspicion is required. Medical practitioners should be aware of the telltale signs and symptoms of scurvy, particularly in patients who are at risk. If vitamin C supplementation is suspected, it should be taken into consideration to avoid exacerbating the condition.

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