

Letter to Editor

What about incorporating vitamins D and C supplementation in the prevention and treatment of COVID-19? The immune response pathway

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Recently, Thevarajan et al. (2020) [1] from the University of Melbourne – Australia published an interesting study about the immune response in a patient with mild-to-moderate COVID-19. The patient did not experience complications and she was recovered, probably due to her immune response (recruitment of immune cell populations, and IG- SARS-CoV-2-binding antibodies).

Supplements that may boost immune system defenses could be used to reduce the severity and risk of death from SARS-CoV-2 infection. Since COVID-19 pandemic occurred in winter, vitamin D deficiency may be involved in the worst prognosis observed in older patients [2]. Vitamin D deficiency in the elderly and especially in winter has been well documented. Both the innate and adaptive immune responses are modulated by vitamin D. During infection, vitamin D (through its receptor) modulates the function of both monocytes and macrophages, prevents infection-associated inflammatory response by inhibiting the maturation of dendritic cells [3], decreasing pro-inflammatory cytokines such as TNF- α , IFN- γ , and IL-1 β , and enhancing anti-inflammatory IL-10 [4]. In a meta-analysis including 25 trials and 11321 participants, it has been found that vitamin D supplementation significantly decreased the risk of acute respiratory tract infection (OR: 0.88, 95% CI: 0.81–0.96, $p=0.003$). Interestingly, the most important benefit was attributed to persons with important vitamin D deficiency [5]. Likewise, vitamin D was found to prevent respiratory tract infections, mainly through stimulating the immune system [6]. Furthermore, vitamin D was shown to alleviate 21 types of adverse effects and synergize with 39 drugs, through its positive effects on the immune system and against the oxidative stress [7]. Immune responses can

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also be enhanced by vitamin C. Indeed, vitamin C supplementation enhanced the Th1 immune response *in vitro* [8]. An uncontrolled longitudinal clinical trial using vitamin C (500 mg) is ongoing in Palermo hospital – Italy (NCT04323514). In this trial, 500 patients with COVID-19 will receive 10 g of vitamin C intravenously in addition to conventional therapy. Another randomized clinical trial (NCT04264533) is conducted at Zhongnan Hospital in Wuhan, China, to evaluate the clinical efficacy and safety of intravenous vitamin C on coronavirus patients.

On the other hand, it should be noticed that a long-life correct nutrition and adequate vitamins levels are highly recommended for a healthy condition. A correct nutritional status, through anti-inflammatory nutrients may contribute to prevent different infectious and inflammatory diseases, such as COVID-19. Indeed, a poor nutritional status and especially vitamin deficiencies are considered a risk factor for a poor prognosis among COVID-19 patients [9]. Recently, we have asked for an urgent nutritional intervention model that should be established to prevent and/or minimize the negative effects of COVID-19 [10]. Furthermore, immunosupportive nutrients have been also recommended for healthy persons to alleviate the quarantine-related negative health effects [11].

Based on those precedents and given their wide therapeutic index, we suggest using vitamins D and C supplementation to enhance the immune system fitness to fight the SARS-CoV-2 infection. This vitamin supplementation requires assessing vitamin D status of the supplemented patients to avoid related negative effects.

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Conflict of interest

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