The role of Vitamin D in the prevention of Coronavirus Disease 2019 infection and mortality

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Abstract

Background/Aims: WHO declared SARS-Cov-2 a global pandemic. The aims of this paper are to assess if there is any association between mean levels of vitamin D in various countries and cases respectively mortality caused by COVID-19.

Methods: We have identified the mean levels of vitamin D for 20 Europeans Countries for which we have also got the data regarding the morbidity and mortality caused by COVID-19.

Results: The mean level of vitamin D (average 56mmol/L, STDEV 10.61) in each country was strongly associated with the number of cases/1M (mean 295.95, STDEV 298.73 p=0.004, respectively with the mortality/1M (mean 5.96, STDEV 15.13, $p < 0.00001$).

Discussion: Vitamin D levels are severely low in the aging population especially in Spain, Italy and Switzerland. This is also the most vulnerable group of population for COVID-19.

Conclusions: We believe, that we can advise Vitamin D supplementation to protect against SARS-CoV2 infection.

Background/aims

WHO declared SARS-Cov–2 a global pandemic. Little is known about the potential protective factors. Previous studies identified associations between higher levels of ACE2 and better coronavirus disease health outcomes. In the lung, ACE2 protects against acute lung injury [1]. Calcitriol (1,25-dihydroxyvitamin D3) exerts pronouncedly impacts on ACE2/Ang(1–7)/MasR axis with enhanced expression of ACE2 [2].

We hypothesize that vitamin D may play a protective role for SARS-Cov2 infections.

The primary aims of this study are to assess if there is any association between the mean levels of vitamin D in various countries and the mortality caused by COVID–19. The secondary aim was to identify if there is any association between the mean vitamin D levels in various countries and the number of cases of COVID–19.

Materials And Methods

To test this hypothesis and to limit confounding bias (latitude, etc), we focused on European countries only. We searched the literature for the mean levels of vitamin D in each country [3]. We searched the number of cases of COVID–19/1M population in each of the countries and mortality caused by this

disease/1M population (20March, 16.00GMT) (table 1)[4]. Statistical analyses were carried out (t-test calculator).

Results

We found very significant correlation between the mean vitamin D levels (average 56.79 nmol/L, STDEV 10.61) and the number of cases of COVID–19/1M population (average 259.95, STDEV 298.732, *t*-value = –3.03947; *p*-value = 0.004274), and between the mean vitamin D levels and the number of deaths caused by COVID–19/1M (Figure 1) (average 5.963936, STDEV 15.13207, *t*-value = 12.29871; *p*-value < 0.00001) (table 1).

Discussion

We acknowledge that this cross-sectional analysis has limitations. The number of cases/country is affected by the number of tests performed. We believe that mortality is a better outcome to demonstrate the potential protective role of vitamin D.

The Seneca study showed a mean serum vitamin D of 26nmol/L in Spain, 28 nmol/L in Italy and 45 nmol/L in the Nordic countries, in older people [3]. Severe deficiency is defined as a serum 25(OH)D lower than 30nmol/L [3]. In Switzerland, mean vitamin D levels are 23(nmol/L) in nursing homes and in Italy 76% of women over 70 years of age have been found to have circulating levels below 30nmol/L [3]. These are countries with high number of cases of COVID–19 and the aging people is the group with the highest risk for morbidity and mortality with SARS-Cov2.

Martineau AR et al concluded in a meta-analysis that vitamin D supplementation was safe and protective against acute respiratory tract infections. They described that patients who were severe vitamin D deficient experienced the most benefit [5].

In conclusion, we found significant relationships between vitamin D levels and the number COVID–19 cases and especially the mortality caused by this infection. The most vulnerable group of population for COVID–19 is also the one that has the most deficit in Vitamin D.

Vitamin D has already been shown to protect against acute respiratory infections and it was shown to be safe. We believe, that we can advise Vitamin D supplementation to protect against COVID–19 infection.

Declarations

Ethical Statement

This study is compliant with the ethical standards. Petre Cristian Ilie, Simina Stefanescu and Lee Smith do not have any conflict of interests. No source of funding was used. Considering the design of the study no informed consent was necessary.

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Table 1

Not provided with this version of the manuscript.

Figures

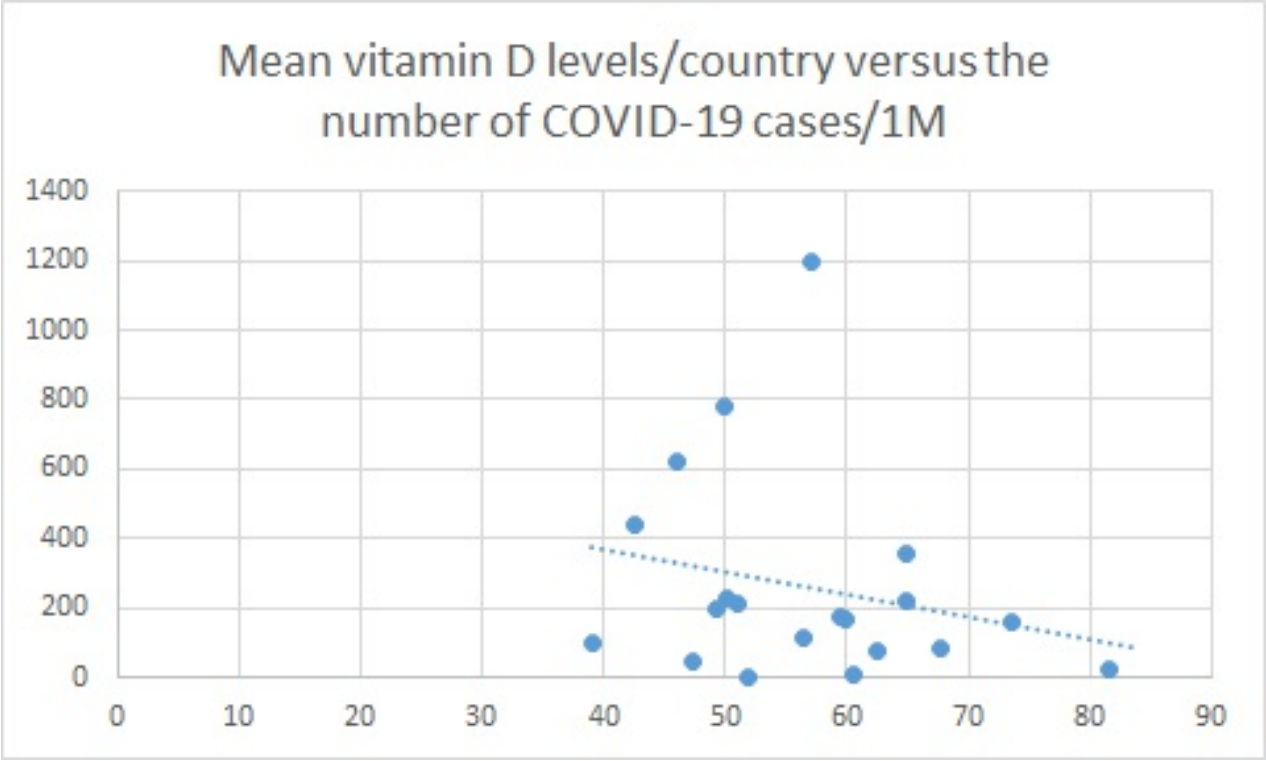

Figure 1

Mean vitamin D levels/country versus the number of COVID-19 cases/1M

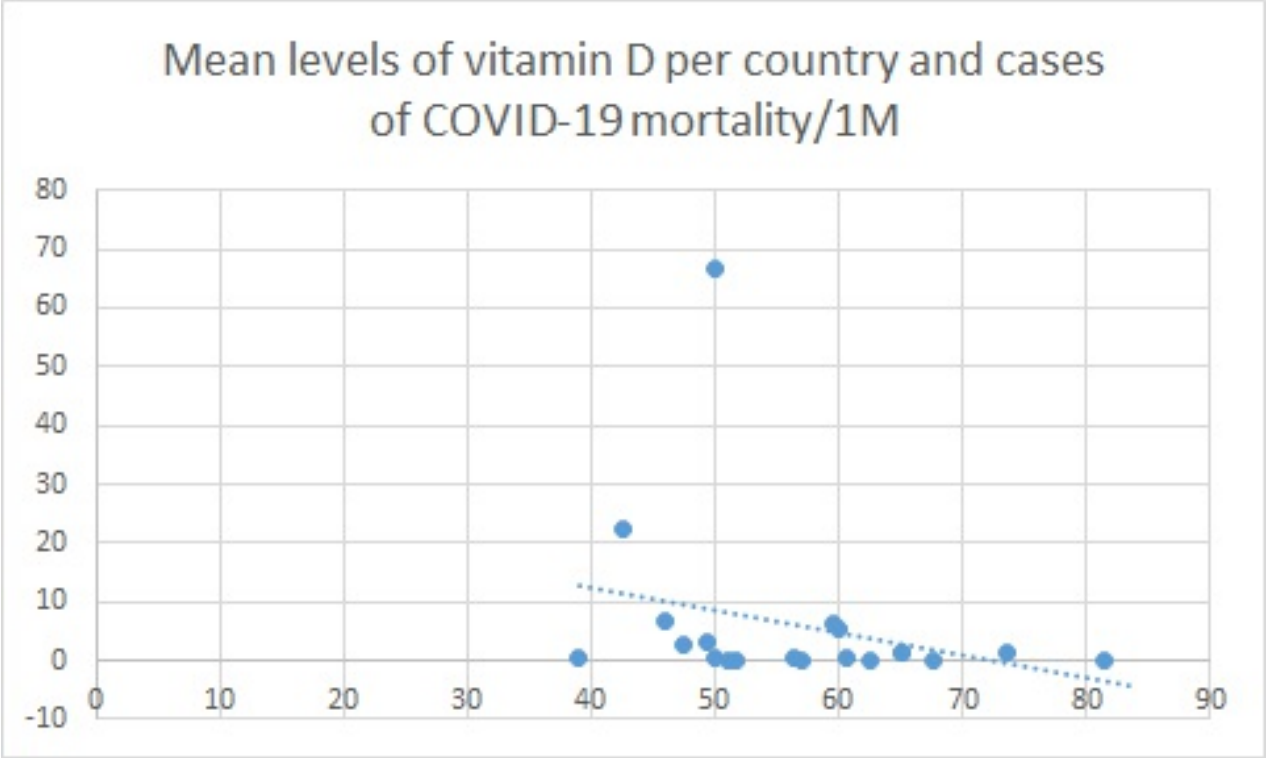

Figure 2

Mean levels of vitamin D per country and cases of COVID-19 mortality/1M