

More Than 80% of COVID Patients Are Vitamin D Deficient

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STORY AT-A-GLANCE

- › Vitamin D deficiency has emerged as a primary risk factor for severe COVID-19 infection and death. Higher vitamin D levels have even been shown to lower your risk of testing positive for the virus in the first place
- › According to a Spanish study, 82.2% of COVID-19 patients tested were found to be deficient in vitamin D
- › One study found your risk of developing a severe case of, and dying from, COVID-19 decreases once your vitamin D level gets above 30 ng/mL (75 nmol/L)
- › Vitamin D can reduce your risk of respiratory infections including COVID-19 via several different mechanisms, including reducing the survival and replication of viruses, reducing inflammatory cytokine production and maintaining endothelial integrity
- › Dark skin color, increased age, preexisting chronic conditions and vitamin D deficiency are all features of severe COVID disease. Of these, vitamin D deficiency is the only factor that is modifiable. As such, it would be foolish to ignore, especially since vitamin D supplements are readily available and low cost

This article was previously published November 9, 2020, and has been updated with new information.

Aside from insulin resistance,¹ vitamin D deficiency has emerged as a primary risk factor for severe COVID-19 infection and death. Higher vitamin D levels have even been shown to lower your risk of testing positive for the virus in the first place.

Getting the word out about this – especially to the Black community and the elderly in nursing homes – could have a significant impact on future hospitalization and death rates from this virus.

If you have a loved one in a nursing home, taking the time to talk to the medical management about vitamin D testing and supplementation could also make a big difference in the general health of all the residents, as vitamin D is something that can strengthen your immune system in a matter of a few weeks and has many health benefits beside lowering your risk of viral illness.

Vast Majority of COVID-19 Patients Have Vitamin D Deficiency

According to a Spanish study^{2,3,4} published online October 27, 2020, in The Journal of Clinical Endocrinology & Metabolism, 82.2% of COVID-19 patients tested were found to be deficient in vitamin D, the medical term for which is 25-hydroxycholecalciferol (25OHD).

The researchers compared the vitamin D levels of 216 COVID-19 patients and 197 population-based controls, finding that hospitalized COVID-19 patients had a higher prevalence of deficiency and had lower vitamin D levels overall. As reported by the authors:⁵

"In COVID-19 patients, mean ± SD 25OHD levels were 13.8 ± 7.2 ng/ml, compared to 20.9 ± 7.4 ng/ml in controls. 25OHD values were lower in men than in women. Vitamin D deficiency was found in 82.2% of COVID-19 cases and 47.2% of population-based controls.

25OHD inversely correlate to serum ferritin and D-dimer levels. Vitamin D deficient COVID-19 patients had a greater prevalence of hypertension and cardiovascular diseases, raised serum ferritin and troponin levels, as well as a longer length of hospital stay than those with serum 25 OHD levels ≥ 20 ng/ml."

While this particular study failed to find a correlation between vitamin D levels and disease severity, other studies have shown patients with higher levels do tend to have

milder disease. In fact, one such study^{6,7} found your risk of developing a severe case of, and dying from, COVID-19 virtually disappears once your vitamin D level gets above 30 ng/mL (75 nmol/L).

Vitamin D's Impact on COVID-19

Back in June 2020, I launched an information campaign about vitamin D that included the release of a downloadable scientific report. This report, as well as a two-minute COVID risk quiz is available on [StopCovidCold.com](https://stopcovidcold.com).

October 31, 2020, my review paper⁸ "Evidence Regarding Vitamin D and Risk of COVID-19 and Its Severity," co-written with William Grant, Ph.D., and Dr. Carol Wagner, both of whom are part of the GrassrootsHealth expert vitamin D panel, was also published in the peer-reviewed journal *Nutrients*. You can [read the paper for free on the journal's website](#).

As noted in that paper, dark skin color, increased age, preexisting chronic conditions and vitamin D deficiency are all features of severe COVID disease and, of these, vitamin D deficiency is the only factor that is modifiable. As such, it would be foolish to ignore, especially since vitamin D supplements are readily available and low cost.

Vitamin D can reduce your risk of COVID-19 and other respiratory infections via several different mechanisms, including but not limited to the following, all of which are discussed in greater detail in our paper:⁹

- Reducing the survival and replication of viruses¹⁰
- Reducing inflammatory cytokine production
- Maintaining endothelial integrity (Endothelial dysfunction contributes to vascular inflammation and impaired blood clotting, two hallmarks of severe COVID-19)
- Increasing angiotensin-converting enzyme 2 (ACE2) concentrations. As explained in our paper:

"Angiotensin II is a natural peptide hormone best known for increasing blood pressure through stimulating aldosterone. ACE2 normally consumes angiotensin I, thereby lowering its concentrations. However, SARS-CoV-2 infection downregulates ACE2, leading to excessive accumulation of angiotensin II.

Cell cultures of human alveolar type II cells with vitamin D have shown that the SARS-CoV-2 virus interacts with the ACE2 receptor expressed on the surface of lung epithelial cells. Once the virus binds to the ACE2 receptor, it reduces its activity and, in turn, promotes ACE1 activity, forming more angiotensin II, which increases the severity of COVID-19."

Vitamin D also boosts your overall immune function by modulating your innate and adaptive immune responses, reduces respiratory distress¹¹ and improves overall lung function, and helps produce surfactants in your lungs that aid in fluid clearance.¹²

It lowers your risk of comorbidities associated with poor COVID-19 prognosis, including obesity,¹³ Type 2 diabetes,¹⁴ high blood pressure¹⁵ and heart disease.¹⁶ All of these factors make it an important component of COVID-19 prevention and treatment.

Criteria for Causality Satisfied

As of September 27, 2020, the data from 14 observational studies – summarized in Table 1 of our paper¹⁷ – suggest that vitamin D blood levels are inversely correlated with the incidence and/or severity of COVID-19, and the evidence currently available generally satisfies Hill's criteria for causality in a biological system, which include:¹⁸

Strength of association	Consistency of evidence
Temporality	Biological gradient
Plausibility (e.g., mechanisms)	Coherence (although it still needs to be verified experimentally)

In our paper,¹⁹ we review several features of COVID-19 that are indicative of vitamin D deficiency. For starters, SARS-CoV-2 emerged in the winter in the northern hemisphere, and as we moved into summer, positive tests, hospitalizations and death rates fell. So, generally, COVID-19 prevalence has been inversely correlated with solar UVB doses and vitamin D production.

Secondly, people with darker skin have higher COVID-19 case and death rates than Caucasians. Vitamin D is produced in your skin in response to sun exposure, but the darker your skin, the more sun exposure you need in order to maintain an optimal vitamin D level.

While a light-skinned individual may need only 10 to 15 minutes a day, a person with very dark skin may need upward of 1.5 hours. As a result, vitamin D deficiency tends to be far higher among Blacks and dark-skinned Hispanics.

“ SARS-CoV-2 positivity is strongly and inversely associated with circulating 25(OH)D levels, a relationship that persists across latitudes, races/ethnicities, both sexes, and age ranges. ~ PLOS ONE September 17, 2020 ”

Thirdly, one of the lethal hallmarks of COVID-19 is the cytokine storm that can develop in severe cases, which manifests as hyperinflammation and tissue damage. Vitamin D is known to regulate inflammatory cytokine production, thereby lowering this risk. Lastly, vitamin D is an important regulator of your immune system, and dysregulation of the immune system is a hallmark of severe COVID-19.

Results of the Largest Study to Date

The largest observational study²⁰ to date was published in the journal PLOS ONE, September 17, 2020. It looked at data for 191,779 American patients with a mean age of

50 who were tested for SARS-CoV-2 between March and June 2020 and had had their vitamin D tested sometime in the preceding 12 months. It found:

- 12.5% of patients who had a vitamin D level below 20 ng/ml (deficiency) tested positive for SARS-CoV-2
- 8.1% of those who had a vitamin D level between 30 and 34 ng/ml (adequacy) tested positive for SARS-CoV-2
- Only 5.9% of those who had an optimal vitamin D level of 55 ng/ml or higher tested positive for SARS-CoV-2

According to the authors:²¹

"SARS-CoV-2 positivity is strongly and inversely associated with circulating 25(OH)D levels, a relationship that persists across latitudes, races/ethnicities, both sexes, and age ranges. Our findings provide impetus to explore the role of vitamin D supplementation in reducing the risk for SARS-CoV-2 infection and COVID-19 disease."

This inverse relationship between vitamin D and SARS-CoV-2 infection rates may be due to the fact that vitamin D reduces survival and replication of the virus by activating immune cells to produce the antimicrobial and antiviral peptides cathelicidin and defensins, and increasing concentrations of free ACE2, which prevents the virus from entering cells via the ACE2 receptor.²²

Higher Vitamin D Lowers Risks Associated With COVID-19

The argument for vitamin D optimization is strengthened by the fact that higher levels not only reduce your risk of testing positive for the virus but also cut the risk of severe illness, the need for hospitalization and mechanical ventilation, the length of hospitalization, and death. Examples of this include the following studies, which show vitamin D:

- **Lowers infection rates** – In the PLOS ONE study²³ above, people with a vitamin D level of at least 55 ng/mL (138 nmol/L) had a 47% lower SARS-CoV-2 positivity rate compared to those with a level below 20 ng/mL (50 nmol/L). Even after adjustment for gender, age, ethnicity and latitude, the risk of having a positive test result was 43% lower among those with a vitamin D level of 55 ng/mL compared to those with a level of 20 ng/mL.

This was also confirmed in an Israeli population-based study^{24,25} published in July 2020. Here, those with a vitamin D level above 30 ng/mL (75 nmol/L) had a 59% lower risk of testing positive for SARS-CoV-2 compared to those with a vitamin D level between 20 ng/mL and 29 ng/mL (50 to 74 nmol/L), and a 58% lower risk compared to those with a vitamin D level below 20 ng/mL (50 nmol/L).

- **Lowers hospitalization rates** – The Israeli analysis²⁶ above also found that among individuals who tested positive for SARS-CoV-2 infection, those who had a vitamin D level below 30 ng/mL had a 1.95 times (crude odds ratio) to 2.09 times (odds ratio after adjustment for demographics and psychiatric and somatic disorders) higher risk of being hospitalized for COVID-19.

In other words, having a vitamin D level below 30 ng/mL about doubled the risk of being hospitalized with COVID-19.

- **Lowers need for intensive care** – Vitamin D, when administered to hospitalized patients, can also lower their risk of needing intensive care. This was demonstrated by Spanish researchers in a small randomized clinical study^{27,28,29,30} published online August 29, 2020.

Hospitalized COVID-19 patients given supplemental calcifediol (a vitamin D3 analog) in addition to standard of care – which included the use of hydroxychloroquine and azithromycin – had significantly lower intensive care unit admissions.

Patients in the vitamin D arm received 532 micrograms of calcifediol on the day of admission (equivalent to 106,400 IUs of vitamin D³¹) followed by 266 mcg on Days 3

and 7 (equivalent to 53,200 IUs³²). After that, they received 266 mcg once a week until discharge, ICU admission or death.

Of those receiving calcifediol, only 2% required ICU admission, compared to 50% of those who did not get calcifediol. None of those given vitamin D supplementation died, compared to 7.6% of those in the standard care group.

- **Reduces severity of COVID-19** – An August 2020 study^{33,34} published in the journal *Nutrients* found patients who had a vitamin D level below 12 ng/mL (30 nmol/L) had a 6.12 times higher risk of severe disease requiring invasive mechanical ventilation.

Studies have also shown vitamin D deficiency is a common factor among hospitalized patients diagnosed with COVID-19 related respiratory failure. One such study³⁵ found 81% of the patients with acute respiratory failure due to COVID-19 had vitamin D levels below 30 ng/ml (75 nmol/L); 24% had severe vitamin D deficiency (≤ 10 ng/ml or ≤ 25 nmol/L).

- **Reduces mortality** – The *Nutrients* study^{36,37} above also found having a vitamin D level below 12 ng/mL (30 nmol/L) raised the risk of death by 14.7 times, compared to having a vitamin D level above 12 ng/mL.

Similarly, researchers in Indonesia found³⁸ those with a vitamin D level between 21 ng/mL (50 nmol/L) and 29 ng/mL (75 nmol/L) had a 12.55 times higher risk of death than those with a level above 30 ng/mL (75 nmol/L), and having a level below 20 ng/mL (50 nmol/L) was associated with a 19.12 times higher risk of death.

In an Iranian study,^{39,40} among COVID-19 patients over the age of 40 who had vitamin D levels below 30 ng/mL (75 nmol/L), 20% died, compared to 9.7% of those with levels at or above 30 ng/mL. Among those with a vitamin D level of at least 40 ng/mL (100 nmol/L), only 6.3% died.

The Role of Magnesium and Vitamin K2

While regular sun exposure is the ideal way to optimize your vitamin D level, this can be nearly impossible during the winter. For this reason, an oral vitamin D3 supplement is recommended for most people. However, when supplementing you also need to be mindful of other nutrients that have synergistic effects.

One of them is magnesium, which is required for the conversion of vitamin D into its active form. Without sufficient amounts of magnesium, your body cannot properly utilize the vitamin D you're taking. ^{41,42,43,44}

According to a scientific review^{45,46} published in 2018, as many as 50% of Americans taking vitamin D supplements may not get significant benefit as the vitamin D simply gets stored in its inactive form, and the reason for this is because they have insufficient magnesium levels. Research⁴⁷ published in 2013 also highlighted this issue, concluding that higher magnesium intake helps reduce your risk of vitamin D deficiency by activating more of it.

Another cofactor is vitamin K2, as it helps prevent complications associated with excessive calcification in your arteries. In fact, relative vitamin K2 deficiency is typically what produces symptoms of "vitamin D toxicity."

Research by GrassrootsHealth, based on data from nearly 3,000 individuals, reveals you need 244% more oral vitamin D if you're not also taking magnesium and vitamin K2. ⁴⁸ What this means in practical terms is that if you take all three supplements in combination, you need far less oral vitamin D in order to achieve a healthy vitamin D level.

Take-Home Message

If you live in the northern hemisphere, which is currently heading toward winter, now is the time to check your vitamin D level and start taking action to raise it if you're below 40 ng/mL (100 nmol/L). Experts recommend a vitamin D level between 40 and 60 ng/mL (100 to 150 nmol/L).

An easy and cost-effective way of measuring your vitamin D level is to order [GrassrootsHealth's vitamin D testing kit](#). Also, if you haven't already visited www.StopCovidCold.com please do so now so you can take your free COVID risk test and also grab a free PDF copy with far better graphics than I was able to put in my recently published Nutrients paper.

Once you know your current vitamin D level, use the [GrassrootsHealth vitamin D calculator](#)⁴⁹ to determine how much vitamin D you might need to reach your target level. Again, to optimize vitamin D absorption and utilization, be sure to take your vitamin D with vitamin K2 and magnesium.

Lastly, remember to retest in three to four months to make sure you've reached your target level. If you have, then you know you're taking the correct dosage. If you're still low (or have reached a level above 80 ng/mL), you'll need to adjust your dosage accordingly and retest again in another three to four months.

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