



Case Report

Copyright © Fevzi Daldal

The C in Covid Might Denote Vitamin C Deficiency

Fevzi Daldal^{1*} and Andrew Dancis²

¹Department of Biology, University of Pennsylvania, USA

²Department of Medicine, Corporal Michael J Crescenz VAMC, USA

*Corresponding author: Fevzi Daldal, Department of Biology, University of Pennsylvania, Philadelphia, PA 19104, USA.

To Cite This Article: Fevzi Daldal. The C in Covid Might Denote Vitamin C Deficiency. Am J Biomed Sci & Res. 2023 19(1) AJBSR.MS.ID.002556,

DOI: [10.34297/AJBSR.2023.19.002556](https://doi.org/10.34297/AJBSR.2023.19.002556)

Received: 📅 May 26, 2023; Published: 📅 June 09, 2023

Case Report

The patient who is the subject of this study is a 37-year-old male unemployed carpenter, who took very seriously public health advice to sequester himself at home during the early days of the recent Covid pandemic. He remained in his Philadelphia city apartment, rarely going out and mostly living on his couch and watching TV. During that time, he ordered out for food, almost exclusively eating plain pizza three times a day, morning, noon, and night. After about three months of living under these conditions, he began to feel unwell. He had some difficulty in walking due to pain in his groin and left thigh. On close inspection the thigh appeared ecchymotic, with a giant bruise extending from the groin medially into the muscles and soft tissues of the thigh, seemingly penetrating the sheaths and muscles of the adductor longus, adductor magnus and gracilis. He experienced severe pain on abduction of the thigh.

At a visit to the ER, doctors thought that he must have ruptured a large vessel and bled into the thigh, but vascular studies including Magnetic Resonance Angiography (MRA) of the region did not reveal any damage to the vessels. Furthermore, the patient denied any trauma of any kind, as he had been basically sitting on his couch, eating pizza and watching TV during the last three months. Laboratory analyses revealed anemia, consistent with loss of blood into his groin and thigh. Consequently, he transfused two units of packed red cells to replace these losses. Another diagnostic consideration was that he might have a coagulopathy (inherited or acquired tendency to bleed). However, he experienced no other bleeding manifestation, no nose bleeds, gum bleeds, or other types of bleeding. He never had any prior bleeding episodes, and in the past, he never bled after hemostatic stresses such as tooth extractions. On close examination of the skin of the legs, it was noted that some of the hair follicles were surrounded by perifollicular hemorrhages. The other constituents of the blood were normal (white blood cells count: 8,000/cmm, hemoglobin: 9g/dl, hematocrit: 36% and platelets count: 241,000/cmm). Platelets

are required to form a platelet plug to initiate hemostasis, but his platelet numbers were normal, hence a low platelet count was not the explanation for his problem. Furthermore, coagulation testing showed no deviation from normal, with prothrombin time (PT) of 12s, Partial Thromboplastin Time (PTT) of 32s, and international normalized ratio (INR) of 1.0.

Upon further examination, an astute hematologist requested the determination of its vitamin C levels, which came back several days later as “undetectable” (i.e., less than 0.1mg/dl). Other micronutrients, including vitamin B12, vitamin B1, amounts of copper, zinc and iron were also measured in the plasma, and were found normal. He was therefore replenished with vitamin C capsules at 50mg per day, and two weeks later, he recovered and was completely fine in clinic observations, wondering why the physicians were seeing him at all. Further investigation led him to confirm that he had not consumed any kind of fresh fruits or vegetables during the entire three months of Covid lockdown.

Based on the overall findings, it was concluded that the diagnosis in this case was scurvy. This is highly unusual and equally surprising in downtown Philadelphia, in the 21st century, aided and abetted by Covid lockdown, and consequent nutritional deprivation. Scurvy is due to deficiency of ascorbic acid (vitamin C), which is an essential micronutrient that needs to be supplied by daily diet in humans. Note that the lack of natural production of vitamin C is only true in primates, as most other animals can biosynthesize their own vitamin C. Scurvy was encountered as a disease during the old times, as long ago as the Crusades. Some of the earliest evidence for a disorder suggesting scurvy dates to 3800-3600 BCE, captured in characteristic bone changes in the skeleton of a roughly one-year-old child in Egypt. Another early probable case of scurvy, described from the skeletal remains of a child in England, dates to 2200-1970 BCE. Scurvy was noted to occur in individuals with poor diets lacking fruits and vegetables. Crews of sailing vessels on

long trips, generally longer than a few months, would develop and often die from scurvy. The introduction of the potato to Europe in the 17th century mitigated the incidence of scurvy (see the excellent description of the life saving features of the potato for common sailors in “Two Years Before the Mast” [1]. Similarly, the U.S. Navy continued to struggle with scurvy into the 19th century even though the British Royal Navy cracked the mystery of the disease in the 18th century by storing citrus fruits on board all its ships. The British Navy gave its sailors limes or lemon juice rations to ward off scurvy - earning them the nickname of “Limeys” among the American sailors who didn’t know about or believe in the preventative treatment of scurvy [2]. Unfortunately, our patient did not consume any potatoes or citrus during his lockdown, and he didn’t even have “French fries” or “lemonade” with his pizza.

It is not generally recognized by clinicians that scurvy is a bleeding disease. The vitamin C in the body exists as ascorbic acid or dehydroascorbic acid which chemically differ by the presence of an additional double bond in the latter. Ascorbic acid can function as a reductant (electron donor) for many enzymatic reactions, most notably the conversion of certain proline and lysine residues in procollagen to hydroxyproline and hydroxylysine during collagen synthesis. Thus, ascorbic acid is critical for making collagen, proteoglycans, and constituents of the intercellular matrix in diverse tissues such as tooth, bone, and capillary endothelium. The bleeding in scurvy results from lack of collagen support for capillaries, which may rupture with minimal trauma [3]. Blood leakage from capillaries ensues, and sometimes the coalescence of petechiae leads to ecchymoses (pronounced bruises) that may be confused with the rupture of a large vessel. The large bruise and extensive bleeding in our patient’s thigh presumably resulted from rupture of capillaries and subsequent local bleeding. One other puzzling feature of this story was that although the pizza contained some tomato sauce, and that tomato is a vegetable relatively rich in vitamin C, apparently it did not provide adequate vitamin C to ward off clinical deficiency. According to the USDA data one slice of cheese

pizza, approx. ~100g, contains approx. 1-2mg of vitamin C, and a daily amount of ~90mg of vitamin C is needed for an adult male [4]. The answer most likely lies in the fact that upon cooking the pizza, vitamin C present in the tomato sauce was heat-destroyed.

Treatment and Conclusion

The patient was replenished with vitamin C pills, which were spectacularly effective. Similarly, simply consuming some fresh fruit rich in vitamin C like the “limeys” of the British Navy would have been sufficient to prevent him from being the subject of this medical case report. This report illustrates and reminds us that scurvy is still present in developed countries despite the bountiful availability of fortified foods [5], and its resurgence can be exacerbated by social scenarios, such as the lockdown induced by Covid pandemics.

Acknowledgement

None.

Conflict of Interest

No conflict of interest.

References

1. Richard Henry Dana (1909) Two Years Before the Mast. Harvard Classics, PF Collier and Son Company, New York, Chapter 35: 359-360.
2. Andre Sobocinsky (2020) The Navy’s Fight Against Scurvy. DVIDS, U.S. Navy Bureau of Medicine and Surgery. United States.
3. Robert Marcus and Ann M Coulson (1996) Water-soluble Vitamins, The B Complex and Ascorbic Acid. 62: 1568-1571. In: Goodman & Gillman’s The Pharmacologic Basis of Therapeutics, Joel G Hardman, Lee E Limbird Editors-in-chief, Ninth Edition, McGraw-Hill, New York.
4. (2018) Fast Food, Pizza Chain, 14 pizza, cheese topping, regular crust. US Department of Agriculture, Agricultural Research Service.
5. Velandia B, Centor R M, McConnell V, Shah M (2008) Gen Scurvy is Still Present in Developed Countries. J Gen Intern Med 23(8): 1281-1283.