

Vitamin D Deficiency and Outcome of COVID-19 Patients

Aleksandar Radujkovic ¹, Theresa Hippchen ², Shilpa Tiwari-Heckler ², Saida Dreher ², Monica Boxberger ², Uta Merle ²

Affiliations [expand](#)

PMID: 32927735 PMCID: [PMC7551780](#) DOI: [10.3390/nu12092757](#)

Abstract

Infection with the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) poses an enormous challenge to health care systems throughout the world. Without causal treatment, identification of modifiable prognostic factors may help to improve outcomes. To explore possible associations of vitamin D (VitD) status with disease severity and survival, we studied 185 patients diagnosed with coronavirus disease 2019 (COVID-19) and treated at our center. VitD status at first presentation was assessed retrospectively using accredited laboratory methods. VitD deficiency was defined as serum total 25-hydroxyvitamin D level < 12 ng/mL (<30 nM). Primary endpoint was severe course of disease (i.e., need for invasive mechanical ventilation and/or death, IMV/D). Within a median observation period of 66 days (range 2-92), 23 patients required IMV. A total of 28 patients had IMV/D, including 16 deaths. Ninety-three (50%) patients required hospitalization (inpatient subgroup). A total of 41 (22%) patients were VitD deficient. When adjusted for age, gender, and comorbidities, VitD deficiency was associated with higher risk of IMV/D and death (HR 6.12, 95% CI 2.79-13.42, $p < 0.001$ and HR 14.73, 95% CI 4.16-52.19, $p < 0.001$, respectively). Similar correlations were observed in the inpatient subgroup. Our study demonstrates an association between VitD deficiency and severity/mortality of COVID-19, highlighting the need for interventional studies on VitD supplementation in SARS-CoV-2 infected individuals.

Keywords: COVID-19; SARS-CoV-2; outcome; retrospective; severity; vitamin D.

[PubMed Disclaimer](#)

Conflict of interest statement

The authors declare no competing financial interest.

Figures

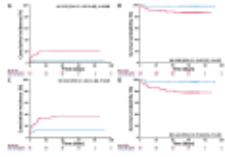


Figure A1 Cumulative incidence of invasive mechanical...

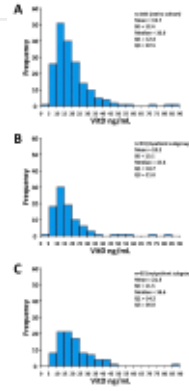


Figure 1 Histograms of the VitD distribution....

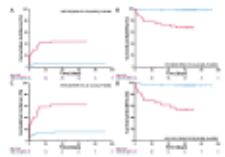


Figure 2 Cumulative incidence of invasive mechanical...

Similar articles

[Impact of Vitamin D Deficiency on COVID-19-A Prospective Analysis from the CovILD Registry.](#)

Pizzini A, Aichner M, Sahanic S, Böhm A, Egger A, Hoermann G, Kurz K, Widmann G, Bellmann-Weiler R, Weiss G, Tancevski I, Sonnweber T, Löffler-Ragg J.

Nutrients. 2020 Sep 11;12(9):2775. doi: 10.3390/nu12092775.

PMID: 32932831 [Free PMC article.](#)

[Evidence Regarding Vitamin D and Risk of COVID-19 and Its Severity.](#)

Mercola J, Grant WB, Wagner CL.

Nutrients. 2020 Oct 31;12(11):3361. doi: 10.3390/nu12113361.

PMID: 33142828 [Free PMC article.](#) Review.

[Vitamin D Insufficiency and Deficiency and Mortality from Respiratory Diseases in a Cohort of Older Adults: Potential for Limiting the Death Toll during and beyond the COVID-19 Pandemic?](#)

Brenner H, Holleczeck B, Schöttker B.

Nutrients. 2020 Aug 18;12(8):2488. doi: 10.3390/nu12082488.

PMID: 32824839 [Free PMC article.](#)

[SARS-CoV-2 positivity rates associated with circulating 25-hydroxyvitamin D levels.](#)

Kaufman HW, Niles JK, Kroll MH, Bi C, Holick MF.

PLoS One. 2020 Sep 17;15(9):e0239252. doi: 10.1371/journal.pone.0239252.

eCollection 2020.

PMID: 32941512 [Free PMC article.](#)

Perspective: improving vitamin D status in the management of COVID-19.

Ebadi M, Montano-Loza AJ.

Eur J Clin Nutr. 2020 Jun;74(6):856-859. doi: 10.1038/s41430-020-0661-0.

Epub 2020 May 12.

PMID: 32398871 [Free PMC article.](#) Review. No abstract available.

[See all similar articles](#)

Cited by

Unveiling the Interplay-Vitamin D and ACE-2 Molecular Interactions in Mitigating Complications and Deaths from SARS-CoV-2.

Wimalawansa SJ.

Biology (Basel). 2024 Oct 16;13(10):831. doi: 10.3390/biology13100831.

PMID: 39452140 [Free PMC article.](#) Review.

Associations between pre-infection serum vitamin D concentrations and Omicron COVID-19 incidence, severity and reoccurrence in elderly individuals.

Chen J, Lu F, Shen B, Xu H, Chen Y, Hu Q, Xu A, Tung TH, Hong D.

Public Health Nutr. 2024 Oct 7;27(1):e197. doi:

10.1017/S1368980024001873.

PMID: 39370947 **Free PMC article.**

Nutritional and Inflammatory Markers Associated with SARS-CoV-2 Infection in the Elderly.

Budelon Gonçalves JI, Lermen FM, Gonçalves JB, Zanirati G, Machado DC, Marques HM, Erwig HS, Becker BM, Wagner F, Boff MO, Rocha MG, Da Costa JC, Marinowic ED.

Int J Mol Sci. 2024 Jul 15;25(14):7749. doi: 10.3390/ijms25147749.

PMID: 39062991 **Free PMC article.**

Dietary patterns and micronutrients in respiratory infections including COVID-19: a narrative review.

Salehi Z, Askari M, Jafari A, Ghosn B, Surkan PJ, Hosseinzadeh-Attar MJ, Pouraram H, Azadbakht L.

BMC Public Health. 2024 Jun 21;24(1):1661. doi: 10.1186/s12889-024-18760-y.

PMID: 38907196 **Free PMC article.** Review.

The evident and the hidden factors of vitamin D status in older people during COVID-19 pandemic.

Schmidt Azevedo P, Fock RA, Pereira FL, Dos Santos PP, Ferro FC, Sacco N, Polegato BF, Zornoff LM, Okoshi MP, Achterberg W, de Paiva SR.

Nutrire. 2021;46(1):1. doi: 10.1186/s41110-020-00131-3. Epub 2021 Jan 6.

PMID: 38624693 **Free PMC article.** Review.

References

1. Dong E., Du H., Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *Lancet Infect. Dis.* 2020;20:533–534. doi: 10.1016/S1473-3099(20)30120-1. - [DOI](#) - [PMC](#) - [PubMed](#)
2. Chen N., Zhou M., Dong X., Qu J., Gong F., Han Y., Qiu Y., Wang J., Liu Y., Wei Y., et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: A descriptive study. *Lancet.* 2020;395:507–513. doi: 10.1016/S0140-6736(20)30211-7. - [DOI](#) - [PMC](#) - [PubMed](#)
3. Yang J., Zheng Y., Gou X., Pu K., Chen Z., Guo Q., Ji R., Wang H., Wang Y., Zhou Y.-N. Prevalence of comorbidities and its effects in patients infected with SARS-CoV-2: A systematic review and meta-analysis. *Int. J. Infect. Dis.* 2020;94:91–95. doi: 10.1016/j.ijid.2020.03.017. - [DOI](#) - [PMC](#) - [PubMed](#)
4. Shi Y., Yu X., Zhao H., Wang H., Zhao R., Sheng J. Host susceptibility to severe COVID-19 and establishment of a host risk score: Findings of 487 cases outside Wuhan. *Crit. Care.* 2020;24:1–4. doi: 10.1186/s13054-020-2833-7. - [DOI](#) - [PMC](#) - [PubMed](#)
5. Charoenngam N., Holick M.F. Immunologic Effects of Vitamin D on Human Health and Disease. *Nutrients.* 2020;12:2097. doi: 10.3390/nu12072097. - [DOI](#) - [PMC](#) - [PubMed](#)

Show all 24 references