

Review Article

A High Weekly Dose of Cholecalciferol and Calcium Supplement as a Potential Preparedness and Proactive Infection Control for Covid-19 Transmission

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Abstract: Corona virus disease 2019 (COVID-19), What is the catastrophe that changed the life of the world suddenly and in a short time. it was affected health, economic, teaching and all the life was changed in badly picture. COVID-19 spreads all over the world and become global pandemic with a lot of worries between the society after record first case of this disease. Until now there is no approved treatment for COVID-19. Researcher also show that vitamin D plays a role in balancing RAS and in reducing lung damage & has been reported to increase immunity and to reduce inflammatory responses and the risk of acute respiratory tract infections. Vit D deficiency especially in winter is associated with increased risk of community acquired pneumonia. to reduce the risk of COVID-19 infection it is recommended to take a high weekly dose of cholecalciferol and calcium supplement as a potential preparedness and proactive infection control for COVID-19 transmission.

Keywords: High Weekly Dose; Cholecalciferol; Calcium Supplement; Potential Preparedness; Proactive Infection Control; COVID-19 Transmission.

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INTRODUCTION

The world is now suffering from new public health crises with spread of 2019 novel coronavirus (2019-nCoV) or the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The new CoV infection epidemic began in Wuhan, Hubei, China, on December 2019, and renamed COVID-19 by the World Health Organization on February 11, 2020 (Wang, C. *et al.*, 2020). The common clinical presentation includes fever, cough, sore throat, headache, fatigue, myalgia and breathlessness. By the end of the first week the disease progress to pneumonia, which is one of the primary causes of death, This progression is associated with increase in inflammatory cytokines including IL2, IL7, IL10, MCP1, MIP1A, and TNF α . Recovery start in the 2nd or 3rd wk. About 50–75% of death cases accompanied with elderly patients and those with underlying co-morbidities (Singhal, T. 2020).

Supportive and symptomatic treatment is applied. The usual principles are maintaining hydration and nutrition and fever and cough control. Until now

there is no approved treatment for COVID-19 (Singhal, T. 2020). Given the extraordinary economic impact of COVID-19 epidemics and widening spread of the disease, ways should be found to reduce the risk of infection and deaths that can be easily applied to large populations at an affordable cost. Vitamin D may be appropriate choice to minimize the infection risk, in addition to its primary functions in bone homeostasis many studies have demonstrated antiviral and antimicrobial of vitamin D, which are important in reducing risk of pneumonia (Zdrenghea, M. T. *et al.*, 2017; & Watkins, R. R. *et al.*, 2015). Among of the different putative function, role for Vitamin D in the modulation of the immune response to infectious agents is based on laboratory findings and observational studies; and this is what we seek to prove in this article.

DISCUSSION

Vitamin D₃ (cholecalciferol) is mainly produced in the skin through the action of UVB radiation, only a minor part comes from dietary sources. It is hydroxylated by liver and kidney producing the active form of calcitriol, 1,25(OH)₂D. calcitriol bind to

the nuclear vitamin D receptor, a DNA binding protein that interacts directly with regulatory sequences near target genes, producing most of vitamin D's effect (Pike, J. W., & Christakos, S. 2017). cholecalciferol (vitamin D₃) and ergocalciferol (vitamin D₂) supplements are commonly used. A recent meta-analysis found that vitamin D₃ more efficacious in improving 25(OH)D status, especially when given as loading doses (Tripkovic, L. *et al.*, 2012). Vitamin D levels 20-30 ng/mL are considered to be insufficient, and ≤20 ng/mL deficient. serum 25(OH)D levels >150 ng/mL may cause acute vitamin D toxicity with hypercalcemia, hypercalciuria and calcifications in many organs. clinical trial evidence showed that a prolonged intake of 10,000 IU/d of vitamin D₃ is likely to be safe in the general population (Vieth, R. 2007).

Vitamin D shows antiviral effects, vitamin D acts as stimulant for innate immunity by enhances expression of antioxidation-related genes. its anti-viral effects could be explained by cathelicidin (in the form of LL-37), which has direct antiviral activity against enveloped respiratory viruses such as influenza and respiratory syncytial virus (RSV) (Telcian, A. G. *et al.*, 2017; & Beard, J. A. *et al.*, 2011). Additionally, it suppresses responses mediated T cells ,by suppressing production of cytokines IL-2 and interferon gamma (INFγ). Furthermore, vitamin D promotes induction of the T regulatory cells, thereby inhibiting inflammatory processes (Wei, R., & Christakos, S. 2015).

Vitamin D deficiency is linked to increased frequency of respiratory viral infections also studies showed that community-acquired pneumonia (CAP) patients had a low 25(OH)D concentration (Kim, H. J. *et al.*, 2015). A review of randomized control studies shows that supplementing with vitamin D significantly decreased the risk of respiratory infections in people deficient in this vitamin and lowered infection risk in those with adequate vitamin D levels (Martineau, A. R. *et al.*, 2019; & Ginde, A. A. *et al.*, 2009). Serum 25(OH)D concentrations tend to decrease with age, which affect their immune response especially in winter season because of less time spent in the sun and reduced production of vitamin D (Vásárhelyi, B. *et al.*, 2011). A cross-sectional analysis showed that participants with 25(OH)D concentrations above 50 ng/ml was associated with a 27% reduction in influenza-like illness (Grant, W. B. *et al.*, 2020).

Additionally, there are multiple studies demonstrate that vitamin D directly prevent COVID-19 from entering lung epithelial cells; this means that Vitamin D might be a supportive preventive strategy. This theory includes that COVID-19 enters lung cells by binding to ACE2 receptors, ACE2 receptors utilize a specific interleukin (IL-6) when normally activated, which in turn blockage of IL-6 by tocilizumab may be an effective treatment for COVID-19 and basically

Vitamin D reduces IL-6 production in monocytes. This provides a rationale for administration of Vitamin D (by IM injection) as treatment in acutely ill patients with COVID-19. An another interesting Randomized Controlled study that trial High-dose oral vitamin D₃ supplementation has been shown to decrease short-term mortality in resuscitation patients with severe reduction in vit D level (17% absolute risk reduction). It is considered safe to take oral vitamin D supplementation at doses up to 10,000 IU/day for short periods, particularly in older adults, i.e. a population that is mostly affected by low vit D level and who should receive at least 1,500 IU of vitamin D daily to ensure satisfactory vitamin D status. We hypothesize that supplementation with 50,000 IU cholecalciferol once weekly with calcium carbonate (1200 mg elemental calcium/day) may lower risk of developing COVID infection and risk of death. In addition to its antimicrobial effects , vitamin D increase intestinal calcium and phosphate absorption, which promotes mineralization of the bone matrix, this may decrease risk of osteoporosis especially in elderly patients who are considered at higher risk of death from COVID.

CONCLUSION

In summary, given the fast spreading pandemic of COVID-19 infection and its enormous economic impacts. So, Vitamin D supplementation is mentioned as a potentially interesting treatment for SARS-Cov-2 infection. We recommended vitamin D and calcium supplements are considered a valuable inexpensive choice to decrease the risk of infection due to its antiviral and immunomodulating effects, in addition to its primary role in bone and mineral metabolism. randomized clinical trials are required to investigate vitamin D₃ supplementation on risk of COVID-19 infection and death.

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