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Immunity Booster Supplements to Fight against Viral Infection with Prominence on COVID-19: An Review

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Abstract

Balanced diet which can help in maintaining or boosting immunity is essential for prevention and management of viral infections. While data regarding supplement in novel corona virus 2019 infection (COVID-19) are not available, in this review, we aimed to evaluated evidence from previous clinical trials that evaluated nutrition-based interventions for viral diseases (with special emphasis on respiratory infections), and tried to summaries our observations. Among vitamins, A, C and D showed a potential benefit, especially in deficient populations. Among minerals, selenium and zinc have also shown favourable immunity enhancing effects in viral respiratory infections. Several nutraceuticals, medicinal plants and probiotics may have some role in enhancing immune functions. In current review we summaries possible benefits of some vitamins, minerals, nutraceuticals, medicinal plants and probiotics. Nutrition principles based on these data could be useful in possible prevention and management of COVID-19.

Keywords: Coronavirus infection (COVID-19), immunity, Vitamins, Minerals, Medicinal plants, Probiotics.

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Introduction

With the 2019 corona virus COVID-19 pandemic, it's especially important to understand that no supplement, diet, or other lifestyle modification other than physical distancing, also known as social distancing,

and proper hygiene practices can protect any person from COVID-19. Currently, no research supports the use of any food supplement to protect against COVID-19 specifically. Our immune system consists of a complex collection of cells, processes, and chemicals that constantly defends body against invading pathogens, including viruses, toxins, and bacteria. 'Keeping our immune system healthy year-round is key to preventing infection and disease'. Making healthy lifestyle choices by consuming nutritious foods and getting enough sleep and exercise are the most important ways to boost our immune system.

In addition, research has shown that supplementing with certain vitamins, minerals, herbs, and other substances can improve immune response and potentially protect against illness.

Supplementing Immunity

A good strategy is to selectively increase nutrients that may be lacking in our climate and in diet. Vitamin D, for instance, is likely to be low in individuals who live in northern climates with less sunlight. For normal levels, a daily supplement of about 600 to 800 IU of vitamin D is suggested, but with lower levels, a medical consultation is advisable. Since this is a fat-soluble vitamin, it should be taken with fatty foods to maximize the absorption. A healthy sprinkle of herbs like garlic, ginger, rosemary, oregano, and turmeric will also introduce natural anti-inflammatory compounds, which also help to fend off respiratory viruses.

(Anonymous; 02/06/2020)

Improve Diet

The food eaten plays a key aspect in determining overall health and immunity. Eat low carbohydrate diets, as this will help control high blood sugar and blood pressure. A low carbohydrate diet will help slow down diabetes and focus on a protein-rich diet to keep in good shape to any human. And regularly consume vegetables and fruits rich in Beta carotene, Ascorbic acid and other essential vitamins. Certain foods like mushrooms, tomato, bell pepper and green vegetables like broccoli, spinach are also good options to build resilience in the body against pathogenic infections.

In diet daily includes supplements rich in omega 3 and 6 fatty acids, if stepping out to buy groceries is not an option during social distancing. Some natural immunity supplements include ginger, gooseberries (amla) and turmeric. Some of these super foods are common ingredients in Indian dishes and snacks. There are several herbs that help in boosting immunity like garlic, Basil leaves and Black cumin. Certain seeds and nuts like sunflower seeds, Flax seed, pumpkin seeds and

melon seeds are excellent sources of protein and vitamin E.

Probiotics like Yoghurt, Yakult and fermented food are also excellent sources to rejuvenate the composition of gut bacteria, which is important for nutrient absorption by the body. These are good options for the older generation too in these pandemic days (Anonymous; 30/05/2020).

Here are some key nutrients that play a role in immunity boosting;

Immunity-Boosting Vitamins Minerals

For supporting immune system, one can eat immunity supporting foods rich in vitamins like citrus fruits, broccoli, and spinach. It can be helpful to supplement with key vitamins and minerals that may have become depleted like Vitamin C, Vitamin B, Vitamin D, and Zinc (Anonymous; 03/06/2020).

Vitamin D

Vitamin D is a fat-soluble nutrient essential to the health and functioning of immune system. Vitamin D regulates the production of a protein that selectively kills infectious agents, including bacteria and viruses. Vitamin D enhances the pathogen-fighting effects of monocytes and macrophages — white blood cells (WBC) that are important parts of immune defense — and decreases inflammation, which helps promote immune response. Specifically, Vitamin D alters the activity and number of WBC, known as T 2 killer lymphocytes, which can reduce the spread of bacteria and viruses.

Many people are deficient in this important vitamin, which may negatively affect immune function. In fact, low vitamin D levels are associated with an increased risk of upper respiratory tract infections, including influenza and allergic asthma. Some studies show that supplementing with vitamin D may improve immune response. In fact, recent research suggests that taking this vitamin may protect against respiratory tract infections. In a 2019 review of randomized control studies in 11,321 people, supplementing with vitamin D significantly decreased the risk of respiratory infections in people deficient in this vitamin and lowered infection risk in those with adequate vitamin D levels. This suggests an overall protective effect. Other studies note that vitamin D supplements may improve response to antiviral treatments in people with certain infections, including hepatitis C and HIV.

Depending on blood levels, anywhere between 1,000 and 4,000 IU of supplemental vitamin D per day is sufficient for most people, though those with more serious deficiencies often require much higher doses (Anonymous-2; 02/06/2020 and Martin Hewison; 2012).

Vitamin C

Vitamin C increases blood levels of antibodies and helps to differentiate lymphocyte (white blood cells), which helps the body, determine what kind of protection is needed. Some research has suggested that higher levels of vitamin C (at least 200 mg) may slightly reduce the duration of cold symptoms. One can easily consume 200 mg of vitamin C from a combination of foods such as oranges, grapefruit, kiwi, strawberries, Brussels sprouts, red and green peppers, broccoli, cooked cabbage and cauliflower. Vitamin C is perhaps the most popular supplement taken to protect against infection due to its important role in immune health.

This vitamin supports the function of various immune cells and enhances their ability to protect against infection. It's also necessary for cellular death, which helps keep your immune system healthy by clearing out old cells and replacing them with new ones. Vitamin C also functions as a powerful antioxidant, protecting against damage induced by oxidative stress, which occurs with the accumulation of reactive molecules known as free radicals. Oxidative stress can negatively affect immune health and is linked to numerous diseases. Supplementing with vitamin C has been shown to reduce the duration and severity of upper respiratory tract infections, including the common cold (Anonymous-2; 02/06/2020 and Pavlovic, V. *et al.*, 2011).

A large review of 29 studies in 11,306 people demonstrated that regularly supplementing with vitamin C at an average dose of 1–2 grams per day reduced the duration of colds by 8% in adults and 14% in children. Interestingly, the review also demonstrated that regularly taking vitamin C supplements reduced common cold occurrence in individuals under high physical stress, including marathon runners and soldiers, by up to 50% (Douglas RM., *et al*., 2005).

Additionally, high dose intravenous vitamin C treatment has been shown to significantly improve symptoms in people with severe infections, including sepsis and acute respiratory distress syndrome (ARDS) resulting from viral infections.

Still, other studies have suggested that the role of vitamin C in this setting is still under investigation. All in all, these results confirm that vitamin C supplements may significantly affect immune health, especially in those who don't get enough of the vitamin through their diet. The upper limit for vitamin C is 2,000 mg. Supplemental daily doses typically range between 250 and 1,000 mg.

Vitamins B complex

B vitamins, including B12 and B6, are important for healthy immune response. Yet,

many adults are deficient in them, which may negatively affect immune health.

Vitamin A

Beta carotene gets converted to vitamin A, which is essential for a strong immune system. It works by helping antibodies respond to toxins and foreign substances. Good sources of beta carotene include sweet potatoes, carrots, mangoes, apricots, spinach, kale, broccoli, squash and cantaloupe.

Zinc

Zinc helps cells in your immune system grow and differentiate. One meta-analysis revealed that zinc supplements may shorten the duration of symptoms of the common cold (Hemila, H. *et al.*, 2016). However, it concluded that "large high-quality trials are needed" before definitive recommendations can be made.

Sources of zinc include beans, chickpeas, lentils, tofu, fortified cereals, nuts, seeds, wheat germ, oysters (including canned), crab, lobster, beef, pork chop, dark meat poultry and yogurt.

Zinc is a mineral that's commonly added to supplements and other healthcare products like lozenges that are meant to boost your immune system. This is because zinc is essential for immune system function. Zinc is needed for immune cell development and communication and plays an important role in inflammatory response. A deficiency in this nutrient significantly affects your immune system's ability to function properly, resulting in an increased risk of infection and disease, including pneumonia. Zinc deficiency affects around 2 billion people worldwide and is very common in older adults. In fact, up to 30% of older adults are considered deficient in this nutrient. Numerous studies reveal that zinc supplements may protect against respiratory tract infections like the common cold.

In a 2019 study in 64 hospitalized children with acute lower respiratory tract infections (ALRIs), taking 30 mg of zinc per day decreased the total duration of infection and the duration of the hospital stay by an average of 2 days, compared with a placebo group. Supplemental zinc may also help reduce the duration of the common cold. Taking zinc long term is typically safe for healthy adults, as long as the daily dose is under the set upper limit of 40 mg of elemental zinc.

Excessive doses may interfere with copper absorption, which could increase your infection risk (Anonymous-2; 02/06/2020).

Selenium

Selenium is a mineral that's essential for immune health. Animal research demonstrates that selenium supplements may enhance antiviral defense against influenza strains, including H1N1 (Anonymous-2; 02/06/2020).

Table 1: Some Sources for Vitamins and Minerals

Vitamins or Minerals	Sources
Vitamin D	Eggs, Cheese, Tofu and Mushrooms
Vitamin C	Oranges, Grapefruit, Kiwi, Lemon, Strawberries, Brussels Sprouts, Red and Green Peppers, Broccoli, Cooked Cabbage and Cauliflower.
B complex vitamins	Meat (Especially Liver), Seafood, Poultry, Eggs, Dairy Products, Legumes, Leafy Greens Vegetables, Seeds and Fortified Foods, Such As Breakfast Cereal and Nutritional Yeast.
Vitamin A	Sweet Potatoes, Carrots, Mangoes, Apricots, Spinach, Kale, Broccoli, Squash and Cantaloupe
Zinc	Beans, Nuts, Cereal and Seafood
Selenium	Whole grains and dairy products, including milk and yogurt, Pork, beef, turkey, chicken, fish, shellfish, and eggs

Medicinal Mushrooms

Medicinal mushrooms have been used since ancient times to prevent and treat infection and disease. Many types of medicinal mushrooms have been studied for their immune-boosting potential. Over 270 recognized species of medicinal mushrooms are known to have immune-enhancing properties. Cordyceps, lion's mane, maitake, shitake, reishi, and turkey tail are all types that have been shown to benefit immune health. Some research demonstrates that supplementing with specific types of medicinal mushrooms may enhance immune health in several ways, as well as reduce symptoms of certain conditions, including asthma and lung infections.

Aside from the items listed above, many supplements basically from medicinal plants may help improve immune response:

Astragalus- Astragalus (*Astragalus propinquus*) is an herb commonly used in Traditional Chinese medicine (TCM). Animal research suggests that its extract may significantly improve immune-related responses.

Garlic- Garlic (*Allium sativum*) has powerful anti-inflammatory and antiviral properties. It has been shown to enhance immune health by stimulating protective white blood cells like NK cells and macrophages. However, human research is limited.

Andrographis- Andrographis (*Andrographis paniculata*) This herb contains andrographolide, a terpenoid compound found to have antiviral effects against respiratory-disease-causing viruses, including enterovirus D68 and influenza A.

Licorice- Licorice (*Glycerrhiza glabra*) contains many substances, including glycyrrhizin, that may help protect against viral infections. According to test-tube research, glycyrrhizin exhibits antiviral activity against

severe acute respiratory-syndrome-related coronavirus (SARS-CoV).

***Pelargonium sidoides*-** Some human research supports the use of this plant's extract for alleviating symptoms of acute viral respiratory infections, including the common cold and bronchitis. Still, results are mixed, and more research is needed.

Curcumin- Curcumin is the main active compound in turmeric. It has powerful anti-inflammatory properties, and animal studies indicate that it may help improve immune function

Echinacea- Echinacea is a genus of plants in the daisy family. Certain species have been shown to improve immune health and may have antiviral effects against several respiratory viruses, including respiratory syncytial virus and rhinoviruses (56Trusted Source).

Propolis- Propolis is a resin-like material produced by honeybees for use as a sealant in hives. Though it has impressive immune-enhancing effects and may have antiviral properties as well, more human research is needed.

Elderberry-Elderberries are full of nutrients including minerals like phosphorus, potassium, iron, copper and vitamins, such as vitamin A, B, and C, proteins and dietary fibre. Elderberries have antibacterial and antiviral qualities which help fight cold and influenza (Anonymous; 01/06/2020). Apart from above supplements, **Protein** is a key building block for immune cells and antibodies and plays a crucial role in helping our immune system do its job. Protein comes from both animal and plant-based sources and includes fish, poultry, beef, milk, yogurt, eggs and cottage cheese, as well as nuts, seeds, beans and lentils. Probiotics and prebiotics also boost the health of the microbiome, which in turn supports our immune system. Sources of probiotics include fermented dairy foods such as yogurt and kefir, and aged cheeses, as well as fermented foods such as kimchi, sauerkraut, miso, tempeh and sourdough bread. Sources of prebiotics include whole grains, bananas, onions, garlic, leeks, asparagus, artichokes and beans (Anonymous; 31/05/2020).

Apart from maintaining a healthy lifestyle, includes immunity booster in diet i.e. taking supplements, the Indian health ministry is also suggesting few organic and natural ways to practice as preventive measures to fight COVID-19. The Ministry of AYUSH has recommended the following self-care guidelines as preventive measures and to boost immunity with special reference to respiratory health (Anonymous-3; 02/06/2020).

1. Drink warm water throughout the day.

2. Practice Meditation, Yogasana, and Pranayama.

3. Increase the intake of Turmeric, Cumin, Coriander and garlic.

4. Drink herbal tea or decoction of Holy basil, Cinnamon, Black pepper, Dry Ginger and Raisin.

5. Avoid sugar and replace it with jaggery if needed.

6. Apply Ghee (clarified butter), Sesame oil, or Coconut oil in both the nostrils to keep the nostrils clean.

7. Inhale steam with Mint leaves and Caraway seeds.

Conclusion

Many supplements on the market may help improve immune health. Zinc, elderberry, and vitamins C and D are just some of the substances that have been researched for their immune-enhancing potential. However, although these supplements may offer a small benefit for immune health, they should not and cannot be used as a replacement for a healthy lifestyle. Maintaining a balanced diet, getting enough sleep, engaging in regular physical activity, and not smoking are some of the most important ways to help keep your immune system healthy and reduce your chances of infection and disease. Moreover, remember that there's no scientific evidence to suggest that any of them can protect against COVID-19 — even though some of them may have antiviral properties. This supplement one can take for improving immunity and not for treatment against COVID-19.

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