

Negative health effects of excessive use of vitamin D, vitamin C and zinc as food alternatives to prevent COVID-19

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Abstract

Covid-19 is one of six viruses belonging to human, leading to mild to severe respiratory diseases. During Covid-19 pandemic, good and balanced food is crucial before, through and after exposure to the virus, because there is in fact no particular food that prevents infection. A review article on the excessive use of vitamin C, D and Zinc as antiviral agents against COVID-19 was prepared and written during the global pandemic of the virus after the phenomenon of increased people's consumption of vitamins and other supplements to prevent infection, after collecting information from various articles and scientific research published during 2020 through various search engines, from July 15 to August 25. In conclusion, there is not enough scientific evidence to give high doses of vitamin C or vitamin and zinc to prevent infection with the Covid-19 virus. Vitamin C is safe when used in high doses, but Vitamin D has toxic effects if the daily dose exceeds 50,000 IU and zinc can be fatal if the dose exceeds 10-30 gm.

Keywords: Health Effects; Covid-19; Vitamin C; Vitamin D; Zinc; Food Alternatives

1. Introduction

Covid-19 is one of six viruses belonging to the human Coronaviridae family, causing mild to severe respiratory diseases, which appeared at the end of 2019 in the Chinese city of Wuhan and has gradually spread around the world to date [1]. During this pandemic, good and balanced food is crucial before, through and after exposure to the virus, because there is in fact no particular food that prevents infection [2]. When adopting a healthy and balanced diet, it will increase the strength of the immune system [2]. It has been shown that certain nutrients such as proteins, minerals and vitamins may affect a person's immune system by activating cells and making modifications in the production processes of signal molecules and gene expression [3]. Any deficiency in the provision of these nutrients may weaken the strength of the immune system and thus increase the chances of infection [3]. Currently, there is no preventive or therapeutic medication available for Coronavirus disease [4]. At the time of the spread of the virus, many people promoted taking this thing and leaving that thing, including vitamins, minerals and immune stimulants, as preventive strategies. Knowing that there is no conclusive scientific evidence for any of these strategies will supercharger immunity, it is necessary not to take excessive doses of vitamins and minerals because our physiology requires limited quantities and any excess does not make the immune system work better [5]. It is well known that essential nutrients and vitamins have good tolerability, and this makes them play an important role in the functioning of the immune system [6]. Since vitamins are available and affordable and accessible in many pharmacies and drugstores around the world, they have not been proven to be effective and safe when administered at higher doses than usual in the treatment of viral infections [6]. The most recommended vitamins to fight the virus are vitamin C and D, while Zinc has become the first choice among minerals to fight infection, because the people realize that vitamin C is an effective role against influenza viruses [7], and vitamin D may have a role in the immune response to respiratory infection [8], while the Zinc deficiency increases

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an individual's vulnerability to disease and infection [9]. These perceptions may have encouraged people to speed up the taking of these vitamins and minerals regardless of the real deficiency or urgent need for them, as their excessive consumption can have serious consequences for the public health of the individual and society [10]. This review aims to show the negative health effects of excessive use of vitamin C, vitamin D and Zinc as food alternatives against COVID-19, the recommended daily dose, and the risk of overuse of each of them.

2. Material and methods

A review article on the excessive use of vitamin C, D and Zinc as antiviral agents against COVID-19 was prepared and written during the global pandemic of the virus after the phenomenon of increased people's consumption of vitamins and other supplements to prevent infection. After collecting information from various articles and scientific research published during 2020 through search engines, including Google, Google Scholar, ResearchGate and PubMed to download everything related to the review subject from December 1, 2021 to March 25, 2022. All these articles and research are well read to extract all that is useful and important in writing an article review. The article was written uniquely for most aspects to avoid scientific plagiarism.

3. Review details

3.1. Vitamin C (Ascorbic Acid)

3.1.1. Scientific evidence as an antiviral agent:

Vitamin C acts as an antiviral for two suggestions, first, vitamin C can be useful against a certain number of viruses because patients with acute infectious diseases have a low level of this vitamin in the circulatory system because of its consumption by metabolic processes, and second, it also suggested that vitamin C has immune modulating properties [11, 12].

3.1.2. Risk of excessive use

Although many of the investigations published during 2020, which focused on strategies for treating COVID-19, concluded that the administration of vitamin C in high doses safe [13], there are other documents found that there is no scientific evidence to treat Corona virus disease using vitamin C, whether oral or intravenous. [14].

3.2. Vitamin D (Calciferol)

3.2.1. Scientific confirmation as an antiviral agent

Vitamin D's role as an antiviral agent is limited to the production of chemokine [15] and inflammatory cytokines [15, 16], and as an important immunomodulator [15, 17, 18]. This vitamin may help reduce the spread and development of the disease as well as boost the immune system [18]. Although there is no good evidence that indicates and suggests taking vitamin D supplement to prevent or treat the corona virus disease [19]. But health agencies advise people at risk of COVID-19 infection to consume more vitamin D-rich foods and use Vitamin D supplements for individuals with COVID-19 and those in COVID-19 risk in order to improve their health outcomes and increase their immunity [20], and decrease the rate of admission to ICU [21].

3.2.2. Risk of excessive use

Although vitamin D toxicity is rare, over-consumption as a supplement increases the chances of toxicity [22, 23]. This toxicity is associated with different symptoms when the concentration of vitamin D in the serum reaches between 213 to >640 ng/mL (533 to >1600 nmol/L) [23]. The Institute of Medicine in America summarizes and advises that the dose of vitamin D less than 10,000 IU/day is not usually associated with toxicity, but when it is equal to or greater than 50,000 IU/day for several weeks or months is often associated with the occurrence of toxic side effects, the most important of which is hypercalcemia [24].

3.3. Zinc supplement

3.3.1. Scientific confirmation as an antiviral agent

Over the past 50 years, there has been a lot of evidence about the role of zinc as an antiviral agent against many viruses that infect humans, and many mechanisms have been identified [25]. These studies revealed that zinc actively participates in generating innate and acquired antiviral immune responses because it is necessary for mucosal epithelial

barrier function due to its antioxidant and anti-inflammatory activity while regulating tight junction proteins that are important for the maintenance of mucosal membranes integrity, reduction of mucosal integrity and loss of tight junction cohesion exacerbates viral inflammation [26, 27, 28].

3.3.2. Risk of excessive use

Taking higher doses of zinc than recommended to prevent a particular disease such as coronavirus disease may cause confusion in the metabolism of the copper element leading to its decline with the decline of iron function and the decrease in the number of low red blood microcytosis, low number of neutrophils, and weakened immunity in addition to excess zinc can also affect heart function and reduce the effectiveness of pancreatic enzymes [29]. Evidence has shown that increased zinc concentrations in the body can be cytotoxic [30]. A single high dose of 10-30 grams under the pretext of ideal prevention of the disease can be fatal [31].

4. Conclusion

In conclusion, vitamin C, vitamin D and zinc have particular mechanisms of action as antiviral agents; however, there is not enough experimental evidence to give high doses of vitamin C or vitamin D and zinc to avoid infection with the Covid-19 virus. Vitamin C is safe when used in high doses, but Vitamin D has toxic effects if the daily dose exceeds 50,000 IU and zinc can be fatal if the dose exceeds 10-30 gm.

Compliance with ethical standards

The present research work does not contain any studies performed on animals/humans subjects by any of the authors.

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Disclosure of conflict of interest

The authors declare that there are no conflicts of interest for this article.

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