

### Does Vitamin D Deficiency Contribute to COVID-19 Severity?

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**Objectives:** In this systematic review, we assessed studies that probed at vitamin D deficiencies in both positive and negative COVID-19 cases. We compared vitamin D levels to see if there was a noticeable difference. Finally, through the review of several studies, we investigated whether more severe cases of COVID-19 were correlated with low vitamin D levels.

**Methods:** The mean and standard deviations of the vitamin D levels in patients who tested positive and negative for COVID-19 were analyzed. We used Practical Meta-Analysis Effect Size Calculator developed by David B. Wilson, Ph.D., George Mason University when looking at COVID-19 status and vitamin D ( $N = 50\text{--}80$  nmol/L) deficient levels. In this systematic review, we measured mean, standard deviations, and 95% CI of many studies to determine if there is a consistent relationship between vitamin D levels and COVID-19. We also performed an independent sample t-test comparing non-survivors vs. survivors of COVID-19 and vitamin D levels, and when comparing moderate vs. severe COVID-19 symptoms and vitamin D levels.

**Results:** A few studies were compared to evaluate the difference in vitamin D levels (serum 25(OH)D, nmol/L) among those who tested positive for COVID-19 to those who tested negative. It was found that the average median serum 25(OH)D, nmol/L for patients who tested positive was 27.08 nmol/L ( $\pm 0.58$  SD, 95% CI: 1.88) and the average median of serum 25(OH)D, nmol/L for patients who tested negative was 48.67 nmol/L ( $\pm 13.66$  SD, 95% CI: 2.17) this difference was near significant ( $p = .059$ ). When looking at the relationship between vitamin D levels and severity of COVID-19 progression the result was not statistically significant,  $t(df) = 0.84, p = .216$ . When comparing the average values of vitamin D level among those who survived COVID-19 vs. those who did not, the results were not statistically significant,  $t(269) = 0.17, p = .438$ .

**Conclusions:** It is apparent that there is a trend found in relationships among those who test positive for COVID-19 and their vitamin D levels. There seems to be a correlation between vitamin D deficiency and likelihood of developing severe illness of COVID-19 when observing studies individually. However, when comparing studies on a larger scale it seems that the significant difference seems to fade.

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