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Role of vitamin D in COVID-19 management

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Implication for health policy/practice/research/medical education: Vitamin D plays an essential role in the management of COVID-19.

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COVID-19 is a subdivision of the beta coronavirus family which causes SARS-COV2 (1). Micronutrients like vitamins C and D affect the human immune system (2). Insufficient vitamin D is a worldwide issue that can be related to ethnicity, latitude, and age. Low vitamin D levels can be associated with conditions such as malignancy, hypertension, diabetes mellitus, and chronic respiratory and cardiac diseases (3).

Vitamin D attaches to the vitamin D response element (VDRE) and suppresses the adverse effects of COVID-19 by changing the innate and adaptive immunity, the renin-angiotensin system (RAS), and physical blockage (4). In animal models, it has been shown that vitamin D modifies RAS and angiotensin-converting enzyme 2 (ACE2) (5,6). These effects are essential as COVID-19 applies ACE2 to infect alveolar epitheliums (7,8). On the other hand, soluble ACE attaches to the COVID-19 S protein and prevents cells from infections; therefore, decreasing soluble ACE2 causes inflammation and adult respiratory distress syndrome (ARDS) (9).

In addition, vitamin D reduces proinflammatory cytokines like tumor necrosis factor-alpha (TNF-α) and interferon-gamma (IFN-γ), which results in a reduction of ARDS risk (4). One of the innate antiviral elements is type I interferon (IFN 1), which can delay inflammatory response causing severe COVID-19 illness (9). Hypovitaminosis D can result in decreased IFN 1 due to a high level of VDRE (9). Additionally, vitamin D plays a crucial role in E-cadherin function, which influences tight junction against virus infiltration (4).

Some studies showed vitamin D could play a key role in COVID-19 treatment as a therapeutic adjuvant agent by improving the vaccine's efficacy (9). However, in another study, Chillon et al found no significant association between mRNA vaccine response (through the generation of antibodies). Vitamin D status in healthy adults with medium-level vitamin D. This study has some limitations, including cellular immunity was not assessed. The sample population was adult healthcare workers (10). Taking vitamin D supplements is reasonable and safe for people with hypovitaminosis D to mitigate the COVID-19 infection risk by complementing the immune response to the vaccine through enhancement of antigen-presenting cells, CD4+T, and CD8+ T cells interactions (9). Although multiple studies showed vitamin D can affect the immune response to COVID-19 and vaccine efficiency, more studies are needed to delineate the role of vitamin D in COVID-19 management.

Conflicts of interest

The author declares that she has no competing interests.

Ethical issues

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