

Nutrition for Immunity against COVID-19

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Key Points:

- Nutrition, Immunity and COVID-19.
- Interrelation between Food and Immunity.
- Role of Vitamin C, Vitamin D and Zinc.

Food is the fuel needed to keep our bodies going and the source of energy required to perform countless functions that a human body has to execute for its proper functionality. In the wake of COVID-19 pandemic, the necessity to incorporate all the essential elements of food performing crucial functions is of significance. This article explains the role of nutrients to develop immunity against COVID-19.

Nutrition is about eating a healthy, balanced diet and is divided into two main categories: macro and micro. Macro nutrients are the foundation of diet and include protein, carbohydrates and fats – the vital components needed for bodily functions. Water is also said to be in the same classification by some nutritionists.¹

On the other hand, micro nutrients include vitamins and minerals, who play a significant role in proper functioning of human body. For instance, vitamins are important for immune system, production of energy and blood clotting. Growth of bones, acid-base balance, healing and utilization of vitamins & other nutrients involves the working of minerals.²

Immunity is the ability of a body to resist against any foreign agent i.e. virus, bacteria and fungi. Food being the fuel provides us enough power to enhance our immunity.³ Function of immunity of a body is to actively perform different functions on recurring basis so that in case of any foreign intrusion or disease, the defense system of the body works properly. For instance, carbohydrates are body's primary fuel, supplying

energy to muscles and central nervous system. Proteins, on the other hand, are involved in the formation of various structures like cell membrane, hair, nails, muscles, organs, bones and tendons. They further play an important role in acid-base balance and organization of enzyme & hormone system. Fats are responsible for the provision of reserve energy and aid in the absorption & transport of fat-soluble vitamins.¹

The immune system of a human body is always active, conducting surveillance and in case of infection, its activity is boosted via increased rate of metabolism that yields energy and this surge in immunity is derived from biosynthesis and regulatory molecules, which are all ultimately acquired from the diet. There are certain key vitamins and trace elements that play a critical role in improving human immune system. These include vitamins like: A, B6, B12, C, D, E, and folate. And trace elements like: copper, zinc, iron, selenium and magnesium. These are the important vitamins and minerals that are necessary to combat infections.^{3,7} It is noteworthy that the mortality rate of COVID-19 in elderly population is higher due to the fact that they are usually deficient in adaptive immunity T and B cells.⁷

Healthy diet is required for the proper development of immunity and the role of some necessary nutrients is explained in the following table.⁴

Vitamin A	Testes, prostate, epithelial barrier, and skin health	Alters immune regulation and response [14]
Vitamin B	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin C	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin D	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin E	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin K	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin B1	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin B2	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin B3	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin B6	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin B12	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin B9	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin B7	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin B5	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin B4	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin B10	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin B11	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
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Vitamin B99	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]
Vitamin B100	Epithelial barrier, skin health, and skin health	Alters immune regulation and response [14]

Figure 1

Source: researchnet.gate

When present in cells like B & T lymphocytes, **Vitamin C** causes their proliferation because of its gene regulating activities. The danger of compromised immunity and increasing risk of infection is inevitable in the case of deficient vitamin C. It is also necessary for the maintenance of wound healing and skin scavenging activity. Vitamin C supports the immune system by forming antioxidant in the skin.



Figure 2: The role of vitamin C in the immune defense.

Source: frontiersin.org

Vitamin D is another micronutrient that independently correlates with proper functioning of muscular skeleton system. It promotes not only immune function but also assists in calcium absorption and bone growth. ² In case of low serum concentration of Vitamin D, risk of prevailing diseases like diabetes, hypertension, myocardial infarction, carotid atherosclerosis, microalbuminuria, stroke, congestive cardiac failure

and kidney dysfunction is raised considerably. ⁶ Clinical trials have proven that Vitamin D has reduced the risk of infection by restraining antimicrobial peptides, defensins, and cathelicidins formations. Furthermore, the production of pro-inflammatory cytokines like: interleukin-6 (IL-6), interleukin-8 (IL-8), interleukin-12 (IL-12), interferon-gamma (IFN-γ) and tumor necrosis factor α (TNF α) that are involved in the so-called “cytokine storm” is inhibited because of Vitamin D intake which ultimately leads to the reduction of infection. ^{5, 6}

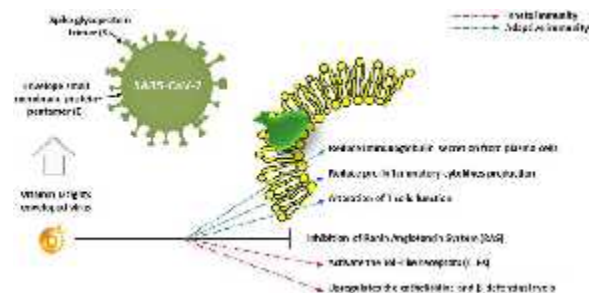


Figure 3: Effect of vitamin D on innate and adaptive immune response in COVID-19 patients.

Source: frontiersin.org

Zinc is a dietary requirement for normal development of immune function and wound healing. Zinc actively fights against invading bacteria and viruses; moreover, it stabilizes the structure of cellular proteins and also protects the cellular membrane from oxidative damage and so its deficiency is linked with raised number of reactive oxygen species (ROS) and pro-inflammatory mediators and this deficiency also affects the normal functioning of immune organs in the body. T cells don't function properly because of zinc deficiency and susceptibility of infections are raised.

Meats, poultry, eggs, seafood, beans, peas, nuts, seeds, soy products and oysters are excellent sources of Zinc. WHO in its report states that a one-third of total population is usually lacking zinc, which is also a cause of 16% respiratory disease around the globe. ⁵

Conclusion:

It is apt to conclude - based on the above stated facts - that nutrition plays a crucial role in the developing of immunity against foreign viruses. To be save from the COVID-19 it is of utmost necessity that we step up our nutrient intake to uphold our immunity at all times as "prevention is better than cure".

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