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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Editorial

Viral infections and Vitamin D: Relevance to COVID-19 pandemic

We are stranded between a collapsed present and an uncertain future because of the ongoing pandemic. There are frequent lockdowns and limitations of all academic activities. According to the UN, the devastating pandemic, still spreading its fangs across the world, could lead 130 million people into extreme poverty, wiping out $8.5 trillion in global output. The changing world order requires us to develop fast solutions exploring molecules that are already known for their pleiotropic effects and immune-enhancing properties. As COVID-19 (Corona Virus Disease-19) is neither the first nor the last catastrophe faced, we need to revisit old schools as there is a dire need to find an answer to the lack of specific treatment. Reportedly, the pathophysiology of the disease is marked by worsened inflammation due to weakened immunity which leads to infiltration of immune cells and necrosis. This causes a drastic drop in the pulmonary oxygen exchange due to hyperplasia of the lungs, which manifests as severe pneumonia, causing fatalities. Importantly, SARS-CoV2 infection also causes fatalities due to viral septic shock, which results from uncontrolled and backfired immune reactions to the pathogen. As Vitamin D and its derivatives have been shown to enhance immunity against respiratory illnesses, this comprehensive presentation certainly delineates the plausibility of employing it as a preventive and therapeutic agent against the current and future pandemic from an immunological perspective.

In this editorial, we would like to briefly describe the role of Vitamin D in oral health with HIV-infected patients and also in multiple sclerosis, diabetes, cancer, and COVID-19. Mumena et al. [1] presented result of their study HIV infection affects 36.9 million people globally, and vitamin D deficiency is a global public health concern for HIV patients. Approximately 70–80% of HIV-infected patients have vitamin D deficiency. The deficiency is associated with many pathologies such as immune disorders, infectious diseases, chronic inflammation, oral diseases, as well as the fast progression of HIV. The causes of vitamin D deficiency in HIV infections include HIV itself, traditional factors such as less sun exposure, mal-absorption, hypercholesterolemia, seasonal variation, poor nutrition as well as some HAART drugs like efavirenz.

Vitamin D has an immunomodulatory, anti-inflammatory, and antiproliferative function. It plays a significant role in preventing oral infections such as periodontal and gum diseases, dental caries, and oral candidiasis in the oral cavity. The consequences of vitamin D deficiency are bone resorption, increased production of pro-inflammatory cytokines, T-lymphocytes, increased T-helper-1 functions, and decreased T-helper-2 functions. Consequently, this leads to increased infections, chronic inflammation, and the occurrence of oral diseases such as oral candidiasis, periodontal and gum diseases, and dental caries. The majority of these oral diseases are encountered in HIV patients. Vitamin D deficiency is significantly found in HIV patients. There is a lack of studies that directly link vitamin D to most oral diseases in HIV patients; however, the role of vitamin D in immunoregulation, prevention of oral diseases, and HIV infection is substantiated.

In a separate study, using mouse genetics and dietary manipulation studies, Starczak et al. demonstrated the necessity of intact VDR signaling for the active regulation of the differentiation and activity of osteoclasts [2]. Such regulation is in addition to RANKL-mediated osteoclastogenesis.

Erem and Razzaque [3] explained the multifaceted role of vitamin D. This review article examines the beneficial effects of ultraviolet radiation on systemic autoimmune diseases, including multiple sclerosis and type I diabetes, where the epidemiological evidence for the vitamin D-independent effects of sunlight is most apparent. Ultraviolet radiation, in addition to its role in the synthesis of vitamin D, stimulates anti-inflammatory pathways, alters the composition of dendritic cells, T cells, and T regulatory cells, and induces nitric oxide synthase and heme oxygenase metabolic pathways, which may directly or indirectly mitigate disease progression and susceptibility.

Recent work has also explored how the immune-modulating functions of ultraviolet radiation affect type II diabetes, cancer, and the current global pandemic caused by SARS-CoV-2. These diseases are particularly important amidst global changes in lifestyle that result in unhealthy eating, increased sedentary habits, and alcohol and tobacco consumption. Compelling epidemiological data shows increased ultraviolet radiation associated with reduced rates of certain cancers, such as colorectal cancer, breast cancer, non-Hodgkin's lymphoma, and ultraviolet radiation exposure correlated with susceptibility and mortality rates of COVID-19. Thus, understanding the effects of ultraviolet radiation on both vitamin D-dependent and -independent pathway is necessary to understand how they influence the course of many human diseases [2].

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