

# Immunity boosting nutraceuticals and dietary supplements in prevention of covid 19

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**Abstract** - COVID-19 was first reported in December 2019 in Wuhan, China. Transmission of the virus happens through human contact via the infected droplets of the COVID-19 patients while performing actions such as talking, sneezing, coughing. Peoples with weak immunity easily affected by COVID-19 infection. Nutraceuticals are non-specific biological therapies used to support wellness, prevent malignant processes and control the diseases. Nutraceutical and dietary supplements modify the metabolism or mechanism of the pathogens, thus restricting the replication and production process of the virus. This review article discuss about vitamins, minerals, fruits, herbs as nutraceuticals and dietary supplements in prevention and control of COVID-19 disease.

**keywords** - Vitamins, fruit, Covid 19.

## INTRODUCTION:

COVID-19 was first reported in December 2019 in Wuhan, China. Symptoms of covid-19 disease vary from patient to patient. Sometimes it may be asymptomatic. Transmission of the virus happens through human contact via the infected droplets of the COVID-19 patients while performing actions such as talking, sneezing, coughing. Common symptoms include fever, dry cough and fatigue, nausea or vomiting, muscle or joint pain, sore throat, loss of sense of smell or taste or both, nasal congestion, head ache and diarrhoea but in acute cases, the diseases can lead to severe shortness of breath, hypoxia and death<sup>[1]</sup> (figure1). Patient with diabetes mellitus, cardiac diseases and respiratory disease who are affecting by covid 19 due to lack of immunity. Elderly peoples are also affecting by COVID-19 because of the poor immunity. Therefore, it is significant to boost our immune system. Apart from vaccines (covishield and covaxin), nutraceutical and dietary supplements used as an adjuvant therapy for prevention of COVID-19

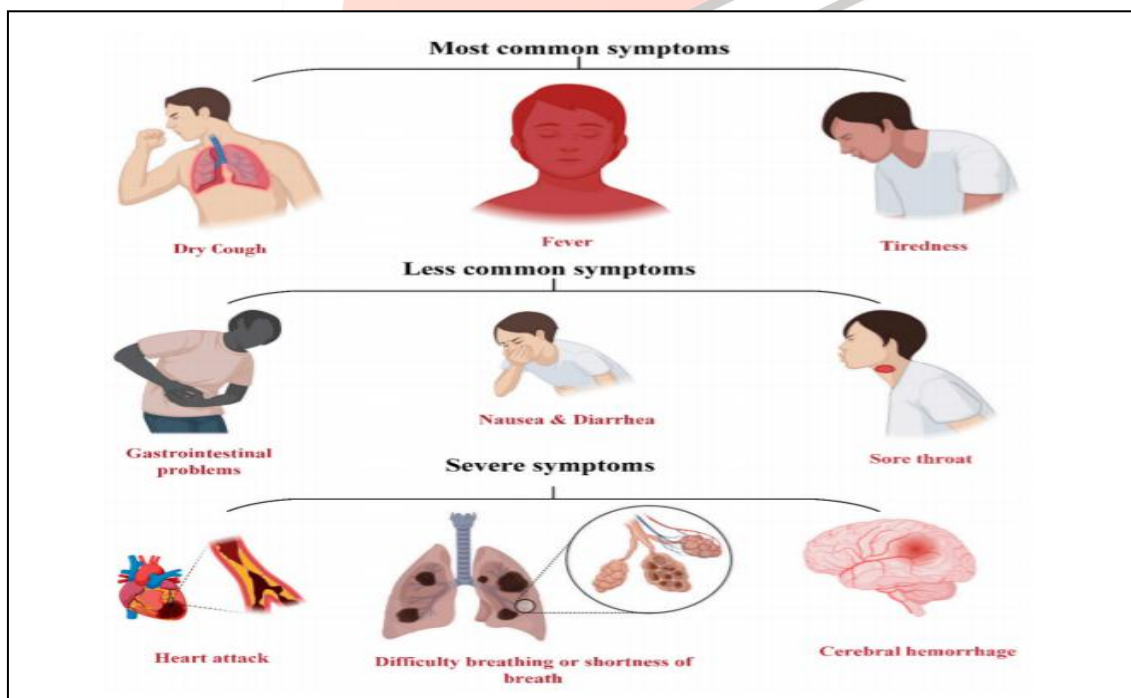


Figure no.1.Minor and Major Symptoms of COVID-19

## CONCEPT OF NUTRACEUTICAL

Nutraceutical defined as any substance that may be considered a food or part of food and provide medical and health benefits including the prevention and treatment of diseases. Nutraceutical play positive role in enhancing health and improving immune function to prevent specific diseases <sup>[2]</sup>.

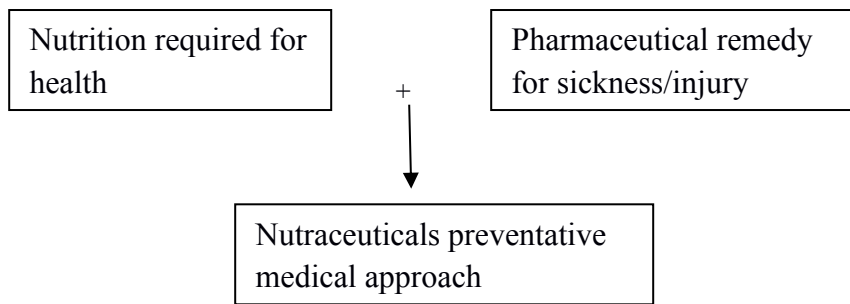


Figure 2. Concept of Nutraceuticals

CLASSIFICATION OF NUTRACEUTICAL

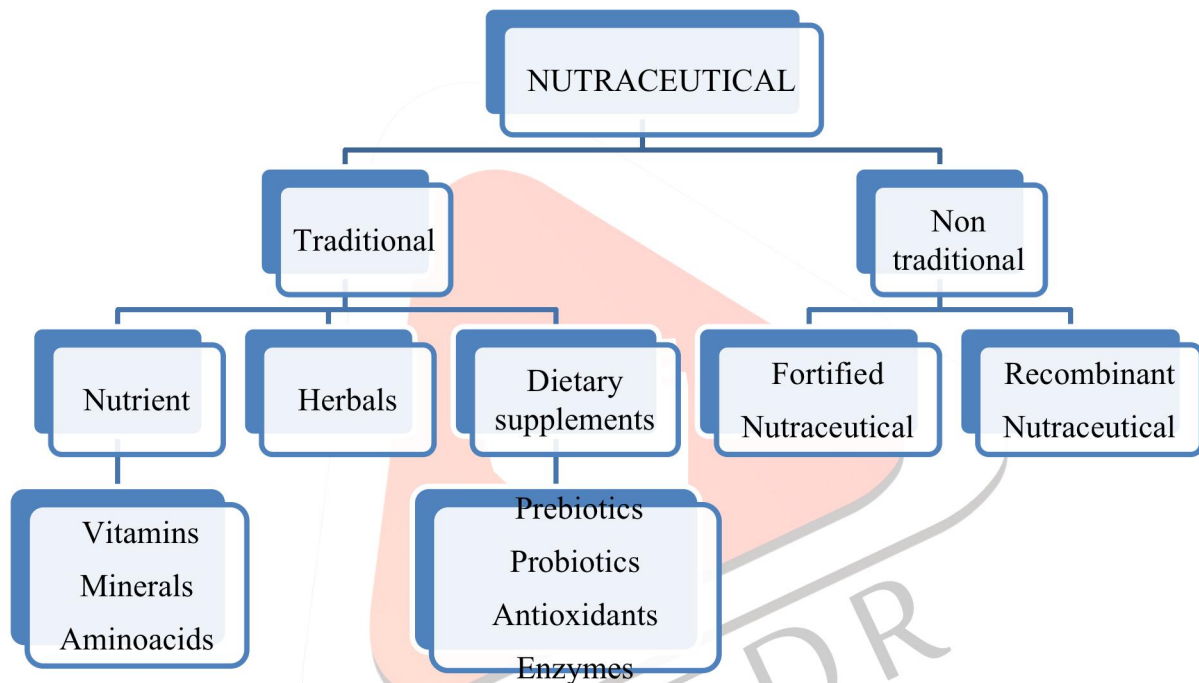


Figure no. 3. Classification of Nutraceuticals

ROLE OF IMMUNITY BOOSTING NUTRIENTS IN COVID-19 PREVENTION

**Vitamin A**

Vitamin A belongs to the family of retinyl-esters and is also known as retinoic acid (RA) which controls the various genes involved in innate and adaptive immune responses. Vitamin A acts as T-cell effectors, facilitating adaptive and innate immunity. It acts on MERS-CoV and SARS-CoV through interruption of lipogenic pathways. The main functions of vitamin A are helping in visions, providing immunity, contributing in gene expression, etc. Vitamin A is required for immune cell maturation and functioning as boosting the immune system is the main focus to prevent the spread of COVID-19. Deficiency of vitamin A may impair barrier functions and immune response<sup>[3]</sup>.

**Vitamin B**

Vitamin B complex is a rich set of vitamins (thiamine [B1], riboflavin [B2], niacin [B3], pantothenic acid [B5], pyridoxine [B6], biotin [B7], folate, or folic acid [B9], cyanocobalamin [B12]) that performs various functions in body regulation. Vitamin B2 along with UV radiations was used to reduce the viral load in MERS-CoV. Vitamin B1 and B3 induces the production of some or all of IL-1 $\beta$ , IL-1, IL-6, COX-2, and TNF- $\alpha$ . Vitamin B3 is used in the treatment of lung inflammation. Vitamin B6 is related to humoral and cell-mediated immunity. Vitamin B12 acts as an immunomodulator<sup>[4]</sup>.

**Vitamin C**

Vitamin C also known as ascorbic acid which possesses antioxidant and immune modulatory property<sup>[5]</sup>. Vitamin C can potentially protect against infection due to its essential role on immune health. This vitamin supports the function of various immune cells and enhances their ability to protect against infection. Supplementing with vitamin C has been shown to reduce the duration and severity of upper respiratory infections (most of which are assumed to be due to viral infections), including the common cold. Clinical trials are being carried out with a combinatorial treatment of vitamin C along with other substances such as quercetin, Vitamin D and zinc in different formats (IV or Oral dosages) to treat COVID 19.

**Vitamin D**

Vitamin D has become a leading prophylactic and therapeutic candidate against SARS-CoV-2. Vitamin D can modulate both the adaptive and innate immune system and is associated with various aspects of immune health and antiviral defence<sup>[6]</sup>. Vitamin D can be sourced through diet or supplementation, but it is mainly biosynthesized by the body on exposure to ultraviolet light (UVB) from sunlight. Vitamin D deficiency is associated with an increased susceptibility to infection<sup>[7]</sup>. In particular, vitamin D deficient patients are at risk of developing acute respiratory infections and ARDS. 1, 2, 5-dihydroxyvitamin D3 is the active form of vitamin D that is involved in adaptive and innate responses.

**Vitamin E**

Vitamin E plays a crucial role in regulating and supporting immune system function as a potent antioxidant which made up of tocopherols and tocotrienols. They are important role in the protection of influenza like infections. Vitamin E along with vitamin C synergistically shows many health benefits. They act as antioxidants and reduce the oxidative stress. Vitamin E regulates the innate and adaptive immune system by increasing the NK, B, T immune cells it.










**ZINC**


Zinc is considered as a supportive treatment therapy as it has direct antiviral effects. It is found that zinc supplementation may have positive effects in the treatment of COVID-19 patient<sup>[8]</sup>. Zinc deficiency can cause loss of T helper cells and also responsible for atrophy of thymus and spleen.

**SELENIUM**

Selenium has important effect on both innate and acquired immunity. Selenium enhances the function of T lymphocyte and B lymphocyte and also increases the activity of natural killer cell<sup>[9]</sup>. A study found that selenium supplementation improved immune function in the human body [21]. The common sources of selenium are fish, meat, egg and nuts. Supplementation of selenium also has some adverse effects on the body<sup>[10]</sup>.

**ROLE OF IMMUNITY BOOSTING FRUITS IN COVID 19 PREVENTION**

S.no	Name	Biological source	Active ingredients	Image
1	Apple	Malus domestica (Rosaceae)	Vitamin A, vitamin C, short chain fatty acids as prebiotic	
2	Dates	Phoenix dactylifera (Palmaceae)	Vitamin A, flavonoids, iron	
3	Lemon	Citrus limon (Rutaceae)	Carotenoids, ascorbic acid, zinc	
4	Muskmelon	Cucumis melo (Cucurbitaceae)	Caffeic acid, ferulic acid, minerals (B, Ca, K, Se, Zn)	
5	Orange	Citrus sinensis (Rutaceae)	Vitamin C, vitamin E	
6	Papaya	Carica papaya L (Caricaceae)	Ascorbic acid, papain, proteolytic enzymes	
7	Pear	Pyrus communis L (Rosaceae)	Vitamin C, zinc, iron, chlorogenic acid	
8	Pine apple	Ananas comosus L (Bromeliaceae)	Vitamin C, bromelain, flavonoids, malic acid	
9	Strawberry	Fragaria ananassa (Rosaceae)	Vitamin C, ellagic acid, procyanidins	

10	Watermelon	Citrullus lanatus (Cucurbitaceae)	Vitamin C, L-citrulline, minerals (Mg, Ca, Zn, Cu, K)	
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**Table no.1.Immunity boosting fruits.**

**ROLE OF IMMUNITY BOOSTING HERBS IN COVID 19 PREVENTION**

**Tulsi (Ocimum sanctum)**



r4a This herb is loaded plenty of with vitamin C, antioxidants, antiseptic and antiviral properties. Tulsi has been used as a natural hand sanitizer due to its anti-microbial activities. One of the most common home remedies for the common cold or sore throat is Tulsi tea. Tulsi can help to strengthen the respiratory system due to the effects it has on the chemical changes in the body. The crude extract and terpenoid isolated from the leaves of Ocimum sanctum have shown promising antiviral properties against the H9N2 virus<sup>[11]</sup>.



**Neem (Azadirachta indica)**

Neem is known as free tree of india as it is found almost every where in india.it is considered as a magic tree which helps to boost your immune system while cooling down your body internally.it boosting both the lymphocytic and cell mediated immune system<sup>[12]</sup>.



**Amla (Phyllanthus Emblica)**

It helps detoxify the entire organ system for better health and immunity<sup>[13]</sup>. Amla fruits are reputed to contain high amounts of vitamin C (Ascorbic acid). Multiple studies have shown significant increase in white blood counts.

**Turmeric (Curcuma longa)**

Curcumin is one of the active constituents of turmeric which extracted from turmeric root and sold as a popular dietary supplement. Turmeric is known for its abundance of anti-inflammatory effects. Curcumin is a potent immunomodulatory agent and has been known to be highly effective as a treatment. Curcumin has been shown to inhibit the replication of some types of viruses, including the dengue virus and hepatitis B<sup>[14]</sup>.

**Ginger(Zingiber officinale)**



The potential of few bioactive compounds ,namely gingeroneA,gingerol,geraniol,shogaol,Zingiberone,zingiberenol and zingerone from ginger as anti-SARS CoV 2for their interaction to spike and main protease (Mpro) protein based on molecular docking study. They found that the bioactive compounds of ginger block the spike(s) protein from binding to the Angiotensin converting enzyme 2 (ACE 2 ) receptor or act as an inhibitor for Mpro. The spike protein is one of SARS CoV 2's protein responsible for viral entry during the infection process. it will bind with ACE2 receptor from the host cell to create a suitable habitation for viral replication.



#### **Ashwagandha (*Withania somnifera*)**

Ashwagandha improves the body's defence against disease by improving the cell mediated immunity .it also possesses potent antioxidant properties that help protect against cellular damage caused by free radicals.



#### **Black pepper (*Piper nigrum*)**

*Piper nigrum* has been extensively explored for its biological properties and its bio-active Phyto-compounds. It is crammed with antibacterial and anti-inflammatory properties, which keep infections at bay and also provide relief from the discomfort. It is used for both human and veterinary medicine in India for menstrual and ear nose-throat Patiletal Natural immunity booster for COVID19disorders in human and gastrointestinal disorders. It is also reported with antioxidant effects and helps in dealing with some throat ailments.



**Garlic (*Allium sativum*)**

The presence of organo sulfur compounds(OSCs) in garlic such as llicin, S–(allyl/methyl/ethyl/propyl)–cysteine, S-allylmercaptocysteine were considered as possible constitutes to inhibit the M pro of SARS- Cov- 2 trough H-bonds with this protease. Molecular docking analysis showed that allicin among other OSCs has higher antiviral potential to prevent COVID-19.



**Drumstick (*Moringa oleifera*)**

Moringa contains more than 90 nutrients and 46 types of antioxidants and is very effective to overcome various physiological disorders. It leaves contains seven times more vitamin C than oranges which need to our body for build a strong immunity in COVID-19 prevention.

**MARKET AVAILABLE IMMUNITY BOOSTING NUTRACEUTICALS**

S.NO	BRAND NAMES	PRODUCTS
1	Dabur	Chyawanaprash awaleha, Giloy churna/tablets, Haldi drops, Ashwagandha tablets, Tulsi drops and amla juice
2	Himalaya	Amalaki tablet and Gudichi tablets
3	Zandu	Ayush kwath powder ,Amla+5 herbs juice and giloy capsules
4	Others	Nutra Gmine C+, Himalayan organics natural immunity boosting powder, Orgovibe organic tablets and Immuntrex capsules.

**CONCLUSION:**

From this review, it has been concluded that the Immune system play a significant role in prevention of many diseases in the body and fight against many microorganism such as bacteria, virus, fungi. People with weak immune system who affected by covid 19 infections. So immunity boosters are gain greater important around the world. There are so many nutraceuticals and dietary supplements act as a immunity boosters and helps to prevention of covid 19 infections.

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