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# A Mini Review on: Coronavirus Disease (COVID-19) And Immunity Booster Green Foods

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## ABSTRACT

This review is concentrated on the use of plant based foods for increasing the immunity of all aged groups against COVID 19. In humans, corona viruses are involved in spectrum of virus that cause common cold and recently severe acute respiratory syndrome (SARS). This disease has been revealed a global pandemic by the world health organization (WHO). The people with low immune systems are most probably being affected by COVID – 19. Yet there are no vaccines or therapeutic strategies to cope up with this infection. In this situation preventive measures may be promising. Hand hygiene is key matter in preventing viral infection; however, there are other entities that can increase the immune response and helps to stop the infection. Plant based foods can boost the intestinal beneficial bacteria which are helpful and make up of 85% of the immune system. By use of plenty of water, minerals like madgnesium and zinc, micronutrients, herbs, food rich in vitamins C, D and E, and better life style one can improve their health and overcome this infection. Various studies have examined that a powerful antioxidant glutathione and a bioflavonoid quercetin may prevent various infections including COVID-19. In summation, the plant based foods play a crucial role in enhancing the immunity of people to control COVID-19.

**Key Words** *Covid-19, Immunity Booster Foods, Vitamins Rich Food*

## INTRODUCTION

The immune system plays a key role: it protects the body from harmful substances, germs and cell changes that could make you ill. Person gets ill if immune system doesn't work properly because it is weak or can't fight particularly against aggressive germs [2]. COVID-19 affects people with low immune systems and mainly people of under age and those who are elderly. The immune system is built on beneficial live bacteria that resides in gut and protects the human body from various diseases. When the immune system

response becomes weak, low or damaged, it becomes an open request for infections such as corona virus, or other diseases like diabetes, heart disease or cancer. A strong immune system could be the perfect formula to handle COVID-19. Therefore we need to boost our immunity in a way that infection doesn't harm your body. Plant based foods can increase and help the intestinal helpful bacteria, and the overall gut microbiome health which makes up to 85% of the body's immune system. On contrary, an overabundance of animal foods deplete the body from good



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bacteria, speed up inflammation, and are the fundamental cause of diabetes, chronic obstructive pulmonary disease, cardiovascular disease, hepatitis B, cancer and chronic kidney diseases<sup>1</sup>. There are few important steps that individuals can take to fight this global pandemic. It is essential to maintain hygiene standards like washing your hands frequently, especially if you have travelled by public transport. Using an alcohol sanitizer, in case you are travelling to clean your hands. Wearing a mask and avoid contact with your hand or mouth. There are also certain ways to improve immunity which is of supreme importance at this juncture. Individuals with pre-existing illness like diabetes, hypertension, cardiac vascular disease and respiratory diseases are at greater risk of having covid-19 complications, it also spreads rapidly with age as the immunity reduces as you get over age. Therefore we need to boost our immunity<sup>4</sup>. Patients of corona virus should consume plenty of water, as that will help to keep their mucous membranes wet which can further reduces the chances of cold and flu. If they do not feel that much thirst, an alternative option is they can prepare soup for them or can consume coconut water, milk, green tea, and even some handmade fruit juice will be helpful. Drink up to 8-10 glasses of water daily to prevent dehydration. Hydration will help to remove out the toxins from the body. Other options include juices made of citrus fruits and coconut water to beat the heat. There is currently no confirmation of survival of covid-19 virus in sewage of drinking water<sup>1</sup>.

Drinking water all the time is not an effective way to help prevent covid-19. The advice is that drinking every 15 minutes would wash any virus down the oesophagus so it can't enter into your lungs<sup>4</sup>. Despite of fact that drinking water does not gurantate that you would not contact corona virus, but hydration can make better your health and make sure that immune system can beat the virus if it is transferred to you. Drinking water helps the cells to get enough oxygen as cells get enough oxygen they can fight well against any infectious agents if they do and prevents them from entering the body. Thus, serve as a safeguard for body.

According to centre for disease control and preventative, hydration plays a vital role in examining body temperature. But if you have a fever and if it is a side effect of covid-19 or some other infection in the body, in that case drinking a plenty of water is really crucial. It is necessary to drink enough water, for a large number of reasons, as shown in Harvard Health report, and one of them is diminishing the risk of disease. In addition to it hydration also plays a key role in maintaining all body functions and working of organs by supplying the nutrients to all the parts of the body and reduces the infection of the body. Dryness is produced in the body due to drugs that we take for viral infections such as common col, and flu. As well as when we are sick, our body loses much of water in the form of mucus and that is the advantage that our body removes the infection caused by pathogens. Till we drink too much water, we remain hydrated and we can remove more mucus (along with germs) from our bodies.



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Until we get a cure and coronavirus vaccine, it is important to take all precautions and keep our selves healthy. In spite drinking excess of water does not ensure you would not get exposed to corona virus infection, it can be productive in reducing risk to a greater extent and can also be helpful to get recovered from illness<sup>1</sup>.

### 2. ZINC AND MAGNESIUM

Zinc is the essential mineral with a broad range of functions in human body, including supporting the function of over 300 enzymes. The most vital role of zinc is manifested in immune system. Zinc modulates proliferation, differentiation, maturation and functioning of leukocytes and lymphocytes. It vital; function is in involved in modulation of inflammatory responses. Zinc provides better antiviral activity by upregulation of interferon alpha production and thus enhancing its antiviral activity. Zinc shows anti-inflammatory activity by hindering NFKb signaling and regulation of T cell functions that may restrict cytokine storm in covid -19. Shortage of zinc often makes one susceptible to inflammatory and infectious disease including flu, cold, malaria, pneumonia, immune deficiency syndrome and other viral functions. Because zinc take part in immunity and diminished zinc status in ageing, and metabolic diseases such as diabetes, cardiovascular diseases, obesity , it is reflected that zinc compounds may be functional as supplement therapy in covid-19 by lowering inflammation, improvement of mucociliary clearance, prevention of ventilator-induced lung injury, regulation of antiviral and antibacterial

immunity. It is suggested to take zinc supplements, especially for older people. Zinc containing foods are red meat and shellfish<sup>3</sup>.

Magnesium is important mineral for our immune system. It also plays a crucial role in increasing the ability of immune system natural killer cells and lymphocytes. Magnesium helps in production of hemoglobin in our blood and is responsible for transferring of oxygen to the entire human body from our lungs, which aid in covid-19infection since the virus attacks respiratory system. Dark chocolate, black beans, avocados and whole grains are some of food rich in magnesium<sup>1</sup>.

### 3. VITAMIN D RICH FOODS

Vitamin D is a steroid hormone, which is derived internally with the effect of ultraviolet radiations on the skin or obtained from exogenous food sources or dietary supplements.

Deficiency of vitamin D is a public health problem that affects over a billion of people across whole world<sup>8</sup>. Deficiency of vitamin D affects the immune system and its functioning because vitamin D shows immunomodulatory role, enhancing innate immunity by production of antiviral peptides, which boosts mucosal defenses. In clinical investigations, stunted level of vitamin D were associated with acute respiratory tract infection together with epidemic influenza. Some recent review postulated that vitamin D deficiency may compromise respiratory immune working, enhancing the chances of covid -19 severity and death rate. There are also some retrospective studies that had checked the correlation of vitamin D levels with COVID-19 severity and death rate.



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The epidemic and rapidly spreading of SARS-CoV-2 are a global health hazard with an unstable outcome worldwide. A recent data suggested the antiviral effects of vitamin D, which can obstruct viral replication directly, and also be effective in an anti-inflammatory and immunomodulatory way. It seems that SARS-CoV-2 primarily uses immune evasion process during infection, following that hyper reaction and infusion reaction or cytokine storm in some patients, known as pathogenic process of acute respiratory disease syndrome (ARDS) development. SARS-CoV-2 enters into alveolar and intestinal epithelial cells by using angiotensin-converting enzyme 2 as the host receptor<sup>5</sup>.

Vitamin D plays an important roles in immune function. Yet, minute is known about the role of vitamin D in preventing COVID-19 infection and fatality. Some recent reviews illustrated some pathways by which vitamin D reduces the danger of microbial infection. Vitamin D shows distinct mechanisms in decreasing the risk of viral infection and mortality is reduced. To lower the chances of common cold, vitamin D uses three passages: physical barrier, cellular natural immunity, and adaptive immunity. A latest review also assisted the possible function of vitamin D in reducing the chances of COVID-19 infections and mortality. These composed of maintaining of cell junctions, and gap junctions, enhancing cellular immunity by decreasing the cytokine storm with effect on interferon  $\gamma$  and tumor necrosis factor  $\alpha$  [5]. Vitamin D upgrades cellular innate immunity in part by converting 1,25- dihydroxyvitamin D

into antimicrobial peptides like human cathelicidin, LL-37, and defensins [1]. Vitamin D is an effective immunity modulator; it stimulates responses induced by helper t cell 1, primarily by trying to terminate inflammatory cytokine production IL-2 and interferon gamma. Furthermore, it facilitates activation of T regulatory cells and thus inhibits inflammatory processes. Vitamin D supplements was also found to increase CD4+ T cell count in HIV infection.

One of the major presentation of severe SARS-CoV-2 infection is lymphocytopenia. In both the mouse models and in human cell lines, vitamin D influenced activity in lung tissue and showed protective effects on experimental interstitial pneumonitis. Several *in vitro* studies revealed that vitamin D plays a vital role in local “respiratory homeostasis” either by stimulating the production of antimicrobial peptides or by directly interfering with the replication of respiratory viruses. This is the reason that Vitamin D deficiency, be involved in ARDS and heart failure and these are the main clinical presentations of severely ill COVID-19 patients. Therefore, lack of vitamin D aids the renin-angiotensin system (RAS), which may lead to chronic cardiovascular disease (CVD) and lung function gets decreased. People with such comorbidities are at higher risk of severe ill cases in COVID-19<sup>5</sup>.

Vitamin D supplements also makes better the production of antioxidation related genes (glutathione reductase and subunit controller glutamate- cysteine ligase). The enhanced production of glutathione affords the use of

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ascorbic acid which also shows antimicrobial properties and has been advised for covid-19 prevention and treatment<sup>1</sup>.

### 4. VITAMIN C AND E RICH FOODS

Vitamin C is a vital form of improving immunity, for the kids, adults, or even older people. Fruits like oranges, papaya, kiwi, and guava are wealthy in vitamin C and should be included in diet. Besides, some vegetables like eggplant, bell peppers, beetroots, spinach, and cauliflower are higher in vitamin C and are good for boosting immunity. Green vegetables like broccoli, mushrooms, and even kale are a few that help to improve immunity and that one can include in the diet. Immune system of elder people is increased rapidly by them. Berries can also be included in the diet along with foods rich in omega-3 fatty acids which include beans, flax seeds, and even some nuts. Older people should eat Spirulina and Curcumin, as they are extremely high in vitamin C and minerals. These super foods help in boosting immunity to greater extent<sup>1</sup>. Vitamin c supplements can remarkably decrease the danger of pneumonia, the severity of disease and mortality rate in children and adults, especially when dietary intake is lesser. In three human trials, vitamin c intake was found to decrease the symptoms and timespan of common cold. As per immunomodulatory effects of vitamin cm, a heavy dose of vitamin c has been postulated to bring several outcomes in patients with severe acute respiratory syndrome due to covid-19 but no documentation has been still been printed in this regard<sup>2</sup>.

Vitamin E is essential for maintaining the overall health of older ones, including their immunity. Vitamin E is a strong antioxidant that can protect you from various infections, bacteria, and viruses. Soaked almonds, peanut butter, sunflower seeds, and even hazelnuts should be ingested to get the daily dose of vitamin E. vitamin E promotes the neutralization of free radicals by working as an antioxidant. Vitamin E a fat-soluble vitamin, is a powerful antioxidant and has the ability to modulate host immune functions<sup>1</sup>. Vitamin E insufficiency damages both humoral and cellular immunity<sup>9</sup>. On the other hand, few studies have shown that vitamin E supplementation might cause dangerous effects on the incidence of infectious disease. A study among 50–69 years old adult smokers showed that vitamin E supplementation increases the chances of pneumonia. Similarly, supplementation of vitamin E (200 IU/day) did not have a statistically important effect on lower respiratory tract infections in elderly nursing home residents. Even so positive impacts of vitamin E have been noticed in the treatment of chronic hepatitis B in a small pilot in Randomized controlled trials (RCT), where a significantly higher regulation of liver enzymes and HBV-DNA negativization, was remarked in the vitamin E group. Comparable results have been noticed in a RCT in the pediatric population, where vitamin E treatment resulted in raised anti-HBe seroconversion and virological response<sup>6</sup>.



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### 5. LIFESTYLE

Psychologic stress can cause immune suppression in healthy people. Researches have explained that psychologic stress can convert Th1 cytokines toward Th2 cytokine and reduces the activity of natural killer (NK) cells. In addition to it, reduced CD4+ to CD8+ T ratio and decreased response to vaccines and low antibodies titer occur in stress. As a result, stress can elevate the



chances for upper respiratory tract infections and can worsen mucosal herpes<sup>[2]</sup>. Tension negatively change the immune system responses within the body<sup>[11]</sup>. Staying away from the social website and TV is also very vital in letting one's mind to be stress free from the world a bit<sup>1</sup>. Sleep has a greater impact on the immune system, gives the body a chance to heal and rest, particularly in critical illnesses. Moreover, sleep was considered very vital by doctors in the recovery of their patients during the Spanish Flu Pandemic<sup>1</sup>. Exercising helps to increase the levels of leukocytes and immunoglobulin that fight off infections and also helps to reduce stress hormones<sup>10</sup>. Exercise can also help in stoppage of formation of blood clots, which have been symptom for some people who contacted COVID-19<sup>1</sup>. Malnutrition is one of the most common cause of secondary immune insufficiency.

Appropriate diet is vital in strengthening the immune system<sup>2</sup>. Eating a well-balanced, healthy diet and avoid eating junk food is vital to control overall health, as well as to regulate immune functions. Eat fresh food as possible. Make sure to eat sufficient amount of protein<sup>1</sup>.

### 7 ANTIOXIDANTS

Glutathione is a strong antioxidant in the body, it removes harmful free radicals and function in tissue repair and construct chemicals and proteins that are used for the immune system. N-Acetylcysteine, or NAC, assists the formation of glutathione and is also used as a supplement. Studies in animal models of other viral infections have manifested that NAC decreases the severity and time span of symptoms by enhancing cellular safeguarding and repair. NAC is taken in doses of 500-600 mg. Glutathione can be taken orally 500 mg or by IV 400–2400 mg under supervision of doctor.

Quercetin is a bioflavonoid found in a diversity of fruits and vegetables. Animal and laboratory studies have revealed that quercetin can hinder a wide variety of virus infections including a COVID-19-related coronavirus SARS COV2. Quercetin shows antioxidant property and thus lung tissue remains safe. As a supplement, it is combined with vitamin C, bromelain is sold as a single supplement. It is advised to take 500 and 1000 mg daily Major sources are leafy green vegetables, dill, peppers, apples, grapes, fennel leaf, red onion, oregano, chili pepper, green tea, and black tea<sup>[1]</sup>.



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### 8. PROBIOTICS

The most commonly used probiotics are bifidobacterium and lactobacillus species, then after streptococcus, enterococcus, bacillus and Escherichia coli. Probiotics not only support the health of the gut but also increases immune system functioning and regulation. It is observed that gut microbiome provides impacts immune system responses as well as local immune responses at distal mucosal sites, including lungs. Consumption of bifidobacterium and lactobacillus species, have found to helpful in clearing influenza virus in respiratory tract <sup>[7]</sup>. probiotics can increase IgA- secreting cells in respiratory and gastrointestinal mucosa. This secreted antibodies provides immunity against some pathogens. These food supplements enhance short chain fatty acids with anticancer, antioxidant and anti-inflammatory effects. Till date, there is a strong evidence for the efficacy of probiotics in prevention of respiratory infections <sup>[2]</sup>.

### CONCLUSION AND FUTURE PERSPECTIVE

People with low immunity are highly susceptible for this global pandemic named as covid 19. To enhance our immune functioning, plant based foods play a vital role by assisting beneficial bacteria in the body. Vitamins like C, D and E are play a vital role in boosting immunity. Fruits like oranges, papaya, kiwi, and guava are wealthier in vitamin c, while vegetables like eggplant, bell peppers, beetroots, spinach and cauliflower are

also plentiful in vitamin c. Green vegetables like broccoli, mushrooms and even kale are few immunity enhancers that helps to boost the immune system of elderly people quite quickly. The most vital preventive measure against microbial agents is hand hygiene, it is also likely that some other measures can boost immune system. Upcoming aspects of this for more research which is needed remarkably on physical behaviors or exercises and their part in immunity related issue thus preventing covid-19. More research is needed to know about the actions of corona virus and role of food in its prevention. Immunity enhancing food combinations should be studied in which one can know how combinations helps to boost our immune system. In nut shell, green food are vital against novel coronavirus by increasing the immunity of all aged groups <sup>[1]</sup>.



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