

Vitamin C for COVID-19: A Review

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Abstract: *In dealing with the COVID 19 taking vitamin C as a supplement has shown worldwide attention. Some studies show that taking vitamin c helped in curing the symptoms of COVID 19. At same time a few cases research showed no medical benefit/poor clinical and showed major adverse effects of using vitamin c. The use of vitamin c (in treatment of COVID-19) is considered as worldwide concern, although a consensus has not yet been reached. In the current analysis which illustrates the ongoing work on use of vitamin c in the management of coronavirus disease-2019. The present analysis will address the potential study of vitamin c, prophylaxis strategy and impact of vitamin c of vitamin c on sars-cov-2 viruses. The review also sums up and discusses all clinical practice trails/ vitamin c use of research studies against COVID-19. Finally considering the public health and pharmacovigilance concerns, detrimental effects are also discussed.*

Keywords: Vitamin C; COVID-19; Coronavirus disease-2019; Clinical trials; SARS-CoV-2; adverse effects of Vitamin C

1. Introduction

Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), a member of the coronaviridae family [11]. COVID-19 has increased rapidly across the world [7]. The outbreak which was caused by severe acute respiratory syndrome coronaviruses (SARS-CoV-2) which first emerged in Wuhan China, which was named as coronavirus disease 2019 (covid-19) and declared as a pandemic [2]. The quick worldwide spread of COVID-19 has caused a global health crisis [4]. People are finding ways in which to possibly protect themselves from the virus or to alleviate its effects once caught. Low levels of micronutrients such as vitamins A, E, B6, B12, zinc, and selenium have been associated with unfavourable clinical outcomes during viral infections [7]. One such means that is being publicized online and in the media is vitamin C [9]. Ascorbic acid is Vitamin C, which is an essential micronutrient for the good function of the human body [1]. The plasma level of vitamin C in healthy people is 70 $\mu\text{mol} / \text{L}$, requiring a daily intake of 0.2 g/ day, but the needs may increase in certain pathological circumstances that increase the metabolism of ascorbic acid [1]. COVID-19 has a wide clinical spectrum, including asymptomatic infection, upper respiratory tract infection (URTI), pneumonia, acute respiratory distress syndrome (ARDS), and death. About 26% of patients with pneumonia findings due to COVID-19 require intensive care due to the development of ARDS and septic shock [2].

Vitamin C impact on the immune response, and COVID-19:

One of the most important parts of the non-enzymatic antioxidant system is Vitamin C. Vitamin C decreases organ injury caused by cytokines by activating the immune system, and increases survival. It is also involved in the synthesis of steroids and catecholamines, wound healing, carnitine synthesis and endothelial cell function [2]. Vitamin C treatment has antiviral effects. Clinical trials have shown that administration of high doses of vitamin C has beneficial effects against the common cold [7]. Animal studies have shown that vitamin C is conversely stored in the brain, adrenal gland, liver and lungs but its levels in these organs are rapidly depleted after about one week of dietary insufficiency [5]. Vitamin C homeostasis is finely regulated by at least four mechanisms: intestinal absorption, transport

to tissue, renal reuptake, and urine excretion, mainly regulated by a family of proteins named Sodium-Dependent Vitamin C Transporters (SVCT) [5]. A high dose of intravenous VC (HIVC) was demonstrated to block several key components of cytokine storms, and HIVC showed safety and varying degrees of efficacy in clinical trials conducted on patients with bacterial-induced sepsis and acute respiratory distress syndrome (ARDS) [4]. COVID-19 infection is the cause of the most devastating pandemics in the last century, whose etiology is virus SARS-COV-2, the entire world learns to know and live with him [1]. Despite the fact that it spreads easily, the impact on the population varies. Three clinical stages of the infection have been described: asymptomatic stage I, stage II with mild and moderate symptoms, accompanied by the presence of the virus and stage III with severe respiratory symptoms, sepsis or multiple organ failure [1]. An intravenous infusion of vitamin C (50 mg/kg body weight) every 6 h for 96 h crucially decreased mortality and increased the number of intensive care unit (ICU)-free days in patients with sepsis and acute respiratory distress syndrome. COVID-19 patients had significantly higher levels of molecules related to inflammation, such as NO_2^- , NO_3^- , C-reactive protein, and lactate dehydrogenase in blood, compared to healthy individuals. After oral or intravenous administration of vitamin C with methylene blue and a known antioxidant N-acetyl cysteine, the blood levels of NO_3^- , methaemoglobin, C-reactive protein, and lactate dehydrogenase were markedly decreased in four out of five patients [7].

Approach to Pharmacovigilance when using vitamin C

Studies showing multiple adverse effects linked to vitamin c usage. Though vitamin c is somewhat harmful and healthier, it also has certain negative impacts that are not insignificant and cannot be disregarded.

Table 1: Vitamin C adverse effects

S. N	Adverse effects	References
1	osmotic diarrhoea and related gastrointestinal distress	[5]
2	nausea or vomiting during or after infusion of VC	[10]
3	electrolyte disturbance	[10]
4	alveolar inflammation secondary to the destruction of immune cells by osmotic mechanism	[1]

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2. Conclusions

In summary, demonstrates antiviral effects toward various viruses, as well as having demonstrated immunomodulatory effects. Vitamin C could be safe to use. However, further clinical trials / testimonies still are expected and appropriate to confirm vitamin C effectiveness toward COVID-19. Actually, clinical studies and case reports reported using vitamin C to counter COVID-19 found the clinical result conflicting. The adverse consequences of using vitamin C toward COVID-19 could not be ignored. Therefore, the usage of vitamin C (in treatment with COVID-19) is of considerable international concern, since a majority has not yet been reached. Misuse of vitamin C as a COVID-19 prophylaxis (without guidance from a physician) should be avoided due to lack of good evidence that may lead to one or more adverse side effects.

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