

Vitamin D deficiency associated with higher risk of COVID-19 hospitalization



By Dr. Liji Thomas, MD

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Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the causative pathogen of the coronavirus disease 2019 (COVID-19) pandemic, continues to spread worldwide.

In an enormous research effort, the global scientific community continues to try and identify the causes of a wide variation in disease manifestations and severity.

A new study published in the journal *Endocrine* in January 2021 shows that low levels of vitamin D are associated with a higher risk of COVID-19 hospitalization.



Study: Patients hospitalized with COVID-19 have low levels of 25-hydroxyvitamin D. Image Credit: Kavun Halyna / Shutterstock

If this is confirmed, vitamin D supplementation may be an inexpensive and rapid method to ensure better outcomes in such patients.

Risk factors for severe COVID-19

Of the 97 million confirmed cases across the globe, over 2 million people have died. The unusual nature of this virus is that it causes severe or even critical illness in a significant minority of patients, while the vast majority escape with no, mild or moderate symptoms.

So far, researchers have found that males are at higher risk for adverse outcomes, along with those who have diabetes mellitus, obesity and hypertension. Vitamin D deficiency has been recently postulated to be a factor associated with increased risk of a poor prognosis in COVID-19.

Mechanism of vitamin D in the immune response

This association is biologically plausible since vitamin D modulates both innate and adaptive immunity, and individuals with low vitamin D levels are known to be susceptible to more infections by either bacteria or viruses.

Very early in the course of the pandemic, many reports linked countries with lower mean vitamin D levels to higher mortality rates. And finally, patients hospitalized with this condition have been shown to have very low levels of 25-hydroxyvitamin D, providing direct evidence of this link.

Study details

The current study was carried out in Armenia, which has high ethnic and cultural diversity among its 3 million population. To date, the country has reported 165,528 cases and 3,021 COVID-19-related.

The researchers measured the levels of 25-hydroxyvitamin D in patients in a designated COVID-19 hospital in Yerevan, Armenia. They compared these measurements to those taken in healthy population controls in the same country.

The study period was for five weeks and included blood samples measured for 25-hydroxyvitamin D taken from 330 successive patients admitted with COVID-19. The researchers also obtained data on other variables that might

confound the results, such as age, sex, height, weight, occupation, pre-existing comorbidities, a history of active tuberculosis, smoking status, use of supplemental oxygen, intubation status, and the duration of hospitalization until discharge, or death.

Lower vitamin D levels in hospitalized COVID-19 patients

The researchers found that the most common comorbid conditions in this patient population were hypertension, diabetes, smoking-related complications, and lung disease. Patients were hospitalized for 11 days, on average, with more than half of them being placed on supplemental oxygen therapy. Only about 5 percent required intubation, and 24 deaths occurred.

The mean 25-hydroxyvitamin D level was about 13 ng/mL, but in about 45% of them, it was below 12 ng/mL. This is widely accepted as indicating frank vitamin D deficiency. In contrast, the average vitamin D level in Armenian women was around 20 ng/mL.

The scientists found that older patients, and patients with a higher BMI, had a longer hospitalization period. However, both these categories, as well as those with other chronic illnesses, required a longer period of supplemental oxygen. When other confounding factors were compensated for, age and the period of hospitalization were found to be significant risk factors for death following COVID-19, as well as other important variables.

However, the level of 25-hydroxyvitamin D was not significantly related to the BMI, period of stay, need for oxygen supplementation, or death. The mean vitamin D levels in patients who succumbed to the illness were not much lower than in the survivors, though there was a small reduction.

What are the implications?

Almost half the hospitalized patients had levels lower than 12 ng/mL, indicating a clear deficiency. This shows a striking association, since only 13% of the national population had similarly low levels. A comparison of outcomes, BMI and age showed no difference between patients with low levels of vitamin D, whether below or above 12 ng/mL.

The low levels of vitamin D in the hospitalized patients indicate that this deficiency could severely affect the immune response in the host, in terms of adaptive immunity.

“It is important to conduct prospective studies to determine if intervention with vitamin D can be protective against COVID-19 as well as whether intervention with vitamin D can mitigate its severity,” the researchers conclude.

Journal reference:

- Hutchings, N. et al. (2021). Patients hospitalized with COVID-19 have low levels of 25-hydroxyvitamin D. *Endocrine*. <https://doi.org/10.1007/s12020-020-02597-7>, <https://link.springer.com/article/10.1007%2Fs12020-020-02597-7>



Written by

Dr. Liji Thomas

Dr. Liji Thomas is an OB-GYN, who graduated from the Government Medical College, University of Calicut, Kerala, in 2001. Liji practiced as a full-time consultant in obstetrics/gynecology in a private hospital for a few years following her graduation. She has counseled hundreds of patients facing issues from pregnancy-related problems and infertility, and has been in charge of over 2,000 deliveries, striving always to achieve a normal delivery rather than operative.