



Role of Immunity Booster Diet, Spices and Herbs, Change Lifestyle: Medical Viewpoints in COVID-19

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ABSTRACT

Background: Coronavirus disease 2019 (COVID-19) is a pandemic caused by a novel coronavirus. On 30 January 2020, the first case of the COVID-19 was reported in India and it affects the whole world. The impact of various nutrients on the human immune system. To defend itself, the human body has numerous components. The human immune system identifies molecules that are foreign to its structure and responds to them in a useful manner. When a pathogen factor enters the human body, the immune system responds by triggering an immunological response.

Methods: Symptoms of COVID-19 may vary from a mild cold to severe respiratory problems and fatality. The symptom may appear in 2 days or as long as 14 days after making contact with the COVID-19 patient.

Results: To avoiding contact with an infected person, regular hand washing, wearing a mask may help to prevent and control the COVID-19. There is no specific therapy available for COVID-19. The best way is to prevent infection is to avoid being exposed to the COVID-19. Nutrition is one of the numerous variables that influence immune system function. There is a link between the immune system and nutrition, and malnutrition should not be seen just as a calorie and protein shortage.

Conclusions: The body's defensive system should be reinforced to boost immunity, minimize illness risks, and maintain good health. Healthy eating, regular exercise, and an immunological diet, on the other hand, will be a more cost-effective and natural choice. Due to these reasons, the main aim of nourishment is not merely to gain energy and protein, but to enhance resistance against ailments with some specific nutriment and to turn the inflammatory response in someone's best interests. The nutriments which show beneficial effects on the immune system are called immune nutrients and nourishment on these nutriments is called immune diet. The main fields of application of immune diet are patients undergoing surgery, traumatized, cancer, patients who need intensive care, and patients with serious infections.

Keywords: Corona Virus, infectious disease, pandemic, herbal drugs, immunity boosters, lifestyle, treatment.

1. Introduction

Coronaviruses are a group of correlated viruses that cause diseases. The Coronavirus name was derived from the Latin word corona, (meaning “crown” or “halo”), crown, or a solar corona around the virus particles when observed under transmission electron microscopy because the surface is covered by club-shaped protein spikes. The official name coronavirus disease 2019 (COVID-19) was declared by the World Health Organization (WHO) on 11th February 2020, due to in the 2019 novel coronavirus was occurred first recognized in Wuhan China. In COVID-19, 'CO' indicates 'corona', 'VI' for 'virus,' and 'D' for the disease. Coronaviruses belong to a large family of viruses, some causing illness. In humans, Coronaviruses cause respiratory infections that may be mild, like common cold (mainly rhinoviruses), and others that may be fatal, like severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), and COVID-19 [1-6].

1.1. Symptoms in other species

In chickens, cause an upper respiratory tract disease, while in pigs and cows they cause diarrhea. There are yet to be antiviral drugs or vaccines to prevent or treat human Coronavirus

infections. Coronaviruses constitute the sub-family Orthocoronavirinae, family Coronaviridae, order Nidovirales, and realm Riboviria. They have enclosed viruses with a positive-sense single-stranded RNA genome and a nucleocapsid of helical symmetry. The genome size of Coronaviruses is about 27 to 34-kilo bases, the largest among known RNA-viruses. Most of the people infected with the COVID-19 virus will have mild to moderate respiratory illness and recover without the need for special treatment. Older people and those with medical problems like cardiovascular disease (CVDs), diabetes, chronic respiratory disease, and cancer are more possible to grow serious illnesses [1-6].

1.2. Causative agent

A novel coronavirus is a type of coronavirus that was not formerly known. The virus causing COVID-19 is not that like the virus that causes illness such as the common cold. Health experts are working hard to discover the original animal source of causes COVID-19. The genetic tree of the COVID-19 virus showed that it originated in bats. It is not known whether the coronavirus jumped directly from bats or there was an animal host (Figure 1).

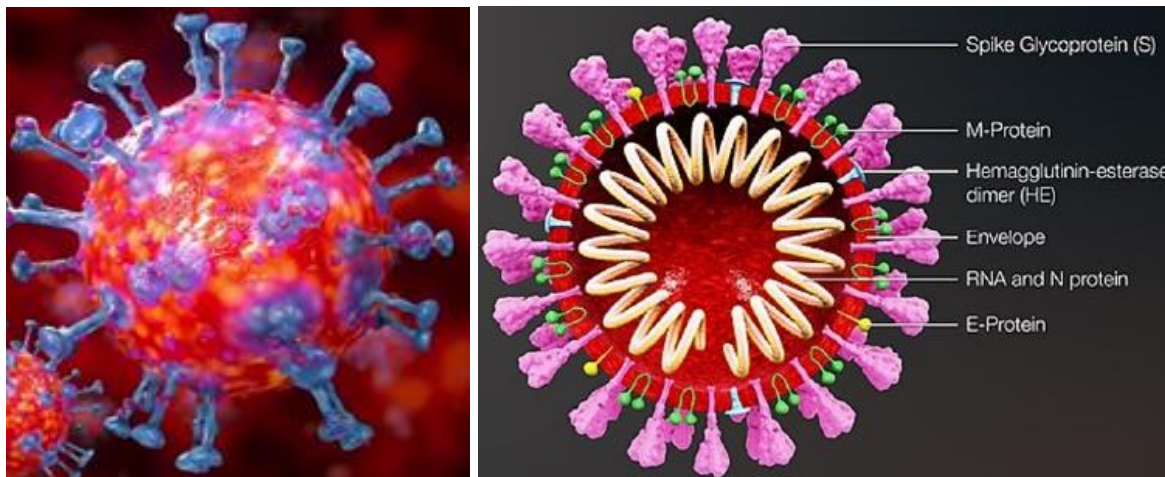


Figure 1. (a) Coronavirus (b) Three dimension (3D) model of the novel coronavirus that showing the RNA genetic material, envelope, and the spikes made of glycoproteins found on the surface of the virus (Images are taken from Wikipedia)

1.3. Symptoms

COVID-19 is caused by a novel coronavirus; an RNA virus that causes diseases in humans and mammals and causes respiratory tract infections that can range from mild to lethal. Mild illness includes the common cold, while more lethal varieties can cause severe respiratory infection. There are as yet no antiviral drugs or vaccines to control or

treat COVID-19. About 80% of COVID-19 infections are asymptomatic, while 20% of COVID-19 cases are moderate to severe infections with mortality most frequent in the age group of more than 60 years with co-morbid conditions. COVID-19 symptoms are very mild to severe and some people have no symptoms while some people have the following symptoms of COVID-19:

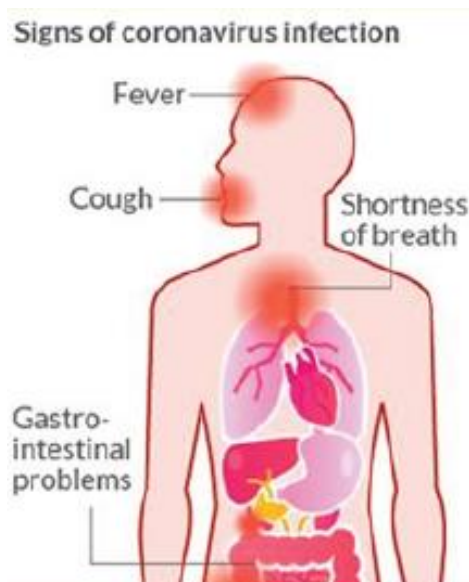


Figure 2: Common symptoms of COVID-19 (Fever, Dry Cough, Nasal Congestion, Sore throat, Diarrhea, Fatigue, Difficulty breathing or Shortness of breath)

The above symptoms may appear from 1 to 14 days. Older people and people with other medical conditions

such as CVDs, diabetes, or asthma may be more exposed to becoming rigorously ill (Figure 3).

1.3.1. Typical symptoms

COVID-19 is typical causes flu-like symptoms such as fever and cough. In some patients - mainly the elderly and others with other chronic health conditions- these symptoms can grow into pneumonia, with chest tightness, chest pain, and shortness of breath. It appears to start with a fever, followed by a dry cough.

After a week, it can go ahead to shortness of breath, with about 20% of patients need hospital treatment. Especially, the COVID-19 infection rarely seems to cause a runny nose, sneezing, or sore throat (these symptoms are observed in about 5% of patients). Sore throat, sneezing, and stuffy nose are most often signs of a cold, and 80% of the cases are mild.

- About 80 % of infections are mild (flu-like symptoms) and can recover at home.
- About 14% are severe, rising severe diseases with pneumonia and shortness of breath.
- About 4% as critical and can include respiratory failure, septic shock, and multi-organ failure.
- About 2% reported cases the virus is fatal.
- Risk of death enhance the older you are.
- Comparatively few cases are seen among children.

1.4. Pathophysiology

Coronavirus is a large virus that contains a single-stranded positive-sense RNA genome encapsulated within a membrane cover. The viral membrane is enclosed with glycoprotein spikes. This gives coronavirus a crown-like appearance. There are four classes of coronaviruses include alpha (α), beta (β), gamma (γ), and delta (δ). COVID-19 belongs to the β -class of the coronavirus. The β -coronavirus genome has many structural proteins, including the glycosylated spike (S) protein which induces host immune responses. This S protein mediates host cell attack by binding to angiotensin-converting enzyme-2 (ACE-2) located on the surface membrane of host cells (Figure 3). This enzyme is usually present in the alveolar cells of the lungs. The viral genome is also competent in encoding several nonstructural proteins including RNA-dependent RNA polymerase (RdRp), coronavirus main protease (3CLpro), and papain-like protease (PLpro). When the virus enters into the host cells, the viral genome is released as a single-stranded positive RNA. Later, through host cell protein translation machinery, the viral genome is translated into viral polyproteins [1-5].

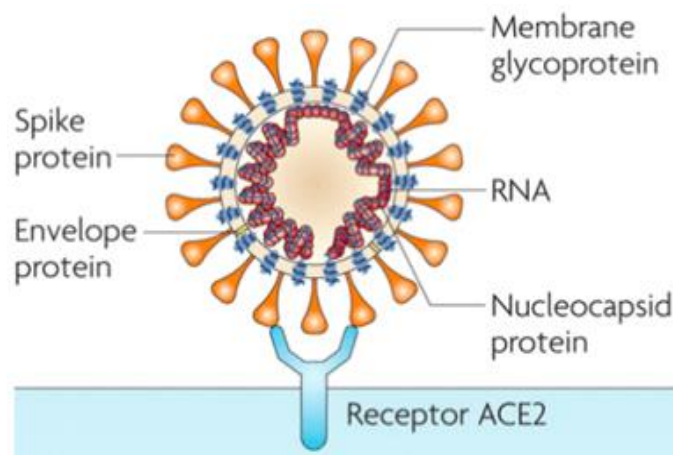


Figure 3. Pathophysiology of novel coronavirus

1.5. Spreads

The coronavirus spreads from person to person. The actively ill person with COVID-19 can spread the illness to others. It also spreads by contact with infected surfaces or fomites.

1.5.1. Person-to-person spread

The mode of spread of COVID-19 infection is mainly person-to-person.

- Between people who are in close contact with one another (within about 6 feet)
- Through respiratory droplets of an infected person while coughing or sneezing.

- These droplets can enter the mouths or noses of people who are nearby or inhaled into the lungs.

1.5.2. Spread from contact with infected articles

It also spread by touching a surface or objects that have the virus and then touching their mouth, nose, or eyes. But this is not the major way the virus spreads.

1.5.3. When does spread happen?

- The affected persons are most contagious when they are most symptomatic.
- Some spread might be possible during the asymptomatic period.

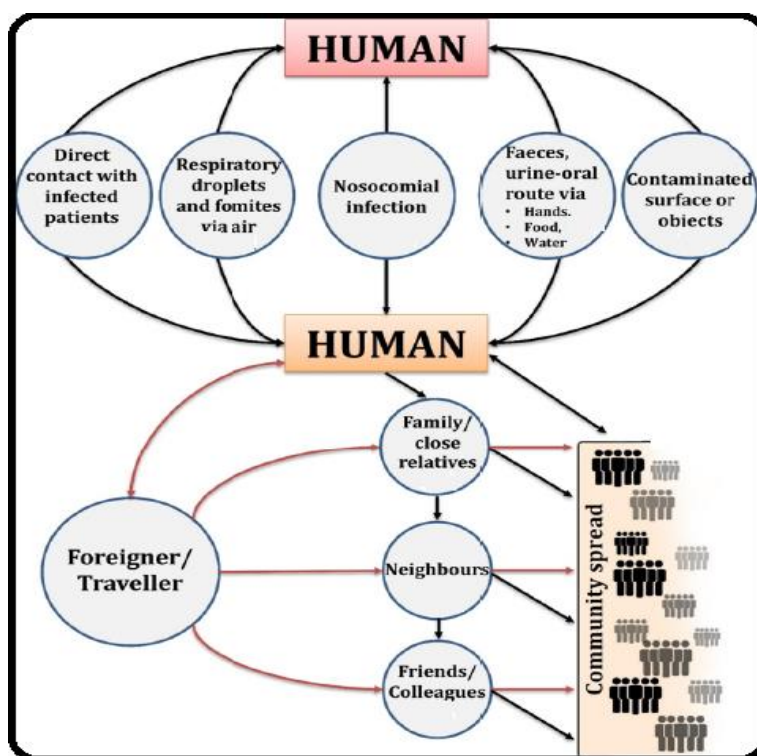


Figure 4:Diagrammatic depiction of human-to-human transmission of Coronavirus, Black arrow: showing the numerous direct or indirect contamination ways of viral infection up to the community spread and Red arrow: showing secondary infection transmit via foreigner/traveler up to the community spread.

1.6. Diagnosis

COVID-19 infection is diagnosed by the RTPCR technique in the nasopharyngeal and oropharyngeal

swabs. If you develop symptoms of COVID-19, and you are exposed to the virus, contact your doctor. Tell him or her if you have traveled to any areas with ongoing community spread of COVID-19

according to W.H.O. Also, let your doctor know if you have had close contact with anyone who is positive COVID-19. Factors used to decide whether to test you for COVID-19 may differ depending on where you live. Depending on your location, you may need to be monitored by your clinic to determine if testing is suitable and available. Your doctor will determine whether to conduct tests for COVID-19 based on your signs and symptoms, as well as whether you have had close contact with someone diagnosed with COVID-19 or traveled to or lived in any areas with ongoing community spread of COVID-19 in the past 14 days. To test for COVID-19, a health care provider uses a long swab to take a nasal sample. The sample is then sent to a lab for testing.

1.7. Prevention

There is no vaccine available to completely prevent COVID-19. Avoid contact with this disease is the best technique to prevent the disease. To prevent the spread of COVID-19 to follow[7-10]

- Avoiding close contact with an infected person.
- Avoid touching nose, eyes, and mouth.
- Cover secretion, sputum, or sneeze with a tissue and throw the tissue in the waste.
- Clean and disinfect used frequently and using a cleaning spray or wipe.
- Stay at home when ill.
- If soap and water are not available, use hand sanitizer with at least 60% alcohol. Always wash hands with soap and water if hands are dirty.
- Follow the Center for Disease Control and Prevention's (CDC) guidelines for using a facemask.
- Facemasks should be used to help control the spread of the disease to others. The use of facemasks is also compulsory for health experts.

- Washing hands frequently with soap and water, mainly after going to the bathroom; before eating; and after blowing your nose, coughing, sneezing, touching an animal, animal feed, animal waste, and touching garbage

1.7. 1. Follow these five steps of handwashing

1. Wet hands with clean, running water and apply soap.
2. Make lather by rubbing hands together with the soap. Lather the backs of the hands, between fingers, and under the nails.
3. Rub the hands for at least 20 seconds
4. Rinse hands well with clean and running water.
5. Dry hands using a clean towel or dry air.

The government is putting its effort in the form of lockdown, social distancing, and quarantine facilities for all diagnosed and suspected cases. The government also designated COVID hospital for the treatment of corona cases. People also should fight against corona by following all preventive measures suggested by the government, health professionals, and corona warriors. If anyone has a fever, cough, and difficulty breathing, seek medical attention and call the medical experts and follow the directions of your local health authority.

1.7.2. Quarantine

In quarantine, separating a person or group of people who are exposed to a contagious disease but do not develop symptoms. Quarantine is usually done for the incubation period, which is the extent of time in which people have developed the disease after contact. In the case of COVID-19, the period of quarantine is 14 days from the last day of exposure.

1.7.2.1. Guidelines to release someone from isolation

This is made on an individual basis and includes the following:

- The person should be free from fever without the use of antipyretic drugs.
- The person not showing any symptoms including cough.
- The person should show negative on at least two successive respiratory specimens collected at least 24 hrs apart.

1.8. Treatment

There is no specific treatment for COVID-19. Supportive treatment helps to alleviate symptoms. In severe cases, treatment centers on supporting vital organ functions. COVID-19 exposed persons should contact healthcare professionals immediately and get screened. Currently, no medicine is suggested to treat COVID-19, and no cure is available. Antibiotics aren't effective against viral infections like COVID-19. Researchers are testing various possible treatments. The U.S. Food and Drug Administration (FDA) granted permission for some medicines approved for other diseases to be used to treat severe COVID-19 when no other alternatives are available. Two malaria drugs-hydroxychloroquine and chloroquine, and an antiviral drug, remdesivir, are approved for use. The main treatment is aimed at relieving symptoms. If you have mild symptoms, the doctor may advise that you recover at home and monitor your symptoms, and avoid spreading the illness to others. You may be isolating yourself as much as possible from family while you are sick, wear a mask when you are around people, and use a separate bedroom and bathroom. The doctor suggests that you stay in home isolation for some time except to get medical care. Your doctor will follow up with you regularly. If you

are very ill, you may need to be treated in the hospital. WHO has declared the Coronavirus as a global pandemic due to most of the countries is in grip of coronavirus. Leading pharmaceuticals and vaccine companies across the world are doing their research to invent vaccines and antiviral drugs for COVID 19, after successfully different phase clinical trials, they get approval from US-FDA and other countries FDA [11-17].

2. Role of Immunity Booster Diet

Indian traditional foods are also known as functional foods because of the presence of functional components having antiviral, and antioxidants effects, dietary fibers, body-healing substances, and probiotics (Figure 5). These functional molecules boost immunities, help in weight control, and blood sugar level. For boosting the immune system it is very vital to include protein, vitamins, minerals, and micronutrients in a regular diet [17-27].

2.1. Protein

Protein plays a vital role in the body's immune system, mainly for healing and recovery. Eat a variety of protein foods, like milk, unsalted nuts, seeds, curd, pulses, legumes, lean meat, poultry, eggs, etc.

2.2. Vitamin-A

Vitamin-A is helping to normalize the immune system and protect against infections by keeping skin and tissues in the mouth, stomach, intestines, and respiratory system healthy. Vitamin-A occurs in foods such as sweet potatoes, spinach, red bell peppers, carrots, broccoli, apricots, etc.

2.3. Vitamin-C

Vitamin C supports the immune system by stimulating the production of antibodies. Sources of vitamin C are

citrus fruits like amla, oranges, grapefruit, lemon, lime, kiwi, papaya, strawberries, tomato, or red bell pepper, etc.

2.4. Vitamin-E

Vitamin-E acting as an antioxidant and supports the immune system. Sources of vitamin E are Pumpkin, flaxseeds, sunflower seeds, almonds, sesame, walnut, vegetable oils (sunflower or safflower oil), hazelnuts, and peanut butter, etc.

2.5. Vitamin-D

Vitamin D works as a support immune system. Present in fortified cereals, sunlight, meat liver, egg, etc.

2.6. Zinc (Zn)

Zinc helps the immune system to work properly and may help wounds heal. Zn can be present in lean meat, seafood, poultry, milk, whole grain products, seeds, beans, and nuts.

2.7. Other nutrients

Including vitamin B₆, B₁₂, copper, folate, selenium, and iron are essential to boost immunity.

2.8. Prebiotic foods

Including flax seeds, chia seeds, oats, barley, potato, apples, bananas, garlic, kiwi promotes the growth of friendly bacteria in the gut and helps the digestive system, and builds a healthy immune system. Probiotics like Yakult, Yoghurt, and fermented food are also good sources to renew the composition of gut bacteria, which is essential for nutrient absorption by the body. These are good options for the older generation too.

2.9. Fermented foods

Fermented foods like Kefir, Kimchi, Sauerkraut, and homemade pickles are another way of adding good bacteria to your diet.

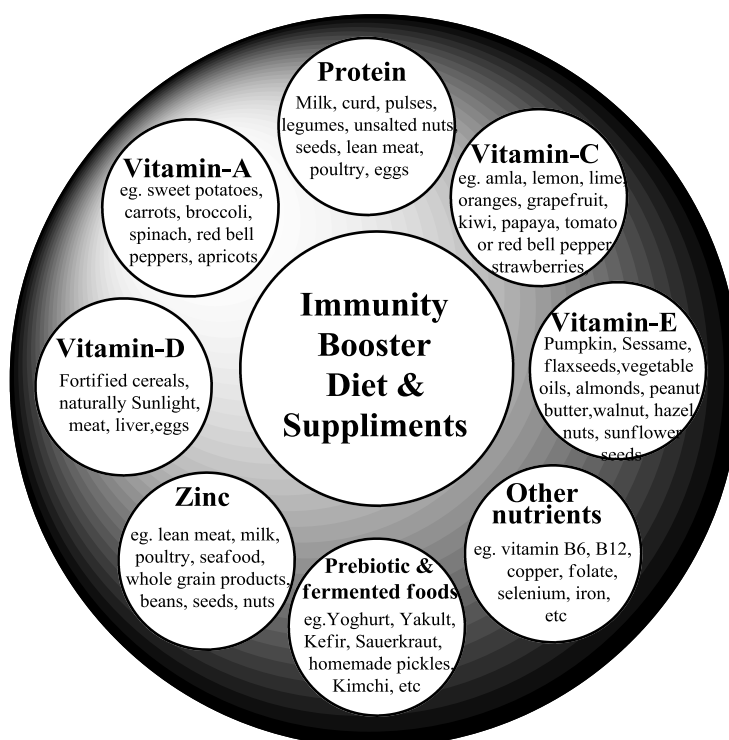


Figure 5. Immunity Booster Diet and supplements

3. Indian Spices and Herbs as Immune System booster

3.1. Turmeric

Turmeric contains a bioactive compound, curcumin. It has various pharmacological activities. It can be used in many ways in the kitchen like spices, tadka in curry, Haldi milk, or kadha, pickles, etc.

3.2. Fenugreek

Fenugreek is a known herb and spice that acts as a natural antioxidant and strengthens the immune system. Herbal tea with fenugreek, fenugreek water is a traditional remedy for viral infections.

3.3. Ginger

Ginger contains gingerol, a substance with powerful medicinal activities like anti-viral, anti-inflammatory, etc. It is used as spices, ginger water, ginger tea, lemon ginger detox water.

3.4. Cinnamon

Cinnamon has antioxidants, anti-inflammatory, and antibacterial effects and reduces the risk of infections, and boosts immunity. It is used as spices, cinnamon tea, cinnamon water, smoothie, sprinkle it into breakfast cereals.

3.5. Garlic

Garlic has sulfur-containing compounds, like allicin. It has antioxidant effects that help in reducing stress and boost immune power.

3.6. Black Pepper

Black Pepper has piperine, it is antioxidants, anti-inflammatory, and antibacterial properties that detox the body. It is used in detox water, tea, vegetables, soups or sprinkle on salads.

3.7. Star Anise

Star Anise has shikimic acid, which is an antiviral activity. It can use it in soups and curries or add with warm water to boost immunity.

3.8. Basil leaves

Basil leaves are rich in phytonutrients such as flavanol, chlorophyll, vitamins, and minerals, as well as eugenol that have antioxidants, anti-microbial, and anti-bacterial activities and reduces stress and plasma glucose levels. Infuse them with tea to boost immunity.

3.9. Neem

Neem has antibacterial and antiviral activities, purifying and cleansing the blood from harmful toxins and boosts the immune system. It is used as neem chutney, crush some neem leaves into a glass of water.

3.10. Amla

Amla is a rich source of vitamin C, boosts immunity by increasing the body's white blood cell (WBCs) count, and helps prevent viral infections. It can use as a chutney, pickles, murabba, soups, and sharbat.

3.11. Clove

Clove is the dried bud of the flower of *Syzygium aromaticum*. This improves digestion by stimulating the secretion of digestive enzymes. It has antibacterial, anti-cancer. Due to its medicinal property, it is used in controlling tooth decay and halitosis-bad breath.

3.12. Onion

Phytochemicals in onion improve the effect of vitamin C. It contains chromium which helps in reducing blood sugar levels. For ages, onion has been used to reduce inflammation and healing infections. The antioxidant effect reduces the risk of developing a gastric ulcer.

3.13. Olive leaf extract

It is a promising and unique herb with multiple applications. It's a powerful defender against sickness, increases energy, and regulates blood pressure (B.P.). It is beneficial in the treatment of viruses, retrovirus, and bacteria like influenza, common cold, meningitis, encephalitis, hepatitis B, pneumonia, tuberculosis (TB), malaria, dengue, urinary tract, and surgical infections.

3.14. Giloy

Giloy is known as Amruta, the Indian name of nectar. It has antioxidant activity that improves health and fights against dangerous diseases. It removes toxins from both kidneys and liver. It is effective against pathogenic bacteria, hepatic disorders and urinary tract infection (UIT), chronic fevers, and alleviates symptoms of dengue fever by increases the count of blood plates. Combine it with honey it will use as antimalaria.

3.15. Ashwagandha

In Sanskrit Ashwagandha means "the smell of a horse". It is traditionally used to help strengthen the immune system after illness, alleviates stress, fatigue, helps in lower cholesterol, stabilizes blood sugar, and contains anti-malarial properties.

3.16. Echinacea

A popular herb that is mainly used to treats common cold and upper respiratory tract infection. It can be consumed as a tea.

3.17. Kutki

Kutki is commonly used in Ayurvedic and Unani medicines in India. Rhizomes have an antibiotic effect. The rhizome is also used in the treatment of high B.P, intestinal pain, bile disease, sore throats, eye disease, gastritis, blood, and lung fever.

3.18. Emblica

Emblica is a well-known herb in Ayurveda and Unani medicines. It is used to treat liver disorders, upper respiratory tract infections, chronic diarrhea, and scorpion sting. It exhibits strong antioxidant activity. It is an immune-modulatory, hepatic protective, antiulcer, anti-inflammatory, and anticancer action.

3.19. Guduchi

Guduchi is used for diabetes, allergic rhinitis (hay fever), high cholesterol, gout, lymphoma, and cancers, fever, upset stomach, rheumatoid arthritis (RA), hepatitis, peptic ulcer, gonorrhea, syphilis, and boost the immune system.

4. Diet and Lifestyle tips for Immunity boosting

4.1. Healthy Drink

Healthy drinks like lemon water, ginger water, cinnamon water, turmeric water, Triphala, or aloe vera water, amla water help your body to detoxify and boost metabolism and immune system. Drink up to 8-10 glasses of water every day, to stay hydrated

4.2. Don't Skip on Exercise

About 30 to 45 minutes of exercise, depending on your stamina. Exercise like yoga, walking, aerobics, running improves metabolism, which has a direct correlation with body immunity.

4.3. Practice meditation

Too much stress releases the hormone known as cortisol, which impairs your reaction to direct surroundings and makes the body susceptible to infections, and you feel constantly anxious. The best way to relieve stress is through meditation, it relax and calm the nervous system.

4.5. Laughing

Laughing is the best medicine because it releases dopamine and other feel-good substances in the brain, all of which can help decrease stress. Twenty minutes of laughter a day may help to keep your immune system functioning accurately.

4.6. Get enough sleep

When you are sleep, your body's immune system releases a type of protein called cytokines, and antibodies, and cells that fight infections and boost immunity.

Because of these factors, the primary goal of nutrition is not just to acquire calories and protein, but also to improve resistance to diseases by consuming certain nutrients and turning the inflammatory response to one's advantage. Nutrients that have a positive impact on the immune system are referred to as immune nutrients and nutrition based on these nutrients are referred to as immune diets. Patients having surgery, traumatized, cancer patients, patients in need of critical care, and patients with significant illnesses such as sepsis are the major domains of use for immune diet [28, 29].

5. Conclusion

There is no vaccine available to completely prevent COVID-19 at present. Avoiding contact with this disease is the best way to prevent the disease. As health care professionals, need to be very cautious while providing care to these patients. Good health indicates a strong immune system and for a strong immune system, good nutrition is required. The food you eat plays a key role in your overall health and immunity. Therefore include all food groups in your diet like vegetables, fruits, whole cereals, protein, fermented foods, dry fruits herbs, spices, prebiotic, and probiotics to build toughness in the body against the coronavirus. When the diet is wrong, medicine is of no use and when the diet is

correct, medicine is no use. So eat healthy foods and live corona-free.

Abbreviation

Authors should write full words or phrases, abbreviated in the article text, in this section

Conflict of interest

All authors have to declare their conflict of interest.

Consent for publications

All authors have to write this sentence that they read and approved the final manuscript for publication.

Availability of data and material

The authors have to declare that they embedded all data in the manuscript.

Authors' contributions

All authors should write their part in designing the idea, doing, analyzing and writing the article.

Funding

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Ethics approval and consent to participate:

The authors have to declare that they do not use human or animals in their research but if they used, they have to write name of the ethics committee that has approved the study of enter the code of research ethics (provided by the institution or university where the research was conducted) in the article.

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References

1. Khanal P, Chawla U, Praveen S, Malik Z, Malik S, Yusuf M, Khan S A, Sharma M. (2021). Study of Naturally-derived Biomolecules as Therapeutics against SARS-CoV-2 Viral Spike Protein. *Journal of Pharmaceutical Research International*, 33(28A): 211-220. <https://doi.org/10.9734/jpri/2021/v33i28A31524>
2. Czeresnia R M, Trad A T A, Britto I S W, Negrini R, Nomura M L, Pires P, Costa F d S, Nomura R M Y, Ruano R. (2020). SARS-CoV-2 and Pregnancy: A Review of the Facts. *Revista Brasileira de Ginecologia e Obstetrícia*, 42: 562-568. <https://doi.org/10.1055/s-0040-1715137>
3. Singh P, Tripathi M K, Yasir M, Khare R, Tripathi M K, Shrivastava R. (2020). Potential inhibitors for SARS-CoV-2 and functional food components as nutritional supplement for COVID-19: a review. *Plant Foods for Human Nutrition*, 75: 1-9. <https://doi.org/10.1007/s11130-020-00861-9>
4. Kavitha P K. (2020). Coronavirus Disease (Covid-19) in India-An Overview. *Acta Sci. Med. Sci.*, 4(5): 64-70.
5. Fazeli-Nasab B. (2021). Biological Evaluation of Coronaviruses and the Study of Molecular Docking, Linalool, and Thymol as orf1ab Protein Inhibitors and the Role of SARS-CoV-2 Virus in Bioterrorism. [Research]. *journal of ilam university of medical sciences*, 28(6): 77-96. <https://doi.org/10.29252/sjimu.28.6.77>
6. Rahmattullah N, Arumingtyas E L, Widyananda M H, Ahyar A N, Tabroni I. (2021). Bioinformatics Analysis of Bioactive Compounds of Four Capsicum Species against SARS-CoV-2 Infection. *Int. J. Adv. Biol. Biomed. Res.*, 9(4): 298-319. <https://doi.org/10.22034/ijabbr.2021.139183.1335>
7. Hamulka J, Jeruszka-Bielak M, Górnicka M, Drywień M E, Zielinska-Pukos M A. (2021). Dietary Supplements during COVID-19 outbreak. Results of Google Trends analysis supported by PLifeCOVID-19 online studies. *Nutrients*, 13(1): 54. <https://doi.org/10.3390/nu13010054>
8. Moreb N A, Albandary A, Jaiswal S, Jaiswal A K. (2021). Fruits and Vegetables in the Management of Underlying Conditions for COVID-19 High-Risk Groups. *Foods*, 10(2): 389. <https://doi.org/10.3390/foods10020389>
9. Peter A E, Sandeep B, Rao B G, Kalpana V L. (2021). Calming the storm: natural Immunosuppressants as adjuvants to target the cytokine storm in COVID-19. *Frontiers in pharmacology*, 11: 2305. <https://doi.org/10.3389/fphar.2020.583777>
10. Galanakis C M, Aldawoud T, Rizou M, Rowan N J, Ibrahim S A. (2020). Food ingredients and active compounds against the coronavirus disease (COVID-19) pandemic: A comprehensive review. *Foods*, 9(11): 1701. <https://doi.org/10.3390/foods9111701>
11. Alkhatib A. (2020). Antiviral functional foods and exercise lifestyle prevention of coronavirus. *Nutrients*, 12(9): 2633. <https://doi.org/10.3390/nu12092633>
12. Khanna K, Kohli S K, Kaur R, Bhardwaj A, Bhardwaj V, Ohri P, Sharma A, Ahmad A, Bhardwaj R, Ahmad P. (2021). Herbal immune-boosters: substantial warriors of

- pandemic Covid-19 battle. *Phytomedicine*, 85: 153361. <https://doi.org/10.1016/j.phymed.2020.153361>
13. Zvereva E, Vandyukova I, Vandyukov A, Katsyuba S, Khamatgalimov A, Kovalenko V. (2012). IR and Raman spectra, hydrogen bonds, and conformations of N-(2-hydroxyethyl)-4, 6-dimethyl-2-oxo-1, 2-dihydropyrimidine (drug Xymedone). *Russian Chemical Bulletin*, 61(6): 1199-1206. <https://doi.org/10.1007/s11172-012-0163-x>
14. Subedi L, Tchen S, Gaire B P, Hu B, Hu K. (2021). Adjunctive nutraceutical therapies for COVID-19. *International Journal of Molecular Sciences*, 22(4): 1963. <https://doi.org/10.3390/ijms22041963>
15. Sohail M I, Siddiqui A, Erum N, Kamran M. (2021). Phytomedicine and the COVID-19 pandemic Phytomedicine (pp. 693-708): *Elsevier*. <https://doi.org/10.1016/B978-0-12-824109-7.00005-4>
16. Karabulut F. (2021). Emerging trends for Harnessing plant metabolome and microbiome for sustainable food Production. *Micro Environer*, 1(1): 33-53
17. Parray J A, Ali U, Mir M Y, Shameem N. (2021). A high throughputs and consistent method for the sampling and isolation of Endophytic bacteria allied to high altitude the medicinal plant *Arnebia benthamii* (Wall ex. G. Don). *Micro Environer*, 1(1): 1-6.
18. Li S, Cheng C-S, Zhang C, Tang G-Y, Tan H-Y, Chen H-Y, Wang N, Lai A Y-K, Feng Y. (2021). Edible and Herbal Plants for the Prevention and Management of COVID-19. *Frontiers in pharmacology*, 12: 900. <https://doi.org/10.3389/fphar.2021.656103>
19. Ahmad S, Zahiruddin S, Parveen B, Basist P, Parveen A, Parveen R, Ahmad M. (2021). Indian medicinal plants and formulations and their potential against COVID-19–preclinical and clinical research. *Frontiers in pharmacology*, 11: 2470. <https://doi.org/10.3389/fphar.2020.578970>
20. Alagawany M, Attia Y A, Farag M R, Elnesr S S, Nagadi S A, Shafi M E, Khafaga A F, Ohran H, Alaqil A A, El-Hack A. (2021). The Strategy of Boosting the Immune System Under the COVID-19 Pandemic. *Frontiers in Veterinary Science*, 7: 712. <https://doi.org/10.3389/fvets.2020.570748>
21. Junaid K, Ejaz H, Abdalla A E, Abosalif K O, Ullah M I, Yasmeen H, Younas S, Hamam S S, Rehman A. (2020). Effective immune functions of micronutrients against SARS-CoV-2. *Nutrients*, 12(10): 2992. <https://doi.org/10.3390/nu12102992>
22. Arshad M S, Khan U, Sadiq A, Khalid W, Hussain M, Yasmeen A, Asghar Z, Rehana H. (2020). Coronavirus disease (COVID-19) and immunity booster green foods: A mini review. *Food Science & Nutrition*, 8(8): 3971-3976. <https://doi.org/10.1002/fsn3.1719>
23. Patel B, Sharma S, Nair N, Majeed J, Goyal R K, Dhobi M. (2021). Therapeutic opportunities of edible antiviral plants for COVID-19. *Molecular and Cellular Biochemistry*: 1-20. <https://doi.org/10.1007/s11010-021-04084-7>
24. Altun H K, Ermumcu M S K, Kurklu N S. (2021). Evaluation of dietary supplement, functional food and herbal medicine use by dietitians during the COVID-19 pandemic. *Public Health Nutrition*, 24(5): 861-869.
25. Pastor N, Collado M C, Manzoni P. (2021). Phytonutrient and nutraceutical action against COVID-19: current review of characteristics and

- benefits. *Nutrients*, 13(2): 464. <https://doi.org/10.3390/nu13020464>
26. Naja F, Hamadeh R. (2020). Nutrition amid the COVID-19 pandemic: a multi-level framework for action. *European journal of clinical nutrition*, 74(8): 1117-1121. <https://doi.org/10.1038/s41430-020-0634-3>
27. Shahraki-Mojahed L, Behzadmehr R, Beigomi Z. (2021). Antimicrobial Effects of Ethanol, Methanol and Ethyl Acetate *Teucrium polium* and *Citrullus colocynthis* extract on *Pseudomonas aeruginosa*. *Micro Environer*, 1(1): 26-32.
28. Chellappan S. (2020). COVID-19: Alerting Health Professionals. *Acta Scientific Women's Health*, 2(4): 15-17.
29. Wu Z, McGoogan J M. (2020). Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. *Jama*, 323(13): 1239-1242. <https://doi.org/10.1001/jama.2020.2648>.

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