

SARS-CoV-2 pandemic and Vitamin D deficiency—A double trouble

Dear Editor,

The current SARS-CoV-2 pandemic has mandated significant isolation measures. Streets in affected countries are mostly empty, and many individuals spend several consecutive days at home to reduce the risk of infection. While determinant for pandemic control, home reclusion may have a significant toll on the health of individuals.

One relevant area where we are yet to see proper discussion and strategies pertains to vitamin D deficiency.

Vitamin D is a fat-soluble hormone that plays a significant role in calcium-phosphate metabolism, in addition to intervening in cell metabolic activity, immune regulation, among other functions.

Vitamin D is synthesized in skin epithelium under ultraviolet B (UVB) radiation. It then undergoes two successive hydroxylations in the 25- and 1- carbons, in the liver and in the kidney, respectively, to yield the active form, calcitriol. A minor portion of vitamin D is obtained from alimentary sources.

The time of exposure to solar radiation sufficient to produce the necessary daily amounts of vitamin D is yet matter of discussion, as it depends heavily on the incident radiation (thus varying according to season, latitude and hour of the day), as well as on individual characteristics such as age, clothing, sunscreen use or skin phototype.

Modern life has significantly reduced daily exposure to solar radiation, as most activities are carried indoors. It comes as no surprise that vitamin D deficiency is common in Western countries. Nationwide data from the United States of America suggests 40% of adults may have vitamin D deficiency.¹ While this prevalence may be higher at nursing homes,² prevalence of about 10% and 60% has been found in paediatric age³ and free-living healthy young adults,⁴ respectively.

Home reclusion in the context of social isolation measures to fight SARS-CoV-2 pandemic may lead to a surge in vitamin D across the world, causing significant harms.

The consequences of vitamin D deficiency have been extensively reviewed,⁵⁻⁷ but are important to be highlighted in the current context. Vitamin D deficiency has been associated with developing both type 1 and type 2 diabetes, cognitive decline, malignant neoplasms, autoimmune diseases, cardiovascular diseases, osteoporosis, risk of fall in the elderly and overall mortality. The risk of fracture may further be heightened in elderly patients as daily physical activity

may be diminished during lockdown, as may physical therapy and rehabilitation treatments. This leads to reduction the beneficial mechanical stimulus that promotes bone mineralization, as well as loss of physical strength, coordination and balance that may predispose to falling and bone fractures. Furthermore, it may be an independent risk factor for infection, severe sepsis and mortality in critically ill patients,⁸ thus raising the possibility of contributing towards worse outcomes in the event of COVID-19 infection.

The fight against SARS-CoV-2 is far from over and will significantly impact society over the coming months. As such, it is paramount that we identify rising problems and address them as soon as possible to prevent dire complications. Regarding vitamin D deficiency, simple measures can be adopted to prevent, identify and treat this condition.

Solar exposure could be recommended as a general advice for the entire population. While individuals should avoid breaking confinement, solar exposure of the face and bare upper limbs over a window or on a balcony may suffice to produce the necessary amounts of vitamin D. Patients should be informed that glass blocks UVB transmission and as such direct solar exposure is necessary. Caution should also be heeded to avoid excessive solar exposure as this may carry unwanted harms. While precise recommendations on ideal time of exposure cannot be offered due to the abovementioned variability, a sensible total exposure of 20-40 minutes, divided in two periods across the day may be adequate to prevent significant vitamin D deficiency.

Increased intake of vitamin D through diet could also be recommended. Egg yolks, oily fish, dairy products and mushrooms are generally good sources for vitamin D, and their intake may be preferred over other low-vitamin D food. However, increasing natural intake of vitamin D may not be easy during isolation, as commerce is running slowly and people avoid frequent shopping, thus preferring long shelf-life foods over fresh produce.

Global supplementation has not been advocated under normal circumstances. However, under the current pandemic, further thought should be given to this matter, particularly if home confinement is prolonged over the coming months, considering the low toxicity of these supplements when administered at standard dosage. Evidence shows vitamin D supplementation significantly reduces the risk for respiratory infections, particularly in those with deficiency⁹ and has been advocated for COVID-19.¹⁰ Additional consideration

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should be given to the elderly, as the risks for bone mass imbalance is higher in this age group. The daily requirements for vitamin D vary according to age and preexisting conditions, but intake up to 4000 UI/day in adults and elderly seems to be safe, posing no risk of adverse effects.¹¹ Thus, 400-2000 UI of vitamin D3 supplementation could assist in preventing vitamin D deficiency during lockdown, without significant risk for harms.


Serum vitamin D dosing should be offered to all individual at high risk for vitamin D deficiency during or immediately after this crisis, to identify those at need for treatment. If vitamin D deficiency is diagnosed, treatment should be conducted according to international guidelines, based on age and comorbid conditions.

Vitamin D deficiency may become a significant public health issue as consequence of lockdown measures implemented to fight SARS-CoV-2. Sensible solar exposition over open windows or on balconies may suffice to prevent over vitamin D deficiency. As food availability is also limited during this crisis, supplementation should be administered particularly to those at highest risk for complications. Global supplementation should be considered as a public health policy, as the risks of such an intervention are minimal. Testing may be advised in high-risk individuals, where prophylactic supplementation may not be sufficient to solve previously established deficiencies.

Yours sincerely

CONFLICT OF INTEREST

None declared.

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REFERENCES

1. Parva NR, Tadeballi S, Singh P, et al. Prevalence of Vitamin D deficiency and associated risk factors in the US Population (2011-2012). *Cureus*. 2018;10(6):2011-2012.
2. Elliott ME, Binkley NC, Carnes M, et al. Fracture risks for women in long-term care: high prevalence of calcaneal osteoporosis and hypovitaminosis D. *Pharmacotherapy*. 2003;23(6):702-710.
3. Karalius VP, Zinn D, Wu J, et al. Prevalence of risk of deficiency and inadequacy of 25-hydroxyvitamin D in US children: NHANES 2003-2006. *J Pediatr Endocrinol Metab*. 2014;27(5-6):461-466.
4. Tangpricha V, Pearce EN, Chen TC, Holick MF. Vitamin D insufficiency among free-living healthy young adults. *Am J Med*. 2002;112(8):659-662.
5. Matyjaszek-Matuszek B, Lenart-Lipińska M, Woźniakowska E. Clinical implications of vitamin D deficiency. *Prz Menopauzalny*. 2015;14(2):75-81.
6. Kulie T, Groff A, Redmer J, Hounshell J, Schragger S. Vitamin D: an evidence-based review. *J Am Board Fam Med*. 2009;22(6):698-706.
7. Pludowski P, Holick MF, Pilz S, et al. Vitamin D effects on musculoskeletal health, immunity, autoimmunity, cardiovascular disease, cancer, fertility, pregnancy, dementia and mortality-A review of recent evidence. *Autoimmun Rev*. 2013;12(10):976-989.
8. de Haan K, Groeneveld JBJ, de Geus HRH, Egal M, Struijs A. Vitamin D deficiency as a risk factor for infection, sepsis and mortality in the critically ill: systematic review and meta-analysis. *Crit Care*. 2014;18(1):660.
9. Martineau AR, Jolliffe DA, Hooper RL, et al. Vitamin D supplementation to prevent acute respiratory tract infections: systematic review and meta-analysis of individual participant data. *BMJ*. 2017;356:i6583.
10. Grant WB, Lahore H, McDonnell SL, et al. Evidence that Vitamin D supplementation could reduce risk of influenza and COVID-19 infections and deaths. *Nutrients*. 2020;12(4):988.
11. Pludowski P, Holick MF, Grant WB, et al. Vitamin D supplementation guidelines. *J Steroid Biochem Mol Biol*. 2018;175:125-135.