

Potential role of vitamin D in patients with diabetes, dyslipidaemia, and COVID-19

Ming-Ke Wang, Xue-Lu Yu, Li-Yun Zhou, Hong-Mei Si, Ju-Fen Hui, Ji-Shun Yang

Specialty type: Nutrition and dietetics

Provenance and peer review: Invited article; externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): B, B
Grade C (Good): 0
Grade D (Fair): 0
Grade E (Poor): 0

P-Reviewer: Khan MKA, Sivanand N

Received: October 17, 2021

Peer-review started: October 17, 2021

First decision: December 16, 2021

Revised: December 22, 2021

Accepted: February 15, 2022

Article in press: February 15, 2022

Published online: March 9, 2022



Ming-Ke Wang, Xue-Lu Yu, Li-Yun Zhou, Hong-Mei Si, Ju-Fen Hui, Department of Disease Control and Prevention, Naval Medical Center of PLA, Naval Medical University, Shanghai 200052, China

Ji-Shun Yang, Medical Care Center, Naval Medical Center of PLA, Naval Medical University, Shanghai 200052, China

Corresponding author: Ji-Shun Yang, MD, PhD, Director, Medical Care Center, Naval Medical Center of PLA, Naval Medical University, No. 338 Huaihai West Road, Shanghai 200052, China. jasunyang@foxmail.com

Abstract

Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus-2 has become a worldwide public health crisis. Studies have demonstrated that diabetes and dyslipidaemia are common comorbidities and could be high-risk factors for severe COVID-19. Vitamin D, a group of fat-soluble compounds responsible for intestinal absorption of calcium, magnesium, and phosphate, has been widely used as a dietary supplement for the prevention and treatment of numerous diseases, including infectious and non-infectious diseases, due to its high cost-effectiveness; safety; tolerability; and anti-thrombotic, anti-inflammatory, antiviral, and immunomodulatory properties. In this letter to the editor, we mainly discuss the potential role of vitamin D in patients with diabetes, dyslipidaemia, and COVID-19.

Key Words: Coronavirus disease 2019; Severe acute respiratory syndrome coronavirus-2; Vitamin D; Diabetes; Dyslipidaemia

©The Author(s) 2022. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: Diabetes and dyslipidaemia are common comorbidities in patients with coronavirus disease 2019 (COVID-19), and these comorbidities are often associated with worse clinical outcome. In this letter to the editor, we hypothesize that vitamin D may be a prognostic factor and could be a promising preventive measure and treatment for patients with diabetes, dyslipidaemia, and COVID-19.

Citation: Wang MK, Yu XL, Zhou LY, Si HM, Hui JF, Yang JS. Potential role of vitamin D in patients with diabetes, dyslipidaemia, and COVID-19. *World J Crit Care Med* 2022; 11(2): 112-114

URL: <https://www.wjgnet.com/2220-3141/full/v11/i2/112.htm>

DOI: <https://dx.doi.org/10.5492/wjccm.v11.i2.112>

TO THE EDITOR

We read with great interest the recent article by Iglesias *et al*[1] entitled “Retrospective analysis of anti-inflammatory therapies during the first wave of coronavirus disease 2019 (COVID-19) at a community hospital”, which demonstrated the survival benefit associated with anti-inflammatory therapy with glucocorticoids and revealed that combination treatment with tocilizumab and glucocorticoids could provide the most benefit in critically ill patients with COVID-19 caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). However, monotherapy with tocilizumab as an interleukin 6 (IL-6) antagonist was not associated with an increase in survival among critically ill patients with COVID-19, which could be explained by the fact that tocilizumab non-selectively blocks both anti-inflammatory and pro-inflammatory actions of IL-6[2]. Meanwhile, vitamin D, a group of fat-soluble compounds, may have advantages over tocilizumab as an IL-6 immunomodulator by potentially reducing the pro-inflammatory effects, but avoiding the deleterious effects on the anti-inflammatory actions of IL-6 in patients with COVID-19[2]. Additionally, vitamin D could modulate the innate and adaptive immune responses, and its deficiency is associated with increased morbidity and mortality in SARS-CoV-2 infection[3]. Vitamin D status may be a potential predictor of COVID-19 outcomes, and vitamin D supplementation could be a promising therapeutic and preventive method against COVID-19, due to its high cost-effectiveness; safety; tolerability; and anti-thrombotic, anti-inflammatory, antiviral, and immunomodulatory properties[3,4].

Another published article in your journal by Gkoufa *et al*[5] entitled “Elderly adults with COVID-19 admitted to intensive care unit: A narrative review” found that diabetes and hypercholesterolemia were common comorbidities in older patients with COVID-19 and these comorbidities were often associated with worse clinical outcome. Previous studies also showed that vitamin D deficiency was associated with diabetes and dyslipidaemia[6,7]. Unfortunately, about 30%-50% of people in the world have vitamin D deficiency or insufficiency, and vitamin D deficiency has been a global health problem[8]. Singh *et al*[3] reviewed the evidence of vitamin D deficiency in patients with diabetes and COVID-19, and they proposed that diabetes increased the tendency for infection and COVID-19, vitamin D deficiency was linked to both diabetes and an increased risk of infections, including COVID-19, and vitamin D supplementation may be a safe, cheap, and simple adjuvant therapy in patients with diabetes and COVID-19. Verdoia *et al*[4] reviewed the mechanisms of action of vitamin D and its potential interaction with SARS-CoV-2 infection, and they reported that vitamin D plays an important protective role in the cardiovascular system, immune system, respiratory system, and glucose-lipid metabolism. Therefore, we hypothesize that vitamin D status has prognostic significance in diabetes and dyslipidaemia, and vitamin D supplementation could exert a triple preventive and therapeutic effect in patients with diabetes, dyslipidaemia, and COVID-19.

In summary, diabetes and dyslipidaemia are common comorbidities in patients with COVID-19. Patients with diabetes and dyslipidaemia are more prone to SARS-CoV-2 infection, and they have poor clinical outcomes. Vitamin D may be a potential prognostic factor and could be a promising preventive measure and treatment for patients with diabetes, dyslipidaemia, and COVID-19. Notably, hypervitaminosis D is a rare but potentially serious condition, and it should be avoided when recommending fat-soluble vitamin D supplementation in the era of COVID-19[9]. Certainly, more robust studies are still required to ascertain the prognostic significance and one-arrow three-vulture effect of vitamin D in patients with diabetes, dyslipidaemia, and COVID-19.

ACKNOWLEDGEMENTS

We thank all colleagues, the reviewers, and the editors for improving our paper.

FOOTNOTES

Author contributions: Wang MK wrote the draft; Yu XL, Zhou LY, Si HM, and Hui JF collected the literature; Wang MK and Yang JS conceptualized the article and revised the manuscript; all authors have read and approved the final manuscript.

Supported by Major Construction Program of Military Key Disciplines during the 13th Five-Year Plan Period, No.

2020SZ21-15.

Conflict-of-interest statement: The authors declare that they have no conflict of interest to disclose.

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <https://creativecommons.org/licenses/by-nc/4.0/>

Country/Territory of origin: China

ORCID number: Ming-Ke Wang 0000-0001-9918-0491; Xue-Lu Yu 0000-0002-8527-2093; Li-Yun Zhou 0000-0003-1413-8679; Hong-Mei Si 0000-0003-1175-6594; Ju-Fen Hui 0000-0001-7816-0635; Ji-Shun Yang 0000-0001-7160-706X.

S-Editor: Liu JH

L-Editor: Wang TQ

P-Editor: Liu JH

REFERENCES

- 1 **Iglesias JI**, Vassallo AV, Sullivan JB, Elbaga Y, Patel VV, Patel N, Ayad L, Benson P, Pittiglio M, Gobran E, Clark A, Khan W, Damalas K, Mohan R, Singh SP. Retrospective analysis of anti-inflammatory therapies during the first wave of COVID-19 at a community hospital. *World J Crit Care Med* 2021; **10**: 244-259 [PMID: 34616660 DOI: 10.5492/wjccm.v10.i5.244]
- 2 **Silberstein M**. COVID-19 and IL-6: Why vitamin D (probably) helps but tocilizumab might not. *Eur J Pharmacol* 2021; **899**: 174031 [PMID: 33722593 DOI: 10.1016/j.ejphar.2021.174031]
- 3 **Singh SK**, Jain R, Singh S. Vitamin D deficiency in patients with diabetes and COVID-19 infection. *Diabetes Metab Syndr* 2020; **14**: 1033-1035 [PMID: 32640414 DOI: 10.1016/j.dsx.2020.06.071]
- 4 **Verdoia M**, De Luca G. Potential role of hypovitaminosis D and vitamin D supplementation during COVID-19 pandemic. *QJM* 2021; **114**: 3-10 [PMID: 32735326 DOI: 10.1093/qjmed/hcaa234]
- 5 **Gkoufa A**, Maneta E, Ntoumas GN, Georgakopoulou VE, Mantelou A, Kokkoris S, Routsis C. Elderly adults with COVID-19 admitted to intensive care unit: A narrative review. *World J Crit Care Med* 2021; **10**: 278-289 [PMID: 34616662 DOI: 10.5492/wjccm.v10.i5.278]
- 6 **Maddaloni E**, Cavallari I, Napoli N, Conte C. Vitamin D and Diabetes Mellitus. *Front Horm Res* 2018; **50**: 161-176 [PMID: 29597238 DOI: 10.1159/000486083]
- 7 **Arif MA**, Niazi R, Arif SA. Association of dyslipidaemia in patients with varying degrees of Vitamin D deficiency in the Asian population. *J Pak Med Assoc* 2017; **67**: 1843-1847 [PMID: 29256527]
- 8 **Nakashima A**, Yokoyama K, Yokoo T, Urashima M. Role of vitamin D in diabetes mellitus and chronic kidney disease. *World J Diabetes* 2016; **7**: 89-100 [PMID: 26981182 DOI: 10.4239/wjd.v7.i5.89]
- 9 **Jovic TH**, Ali SR, Ibrahim N, Jessop ZM, Tarassoli SP, Dobbs TD, Holford P, Thornton CA, Whitaker IS. Could Vitamins Help in the Fight Against COVID-19? *Nutrients* 2020; **12** [PMID: 32842513 DOI: 10.3390/nu12092550]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

Telephone: +1-925-3991568

E-mail: bpgoffice@wjgnet.com

Help Desk: <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

