

Vitamin D Deficiency Is Associated with COVID-19 Severity and Mortality

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On April 7th, we proposed that Vitamin D might be important in COVID-19 infections based on the timing of the pandemic and the “at risk” populations. We cited literature showing that Vitamin D sufficiency reduced the risk of acute respiratory infections and the severity of infection by other viruses. We found several studies using high-dose Vitamin D in patients on ventilators that showed improved outcomes including decreased mortality. A month ago, we called for [more research](#).

Now, new studies in COVID-19 patients suggest Vitamin D sufficiency might reduce disease severity and death.

The Associations are Strong

On April 9th, [initial data from the Philippines](#) on 212 confirmed COVID-19 patients showed that Vitamin D status was strongly associated with severity of COVID-19. The study sorted patients into 4 categories of severity based on criteria established in Wuhan. The levels were:

- Mild – Mild clinical features without pneumonia
- Ordinary – Confirmed pneumonia by CT with fever and other respiratory symptoms
- Severe – Hypoxia (low oxygen) and respiratory distress

- Critical – Respiratory failure requiring intensive care monitoring.

In the analysis, **85.5% of patients with sufficient (>30ng/ml) Vitamin D had mild cases while 72.8% of patients who were deficient in Vitamin D (<20ng/ml) had severe or critical cases.**

On April 26th, a [second retrospective study came out of Indonesia](#). This larger study investigated Vitamin D status in 780 confirmed COVID-19 cases. The researchers collected data on Vitamin D status, age, sex and the presence of comorbidities along with mortality data. The study confirmed what we know—that male patients, those over age 50, and those with pre-existing conditions were all significantly more likely to die of COVID-19. However, the most dramatic finding was that patients with Vitamin D *insufficiency* (between 20 and 30 ng/ml) were 12.55 times more likely to die and patients with Vitamin D *deficiency* (<20ng/ml) were 19.12 times more likely to die from the disease than patients with sufficient Vitamin D.

Since age, sex and comorbidities can also be associated with Vitamin D deficiency, the researchers then did an adjusted analysis. The key finding is that, even after controlling for age, sex and having a comorbidity, **“When compared to cases with normal Vitamin D status, death was approximately 10.12 times more likely for Vitamin D deficient cases.”**

Strikingly, 100% of ICU patients less than 75 years old had Vitamin D insufficiency.

A [third small study out of Louisiana State University Health Sciences Center](#) dated April 24th, examined Vitamin D insufficiency (VDI) in severe COVID-19 patients and discussed possible Vitamin D-related mechanisms for the coagulopathy and immune responses that are being seen. It stated that, “Among ICU subjects, 11 (84.6%) had VDI, vs. 4 (57.1%) of floor subjects. **Strikingly, 100% of ICU patients less than 75 years**

old had VDI.” The study is limited by its small sample size but is consistent with the above studies.

In an [excellent 2018 review paper](#) on Vitamin D in critical care, the authors stated, “Vitamin D deficiency is common in critical illness with prevalence between 40 and 70%.” They continue, “Vitamin D deficiency has been shown to be associated with sepsis, acute respiratory distress syndrome and acute kidney injury and three different meta-analyses confirm that patients with low Vitamin D status have a longer ICU stay and increased morbidity and mortality.”

More recently, in another [review paper](#) (2020) investigating the potential links between Vitamin D status and risk of Influenza and COVID-19, the authors point out that, “Through several mechanisms, Vitamin D can reduce the risk of infections. Those mechanisms include inducing cathelicidins and defensins that can lower viral replication rates and reducing concentrations of pro-inflammatory cytokines that produce the inflammation that injures the lining of the lungs, leading to pneumonia.” Cathelicidins and defensins are molecules your body produces to protect you against bacteria, viruses and fungi and modulate your immune system.

If Vitamin D can reduce severity of COVID-19, it is a potential game-changer.

Why Vitamin D Should Be Studied in Large Clinical Trials

Currently, only Remdesivir has been FDA approved for severe cases of COVID-19. It is an IV pro-drug (the drug is a precursor; the body creates the active compound) that is both expensive at a potential price of [\\$4500 per patient](#) and [challenging to scale up quickly](#). The NIAID/NIH Remdesivir trial was double-blinded and placebo-controlled.

Participants had to test positive for the virus and have evidence of lung problems. Remdesivir improved time to recovery (discharge from the hospital or ability to return to

normal activity) by 4 days, from 15 days to 11 days. However, the overall survival difference in the trial did not reach statistical significance (8% mortality in the treatment group, 11.6% in the placebo group). So, Remdesivir is unlikely to be a significant factor in the U.S. or the solution on a global scale.

By contrast, Vitamin D is free from the sun and widely available. It is inexpensive in typical supplements and costs about \$100 for a typical IV formulation which may be needed for patients with kidney disease. It is manufactured around the globe and is not subject to patent restrictions. Its safety is well-established and understood. If Vitamin D can reduce severity of COVID-19, it is a potential game-changer. Taking the pressure off of hospitals and health care workers, protecting our elderly, veterans and prisoners, and preventing a resurgence of hospitalizations and deaths are all on the table.

An April 28th [press release](#) from the Medical University of South Carolina is encouraging. Long-time Vitamin D researchers, Bruce Hollis, PhD, and Dr. Carol Wagner, are starting to study COVID-19. Hollis and Wagner have recently been studying the impact of Vitamin D in pregnancy and during breast-feeding on infant outcomes. They have over 60 years of combined experience with Vitamin D research.

There are currently [10 clinical trials including Vitamin D for COVID-19](#), some in addition to standard therapies and some in specific combinations with other drugs and supplements. Unfortunately, several of these trials are not well-designed to show significant outcomes because the doses proposed are fairly low.

The Bottom Line

Vitamin D might be a game changer, reducing deaths and disease severity. Vitamin D from sunshine is free and regular exposure for 20 minutes a day this time of year will provide about [1000](#)

[IU](#) for people living in mid-latitudes who expose about 30% of their body surface. Vitamin D is available to almost everyone, even the poorest and recently unemployed. Populations that can't get outside easily (the elderly, prison populations, indoor workers) may need Vitamin D supplements to achieve sufficient blood levels. We should work towards testing Vitamin D levels in those populations to ensure that they are sufficient.

Please share this information; it might save a life.