

POTENTIAL CONTRIBUTION OF VITAMIN D IN SARS-COV-2 VIRUS/COVID-19 DISEASE (SCVD).

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Background and aims

This short report resulting from many informations providing from several and recent studies, aims to provide a balanced scientific view on vitamin D (VD) and SCVD.

The overarching messages are as follows:

- VD is essential for good health.
- Many people have poor VD status, especially in winter or if confined indoors.
- Low VD status may be exacerbated during this Covid-19 crisis due particularly to limited access to sunlight.

Methods

It has been reported in many recent studies that vitamin D deficiencies have a higher risk of mortality from SCVD and it has been suggested that vitamin D supplementation can be effective in lowering the rate of SCVD intensive care unit admissions.

Covid-19 and low levels of VD appear to disproportionately affect black and minority ethnic individuals ⁽¹⁾.

There is an urgent need to better understand risk factors for contracting the infection and for poorer prognosis thereafter.

The relationship between ethnicity and covid-19 has been identified as an urgent public health research priority ⁽²⁾.

Several factors issue from statistical analysis have been proposed to explain the apparent greater risk of covid-19 infection in ethnic minority group, among them certain minority ethnic groups experience a higher burden of comorbid disease ⁽³⁾, which may put them at higher risk of more severe covid-19 infection ^(4,5). One potential mediator could be the higher apparent vitamin D deficiency in black and minority ethnic populations ⁽²⁾. Vitamin D is variably inversely associated with multiple health outcomes and mortality ⁽⁶⁾.

Whilst most chronic conditions have not been improved by vitamin D supplementation, a recent meta-analysis of randomised trials suggested vitamin D may lessen the risk of acute respiratory infections ⁽⁷⁾. Vitamin D has been suggested as possibly protective of covid-19 infection ^(8,9,10). In view of current interest in vitamin D as a potential factor in the Covid-19 pandemic, we have analysed, by retrospective review, the ways in which vitamin D reduces the risk of viral infections, and the potential contribution in Covid-19 disease.

Vitamin D has many mechanisms by which it reduces the risk of microbial infection and death. The most commonly processes known are: physical barrier, cellular natural immunity and adaptive immunity. Vitamin D helps maintain right, gap, and adherences junctions.

Results

Vitamin D status is reflected by the level of the circulating metabolite 25-hydroxyvitamin D (25OHD), which is produced by hepatic hydroxylation of vitamin D coming from either skin or the gut from oral intake ⁽¹¹⁾. If the 25OHD concentration is low, such as observed commonly during and towards the end of the winter, this indicates that stores are depleted and vitamin D-requiring functions may be impaired. The association between low vitamin D status and increased risk of rickets in children and poor musculoskeletal health in adults is well documented. In addition, vitamin D, via its active metabolites, regulates more than 200 genes including those genes that are responsible for cellular proliferation, differentiation and

apoptosis⁽¹²⁾. The discovery of the expression of nuclear vitamin D receptors and vitamin D metabolic enzymes in immune cells provides a scientific rationale for the potential role of vitamin D in maintaining immune homeostasis and in preventing the development of autoimmune processes⁽¹³⁾. The field of vitamin D research has grown exponentially in recent years with a much improved understanding of its biological importance. Recent meta-analyses of randomised controlled trials concluded that the use of vitamin D supplements was associated with lower total mortality in elderly, mostly vitamin D-deficient participants^(14,15).

However, the most recent vitamin D assessment study and the vitamin D and omega-3 fatty acid study did not show a mortality effect in vitamin D-replete adults^(16,17).

Vitamin D enhances cellular innate immunity partly through the induction of anti-microbial peptides, including human cathelicidin and defensins. Vitamin D also enhances cellular immunity, in part by reducing the cytokine storm induced by the innate immune. This system generates pro-inflammatory and anti-inflammatory cytokines in response to viral and bacterial infections as observed in Covid-19 patients.

It is relevant to suppose that an adapted supplementation to patients, taking in account the turnover of vitamin D in the body, by reference to 25(OH)D serum concentration could be imagined as reference, taking everything into consideration.

Conclusion

We can confirm observational evidence of a link of vitamin D with mortality and morbidity of SCVD. Based on the concept of balance benefit risk, we propose to people at risk of SCVD and diagnosed patients, a supplementation of vitamin D for adult patient, close to 2000 UI per day of vitamin D₃ to raise 25(OH)D concentration about 50-60ng/ml.

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