

Current Evidence on Vitamin C, D, and Zinc Supplementation for COVID-19 Prevention and/or Treatment

Andrea Giacalone ^{1*}, Luca Marin ², Massimiliano Febbi ², Marcos Roberto Tovani-Palone ^{3**}

¹University of Rome Tor Vergata, Department of Industrial Engineering, Rome, ITALY

²Asomi College of Sciences, Department of Research, Marsa, MALTA

³Ribeirão Preto Medical School, University of São Paulo, Ribeirão Preto, BRAZIL

*Corresponding Author: giacalonericci@yahoo.it

**Corresponding Author: marcos_palone@hotmail.com

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ABSTRACT

In this article, we discuss current evidence on some of the dietary supplements that have been most commonly used for coronavirus disease 2019 (COVID-19) prevention and/or treatment, including vitamin C, vitamin D, and zinc.

Keywords: COVID-19, pandemics, ascorbic acid, vitamin D, zinc

Dear Editor,

The role of food sources immune-boosting nutrients has been much discussed during the coronavirus disease 2019 (COVID-19) pandemic. Moreover, a nutritional deficiency could be a predisposing factor to development and progression of a viral infection [1]. However, there is still no global consensus regarding the use of dietary supplements and/or medicines in the recommendations for COVID-19 management [2,3]. Knowledge of the benefits and risks associated with the use of dietary supplements is of considerable importance, especially if they are used in order to prevent and/or treat severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection cases. In this context, pharmacists should ensure that patients are informed of the current lack of evidence to demonstrate the effectiveness of dietary supplements for that purpose [4]. Here, we discuss some of the dietary supplements that have been most commonly used for COVID-19 prevention and/or treatment, including vitamin C, vitamin D, and zinc.

VITAMIN C

Vitamin C has a number of physiological properties and its intravenous use is believed to be effective in inhibiting cytokines production in acute respiratory distress syndrome cases [5]. Vitamin C properties include its acting as an enzymatic cofactor and antioxidant factor, roles in proteoglycan deglycanation, in the free radicals scavenger process, histone dealkylation, and homeostasis of subcellular compartments [6]. Some clinical trials have looked at the use of vitamin C as part of a respiratory diseases management plan [7]. Recently, a team of Chinese doctors stated that they have effectively treated over 50 patients affected by mild to acute COVID-19 with large intravenous (IV) vitamin C doses (10,000-

20,000 mg/d) for a period of 8-10 hours [8]. In fact, vitamin C has modes of action that could be relevant to acute respiratory infections management, such as antioxidant, anti-inflammatory, antithrombotic, and immunomodulatory functions [9]. However, it should be borne in mind that high doses of vitamin C can promote the development of kidney stones, especially in people with high oxalate levels [4].

In addition, surprisingly, in an open randomized clinical trial conducted in Pakistan, the use of standard therapy in combination with IV vitamin C resulted in early regression of COVID-19 symptoms and reduced length of hospital stay [10]. In contrast, other studies performed in the USA show that vitamin C treatment caused no change in COVID-19 patients [11,12]. It should be noted that the results of many ongoing randomized clinical trials are still pending and currently available studies do not provide scientifically strong evidence for the use of vitamin C as a treatment for COVID-19.

VITAMIN D

Vitamin D obtained by sun exposure, food, and supplements must undergo two hydroxylation reactions to be converted into calcitriol (the biologically active form of vitamin D) [13]. Maintaining sufficient vitamin D levels through adopting a healthy diet, consuming vitamin supplements, and sun exposure is essential for good health. Patients should carefully follow the guiding principles for daily vitamin D intake based on: maximum intake levels to optimize general health and a need for intake due to vitamin deficiency. It is recommended to follow medical advice and avoid doses higher than the upper limit (4000IU/day; 100µg/day) in the hope of treating or preventing COVID-19 [14]. Prolonged intake of more

than 4000 IU of vitamin D is considered to be potentially dangerous and may cause hypercalcemia [4].

On the other hand, given the possible association between hypovitaminosis D and COVID-19, vitamin D supplementation has been indicated as a useful treatment due to its anti-inflammatory and antithrombotic properties [15]. Vitamin D deficiency appears to be associated with more severe clinical stages of COVID-19, so its assessment may be a useful analysis for possible therapeutic interventions [16]. However, the use of high doses of vitamin D does not significantly reduce the mortality rate or length of stay [17].

ZINC

Administration of zinc lozenges has been associated with a reduction in the duration and severity of cold symptoms. In this case, zinc should be administered within 24 hours of symptoms development, at doses around 80 mg/day and for less than two weeks [18-20]. Zinc supplementation increases mucociliary clearance, anti-oxidative effects, and epithelial integrity. Furthermore, it decreases viral replication and the likelihood of hyperinflammation, as well as maintains antiviral immunity, reducing lung damage and the risk of secondary infections [21]. In this regard, zinc combined with medicines could eventually be effective in COVID-19 patients only if administered prior to the onset of the cytokine storm [22].

FINAL CONSIDERATION

Current COVID-19 treatment recommendations make no mention of dietary supplements and do not include the use of drugs not tested in clinical trials [23,24]. Although the use of dietary supplements has created high expectations in the population, there is no robust evidence in the literature supporting the effectiveness of their use for COVID-19 prevention and/or treatment.

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