

Vitamin D and COVID-19

Editorial

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The advancements in the biological sciences over the past half a century have been phenomenal. The development of new and sophisticated techniques in genetics and biochemistry has led to a greater understanding of how our bodies function and the roles genes play at the cellular level. Such information, which is still far from complete, has had a significant impact in improving the health of people around the world. This is evident by the remarkable development of new drugs and vaccines to prevent and treat many diseases including the current pandemic. Nutrition, a relatively young science, has also seen incredible developments, particularly in the area of nutrigenomics. The latter involves studying the effects that foods, specifically individual nutrients, have on gene expression and human health.

The current pandemic around the world has not only shut down economies but has led to the tragic loss of close to two million lives. Efforts to control this virus, has challenged the ingenuity of the scientific community to find ways to prevent this disease by developing unique vaccines. An important discovery made from examining the clinical records of patients suffering from COVID-19 was the beneficial effect that vitamin D had on those suffering from COVID-19. Patients deficient in vitamin D generally suffered more severe respiratory viral infections and had much lower survival rates. Prior supplementation with vitamin D, however, was found to reduce the risk of such infections by over 40%. How does vitamin D protect us from COVID-19 and what is the mechanism involved?

Vitamin D functions at the molecular and cellular level. It regulates protein synthesis by enhancing the body's physical barriers against viral infection [1, 2]. It also functions in the immune system as the majority of the immune cells have expressed intracellular receptors (VDR) for the enzyme 1- α -hydroxylase (CYP27B1). CYP27B1 synthesizes the active form of vitamin D (1,25(OH)₂D, calcitriol) from its precursor, 25-hydroxyvitamin D (25-OHD). At one time this was considered a pathological response to immune disorders but it has now been shown to be fundamental for the normal development of antigen cells. The antimicrobial activity of 1,25(OH)₂D, first reported reported 30

years ago, was subsequently attributed to its expression of the bactericidal cationic peptide cathelicidin. This peptide, which is also produced by the epithelial cells, has anti-viral activity effective against SARS-Cov-2. Clearly, vitamin D exerts an important protective role. For a detailed review of vitamin D and COVID-19, articles by Grant et al. [3], Griffin et al. [4] and Brighthope et al. [5] are recommended.

The protective role of vitamin D, is not only against COVID-19 but also other diseases including tuberculosis. Consequently, being deficient in vitamin D must be prevented. Our dietary recommendations must ensure an adequate intake of vitamin D, and if this not attainable, appropriate supplementations must be recommended. COVID 19 not only revealed that a large segment of the world's population is deficient in Vitamin D, but the recommended levels of supplementation are clearly inadequate. Laird et al. [6] reported a correlation between vitamin D deficiency and COVID 19 mortality levels in the European countries. The markedly lower mortality rates in Scandinavian countries reflected their strong promotion of vitamin D supplementation. Limited exposure to ultraviolet B (UV B), particularly in Northern latitudes, the availability of vitamin D rich food sources, skin color, obesity and aging, are some of many factors affecting vitamin D status. The current recommendation in the USA and Canada, established by the Standing Committee on Dietary Reference Intake in 1997, suggested that adults over 50 years of age should consume 400 IU/day. This is also the level recommended in the UK. Based on the latest evidence this level is clearly inadequate and Griffin et al. [4] proposed that supplementation of vitamin D should be at 800-1000 IU/day for the general population. This warrants a complete review of not only the vitamins but also minerals. Bae and Kim [7] recommended that nutritional therapy be a part of patient care for COVID-19 by boosting the immune system with a combination of vitamin D, vitamin C and selenium.

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Received: February 11, 2021

Published: February 19, 2021

Citation: Michael N. A. Eskin. Vitamin D and Covid 19. *Int J Food Sci Nutr Diet*. 2021;10(01e):1-2. doi: <http://dx.doi.org/10.19070/2326-3350-2100011e>

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