



**A REVIEW PAPER ON BOOSTING IMMUNITY IS ESSENTIAL TO FIGHT COVID-19 BATTLE**

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**ABSTRACT**

Current situation depicts that the whole world has been seized by COVID-19 pandemic. SARS CoV-2, highly infectious causative agent of this disease is transmitted through droplets, contact routes and aerosols. Health infrastructure of all Nations experiencing difficulty to limit its spread and the disease is still spreading at an alarming rate. Since December, 2019, coronavirus, SARS-CoV-2 (COVID-19) have come into existence and up till now world is still in the state of shock. The unabated transmission is due to lack of drugs, vaccines and therapeutics against this viral outbreak. But research is still underway to formulate the vaccines or drugs by this means. So there has been a lot of interest in ways to boosting our immune system, and thus build a first line of defence against the deadly virus. Therefore, the medicinal plants and herbs playing a critical role to boosting our immunity during the COVID-19 pandemic. The present review discusses the vital concepts related to COVID-19, in terms of its origin, transmission, clinical aspects and some allopathic and herbal immunity boosters.

**KEYWORDS:**

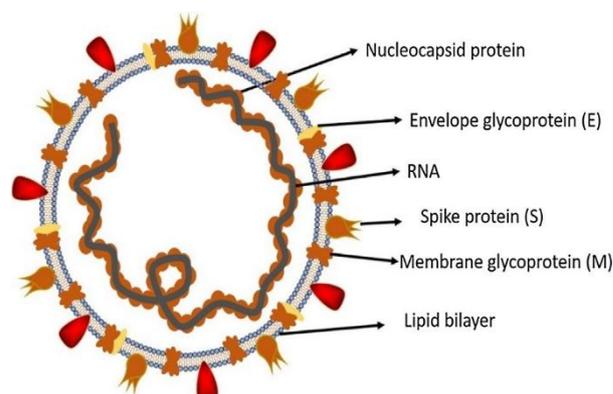
**INTRODUCTION<sup>[1-3]</sup>**

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness. The best way to prevent and slow down transmission is to be well informed about the COVID-19 virus, the disease it causes and how it spreads. Protect yourself and others from infection by washing your hands or using an alcohol based hand sanitizer to rub frequently and not touching your face. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes, so it's important that you also practice respiratory etiquette (for example, by coughing into a flexed elbow).

**Comparative Analysis of Emergence and Spreading of Corona Viruses<sup>[4,5]</sup>**

In 2003, the people from Guangdong province, China were infected with a virus causing severe acute respiratory syndrome (SARS). The virus was found as a member of the Beta-corona virus subgroup and was known as SARS-CoV. The infected patients showed symptoms similar as pneumonia infection with a diffused alveolar injury

which lead to acute respiratory distress syndrome (ARDS). Primarily SARS appeared at China in Guangdong province and then spread rapidly around the worldwide with more than 8000 infected persons and 776 deaths.



**Fig. 1: Structure of respiratory syndrome causing human coronavirus.**

A decade later in 2012, a couple of Saudi Arabian citizens were infected with found infected by another coronavirus. The detected virus was found as a Coronavirus (MERS-CoV). The World health organization reported that MERS-coronavirus infected more than 2428 individuals and 838 deaths. MERS-CoV is a member beta-coronavirus

subgroup and phylogenetically diverse from other human-CoV. The infection of MERS-CoV initiates from a mild upper respiratory injury while progression leads to severe respiratory disease. Similar to SARS-coronavirus, patients infected with MERS-coronavirus suffer pneumonia, followed by ARDS and renal failure. Both the viruses originated from bat and having great ability mutate rapidly and adapt to new host.

In 2019 after 7 years from MERS 2012 outbreak the Chinese government found several cases of pneumonia with unfamiliar etiology. The outbreak was started from the Hunan seafood market in Wuhan city of China and rapidly infected more than 50 peoples. The live animals are often sold at the Hunan sea-food market such as bats, frogs, snakes, birds, marmots and rabbits. It is possible that animals brought into and sold with viruses. It causes transmission of virus from animal to human. On 12 January 2020, the National Health Commission of China released further details about the epidemic, suggested viral pneumonia. The instant investigation of characterise, control of disease and isolation of suspected patients. The sequence-based analysis of clinical data from the isolated patients, the virus was identified as a novel coronavirus. Moreover, the genetic sequence was also provided for the diagnosis of viral infection. Primarily, it was assumed that the people infected with Wuhan coronavirus induced pneumonia in China may have visited the seafood market where live animals were sold or may have used infected animals or birds as a source of food. However, further investigations revealed that some infected patients with no record of visiting the seafood market. This interpretation showed a human to the human spreading capability of this virus, which was subsequently reported in more than 100 countries in the world. The human to the human transmission of the virus occurs due to close contact with an infected person, exposed to coughing, sneezing, respiratory droplets or aerosols. These aerosols can penetrate the human body (lungs) via inhalation through the nose or mouth.

#### Symptoms of COVID-19 By WHO<sup>[6]</sup>

COVID-19 affects different people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization.<sup>[7]</sup>

#### Most common symptoms

- fever.
- dry cough.
- tiredness.

#### Less common symptoms

- aches and pains.
- sore throat.
- diarrhoea.

- conjunctivitis.
- headache.
- loss of taste or smell.
- a rash on skin, or discolouration of fingers or toes.

#### Serious symptoms

- difficulty breathing or shortness of breath.
- chest pain or pressure.
- loss of speech or movement.

Seek immediate medical attention if you have serious symptoms. Always call before visiting your doctor or health facility. People with mild symptoms who are otherwise healthy should manage their symptoms at home. On average it takes 5–6 days from when someone is infected with the virus for symptoms to show, however it can take up to 14 days.

#### To prevent infection and to slow transmission of COVID-19, do the following<sup>[6]</sup>

- Wash your hands regularly with soap and water, or clean them with alcohol-based hand rub.
- Maintain at least 1 metre distance between you and people coughing or sneezing.
- Avoid touching your face.
- Cover your mouth and nose when coughing or sneezing.
- Stay home if you feel unwell.
- Refrain from smoking and other activities that weaken the lungs.

Practice physical distancing by avoiding unnecessary travel and staying away from large groups of people.

#### Immunity<sup>[7]</sup>

Immunity is the ability of the body to defend itself against disease-causing organisms. Everyday our body comes in contact with several pathogens, but only a few results into diseases. The reason is, our body has the ability to release antibodies against these pathogens and protects the body against diseases. This defence mechanism is called immunity.

#### Types of immunity

- Innate Immunity or Natural or Non-specific Immunity.
- Acquired Immunity or Adaptive Immunity.

#### Innate immunity

This type of immunity is present in an organism by birth.

This is activated immediately when the pathogen attacks. Innate immunity includes certain barriers and defence mechanisms that keep foreign particles out of the body.

Innate immunity refers to the body's defence system.

This immunity helps us by providing the natural resistance components including salivary enzymes,

natural killer cells, intact skin and neutrophils, etc. which produce an initial response against the infections at birth prior to exposure to a pathogen or antigens.

It is a long-term immunity in which our body produces the antibodies on its own. Our body has few natural barriers to prevent the entry of pathogens.

### **Acquired immunity**

Acquired immunity or adaptive immunity is the immunity that our body acquires or gains over time. Unlike the innate immunity, this is not present by birth.

The ability of the immune system to adapt itself to disease and to generate pathogen-specific immunity is termed as acquired immunity. It is also known as adaptive immunity.

An individual acquires the immunity after the birth, hence is called as the acquired immunity.

It is specific and mediated by antibodies or lymphocytes which make the antigen harmless.

The main function of acquired immunity is to relieve the victim of the infectious disease and also prevent its attack in future.

It mainly consists of an advanced lymphatic defence system which functions by recognizing the own body cells and not reacting to them.

### **Immune response on covid 19<sup>[8,9]</sup>**

The person infected with SARS CoV-2 the host's immune responses starts as soon as SARS-CoV-2 binds to ACE2 receptors and releases viral RNA for replication. Both the innate and adaptive immune response could be triggered in response to the SARS-CoV-2 infection. However, immune responses are different between severely and moderately infected persons. In a blood sample of symptomatic hospitalised patients with mild to moderate SARS-CoV-2 infection before resolution of symptoms, immunological changes such as increase in the number of activated CD4+ helper T cells and CD8+ killer T cells, follicular helper T cells, antibody-secreting cells (ASCs) and antibodies particularly IgG (Immunoglobulin G) and IgM (Immunoglobulin M) were detected. In severely infected patients, lymphocytopenia is a common denominator with substantial fall in numbers of natural killer cells, B cells, CD3+ T cells, CD4+ helper T cells, CD8+ killer T cells along with the increase in neutrophil-to-lymphocyte ratio and C-reactive protein levels.

Until we get a cure and a novel coronavirus vaccine, taking all preventive measures and keeping ourselves healthy and safe is crucial. Wear a mask that covers your nose and mouth to help protect yourself and others. Stay 6 feet apart from others who don't live with you. Avoid crowds and poorly ventilated indoor spaces. Wash your

hands often with soap and water. Use hand sanitizer if soap and water aren't available. And the most important thing is the of boosting immune system. It will provide long term strength to body against corona virus and give protection from many other infectious diseases.

### **The best supplements to take during COVID-19 crisis<sup>[10, 11]</sup>**

Whether eaten as a whole food or in the form of a pill, the following supplements may help keep you healthy and your immune system in top shape to combat coronavirus.

#### **Elderberry**

Full of antiviral and anti-inflammatory properties, elderberry syrup is used as a remedy for colds, flus, and bacterial sinus infections. Elderberry works by reducing swelling in the mucus membranes. Some studies suggest elderberry extract reduces the duration of the flu, which is why some believe it may also help your immune system against coronavirus (COVID-19)

#### **Mushrooms**

Mushrooms contains high selenium and B vitamins like riboflavin and niacin, which play important role to keep the immune system running optimally. Mushrooms are also high in polysaccharides, sugar-like molecules that boost immune function.

#### **Astragalus**

Astragalus is an herb, and its root is used in medicine. Typically used to strengthen the immune system and treat the common cold upper respiratory infections, seasonal allergies, swine flu, astragalus is also used to fight bacteria and viruses. Its effectiveness against illness doesn't have a lot of research behind it, although in treating seasonal allergies, 160 mg of astragalus root extract by mouth daily for 3-6 weeks was found to improve symptoms such as running nose, itching, and sneezing.

#### **Selenium**

Selenium is a mineral and a potent antioxidant having various medicinal uses. It is used in preventing bird flu and swine flu. Selenium can boost immune function, except in those with autoimmune disorders, who could experience a negative impact on their immune system.

#### **Garlic**

It contains antiviral properties may be helpful in reducing the severity of symptoms in colds, flu or COVID-19 infections. Garlic may also shorten the duration of a cold. While you can eat garlic fresh, you can also take it in the form of a supplement.

#### **Andrographis**

A plant used in medicine for a variety of ailments, Andrographis is frequently used as a painkiller and fever reducer, and to treat the common cold and flu. Taking Andrographis extract in combination with

Siberian ginseng may improve symptoms of the common cold when started within 72 hours of feeling sick.

#### **Licorice root**

Licorice root, when used as a gargle, may be used to soothe the pain of a sore throat, a common symptom of coronavirus, according to a 2009 study in the journal *Anaesthesia & Analgesia*. Additionally, licorice root can loosen congestion and reduce inflammation. You can also chew a piece of licorice root or drink it as a tea.

#### **Pelargonium sidoides**

Also known as Umckaloabo among other names, pelargonium sidoides is commonly taken by mouth for upper respiratory infections including bronchitis, sinusitis, sore throat, tonsillitis, and the common cold. Taking a specific extract of pelargonium sidoides seems to help reduce symptoms and clear up the common cold after 10 days of treatment. It also lessens symptoms of bronchitis in adults within 48 hours of feeling sick.

#### **Curcumin**

Curcumin is derived from the *Curcuma longa* plant, commonly known as turmeric. Curcumin is used in Ayurvedic and Chinese medicine for its analgesic, anti-inflammatory, and antiseptic activity. Curcumin can help fight inflammation and aid the body's immune response, as found by a study published in *Molecules*.

#### **Echinacea**

Echinacea has been used to treat colds symptoms upon first signs of illness, but the research on its effectiveness varies. Some research shows that taking echinacea can reduce the risk of catching a cold by 45% to 58%. But other research shows that taking echinacea does not prevent the common cold when you are exposed to cold viruses. Early research shows that taking a specific echinacea product (Monoselect Echinacea, PharmExtracta, Pontenure, Italy) daily for 15 days might improve the response to the flu vaccine in people with breathing problems such as bronchitis or asthma, and these are high-risk types who could suffer complications of COVID-19.

#### **Propolis**

Propolis, a resin-like material from the buds of poplar and cone-bearing trees, is used for boosting the immune system, and as an antioxidant and anti-inflammatory agent. Some evidence suggests that propolis might help prevent or reduce the duration of common colds and other upper respiratory tract infections.

#### **Acai berry**

Acai berry is such a potent antioxidant and stimulator of the immune system, researchers are studying it as a potential treatment for all kinds of conditions, and it's often touted as a supporting of general health and immune function.

### **Nutraceuticals and Herbal Extracts<sup>[12,13]</sup>**

#### **Vitamins**

Vitamin B plays important role in cell functioning, energy metabolism, and proper immune function. It regulates proper activation of both the innate and adaptive immune responses. It reduces pro-inflammatory cytokine levels, improves respiratory function, maintains endothelial integrity, prevents hypercoagulability. Therefore, vitamin B status should be assessed in COVID-19 patients and vitamin B could be used as a non-pharmaceutical adjunct to current treatments.

Vitamin C, as an antioxidant it can help reduce lung inflammation which is a severe symptom of COVID-19. The administration of high-dose vitamin C (1,000-6,000 mg) has also been reported to decrease the time spent by critically ill patients on mechanical ventilation by 25%, and also reduced their length of stay in an intensive care unit.

Vitamin D The primary function is to help your body maintain optimal blood levels of calcium and phosphorous. A daily intake of 20-50 µg of vitamin D was recently recommended for obese individuals, healthcare workers and smokers in order to enhance their resistance to COVID-19 infection.

#### **Dietary minerals**

Selenium it provides resistance against viral infections through its redox homeostasis and antioxidant properties. Selenium deficiency has been associated with impaired immune function.

Zinc Elderly individuals are often deficient in zinc, which is essential for immune function. Iron The strict regulation of serum iron concentration could thus provide favorable clinical outcomes for patients with COVID-19.

N-acetyl-cysteine (NAC) NAC, which is derived from the naturally occurring amino acid, cysteine, is most commonly prescribed to patients suffering from various respiratory complications. The anti-oxidant and mucolytic effects of NAC have been reported to significantly improve the function of airways and to reduce COPD exacerbations.

#### **Probiotics**

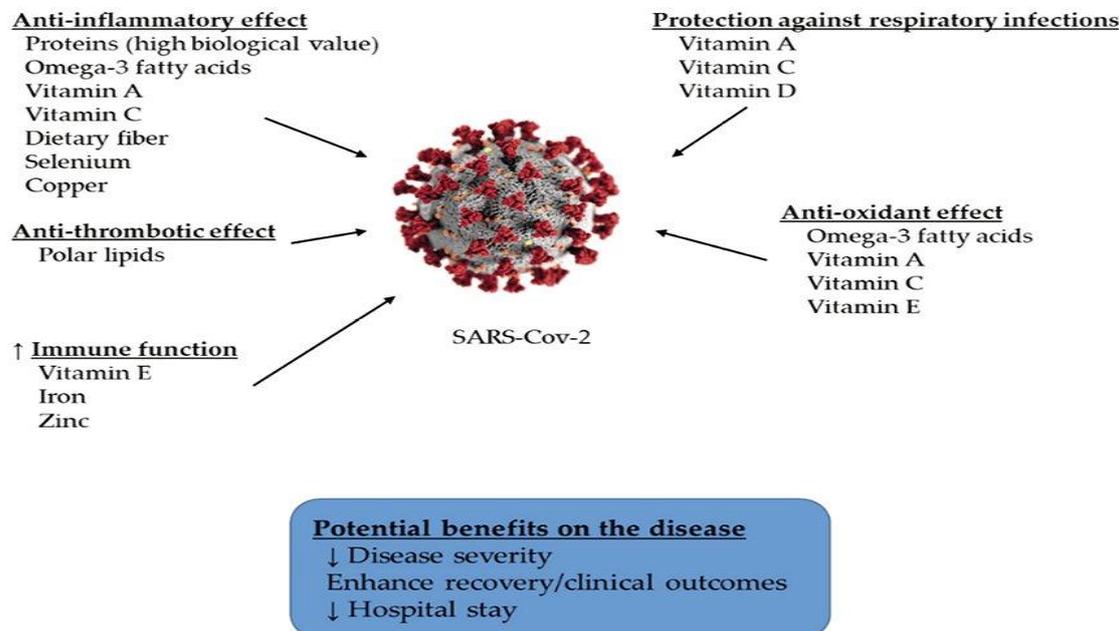
They exhibit immunomodulatory, anti-inflammatory and anti-oxidative effects. Nutritional supplementation with probiotics has been reported to be beneficial for patients suffering from respiratory tract infections.

#### **Omega-3 fatty acids**

omega-3 fatty acids have proven to be effective in reducing airway inflammation and bronchoconstriction, have also exhibited efficacy against viral infections, their potential for use against COVID-19 warrants further investigation.

**$\beta$ -glucans**

$\beta$ -glucans, which are potent activators of immune cells,  $\beta$ -glucans can help to reduce morbidity and mortality associated with COVID-19.

**Effects of several nutrients on aspects of COVID-19infection****CONCLUSION**

Now a days the whole world is struggling to overcome COVID-19 and trying hard to find proper medicine for diagnosis and prevention of it. From outbreak of COVID-19 to till date there is no proper medicine to prevent infection. many scientists are still engaged in these studies to develop a suitable antidote for this virus. People with low immunity are more susceptible to COVID-19. Boosting immunity is the only way to fight and prevent COVID-19 battle. The present review discussed the potential of various nutraceuticals and herbal formulations to treat COVID-19. The investigations for evaluation of different plant genera as anti SARS- CoV-2 agents, are insufficient but the various traditional medicinal plants and herbs have been used as medicines to enhance immune system for fighting against covid 19 and resulted in positive health effects among COVID-19 patients.

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