

Vitamin D and Covid-19 State of Evidence: Literature Review

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Received 17 August 2020; revised 23 January 2021; accepted 30 July 2021

Abstract

Following the occurrence of the global pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), some studies highlighted the possible importance of vitamin D against the disease. Several studies have supported the role of vitamin D in the regulation of the immune system. Vitamin D can suppress cytokine production simultaneously by stimulating the innate immune system, thus reducing viral load, and by decreasing the overactivation of the adaptive immune system to respond immediately to viral load. Vitamin D activity is mediated by its receptor (VDR), which acts as a transcription factor modulating the expression of genes triggering the response against viruses. Observational studies report an independent association between low serum concentrations of 25-hydroxyvitamin D and susceptibility of the respiratory tract to acute infections. Calcitriol (1,25-dihydroxyvitamin D₃) is acting on the ACE-2/Ang (1-7)/ MasR axis leading to improved expression of the angiotensin converting enzyme (ACE-2). ACE-2 is a receptor used by SARS-CoV-2 to infect host cells. Previous studies identified an association between high levels of ACE2 and improvement in the general health status of covid-19 cases. In addition, ACE-2 has been shown to protect against acute respiratory lesions. We conducted a review of the literature to clarify the protective role of vitamin D against SARS-CoV-2 infection through a review of the recently published studies.

Keywords: COVID-19; Vitamin D, Immune system; Respiratory system

1. Introduction

The novel Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) who was first reported in Wuhan, China, in December 2019, is defined by the World Health Organization as a global pandemic. This global health concern leading to a substantial need for patient hospitalization, treatment at intensive care units (ICUs), and invasive ventilation [1,2].

Immune systems, play a major role in the susceptibility and pathogenesis of viral diseases. The importance of vitamin D in the modulation of both innate and adaptive immune systems has been since many years. Moreover, several studies have previously found that there is evidence that vitamin D may help to prevent viral infections, such as SARS-CoV-19, through its role in immunity [3,4,5].

Vitamin D or 1,25-dihydroxyvitamin D or calcitriol is a fat-soluble vitamin that has long been known for its role in protecting bone tissue. It is also known to have significant effects on overall health [6,7], hence studies on vitamin D have increased exponentially in recent years.

In our country, although sunlight is important, hypovitaminosis D is estimated at 90% in women and 85% in men. For this reason, in order to reach an optimal concentration, which must be higher than 30ng/ml, it is necessary to systematically supplement at risk individuals [8,9,10,11].

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