Review Article Open Access

ISSN: 2349-9818

January - February 2021, Vol. 8 (1), 01-09

TROPICAL JOURNAL OF PHARMACEUTICAL AND LIFE SCIENCES

(An International Peer Reviewed Journal)

Journal homepage: http://informativejournals.com/journal/index.php/tjpls

IMPORTANCE OF MEDICINAL PLANTS AND HERBS AS AN IMMUNITY BOOSTER FOR PANDEMIC COVID-19

Firoj A. Tamboli*, Harinath N. More, Shivani S. Khairmode, Dhanashri R. Patil, Prajakta D. Tambare, Anilkumar J. Shinde, Namdeo R. Jadhav

Department of Pharmacognosy, Bharati Vidyapeeth College of Pharmacy, Kolhapur -416 013 Maharashtra, India.

ARTICLE INFO:

Received: 14th Jan. 2021; **Received** in revised form: 28th Jan. 2021; **Accepted:** 9th Feb. 2021; **Available online:** 27th Feb. 2021

ABSTRACT

The whole world facing COVID-19 pandemic, 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. Since ancient times, medicinal plants, herbs and spices were well known for their medicinal properties. Therefore, the medicinal plants and herbs playing a critical role to boosting our immunity during the COVID-19 pandemic. it is also very important to consume supplements in the form of immune nutrients such as vitamin A, C, E, D, B-complex, Zinc and copper that will support your body to fight against the pathogens. This paper presents an analysis of popular immune-boosting medicinal plants and herbs.

Keywords: Medicinal herbs, Medicinal plants, COVID-19, Coronavirus, Immunity, SARS-CoV-2, Immunity booster.

INTRODUCTION

Covid-19 attacks people with low immune systems and people especially people of under and over ages. The immune system is built on beneficial live bacteria that lives in the gut which protect the human body from various diseases. When the immune system response is low, weak, or damaged, it becomes an open invitation for infections such as coronavirus or other diseases like diabetes, heart disease, or cancer.[1] In this article we discussing about various medicinally important plants and herbs which can serve as boon in the fight against COVID-19 e.g. Garlic (*Allium sativum*), Margosa neem (*Azadirachta indica*), Tulsi (*Ocimum sanc*tum), Giloy (*Tinospora Cordifolia*), clove (*Syzygium aromaticum*), ginseng (*Panaxquinquefolius L.),* Betel vine (*Piper betel*), Black paper (*Piper nigrum*), Black cumin (*Black cumin L.*), Ashwagandha (*Withania somnifera*), Licorice astragalus (*Astragalus glycyphyllos*), turmeric (*Curcuma domestica*), elderberry (*Sambucus nigra*), Giloy (*Tinospora Cordifolia*)etc. These plants are known to be rich in antioxidants, vitamins, proteins, carbohydrates, dietary fibers, amino acids, minerals, steroids, alkaloids, antiviral, antibacterial phytochemicals which will help in rejuvenating the immune system and also helps in

***Corresponding Author:**
Dr. Firoj A.Tamboli,
Head, Department of Pharmacognosy,
Bharati Vidyapeeth College of Pharmacy,
Near Chitranagari, Kolhapur -41601,
Maharashtra, India

killing the invaded viruses. Figure 1 shows pictures of different herbs that may be helpful in prevention and treatment of COVID-19.[2]

Figure 1: Different plants and herbs that can help in the fight against COVID-19. (a) Elderberry, *Sambucuss nigra* (b) Garlic, *Allium sativum* (c) Ginger, *Zingiber officinalis* (d) Giloy, *Tinosporacordifolia* (e) Tulsi, *Ocimum sanctum* (f) Betalvive, *Piper betal* (g) Margosa, *Azadirachtin indica* (h) Turmeric, *Curumadomestica* (i) Clove, *Syzgiumaromaticum* (j) Black paper, *Piper nigrum* (k) Ginseng, *Planaxquinquefolius* (l) Black cumin, *Black cumin L.* (m) Licorice astragalus, *Astragalus glycyphyllos* (n) Aswagandha, *Withaniasomnifera* (o) Cinchona (*Cinchona officinalis*).[2]

IMMUNITY

The immune system protects our body from diseases and infections (invading pathogenic microorganisms) and cancer. It's the bodily system that produces the immune response to defend your body from foreign substances, cells, and tissues. The immune system includes various parts of the body including the thymus, spleen, lymph nodes, special deposits of lymphoid tissue (such as those in the gastrointestinal tract and bone marrow), macrophages, lymphocytes including the B cells and T cells, and antibodies.[1] Immunity, the state of protection from infectious disease has both a less specific or innate and a more specific or adaptive component. Therefore, the immune system has two components: innate and adaptive immunity. The innate immunity is present in all metazoans, while the adaptive immunity only occurs in vertebrates.

Innate Immunity

This provides the first line of defence against infection. It is a rapid response (minutes); it is not specific to a particular pathogen. It has no memory and does not confer long-lasting immunity to the host. It has 4 main components and is found in all classes of plant and animal life.[2] The innate immune system is made of defences against infection that can be activated immediately once a pathogen attacks. The innate immune system is essentially made up of barriers that aim to keep viruses, bacteria, parasites, and other foreign particles out of your body or limit their ability to spread and move throughout the body. The innate immune system includes:

Physical Barriers

Such as skin, the gastrointestinal tract, the respiratory tract, the nasopharynx, cilia, eyelashes and other body hair.

Defense Mechanisms

Such as secretions, mucous, bile, gastric acid, saliva, tears, and sweat.

General Immune Responses

such as inflammation, complement, and non-specific cellular responses. The inflammatory response actively brings immune cells to the site of an infection by increasing blood flow to the area. Complement is an immune response that marks pathogens for destruction and makes holes in the cell membrane of the pathogen.[3]

Adaptive Immunity

This provides a specific immune response directed at an invading pathogen. Following exposure to a foreign organism there is an initial effector response that eliminates or neutralizes a pathogen. Later re-exposure to the same foreign organism induces a memory response with a more rapid immune reaction that eliminates the pathogen and prevents disease. This response is found only in vertebrates.[4]

Adaptive immunity is an immunity that occurs after exposure to an antigen either from a pathogen or a vaccination. This part of the immune system is activated when the innate immune response is insufficient to control an infection. In fact, without information from the innate immune system, the adaptive response could not be mobilized. There are two types of adaptive responses: the cell-mediated immune response, which is carried out by T cells, and the humoral immune response, which is controlled by activated B cells and antibodies. Activated T cells and B cells that are specific to molecular structures on the pathogen proliferate and attack the invading pathogen. Their attack can kill pathogens directly or secrete antibodies that enhance the phagocytosis of pathogens and disrupt the infection. Adaptive immunity also involves a memory to provide the host with long-term protection from reinfection with the same type of pathogen; on re-exposure, this memory will facilitate an efficient and quick response.[5]

Natural immunity

Antibodies generated due to a normal infection. Includes antibodies provided by mother through their colostrum, the initial breastmilk. Only protects for short time, but when infant is most vulnerable.

Artificial immunity

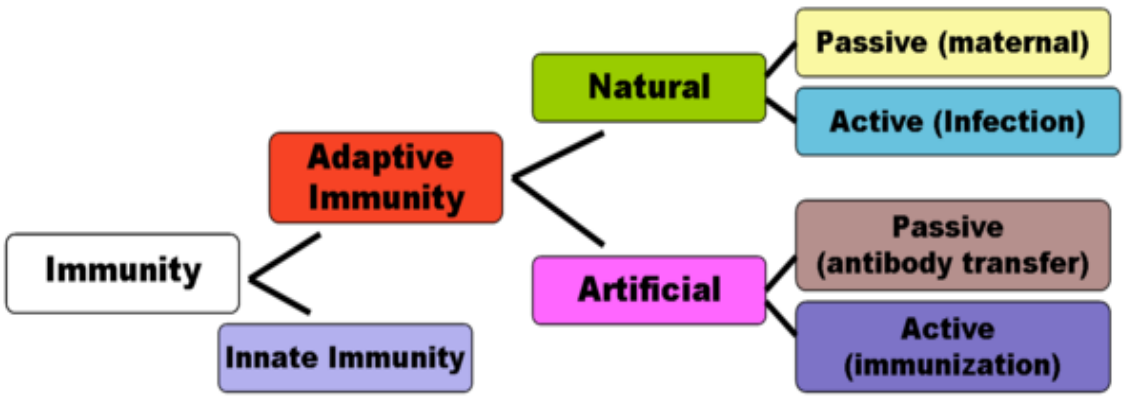
Antibodies generated by receiving antigen in a vaccine/serum rather than a normal infection. Generally does not last as long as when generate antibodies from a natural infection.

Active immunity

Immunity derived from antibodies generated by own body. Generated in response to normal infection or in response to vaccine antigens.

Passive immunity

Immunity derived from antibodies from another body, such as given through mother's milk or artificial means (antivenom antibodies). Generally does not last as long as active immunity as antibodies are not supplied by the body. The diagram below summarizes these divisions of immunity.[6-7]



Medicinal plants are considered as rich resources of ingredients which can be used in drug development pharmacopoeial, non- pharmacopoeial or synthetic drugs. There are many benefits of Herbal Medicine like easier to obtain than prescription medicine, Stabilizes hormones and metabolism, Natural healing, Strength in immune system. According to the World Health Organisation, around 80% of the world's population uses herbal medicines for primary health care, particularly across Europe and South Asia. Research indicates that many of these herbs not only have anti-inflammatory properties, they also help build up the body's natural immunity. And unlike allopathic medicines like antibiotics, which can have serious side effects, most of these herbs and spices are relatively safe.

Medicinal Plants and Herbs

***Sambucus nigra* (Elderberry)**

Elderberry, scientific name *Sambucus nigra*, is an intense purple berry and widely present in Europe and Western Asia. It has been in use for many years due to its enormous health benefits. Chemically it is rich in polyphenolic compound (Anthocyanins, Flavonols, Phenolic acid), terpenes, carbohydrate (mainly glucose and fructose), citric acid, malic acid and lectins and other essential nutrients.[2] Liquid elderberry extract is characterized by antiviral action in vitro against influenza, as well as respiratory bacterial pathogens. There is preclinical evidence that elderberry (*Sambucus nigra L*. (Adoxaceae)) inhibits the replication and viral attachment of the human coronavirus NL63 (HCoV-NL63), which di_ers from COVID-19 but also belongs to coronaviruses. Elderberry is the most effective means of preventing or combating coronavirus infections at an early stage.[8] One cup of elderberries contains 106 calories.[9] However, their nutrient values in per 100 grams are as ~870 mg Vitamin A, 34.10 mg Vitamin C, 391.33 mg Potassium, 28.06 mg Calcium, 1.86 mg Iron, 217 mg Sodium as well as some amount of other minerals, folic acid, amino acids, dietary fibers are also present. This fruit is enriched with flavonoids having antioxidant and anti-inflammatory properties that help protecting the healthy cells from the attack of harmful free radicals thus have implications in skin care, boosting immune system which will supports the body to fight against flu, cold and other respiratory infections.[10]

***Allium sativum* (Garlic, Lahsun)**

Garlic has potent anti-oxidant properties, and helps in reducing stress and high blood pressure. It also helps to enhance thiamine (vitamin B1) absorption in the body and prevents beriberi. The antiviral property may be helpful in reducing the severity of colds, flu or COVID-19 infection. Hence, Garlic boosts the immune system and helps in fighting against viruses and other diseases. It has Allicin which is board spectrum antibiotics.[11] It is reported to enhance immune health by stimulating protective white blood cells like NK cells and macrophages.[12] In an in vitro study[13], Allium sativum L. (Amaryllidaceae) extract inhibited influenza A (H1N1) virus by inhibiting the synthesis of viral nucleoproteins and polymerase activity. The paper recommended a decoction of Allium cepa L. (Amaryllidaceae) for colds .[8,14] It is always best to chop or crush garlic before consuming it, because it works better when in contact with oxygen. Garlic is used to add flavour to almost every form of cuisine across the world.[2]

***Zingiber officinalis* (Ginger)**

Zanjabeel or Adrak is also known as Zingiber officinale Roscoe. Among other, it's also a very important medicinal plant which belongs to the family of Zingiberaceae. **Ginger** is well known for its anti-inflammatory, antifungal, and anti-cancer properties. In traditional medicine, ginger has been extensively used for curing colds and coughs, nausea, asthma, travel sickness, morning sickness, arthritis, gastrointestinal complaints and even depression. Consume it as ginger tea, which involves crushing ginger and boiling it with tea leaves and water. Powdered ginger mixed with pulverized cloves, cardamom and caraway has been used for digestive ailments since ancient times.

Immunomodulatory (boost up the immune system of the patients which further prevent load of infection).[15] Ginger is beneficial in to fight respiratory problems (relieve congestion associated with the common cold),

strength immunity (due to high level of anti-oxidant), Relieve stress (due to combination of the strong aroma and healing property), improve blood circulation (due to presence of vitamin, minerals and amino acids in ginger it can help restore and improve blood circulation and prevent fat from deposition in arteries helping to prevent heart from Cardiac Vascular Disorder.[16]

***Tinospora cordifolia* (Giloy, Guduchi)**

Giloy or Guduchi, scientific name *Tinospora cordifolia,* is a plant being used from centuries for its medicinal values. Many studies have reported the hypolipidemic, hypoglycemic, hepatoprotective, antibacterial, anti-inflammatory, antiosteoporotic, antiobesity, anticarcinogenic and antimutagenic properties of giloy.[17] Guduchi or Giloy herb is suggested to contain various diterpene compound and polysaccharides including arabinogalactan polysaccharide. These polysaccharides and terpenoids are immunomodulating and adaptogenic in nature. Various studies on Giloy herbal extract revealed that it could cause imperative enhancement in IgG antibodies in the serum and activation of macrophages, induction of cell regulated immunity and humoral immunity.[18]

Ocimum sanctum (Holy Basil, Tulsi)

Tulsi, also called as holy, basil. Many in-vitro and in-vivo reports on animals and humans have proven its therapeutic potential as Antioxidant, anti-aging, anticancer, antiviral, antimicrobial properties, immunomodulatory activity, immunomodulatory activity, antipyretic activity, anti-arthritic activity, treatment of gum ulcers, kidney problems, earache, menstrual irregularities, arthritis, anorexia and malaria and used as a haemostypticin childbirth etc.[19] Interestingly, the role of tulsi for scientific evidence against COVID-19 has also been elucidated.[18]

***Curcuma domestica* (Turmeric, Haldi)**

Turmeric, scientific name *Curcuma domestica* is a perennial herb and belongs to the family *Zingiberaceae*. The “Indian saffron” is a yellow orange spice and medicinal herb that has been used for thousands of years. Turmeric contains a bioactive compound known as curcumin, which acts as an anti-inflammatory agent. Commonly used in India for curries and other dishes, it can also be consumed as a decoction (kadha) made from grated ginger, tulsi and turmeric once daily to improve immunity as recommended by AYUSH. It is one of the most well researched spice, explored for its therapeutic properties. The main phytochemical includes diarylheptanoids such as curcumin. Curcumin is very helpful in addressing such issues and enhancing the immunity system. Previous finding has proven that it has therapeutic potential as antifungal, antiviral, antioxidant, anti-inflammatory, cardiovascular and anti-diabetic effects, gastrointestinal effects, anticancer effect, antimicrobial activity, hepatoprotective and renoprotective effects, photo-protector activity and in the treatment of inflammatory and edematic disorders and alzheimer disease.[20]

***Syzygium aromaticum* (Clove, Laung)**

Clove, scientific name *Syzygium aromaticum*. The consuming whole cloves can help boost the immune systemperfectly. Clove essential oil may have Nutritional Therapeutic Potential effects due to its various effects, which includes antimicrobial, anti-fungal, anti-viral, an-ti-inflammatory, cytotoxic, analgesic, anesthetic activities, very potent as antioxidants, and inhibits post binding en-try of severe acute respiratory syndrome (SARS) coronavi-rus into cells. Besides, anti-platelet activities; prevent the formation of a thrombus or a blood clotting. Therefore, essential oil of cloves may be considered the most candi-dates to combat the coronavirus and protecting against sudden death seen in some patients infected by Coro-navirus (COID 19), resulting from embolism associated with hypercoagulable formation. Clove Oil should only be diffused in well-ventilated places, and diffusing treat-ments shouldn’t exceed more than 60 minutes each time.[21]

***Withania somnifera* (Ashwagandha)**

It is a small shrub with pale green flowers, simple leaves, and red berries. More commonly known as ashwagandha, Indian ginseng. Most of the benefits from Ashwagandha are from the root and the leaves. The leaves are most commonly used in teas preparation. The root can be taken in many ways but it's most commonly dried, powdered, and taken as a supplement these days. The extract of Ashwagandha can reduce blood sugar levels, cortisol levels, symptoms of depression, and inflammation. It helps increase strength, muscle mass, and improve brain function as well. Ashwagandha improves the body's defense against disease by improving the cell-mediated immunity. It also possesses potent antioxidant properties that help protect against cellular damage caused by free radicals. It also shown inhibitory properties against many cancers, (breast, colon, prostate, colon, ovarian, lung, brain), along with their mechanism of actions and pathways involved.[22,23] Ashwagandha extracts, has shown a strong effect related to immune health and stress reduction.[24]

***Planax quinquefolius* (Ginseng)**

Ginseng is a plant in the family Araliaceae and the genus *Panax* with the formal name of *Panax ginseng C. A. Meyer* and the treasure of traditional herbal medicine resources as the "King of Herbs." [2526] Acute respiratory tract infection induced by COVID-19, influenza or chronic diseases causes the horrible threat to human health in the whole world. Based on the effect of benefiting Qi, ginseng can strengthen human immunity against acute respiratory tract infection.[27]

Fenugreek is a well-known herb in the Ayurvedic system of medicine which acts a natural anti-oxidant and strengthens immune system. It is not only used as an herb (dried or fresh leaves), spice(seeds), vegetable (fresh leaves) but also as a condiment in artificial flavoring of maple syrup or in the production of steroids.[28]

Nutraceuticals and Herbal Extracts[29]

Vitamins.

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

The importance of selenium for optimal 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.

Probiotics

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 (102,103), their potential for use against COVID-19 warrants further investigation

β-glucans

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

CONCLUSION

Medicinal plants and herbs are better alternatives to treat several diseases. During the COVID-19 pandemic in december 2019 when no proper allopathethic medicine was available to treat COVID-19, various traditional medicinal plants and herbs have been used as medicines and resulted in positive health effects among COVID-19 patients. In the present review, we have discussed the possible potential uses of medicinal plants and herbs to boosting immunity against these viruses and also prevent or even treat COVID-19 infections.

REFERENCES

1. Arshad, MS; Khan, U and Sadiq, A *et al.*(2020), "Coronavirus disease (COVID-19) and immunity booster green foods: A mini review", ***Food Sci Nutr***,8,3971-3976.
2. Srivastava, AK; Chaurasia, JP; Khan, R; Dhand, C and Verma, S (2020), "Role of Medicinal plants of Traditional Use in Recuperating Devastating COVID-19 Situation", ***Med Aromat Plants (Los Angeles)***, 9, 359. doi: 10.35248/2167-0412.20.9.359.
3. https://www.merriam-webster.com/dictionary/immunity, Accessed Jan. 2021.
4. Robin, Reid; Fiona, Roberts and Elaine, MacDuff (2011), "***Pathology Illustrated-Immunity***", 7th Edition, 87-111.
5. https://www.khanacademy.org/test-prep/mcat/organ-systems/the-immune-system/a/innate-immunity, Accessed Jan. 2021.
6. https://opentextbc.ca/biology/chapter/23-2-adaptive-immune-response, Accessed Jan. 2021.
7. Akira, S; Uematsu, S and Takeuchi, O (2006), "Pathogen recognition and innate immunity", ***Cell***, 124 (4), 783–801. doi:10.1016/j.cell.2006.02.015. PMID 16497588. S2CID 14357403.
8. Babich, O.; Sukhikh, S.; Prosekov, A.; Asyakina, L.; Ivanova, S. (2020), "Medicinal Plants to Strengthen Immunity during a Pandemic", ***Pharmaceuticals***, *13*, 313. https://doi.org/10.3390/ph13100313
9. Vulic, JJ; Vracar, LO; Sumic, ZM (2008), "Chemical Characteristics of Cultivated Elderberry Fruit", ***Acta Periodica Technologica***, 39, 85-89.
10. Torabiana, G; Valtcheva, P; Adilc, Q; Dehghania, F (2019), "Anti-influenzaactivity of Elderberry *(Sambucus nigra*), *J Funct Foods*, 54,353-360.
11. Schoeman Dewald Fielding BC (2019), "Coronavirus Envelope Protein: Current Knowledge, ***Virol J***, 16, 69.
12. Gunathilake, KD; Rupasinghe, HV (2015), "Recent Perspectives on the Medicinal Potential of Ginger, ***Botanics: Targets and Therapy***, 5, 55-63.
13. Chavan, R.D.; Shinde, P.; Girkar, K.; Madage, R.; Chowdhary, A (2016), "Assessment of Anti-Influenza Activity And Hemagglutination Inhibition of Plumbago Indica and Allium Sativum Extracts", ***Phcog. Res.***, 8, 105-111.

14. Uzun, M.; Kaya, A (2016), "Ethnobotanical Research of Medicinal Plants In Mihalgazi (Eski¸Sehir, Turkey)", ***J. Pharm. Biol.*** , 54, 1194863.
15. Ahuli, M.L; Champy, P; Ramadan, A *et al.*(2008), "Ginger Prevents Th_2-Mediated Immune Response In A Mouse Model of Airway Inflammation", ***International Immunopharmacoogy***,8,1626- 1632.
16. Subodh, Kumar (2020), "Immunity Boosting Role of Medicinal Plant And Pranayam: An Alternative Way to Fight Against Covid-19", ***International Journal of Contemporary Medical Research*** 7(9),I1-I5.
17. Singh, S (2020),"Magical ayurvedic spices and herbs that can boost our immunity", ***MOJ Food Process Technols***, 8(3),99-102.
18. Ahmad, Parvaiz *et al.* (2020), "Herbal Immune-Boosters: Substantial Warriors Of Pandemic Covid-19 Battle", ***Phytomedicine***,153361.
19. Lupton D, Mumtaz Khan M, Al-Yahyai RA, Asif Hanif M. (2017), "Basil: A Natural Source Of Antioxidants And Neutraceuticals, Leafy Medicinal Herbs: Botany, Chemistry, Postharvest Technology and Uses (Eds D.C.P. Ambrose *et al*.).
20. Mahmoud Rafieian- Kopaei, *et al.*(2014), "Turmeric: A Spice With Multifunctional Medicinal Properties, "***Journal of Herb Med Pharmacology***", 3(1),5-8
21. Abdulrahim Abu Jayyab, (2020), "Nutritional Pharmacology Aspects and Potential Clinical Uses of Clove Essential Oil in the Treatment of Coronavirus infection and Possibility Protect from Coronavirus (COID-19) induced Sudden Death due the Embolism, ***Journal ofChemical Biology & Pharmaceutical Chemistry***, S1.
22. Dutta R, Khalil R, *et al.* (2019), "Withania Somnifera (Ashwagandha) and Withaferin A: Potential in Integrative Oncology**",** ***Int J Mol Sci.***, 20(21), 5310.
23. Patil, A; Kakde, MS(2020), "Medicinal Plant As A Natural Immunity Booster for COVID19- A Review", ***Indian J Integr Med***.,2(2), 24-27.
24. Renu, Rathi (2020), "COVID-19 Pandemic: Home Remedies for Immunity Boosting", ***International Journal of Research In Pharmaceutical Sciences***, 11 (SPL)(1), 734-738.
25. Park, HJ *et al.* (2012), "Ginseng in Traditional Herbal Prescriptions***",*** ***J Ginseng Res***,36,225–41.
26. Li XY *et al.* (2019), "Current Status and Problem-Solving Strategies For Ginseng Industry", ***Chin J Integr Med***, 25,883–6.
27. Zhang Z, *et.al* (2020), "Effect of *Panax Ginseng* On Preventing Acute Respiratory Tract Infection: A Protocol For Systematic Review And Meta-Analysis", *Medicine*,99, 24(e20690).
28. https://poshan.outlookindia.com/story/poshan-news-covid-19-herbs-that-strengthen-your-immune-system/350819
29. *Ahmed* Hamza Tahir *et al.* (2020), "Nutraceuticals and herbal extracts: A Ray Of Hope For COVID-19 And Related Infections (Review)", ***International Journal of Functional Nutrition***, 1, 6.

How to cite this article: Tamboli, F., More, H., Khairmode, S., Patil, D., Tambare, P., & Shinde, A. (2021). IMPORTANCE OF MEDICINAL PLANTS AND HERBS AS AN IMMUNITY BOOSTER FOR PANDEMIC COVID-19. Tropical Journal of Pharmaceutical and Life Sciences, 8(1), 01-09. Retrieved from https://informativejournals.com/journal/index.php/tjpls/article/view/65.

Published by:
Informative Journals
Jadoun Science Publishing Group India