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Vitamins: The Mega Preventive and Therapeutic Micronutrients for Sars-Cov-2 and Viral Infections

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ABSTRACT

Diet, especially vitamins and micronutrients, may play a major role in mitigating the severity of Covid-19 by preventing and reducing its complications in the general population, with an emphasis on the elderly. Supplements taken through diet, such as zinc and several vitamins, may help prevent coronavirus infections or lessen their severity if they are found. Numerous studies have investigated the role that nutrients play in building defense against this virus because dietary changes are linked to noticeable changes in immunity. Furthermore, dietary methods have a positive impact on immunity, making them safe and possibly effective. Immune dysfunction brought on by illnesses or other forms of weakness is linked to aging, and immune dysfunction itself is linked to deficiencies in calcium, zinc, vitamin B, vitamin D, and other nutrients.Viral infections harm and kill cells through a variety of methods. The cell interacts with innate immune responses upon detecting this process, which ultimately results in the development of more powerful and targeted adaptive immunity. Consequently, as part of primary and secondary prevention of COVID-19, which is still a global problem, some researchers have shown possible benefits of utilizing nutritional supplements, including vitamin C, vitamin D, zinc, and vitamin B3. This was identified during the pandemic years. In summary, this descriptive minireview seeks to clarify the primary function of vitamins and minerals in corona.

Keywords: Vitamins; Micronutrients; SARS-CoV-2; Viral Infections; Corona

Abbreviations: ICU: Intensive Care Unit; VDR: Vitamin D Receptor; ACE2: Angiotensin-Converting Enzyme 2; MS: Multiple Sclerosis; ARDS: Another Risk Factor for Acute Respiratory Distress Syndrome

Introduction

Numerous micronutrients support the growth and motility of immune cells, aid in the maintenance of physical barriers (such the gut) and create compounds that both promote and lessen immunomodulatory and inflammatory processes as well as their deleterious consequences. The innate and adaptive immune systems, as well as infection resistance, may be seriously weakened in the event of their lack. Due to age-related declines in natural defenses and severe malnutrition, particularly in the areas of micronutrients, older persons are more vulnerable to a wide range of illnesses. This tendency can be exacerbated by increased medication use, which might result in reduced appetite or food utilization. With special emphasis on vitamins and minerals, the significance of micronutrients for the appropriate operation of the innate and adaptive immune systems has been extensively studied.

The media's and hospitals' little contribution to the ongoing promotion of these components of the virus-fighting strategy is the root cause of the severe lack of Covid-19 prevention. On the other hand, since the start of the pandemic, a lot of focus has been made on the role that nutrition plays in bolstering the immune system. One example of this is the role that marine omega-3, which is often ingested in tiny amounts by the general public, plays in stimulating immunomodulation and reducing respiratory disorders, including Covid-19 [1-5]. Immunonutrition, or bolstering the immune system through dietary changes, has been demonstrated to have beneficial benefits in a number of individuals with severe respiratory diseases and respiratory infections in earlier studies. The vitamins A, B, C, D, and E were found to have beneficial effects on Covid-19.

Vitamin C

Although vitamin C is the first vitamin that comes to mind when you feel queasy, its benefits extend beyond improved immune system and skin health. Water-soluble and antioxidant, vitamin C helps the body combat free radicals and is necessary for the development of blood vessels, connective tissue, bones, and teeth. Since humans cannot produce or retain this vitamin like other animals do, it is crucial to take a daily supplement. Foods high in vitamin C include papaya, broccoli, bell peppers, Brussels sprouts, and strawberries. It is recommended to take vitamin C on an empty stomach. For men, a daily dose of 90 mg and for women, 75 mg of vitamin C is advised. Research has shown that vitamin C helps shorten cold symptoms and lessen their intensity. An almost thirty-study meta-analysis has validated this. As a potent immune system enhancer, vitamin C may also lessen or prevent illnesses brought on by bacteria, viruses, and parasites. The advantages of vitamin C, however, could only be seen by individuals who are vitamin C deficient, young people, and those with illnesses that lead to metabolic problems and low vitamin C levels.

One extremely safe chemical is vitamin C. Given that Corona has high levels of oxidative and inflammatory indicators, including hsCRP, and cytokine storm, another indicator of oxidative stress, its antioxidant action is highly potent. A study indicated that the administration of vitamin C decreased the duration of stay in the intensive care unit (ICU) and the prognosis for ventilated patients in one research including patients with severe inflammatory lung disease linked to oxidative damage and on mechanical ventilation [6-10]. According to a Chinese research, intravenous vitamin C infusions improved oxygenation status and all COVID-19 patients receiving therapy were sent home with their diagnoses. If the situation was serious, multiple doses of the infusion were administered.

Vitamin D

Due to its active form's interaction with the vitamin D receptor (VDR) on immune cell nuclei, vitamin D is also essential for immunity and mounting an active immune response. It improves innate immune responses by inducing the synthesis of broad-spectrum antimicrobial peptides, such as defensins and cathelicidins, which are effective against a variety of infections. Because it is naturally created in our skin when it is directly exposed to sunlight, it is commonly referred to as the "sunshine vitamin." While vitamin D has various benefits, the three most significant ones are enhancing bone health, promoting immune system function, and controlling calcium absorption. In addition to being connected to some forms of cancer and heart disease, a vitamin D shortage can cause bone abnormalities. These days, a lot of foods—like orange juice, milk, and morning cereals—are fortified with vitamin D. Tuna, sardines, salmon, and mackerel are examples of fatty fish that are natural sources of vitamin D. It is believed that older folks, Black people, those with a higher body mass index, and smokers are at risk for COVID-19 due to vitamin D insufficiency. Low vitamin D levels have also been linked to other immunological illnesses, including autoimmune diseases including multiple sclerosis (MS), rheumatoid arthritis, and inflammatory bowel disease.Angiotensin-converting enzyme 2 is lowered by vitamin D (ACE2). At greater concentrations, this molecule may enhance susceptibility to more severe symptoms as it functions as an entrance receptor for COVID-19 [11-15].

Another risk factor for acute respiratory distress syndrome (ARDS), a frequent and deadly COVID-19 consequence, is a vitamin D deficiency. According to a recent study, there may be a significant correlation between having low vitamin D levels in the body and having persistent COVID symptoms. Researchers are presently looking at how consuming vitamin-containing dietary supplements might lessen these symptoms. Research presented at the 25th European Congress of Endocrinology in Istanbul revealed that low levels of vitamin D in the body enhance the likelihood of experiencing protracted COVID symptoms. The results, which were written up in the journal Endocrinology and Metabolism, recommend that, in order to keep COVID-19 patients' symptoms from getting worse, people should get their vitamin D levels evaluated on a regular basis. Long COVID is a condition in which the consequences of the illness last for more than 12 weeks after the first infection with the new coronavirus, even after the virus has cleared from the body. It is also referred to as post-COVID-19 syndrome, "chronic COVID-19," or "prolonged recovery syndrome. "Extended COVID-19 symptoms might include chronic exhaustion, dyspnea, chest discomfort, recurrent headaches, arthritis, memory loss, anxiety, sadness, appetite loss, sleeplessness, and numbness in the limbs. It is believed that the virus's effects on the body's organs and immune system are what create these symptoms [16-20].

Research has indicated that between 50 and 70 percent of individuals who were previously hospitalized with COVID-19 also have this disease; nevertheless, very little is known about this illness. Low vitamin D levels are one risk factor for worse outcomes for hospitalized COVID-19 patients, such as not getting enough oxygen and needing to be on a ventilator. However, until the study, the effect of vitamin D deficiency in prolonged COVID had not been sufficiently studied. Researchers from the IRCCS San Raffaele Hospital in Milan and the University of Vita Salute San Raffaele in Italy investigated 100 individuals, some of whom were asymptomatic and others who had signs of extended COVID-19, for this study. The patients ranged in age from 51 to 70. When vitamin D levels were taken six months after release from the hospital and when patients were first hospitalized with COVID-19, it was shown that patients with long-term symptoms had lower vitamin D levels than those without. This result was especially noticeable in patients who exhibited symptoms at the six-month follow-up following discharge, such as disorientation, forgetfulness, and poor focus, which are associated with brain function. Earlier researches on the association between vitamin D and long-term COVID-19 has been inconclusive because of several other characteristics that are associ-

ated with the disease's symptoms. However, by concentrating on one aspect of the relationship—namely, how vitamin D deficiency exacerbates conditions—researchers were able to establish a correlation [21].

Researchers at the University of Chicago also found that those with low vitamin D levels have a 7% increased risk of contracting the corona virus. According to the research, individuals of African descent with low vitamin D levels are at 2.6 times higher risk of contracting an illness. This research does not imply that vitamin D guards against coronavirus infection, but it does play a critical role in immune system function and response to infection.

Covid-19 and Minerals

Selenium aids in shielding cells from overreactions to inflammation and oxidative damage. Its extended absence can make the common flu hazardous, and it has been shown that its proper integration can effectively avoid the illness. Among the several micronutrients, zinc is essential for the immune system's proper operation and possesses a unique antiviral property that can stop viruses from spreading. It has the ability to boost the effects of other micronutrients, such vitamin A, and as a result, it has anti-inflammatory and antioxidant properties that help lower the chance of contracting Covid-19 and lessen the severity of the illness.All bodily tissues and mineral enzymes include zinc, however approximately one-third of the global population lacks sufficient amounts of this element. Inadequate consumption of zinc has been associated with certain medical illnesses, such as skin diseases and cognitive problems. Moreover, immune function is compromised. A vegan diet increases the risk of zinc insufficiency since foods high in fiber and phytotates might decrease the body's ability to absorb zinc. This is also present in many stages of chronic illness. From immune cell formation onward, zinc is implicated in both innate and adaptive immune responses by maintaining the integrity of the mucosal membrane. Children's respiratory infections are decreased by zinc supplementation, which shortens colds by one day. Research is being conducted to evaluate the impact of zinc supplementation in Covid-19 patients.

Vitamin B

The eight water-soluble vitamins that make up vitamin B are basically thiamine, (B1) riboflavin, niacin, vitamin B6, and vitamin B12. These vitamins are critical for a number of metabolic activities. Even though each of these vitamins has unique activities and advantages of its own, they all work together to support a variety of body processes. In addition to aiding in the central nervous system's operation, the vitamin B complex is necessary for the conversion of glucose into the energy source that our bodies use. Fish, poultry, meat, eggs, dairy products, green leafy vegetables, fortified cereals and breads, nutritional yeast, etc. are some foods high in vitamin B complex. For COVID-19 patients, vitamin B3 supplementation may improve both innate and adaptive immunity. Larger research is necessary in light of the results of a recent experiment that shown supplementation with conventional treatment shortened recovery times in COVID-19 patients by a third.

In summary

Immunonutrition, or boosting immunity via dietary changes, has shown beneficial for a number of people suffering from respiratory infections and severe respiratory diseases. Vitamins A, B, D, C, and E were discovered to benefit COVID-19 patients by researchers. The primary concern facing the entire globe now is the prevention and treatment of corona. In recent years, coronavirus has grown to be a major worldwide issue and challenge that has raised numerous worries in the majority of countries. It is preferable to understand that boosting the body's immune system is the most effective way to avoid the corona virus, and that stress and anxiety are two things that lower the immune system's effectiveness. By boosting their immunity, even people who are infected with the coronavirus can receive treatment for it more quickly.

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