

Importance of Vitamins and Nutrients on SARS-CoV-2

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Abstract

Prevention and protection on COVID-19 is a major challenge for today's situation. Immunity boosting is very essential step for each and every human to overcome the recent situation. . Multiple variants of the virus that causes COVID-19 are circulating globally. In collaboration with a SARS-CoV-2 Interagency Group (SIG), CDC established 3 classifications for the SARS-CoV-2 variants being monitored: Variant of Interest (VOI), Variant of Concern (VOC), and Variant of High Consequence (VOHC). CDC is working to monitor the spread of identified variants, characterize emerging viral variants, and expand its ability to find new SARS-CoV-2 variants. To reduce the cytokine storm syndromes, it is very necessary to fortify immunity by the immune-boosters. Some of the nutrients like vitamin-D, vitamin-C, zinc, omega fatty acids etc. have also been shown to have a potential role in the management of COVID-19.

Keywords: SARS-CoV-2; COVID-19; Vitamins; Variant of High Consequence.

1. Introduction

The novel SARS (severe acute respiratory syndrome) like coronavirus SARS-CoV-2 was first identified in December 2019. The emergence and rapid spread of virus is destroying global health and economy. Nearly 138,931,822 total corona cases are observed till middle of the april 2021 and 2,987,958 total deaths. It forces much of the world to adopt a lockdown mode, causing staggering economic fallout and human suffering. When an epidemic spreads beyond a country's borders, that becomes a pandemic officially. The World Health Organization declared a Public Health Emergency of International Concern regarding COVID-19 on 30 January 2020, and later declared a pandemic on 11 March 2020. The rate of corona cases decreased in the middle of 2020. But in later periods of 2020, there seemed the increase in corona cases world wide as well as many new

variants of corona virus was detected. Variants of viruses occur when there is a change or mutation to the virus's genes. It is the nature of RNA viruses such as the coronavirus to evolve and change gradually. "Geographic separation tends to result in genetically distinct variants. Multiple variants of the virus that causes COVID-19 are circulating globally. In collaboration with a SARS-CoV-2 Interagency Group (SIG), CDC established 3 classifications for the SARS-CoV-2 variants being monitored: Variant of Interest (VOI), Variant of Concern (VOC), and Variant of High Consequence (VOHC). CDC is working to monitor the spread of identified variants, characterize emerging viral variants, and expand its ability to find new SARS-CoV-2 variants. These variants seem to spread more easily and quickly than other variants, which may lead to more cases of COVID-19. An increase in the number of cases will put more strain on health care resources, lead to more hospitalizations, and potentially more deaths. There arises many questions for new variants like the speed of spreading, depth of effects in living organisms, death rate and one more thing "is the effect of vaccine control the new variants" etc. Undoubtedly, nutrition is a key determinant of maintaining good health. Key dietary components such as vitamins C, D, E, zinc, selenium and the omega 3 fatty acids have well- established immune-modulatory effects, with benefits in infectious disease.

2. Discussion

2.1 Variants of Concern

Worldwide, there are observed some recent VOCs, those become the most dominant strain for scientists. Distinct recent variants of COVID-19 are:

B.1.1.7: one mutated version of the coronavirus was detected in southeastern England in September 2020. This variant quickly became the most common version of the coronavirus in the United Kingdom, accounting for about 60% of new COVID-19 cases in December. Preliminary evidence that this variant is more contagious. Scientists noticed a surge of cases in areas where the new strain appeared." preliminary evidence shows that this variant is more contagious. Scientists noticed a surge of cases in areas where the new strain appeared."

B.1.351: This variant was first detected in South Africa in December 2020.

P.1: This variant was initially identified in travelers from Brazil, who were tested during routine screening at an airport in Japan, in early January.

B.1.427 and B.1.429: These two variants were first identified in California in February 2021 and were classified as VOCs in March 2021.

2.2 Symptoms

The coronavirus is commonly spread through droplets released into the air when an infected person coughs or sneezes. The droplets generally do not travel more than a few feet, and they fall to the ground (or onto surfaces) in a few seconds this is why physical distancing and wearing masks are effective in preventing the spread.

Generally it has been shown from the first cases of COVID-19 that the patients have the symptoms like: cough, fever or chills, shortness of breath or difficulty breathing, muscle or body aches, sore throat, new loss of taste or smell, diarrhea, headache, new fatigue, nausea or vomiting and congestion or runny nose. In rare cases, COVID-19 can lead to severe respiratory problems, kidney failure, brain and heart problems or death.

Patients with COVID-19 are experiencing an array of effects on the brain, ranging in severity from confusion to loss of smell and taste to life-threatening strokes. Younger patients in their 30s and 40s are suffering possibly life-changing neurological issues due to stroke. Patients are also having peripheral nerve issues, such as Guillain-Barré syndrome, which can lead to paralysis and respiratory failure.

2.3 Role of vitamins and nutrients

On entry, SARS-CoV-2 virus binds to human sockets of epithelial cells and activate the innate and adaptive immune systems. That result the onset of cytokine release syndrome. The streaming of continuous cytokine forms dysfunctional host immune responses. This developed acute respiratory distress syndrome (ARDS). It refers to cytokine storm syndromes (CSS) and occurs when large numbers of white blood cells are activated and release inflammatory cytokines. The infected cells give more stress to Immune cells by the interactions of receptor-ligand. The fighting of the immune system and pathogens produces more effector immune cells, such as T-cells and inflammatory

monocytes. The stimulation of further cytokine production can be life-threatening due to systemic hyper-inflammation, hypotensive shock, and multi-organ failure.

The more amount of interleukin (IL)-6 release in COVID-19 patients causes critical inflammatory mediator as well as respiratory, and multi-organ failures. The severe COVID-19 have high levels of circulating pro-inflammatory cytokines such as IL-2, IL-7, G-CSF, and TNF α . COVID-19 infection results in elevated levels of IL-6 and are associated with higher mortality. To reduce the cytokine storm syndromes, it is very necessary to fortify immunity by the immune-boosters. Some of the nutrients like vitamin-D, vitamin-C, zinc, omega fatty acids etc. have also been shown to have a potential role in the management of COVID-19.

Newly, it is studied that the 80% of patients with COVID-19 have no adequate levels of vitamin D in their blood. Lower level of vitamin-D releases a higher amount of ferritin and D-dimer, that increases the risk factor for the COVID-19 patients. A different study found that COVID-19 patients who had adequate vitamin D levels had a 51.5 percent lower risk of dying from the disease and a significant reduced risk of complications. People with vitamin D deficiency had a higher prevalence of hypertension and cardiovascular disease. Dr. Hans Konrad Biesalski, a professor at the University of Hohenheim, who has evaluated vitamin D and COVID-19. There are several publications that have suggested that vitamin D deficiency is associated with increased risk for upper respiratory tract infections including influenza and the coronavirus.

The storm of Cytokine that occurs due to infection of COVID-19 can be countered by vitamin C. The more release of pro-inflammatory cytokines like IL-6, IL-8 and TNF- α can be controlled by increasing anti-inflammatory cytokines (IL-10). Vitamin C plays an important role to release IL-10 that works as a negative feedback mechanism with IL-6 and controls inflammation, critical in COVID-19. A case study of a patient treated with high-dose vitamin C after development of ARDS was able to be removed from ventilation after 5 days. Therefore, vitamin C supplementation is a sensible option in micronutrient deficient individuals that are at risk of COVID-19 infection to assist with the prevention and support of immune responses. To this end, several clinical trials are evaluating Vitamin C supplementation in COVID-19 patients.

Due to the immunomodulatory and anti-viral properties of zinc, it has the potential to be a supportive treatment in COVID-19 patients. Studies have shown that zinc supplementation is able to decrease COVID-19 related symptoms such as lower respiratory tract infection. A clinical trial

registered in Australia will determine the use of intravenous zinc administration COVID-19 positive individuals. Omega-3 fatty acids are polyunsaturated fatty acids and include eicosapentaenoic and docosahexaenoic fatty acids, and are well known to have favorable effects on immunity and inflammation. The anti-oxidant Vitamin E, and trace element selenium, are major components of anti-oxidant defense. Epidemiological studies demonstrate that deficiency in either of these nutrients alters immune responses and viral pathogenicity. It has been noted, that there is a correlation between geographic selenium levels and COVID-19 cure rates in different Chinese provinces [45]. Vitamin E and selenium both act through anti-oxidant pathways to increase the number of T cells, enhance mitogenic lymphocyte responses, increase IL-2 cytokine secretion, enhances NK cell activity, and, decreases the risk of infection.

3. Conclusion

Prevention and protection on COVID-19 is a major challenge for today's situation. Immunity boosting is very essential step for each and every human to overcome the recent situation. So, proper diet with vaccination, physical distancing, use of masks, hand hygiene, and isolation is required to limit the spread of the virus that causes COVID-19.