

# Role of Vitamin C as an Immunity Booster in the Management of Covid-19

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## ABSTRACT

Ascorbic acid, also known as vitamin C, is a water-soluble vitamin that is essential for several immune system biosynthesis pathways as well as acting as an antioxidant. It is a necessary nutrient that the body is unable to produce on its own. The prevention or reduction of respiratory tract infection duration with the use of vitamin C supplements. One inexpensive, safe, and necessary nutrient is vitamin C. Treatment for respiratory viral infections may benefit from vitamin C. Due to its many health benefits, including its antiviral, antioxidant, anti-inflammatory, and immune-modulating qualities, vitamin C may be used as a treatment alternative to treat COVID-19 infection. High-dose intravenous vitamin C has demonstrated encouraging outcomes in the treatment of coronavirus infections in both China and the US. High amounts of vitamin C taken short-term have not been associated with any negative consequences. Given that it helps treat viral infections and patients who are in severe condition, vitamin C is a cheap, easily accessible, and safe medication. In particular, if ongoing clinical trials assessing the efficacy of vitamin C in the therapy of coronavirus disease (COVID-19) produce positive results, (19) it would be advisable to add it to the management protocol.

**Keywords:** COVID-19, Immunity Booster, Vitamin C

## Introduction

Vitamin C is a vital nutrient that functions as an antioxidant and is important as a cofactor and regulator of several immune system pathways. Ascorbic acid, another name for vitamin C, is a necessary building block for the body's growth, development, and repair. It functions in our bodies as a multi-regulator to prevent and lessen the severity of a number of illnesses [1]. Due to its immune-modulatory and antibacterial properties, vitamin C has been linked to a number of viral and chronic illnesses. According to the majority of research, taking large doses of vitamin C supplements has been linked to decreased risk of infection and inflammation, fewer hospital admissions, a decreased need for mechanical ventilation, and a lower death rate [2]. It has been demonstrated that a low dosage of vitamin C results in a marginally reduced level of thrombosis. Approximately 200 mg of vitamin C should be consumed daily to lower the risk of chronic illness.

## Epidemiology of Covid 19

Using unbiased next-generation sequencing, the majority of the early cases were epidemiologically linked to the Huanan seafood wholesale market, where aquatic animals and live animals were sold. In December 2019, Wuhan, the capital city of Hubei province, reported an outbreak of pneumonia with unknown causes. From the lower respiratory tract samples of these patients, an unidentified beta coronavirus was found. The virus known as 2019-novel Coronavirus was isolated using human airway epithelial cells [3]. When the virus was found under an electron microscope, it resembled the coronavirus family and had a diameter of 60 to 140 nm with distinctive spikes of 9 to 12 nm. The new coronavirus strain has 88% of phylogenetic similarities with human coronaviruses, such as those that infect SARS (79% similarity) and MERS (50% similarity). On February 11, 2020, the International Committee on Taxonomy of Viruses' Coronaviridae study group designated the virus as COVID-19, a SARS-resultant disease, based on taxonomy and phylogeny. After evaluating the global situation, the World Health Organization (WHO) proclaimed COVID-19 to be a pandemic on March 11, 2020[4].

## Effect of COVID-19

Covid-19 targets those with weakened immune systems, particularly those who are young or elderly. The gut's beneficial bacteria, which shield the body from a variety of illnesses, are the foundation of the immune system. A weakened, compromised immune system leaves

room for infections like coronaviruses as well as conditions like diabetes, heart disease, and cancer. Plant-based diets boost and support the health of the gut microbiome, which comprises up to 85% of the body's immune system, as well as intestinal beneficial bacteria.[5] Conversely, an overabundance of animal products causes inflammation, depletes the body of beneficial bacteria, and is the root cause of conditions including diabetes, cancer, heart disease, hepatitis B, chronic kidney disease, and chronic obstructive pulmonary disease.

## Dietary management for COVID-19 patients

Drinking lots of water will help coronavirus patients keep their mucous membranes wet, which can further reduce their risk of getting the flu and colds. If they don't feel very thirsty, they can make soup on their own or simply drink milk, coconut water, green tea, or even some fresh fruit juice. As of right now, there is no proof that the COVID-19 virus can survive in drinking water or sewage. Every day, consume five servings of fresh veggies [6].

## Possible Management Effect of Vitamin C

### Indirect Antiviral effect

The hosts have natural defenses against viral invasion. Clinical investigations, animal experiments, and in vitro research have all shown indications that vitamin C may have antiviral properties. Because high doses of vitamin C inactivate viral growth in vitro, there is a possibility that they have virucidal effects. Vitamin C deficiency has been observed in post-herpetic neuralgia sufferers [7].

### An Oxidative Effect

Restoring endothelial function reduces the risk of SARS-CoV-2-induced endothelial dysfunction and its detrimental effects. Reduced oxidative stress-induced lung inflammation and injury. Vitamin C preserves the redox integrity of the cells, which protects the lungs against oxidative stress induced by inflammation. After an ultramarathon race, a 600 mg daily vitamin C supplement decreased the frequency, intensity, and length of URTIs [8].

### Enhancing T cell activity and boosting immunoglobulin

Synthesis are two immunomodulatory effects that may lessen the lymphogenic impact of SARS-CoV-2 infection. The initial line of protection against external infections is the epithelium barrier, which

is strengthened by vitamin C. Numerous inflammatory mediators are modulated in their release by vitamin C [9].

**Vitamin C as an enhancer of immunity**

The body's first line of defense against pathogenic microbes and other harmful chemicals continues to be the immune system. The importance of nutrition in immunity has grown during the past few decades. The impact of vital nutrients, like vitamins, on particular facets of immune function has drawn a lot of attention. Well-known as an antioxidant, vitamin C, commonly referred to as ascorbic acid, can function as a cofactor for several enzymes involved in biosynthesis and the control of gene expression. By promoting several facets of the innate and adaptive immune systems, such as the function of the epithelium barrier, phagocyte cell chemotaxis and antimicrobial activity, natural killer cell function, and lymphocyte proliferation and differentiation, vitamin C regulates the operation of the human system. While vitamin C supplementation appears beneficial in both preventing and treating infections, vitamin C deficiency has been linked to immune system deficiencies and an increased susceptibility to infections.[10] Additionally, vitamin C helps reduce how long symptoms of a common cold last. Low vitamin C levels may weaken the immune system because they control the immune system to prevent tissue damage.

**Vitamin C for medicinal purposes COVID-19**

There is evidence linking vitamin C deficiency to pneumonia. Patients who come with an acute chest infection lose vitamin C due to increased physiological demand and oxidative stress. To restore normal vitamin C levels during the acute stage of infection, vitamin C supplementation may be necessary. An RCT revealed that giving hospitalized early patients with acute respiratory infections, such as pneumonia and acute bronchitis, 200 mg of oral vitamin C per day for four weeks improved the clinical result, decreased severity, and decreased the death rate. Supplementing with vitamin C shortened the length of hospital stays for pneumonia patients. Patients who received larger dosages of vitamin C had shorter hospital stays. When 200 mg of vitamin C was administered to children under the age of five who had been diagnosed with pneumonia, there was a statistically significant improvement in oxygen saturation and tachypnea after just one and four days of inpatient treatment. In contrast, sepsis and ARDS with onsets less than 24 hours were treated with 50 mg/kg/6 of IV vitamin C for 96 hours. When compared to patients who did not get IV vitamin C treatment, improvements were observed.

**Sources of vitamin C**

Food with the highest source of vitamin C

FRUITS	ASCORBIC ACID (mg)
Guava	217
Apricot	10
Orange	43
Mango	37
Banana	10
Strawberries	49
Tomato	17
Spinach	11
Cabbage	16
Green pepper raw	37
Cauliflower, cooked	28
Blueberries	7
Blackberries	15

**Public health workers' response to management of COVID 19**

An essential component of managing COVID-19 in the fight against the pandemic is public health. During the COVID-19 epidemic, they were subjected to a more varied public response, which can have an impact on their life and careers. The global COVID-19 epidemic has caused substantial disruptions to individuals' everyday lives, particularly for those employed in the healthcare sector.[11] According to a recent analysis from the Centers for Disease Control and Prevention, public health personnel who spent more time on COVID-19 response activities were more likely to report mental health problems, including post-traumatic stress disorder.

**Conclusion**

Vitamin C may possess antiviral properties against certain respiratory viruses, as well as DNA and RNA viruses like EBV and HSV-1. Strong antioxidant and anti-inflammatory properties of vitamin C lower the risk of tissue damage caused by oxidative stress and inhibit cytokine storm, an overabundance of inflammation. By promoting the generation of interferon and lymphocyte proliferation, vitamin C enhances the host's antiviral immune response. It's interesting to note that giving large IV vitamin C dosages to COVID-19 patients in China and the US has produced encouraging outcomes. Additionally, short-term usage of large dosages of vitamin C has not been associated with any negative consequences recorded. The pharmacological properties of vitamin C include its antiviral, antioxidant, anti-inflammatory, and immunomodulatory properties.

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