Vitamin D supplementation to prevent COVID-19 in patients with COPD: a research perspective

To the Editor

The Coronavirus disease 2019 (COVID-19) is a global pandemic that has caused now more than 200000 deaths. Its mortality is increased in people with comorbidities, such as chronic obstructive pulmonary disease (COPD) [1, 2]. There is increased evidence that the massive release of pro-inflammatory cytokines leading to the cytokine storm syndrome shapes the evolution of COVID-19 and is responsible of the severity of COVID-19 in some patients [3]. A recent review argued that vitamin D deficiency could have increased the COVID-19 outbreak and suggested vitamin D supplementation as a preventive action [4]. In fact, many factors seem to be correlated both to low vitamin D levels and the importance of COVID-19 spreading and severity. It is also important to highlight that the lockdown, implemented in many countries, prevents people to go out and then increases the risk of vitamin D deficiency.

Vitamin D receptor is widely present in different tissues of the organism. Therefore, vitamin D is involved in multiple biological metabolisms. It was proven to have immunomodulatory functions, and particularly suppresses pro-inflammatory cytokines [5]. Very few dietary sources are known to contain significant quantities of vitamin D, such as cod liver oil, oily fish and fortified food in some countries. This vitamin is mainly synthesized in the skin when exposed to ultra-violet (UV) radiation. Its synthesis is thus influenced by different factors such as the season, the time of the exposure during the day and the latitude. The zenith angle influences vitamin D production by modulating the path of UV radiation to the skin. That is why, latitude affects vitamin D levels, and vitamin D can hardly be produced neither above (to the north) and below (to the south) 33° latitude during winter months, nor in the early morning and late afternoon (approximately before 10 a.m. and after 3 p.m.). Vitamin D status changes depending on the period of the year. In fact, they reach their peak at the end of the summer, while the lowest levels are observed at the end of the winter. Besides, air pollution absorbs UV and so reduces vitamin D synthesis [6]. The facts that the outbreak is taking place when vitamin D levels are at their lowest, that the most affected countries by COVID-19 are northern countries and that polluted cities were more hit [7] suggested that it could be linked to sun exposure and vitamin D. Different factors may interfere with these variables such as the ability of the virus to resist to high temperatures as well as the effects of air pollution on health. It is still early to conclude about the spreading and severity of the disease in southern countries which differ in the time of the beginning, the governmental measures, the strength of the health system, and possible genetic and social factors.

Vitamin D deficiency represents a common public health issue in many countries worldwide. COPD patients are particularly at risk to have low levels of vitamin D due to multiple risk factors associated to the disease, such as aging, reduced outdoors activity, poor diet, and the use of corticosteroids [8]. COPD is more than just an airways disease. In fact, it may generate a systemic
inflammatory process responsible of secondary extra-pulmonary impairments. Although COPD patients share certain risk factors that may explain some of the comorbidities, such as smoking history, physical inactivity and aging, other frequently observed comorbidities cannot be easily attributed to them. There is increasing evidence that COPD is just a part from a chronic inflammation linking these comorbidities and explaining why they develop together [9]. Vitamin D deficiency could sustain and aggravate the systemic inflammation associated to COPD. Reports have also shown that vitamin D deficiency was associated to exacerbations and hospital admissions, as well as lung function [5]. That may be explained by the immunomodulatory effects of vitamin D. Recent research showed that vitamin D supplementation significantly reduced COPD exacerbations [10]. These encouraging results are a further argument to test this option.

Although vitamin D deficiency was not proved to be neither a risk factor of COVID-19, nor a determinant of its severity, it represents a preventive perspective that needs to be further studied. Future studies should precise the relation between stages of COPD and COVID-19, and test the effectiveness of a preventive vitamin D supplementation.

Conflicts of interest

The authors declare no conflict of interest.

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