Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letter to the Editor

COVID-19 infection, inception and immunity: Observations and recommendations in the light of vitamin D?

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ABSTRACT

Responsive immunity plays an important role fighting against infections. Worldwide, Vitamin D deficiency is a major concern not only for musculoskeletal health but also affecting the immunity status in population. Amidst COVID-19 pandemic, it is imperative to establish the role of vitamin D in destruction of pathogens. Vitamin D awareness program at school level might be an effective health governance policy to educate populations for the importance of vitamin D in overall health.

Dear Editor,

It is well known that the COVID-19 outbreak has brought down the world on its knees and become a challenge before scientists and healthcare workers alike. Amidst novel corona conundrum, two other factors are being closely argued, namely lack of responsive immunity and vitamin D deficiency and unfortunately; both are pandemic. Whilst the world is struggling to discontinue the chain reaction among populations and also for mitigating the infection control; attempts are also being made to find out the links between the infection (COVID-19), mortality, and immune response. Given the newness of coronavirus, few articles (majority are editorials and views) presumed a close link between vitamin D levels and coronavirus infection. However, definitive studies are still lacking.

Now by the time its (COVID-19) vaccine comes, there are two major factors upon which population needs to focus such as personal hygiene and immunity modulation. It is well known that apart from several other factors viz. vitamin C, zinc and magnesium; Vitamin D also acts in several ways to improve immunity [1]. Vitamin D is activated in macrophages to 1,25-dihydroxyvitamin D. This active form of vitamin D regulates the production of a defensin protein called cathelicidin. This protein selectively kills infectious agents including bacteria and viruses. Additionally, it (1,25-dihydroxyvitamin D) acts to alter the activity and number of lymphocytes known as Th2 lymphocytes which have the ability to release factors improving innate immune function resulting into reducing the risk of spread of infectious agents including bacteria and viruses [1].

Dr. Michael F. Holick, who has worked extensively in the research related to 'vitamin D and health', has conducted important studies about the role of vitamin D on immune function in healthy adults [2]. He reported that healthy adults who ingested 2000 IUs of vitamin D per day for three months altered the expression of 291 genes in their immune cells. In another study Dr. Holick reported that healthy adults who took 10,000 IU vitamin D3 daily for 6 months regulated more than 1000 genes in their immune cells associated with improved immune function [2].

The vital source of vitamin D is sensible sun exposure that continues to be a major source of vitamin D worldwide for the children, adults and elderly population. However, time of day, season, latitude and degree of skin pigmentation are the factors that can have a dramatic influence on how much vitamin D can be produced when the skin is exposed to sunlight. Since, vitamin D fortified products are not easily available in most of the parts of world and are expensive too, therefore, sun exposure is the cheapest way to obtain it. It has been estimated that for 80–90% of population, the daily vitamin D requirement is coming from casual exposure to sunlight [1]. As the majority of the population were confined at their home during lockdown and thus having no access to sun exposure; it is prudent to make sure for populations to have adequate vitamin D levels to support their immune system against such diseases With this background, we postulate that population with optimum levels of vitamin D not only could be able to reduce the risk of getting infection from COVID-19 but also with empowered immunity, resulting in reduced case fatality rate. We also believe that if there would have not been vitamin D deficiency among population, the chance of mortalities would have been less as of now. Moreover, optimum levels of vitamin D may also help to fight against other infectious pathogens other than COVID-19, limiting the comorbidities of Covid-19 as well. We conclude that vitamin D might have a role in the management of ongoing COVID-19 through immunity modulation.

When it comes to Asian and Indian subcontinent, we wish to submit certain observations and recommendations and how we believe these factors can be effectively dealt with current crisis.

Observations

Much of India is above the latitude 35 °N. Due to this geographical location, sun rays comes obliquely and moreover dense fog and

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atmospheric pollution leads to a limited availability of UVB rays and population are compelled to grab vitamin D either through dietary or pharmacological products and therefore it is difficult for population to get naturally synthesized vitamin D between the months of November to March. It is also important to mention here that most of the flu infections are noticed during these winter months. This climate associated vitamin D deficiency may negatively affect the immunity and therefore increasing the risk of developing viral infections. There are evidences that adequate levels of vitamin D during the winter can result in a reduction in the incidence of influenza A and other viral illnesses of the respiratory tract [3].

Accidently, nationwide lockdown has evolved a new work culture i.e. Shift to 'Work from Home (WFH)' culture, especially in the IT sector throughout spring and summer months due to which majority of people are compelled to say at home. Approximately 30% of Indian population resides in urban settings where majority of houses do not have access to sun light. Moreover, it has been observed that much of population are already lacking in sun seeking behaviour. Cessation of construction work and infrastructure activities in open areas during the pandemic has debarred the labourers as well. During current crisis, much of the hospital resources were shifted to COVID-19 management, leading to further inability of patients to access government dispensaries and hospital pharmacies for their routine Vitamin D supplements.

Recommendations

Till date, there are no original studies available establishing the correlation between Vitamin D and Immune response in COVID-19 infection. We therefore must pay an urgent attention to conduct such studies. Keeping in view of the socio-economic spectrum in India, food fortification has to be much viable and affordable. For working class, 'D' breaks (having sun exposure) analogous to tea-breaks will be an interesting and welcoming drive to encourage people to obtain natural vitamin D.

In India, majority of people are living with vitamin D deficiency till it brings deleterious health consequences. Therefore, it is imperative to initiate a curriculum at school level itself about the importance of vitamin D in human health. Needless to say, 'Vitamin D awareness program' through government along with civil societies particularly at school, can make people to understand the importance of vitamin D in their life and can manage to correct its deficiency naturally (diet & sunshine). The authors have already advocated and highlighted the importance of vitamin D & its role in maximizing health in their previous publications [4,5]. We therefore lay these recommendations to be tested in near future to avoid such further tsunamis of infection.

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