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A REVIEW ON HOW HERBAL MEDICINE IS SUPERIOR THAN ALLOPATHIC MEDICINE IN PREVENTION OF COVID - 19

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ABSTRACT

The COVID-19 pandemic has hit an international healthcare system with low levels of preparedness and emergency response. Although the advent of effective vaccines has helped governments, the scientific community, and the general public to emerge from the pandemic, effective drug therapies (including immunotherapy) for the prevention and treatment of COVID-19 has not yet been established. Internationally, this has increased the demand and supply of many complementary and alternative medicine (CAM) practices. Recent surveys show that the public and patients are increasingly seeking his CAM information from pharmacists and other health care professionals for the purposes of preventing, relieving symptoms, or treating COVID-19. I'm here. This narrative commentary provides an update on global practices, policies, and research related to the use of CAM in the context of COVID-19. Health professionals' understanding of CAMs in general and those who have been alerted to the potential benefits of COVID-19, patient and consumer behaviour related to CAM use. Health professionals' awareness of the cultural, religious, and self-care practices associated with the use of CAM is important to inform effective communication and counselling practices and to promote evidence-based self-care when patients undergo counselling.

KEYWORDS: Covid-19, Immunity, Herbal medicine, Traditional Application, Allopathy.

INTRODUCTION

There is now a need for therapeutic solutions to stop the spread of the 2019 novel coronavirus (known as SARS-Cov-2).[1] Statistical and scientific studies show that the pandemic is on the rise worldwide, and that people infected with Covid 19 are experiencing symptoms similar to rum or flu (fever, cough, shortness of breath, fatigue, headache, diarrhoea and phlegm).[2,3] Morocco will first have. to deal with some victims contaminated by the arrival of the infected from abroad. Specialized departments and Moroccan families, and within Moroccan families,[4] traditional phytotherapy (the use of medicinal and aromatic plants) has evolved greatly in the treatment of some infections.[5] Today, the traditional uses of these plants have evolved. Avoiding overuse of antibiotics offers a therapeutic approach. As such, the rapid spread of Covid 19 has left researchers with no choice but to find effective treatments and take all necessary and essential measures to fight and stop the transmission of Covid 19. To contribute to this collective effort to prevent this pandemic, we present a natural remedy that has been used by the people of Morocco for generations. Helps fight fatigue, headaches, and phlegm. The main symptoms commonly seen in patients affected by the Covid-19 pandemic. This is a treatment based on a blend of three medicinal plants, including lemon, ginger, and thyme, combined with honey. This combination was widely used during Covid 19.

MATERIAL AND METHODS

Moroccan people traditionally use plants such as thyme, ginger, lemon and honey to treat dry coughs and fevers, and to boost immunity so the body can defend itself. The combined medicinal use of these plants and honey is known in a variety of ways, including to combat and prevent rum flu disease, which has symptoms similar to those of Covid -19. We chose the most realistic method as the preferred treatment. The process of preparing a drink for oral administration looks like this: Ingredients and Usage:

Cleaned lemon, 1 tablespoon thyme, 1 teaspoon grated ginger, 2 tablespoons organic honey, 250 ml water, 2 large bowls. Preparation:

Add thyme and grated ginger to a bowl. Boil 250ml of water and pour directly over the whole. Then let it rest for at least 2 hours (don't forget to cover the bowl). After 2 hours, filter the mixture (thyme and ginger), put everything in a pot and cook over low heat (infusion should be hot). Remove mixture from heat and while lemons are preparing Let cool. Grate the whole lemon, sieve everything, collect the juice and add to the infusion. Ready for injection. Add 1-2 spoons of organic honey. Lemon juice and honey are not heated to

maintain their beneficial effects. The doses used are sufficient and necessary in ml, taken orally 1-2 times a day (Morning and/or evening) as needed.

Herbal plant use in COVID 19

Several medicinal plants are being used as potential treatments against Covid-19. Ayurvedic practitioners in India have suggested several important plants that provide strong immunity to the human body.), Kutak (Picrorhiza kurroa Royle ex Benth), Guduchi (Tinospora cordifolia (Willed. Milers), Drumstick (Moringa oleifera Lam.), Tulsi (Ocimum sanctum L. Ashwagandha (Withania somniferous (L.) Dunal), Cinnamon (Cinnamomum zeylanicum Blume), black pepper (Piper nigrum L.), ginger (Zingiber officinale Roscoe), turmeric (Curcuma longa L.), liquorice (Glycyrrhiza glabra L, aloe (Aloe barbadense Mill), herringer (Nyctanthes Arbor- tristis L. satavar (Asparagus racemases Willed.), almonds (Prunus amygdalus), and broccoli (Brassica oleracea L.). These are important first level Ayurvedic herbs that help build the human body's immunity and prevent infections. Because the immune system plays an essential and major role in fighting off this new viral infection. The neem plant belongs to the mead family and, due to its active constituents, has therapeutic importance in the prevention and treatment of diseases by modulating various biological pathways. Different active substances such as azadirachtin, nimodipine, nimbi, nimbi dine, nimbidol, sodium nimbate, gaduins, sarannin and quercetin are responsible for different therapeutic effects.[6,7] Nimbin (C30H36O9) is the first bitter-tasting compound isolated from neem oil to help strengthen the body's immune system and fight infections of all kinds. This extract enhances the immune system by stimulating the phagocytic activity and antigen-presenting capacity of macrophages by stimulating cytokines. This extract enhances the mitotic response of splenocytes to concanavalin-A and stimulates the production of IL-1, IFN-gamma, and TNF-alpha, reflecting activation.[8] Immunomodulatory activity of aqueous extracts of Azadirachta indica flowers on humoral and cellular immune responses to ovalbumin, phagocytosis assessed by carbon clearance assay and cyclophosphamide-induced myelosuppression model. the results mattered Immunomodulatory activity by inducing both humoral and cellular immunity, and non-specific immune responses by phagocytosis of macrophages.[9] Neem leaves are her top herbal choice against COVID-19 because neem not only has immunomodulatory activity, but also strong antiviral activity. An aqueous extract from the bark of the neem plant acts as a potent inhibitor of herpes simplex virus type 1 (HSV-1) infection in natural target cells and is considered a novel anti-herpetic fungicide. Recently, neem leaf phytochemicals were shown to be effective against his COVID-19 virus.

This was confirmed by molecular docking studies in which the component has high binding affinity for the major proteases of COVID-19 (Shanmugam, 2020). Another molecular docking study showed neem compounds from seed extracts to have some inhibitory activity.

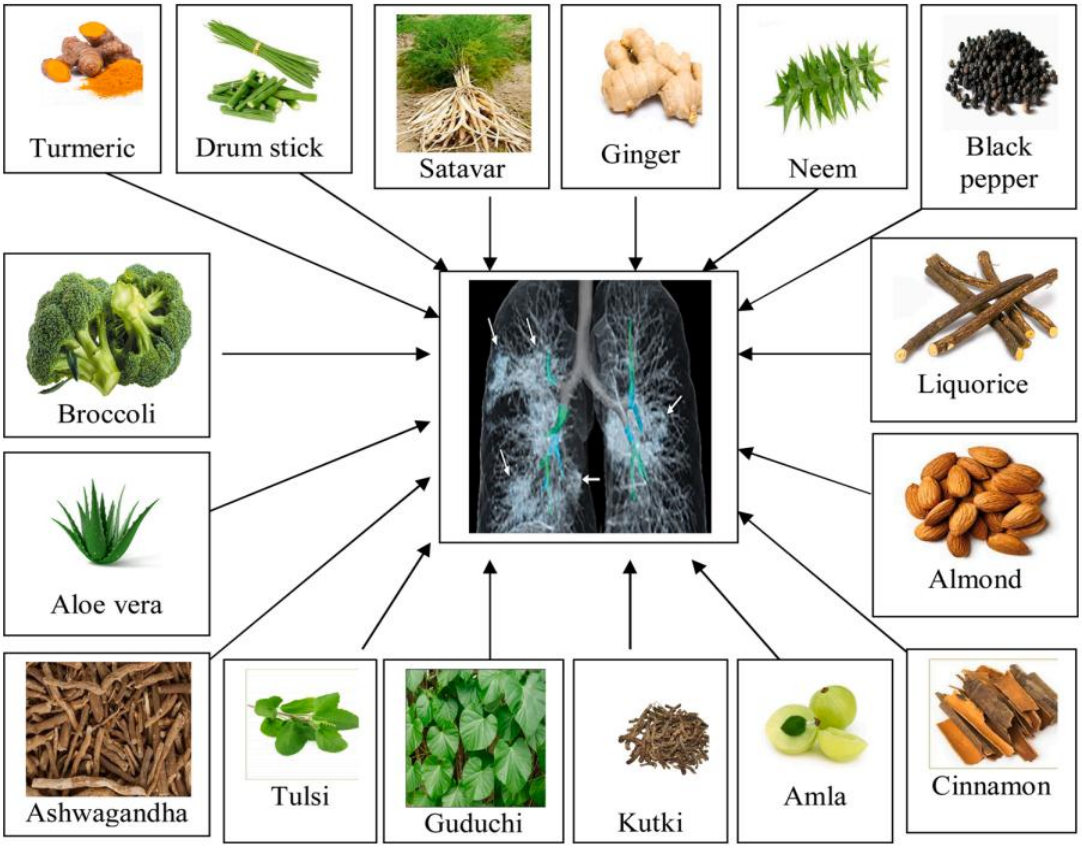

Fig. 2: Herbal plants as immunomodulator against COVID-19 infection.

Amalaka belongs to the pepper family and its fruit is one of the most important fruits used as an immunomodulatory agent for recurrent respiratory infections in humans. The fruits are rich in vitamin C and other active ingredients, the most important flavonoids being kaempferol, ellagic acid and gallic acid. The extract acts as an adaptogen and improves immunity. It enhances IL-2 and NK (natural killer) cell activity, antibody-dependent cellular cytotoxicity (ADCC) and gamma IFN production, and inhibits apoptosis. Currently, the fruit is a rich source of vitamin C, so it is mainly used to improve immunity against COVID-19. Philembulysin B, a plant component extracted from roots, has shown inhibitory potency against coxsackieviruses[10] and its phenol content is similar to that of herpes simplex virus (HSV) 1 and 2. The phytochemical 1,2,4,6-tetra-O-galloyl-βD-glucose from P. emblica showed antiviral activity against HSV in vitro. Pentagalloyl glucose inhibited influenza A virus replication by preventing viral adsorption and inhibiting viral shedding. P. emblica plant

extracts have also shown anti-HIV properties by inhibiting the viral reverse transcriptase. Kutki belongs to the Scrophulariaceae family and is a potent immunomodulator, effective against liver and respiratory diseases. The plant extract contains the plant components Kutki, picroside, vanillic acid, D-mannitol, androsine., which contains apocynin. Picroside strengthens the immune system by increasing phagocytosis and cellular and humoral immunity.[11] Its immunomodulatory activity was assessed in a peritoneal macrophage model and Freund's complete adjuvant-induced stimulation of lipopolysaccharide-stimulated RAW 264.7 mouse macrophages, resulting in significant immunomodulatory activity. Apart from this activity, the plant is also useful against viral infections. Recently, four new bis-iridoid glycosides, saungmaygaosides AD. The leaves mainly contain niaziminin A and niaziminin B, niaziminin, and the flowers mainly contain flavonoids such as quercetin, isoquercetin, kaempferol and kaempferritin. Its fruits contain isothiocyanates, nitrites, thiocarbamates and beta-sitosterol. Leaf-derived glucosamine-specific lectins exhibit immunomodulatory effects via NK cell activity and antibody-dependent cellular cytotoxicity (ADCC). The antiviral activity of Moringa oleifera chloroformate leaf extract was tested against foot and mouth disease virus using MTT test (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) and demonstrated potent antiviral activity. A recent article revealed that Moringa oleifera contains high levels of potassium (K). This reduces infection in COVID-19 patients caused by the SARS-CoV-2 virus.[12]

Herbal medicine how superior allopathic medicine

Tulsi is considered a sacred plant in Ayurveda and is available throughout India. This plant is also called holy basil and belongs to the Labiatae family. The leaves mainly contain ursolic acid ($C_{30}H_{48}O_3$) and apigenin ($C_{15}H_{10}O_5$), as well as oils containing the monoterpenes 1,8-cineol and eugenol. Leaves exhibit immunomodulatory effects by increasing IFN-γ, IL-4, helper T cells, NK cells, and increasing phagocytosis and index.[13] Oil also enhances immunity through mediated GABAergic pathways and cellular and humoral immunity. An immunomodulatory activity of an aqueous leaf extract of Ocimum sanctum has been evaluated in vitro and in vivo methods using delayed-type hypersensitivity models, humoral antibody titers, total white blood cell counts, and differential white blood cell models.[14] More recently, the plant has been the focus of his treatment for COVID-19 as an antiviral agent. This study demonstrated the antiviral activity of its leaves (crude extract, terpenoids and polyphenols) against His H9N2 virus using an in Ovo model, demonstrating a strong antiviral effect. Another study confirmed the antiviral activity of various Ocimum sanctum

extracts against orthomyxoviruses and paramyxoviruses using in vitro cytotoxicity assays.[15] A study last year found that Ocimum sanctum phytochemicals could inhibit his Mpro, the major protease of SARS-CoV-2, using molecular docking and molecular dynamics (MD) simulation studies. We found that Ashwagandha is an evergreen shrub native to India. It belongs to the Solanaceae family and is a master herb in Ayurvedic medicine. Roots contain alkaloids such as isoperetieline, anaferine, quahygrin, anahygrin, steroidal lactones, withanolides, withaferins, and saponins. The Ariel portion also contains 5-dehydroxywithanolide-R and withasomniferin-A. Two isolated compounds, cytoindoside .The main component, withaferin A, has demonstrated the ability to attenuate the neuraminidase of H1N1 influenza.[16] Previous studies using the MTT assay showed potent antiviral activity of aqueous extracts of ashwagandha leaves against hepatitis C virus (HCV). Activity was confirmed by NS5B RNA-dependent RNA and human protein kinase N2 (PKN2, PRKCL2) using molecular docking. Cinnamon belongs to the Lauraceae family and is a well-known tree in many countries, including India. Easy to use as a spice. The bark is best known as a fragrance compound, but it also exhibits various therapeutic effects. Bark and leaves contain oils such as cinnamaldehyde, camphor (found in bark oil), and eugenol (found in leaf oil) showed immunomodulatory activity by increasing globulin levels and enhancing both cellular and humoral immunity.[17] Silver nanoparticles were shown to have significant antiviral activity against the highly pathogenic H7N3 avian influenza virus subtype. Zeilanicum cinnamon essential oil and powder showed considerable immunostimulatory activity by increasing viability (challenge test), lysozyme, phagocytic index, and phagocytic activity.

Black pepper (Family: Pepperaceae) is he one of the most commonly used spices worldwide. The fruit is known to treat sore throats, coughs and colds. Therapeutic efficacy is demonstrated by the presence of piperine and other components such as piperic acid, piperlonguminine, peritrine, piperolein B, piperamide, piperetine, and (-)-camsnoquinine. Piperine exhibits an effective immunostimulatory agent through increased phagocytic index, macrophage cell proliferation, and increased white blood cell count Recently, black pepper fruit has been widely used as a potent antiviral agent to treat COVID-19. A previous study revealed an antiviral assay of Piper longum Linn ethanol extract. It has excellent in vitro anti-B virus activity against hepatitis B virus, against the secretion of hepatitis B virus surface antigen and hepatitis B virus E antigen.[18] Another study demonstrated potent antiviral activity of methanol and chloroform extracts from piper longum seeds against vesicular

stomatitis virus and human parainfluenza virus in HeLa cell lines, which may be due to the presence of piperidine. Ginger belongs to the Zingiberaceae family and is known as a spice and seasoning in the kitchen. This plant is readily available everywhere. Rhizomes are used for sore throats, colds, dry coughs, many gastrointestinal infections, and influenza. - Sesquipherandrene and α-curcumene, as well as the phenolic compounds gingerol, parador and shogaol (phenolic compounds).[19] This extract increases IL-1β, IL-6, and TNF-α production in activated macrophages, as well as splenocyte proliferation and cytokine production. Gingerol and zingiberene are potent immune enhancers that have been shown to improve humoral and cell-mediated immune responses. An in vitro study demonstrated anti-hydration and immunomodulatory effects of ginger and[6]-gingerol and interferon-gamma (IFN-γ) on PSCs co-cultured with mononuclear cells from hydrated patients. Recent studies have shown that ginger root is an immunomodulator in herbal formulations that have been used to treat respiratory diseases. (IgG) antibody measurements.[20] Ginger rhizome is currently one of the leading candidates for treatment of COVID-19 infection due to its antiviral activity. Previous studies have shown it to be a potent antiviral agent against Chikungunya virus using the MTT assay. Turmeric also belongs to the Zingiberaceae family and is a very common and well-established multifunctional herb cultivated and used worldwide. Used for various medicinal purposes. This activity is mainly due to the presence of the active ingredients curcumin, zingiberene, alpha and beta his turmerone. Curcumin (C21H20O6) is an essential. Roots exhibited antiviral activity and anti-SARS activity when 2-acetamido-β-D-glucopyranosylamine was attached to the glycosidic chain of glycyrrhizin to inhibit SARS coronavirus (SARS-Cove) replication in vitro. - increased by 10x. activity. Proven to be a potent antiviral agent effective against hepatitis C Virus due to the presence of glycyrrhizin by real-time quantitative RT-PCR measurement.[21] Aloe, which belongs to the Liliaceae family, is a multifunctional plant known all over the world. Fruit juice contains important active ingredients such as polysaccharides (glucomannan, acemannan, mannose derivatives, hemicellulose), aloin, paracoumaric acid and aldopentoses. Liliaceae is a very potent immunomodulator. Root steroid sapogenic acid has shown to be a potent immunomodulator through significant increases in CD3+ and CD4/CD8+ % T cell activation and significant upregulation of Th1 (IL-2) and Th2. It also exhibits immune adjuvant effects through regulation. (IL-4) cytokines. Another study demonstrated the bioactivity and immunomodulatory potential of shatavarin generated in vitro from Asparagus racemosus cell cultures using human peripheral blood lymphocytes, demonstrating a dose-dependent stimulation of immunity by shatavarin. resulted in cell proliferation and IgG secretion.[22]

Home traditional application

Adjusting various traditional habits during home quarantine can strengthen the body's immunity and is considered a first line of defense against COVID-19. The Ministry of Ayurveda, Yoga, Naturopathy, Unani, Siddhas and Homeopathy (AYUSH) recommends the following self-care guidelines.[23]

a) Warm water in the morning and after a 1-2 hour break. I drink during the day.
b) Practice yoga asana, pranayama and meditation for at least 30 minutes daily to boost your body's immunity.
c) Eating homemade foods with spices such as turmeric (Curcuma longa), cumin (Cuminum cyminum), coriander (Coriandrum sativum) and garlic (Allium sativum) boosts immunity.
d) Drink hot herbal tea with tulsi, cinnamon, black pepper, dried ginger and raisins once or twice a day.
e) Drink hot milk mixed with half a teaspoon of turmeric powder once or twice a day.
f) Put a few drops of sesame oil, coconut oil, or ghee into both nostrils every morning and evening.
g) Vapor inhalation of very hot water infused with fresh mint leaves or caraway seeds before bedtime.
h) Drink a glass of hot water mixed with ginger juice to improve throat infections and general immunity.
i) In the morning, combine a spoonful of honey and garlic to boost immunity.
j) Drinking a glass of warm water mixed with a spoonful of lemon juice will boost your immune system.
k) Take a spoonful of Black Seed Powder with Coleus Leaf Extract every morning to boost immunity.
l) After dinner, to boost immunity: Drink hot milk mixed with 2-3 saffron leaves and a spoonful of almond seed powder.

Allopathic medicines used for treatment of COVID-19

Many symptomatic antiviral drugs have been used to combat COVID-19 infection. In the current scenario, chloroquine, hydroxychloroquine, remdesivir, lopinavir/ritonavir, and ribavirin are being used to treat his COVID-19. 19 infections are still being decrypted. Various studies have suggested the use of different drugs to treat COVID-19 infection, but no single antiviral drug has been proven available against COVID-19. Therefore, during

treatment he described symptomatic medications administered to COVID-19 patients. Antiviral mechanisms against COVID-19 are unknown, but COVID-19 patients have received relief using the following drugs.

Chloroquine and Hydroxychloroquine

Chloroquine/hydroxychloroquine have shown satisfactory results in the treatment of COVID-19. Effective as an antimalarial drug since 1990. Their mechanism of action is based on pH mechanisms.[24] These drugs are weakly basic and accumulate in organelles such as lysosomes and endosomes. After drug accumulation, the pH of cellular organelles increases, inhibiting endosomal processes and subsequently degrading cellular enzymes. Altered pH is responsible for inhibiting viral replication and also affects the process of endocytosis. Chloroquine and hydroxychloroquine also play an important role in the process of reducing glycosylation of the angiotensin-converting enzyme 2 receptor (ACE2), resulting in inhibition of COVID-19 binding to host cells. Chloroquine/hydroxychloroquine have shown satisfactory results in the treatment of COVID-19. Effective as an antimalarial drug since 1990. Their mechanism of action is based on pH mechanisms. These drugs are weakly basic and accumulate in organelles such as lysosomes and endosomes. After drug accumulation, the pH of cellular organelles increases, inhibiting endosomal processes and subsequently degrading cellular enzymes. Altered pH is responsible for inhibiting viral replication and also affects the process of endocytosis. Chloroquine and hydroxychloroquine also play an important role in the process of reducing glycosylation of the angiotensin-converting enzyme 2 receptor (ACE2), resulting in inhibition of COVID-19 binding to host cells. Remdesivir, Ritonavir/Lopinavir, Umifenovir, Favipiravir, and Oseltamivir

Remdesivir (GS-5734)

Adenosine nucleoside analogue was originally made for the treatment of the Ebola and Marburg viruses.[25] However, it is also being used for treatment of COVID-19 infection because of its specific action against the RNA virus. After metabolism inside the cell, the prodrug is transformed into the active "nucleotide triphosphate" metabolite form, which is responsible for inhibiting the viral RNA-dependent RNA polymerase. Thus, it prevents the synthesis of viral RNA and virus replication inside the cells.[26] R i t o n a v i r / L o p i n a v i r u s e d i n H I V, a r e responsible for the inhibition of protease enzymes to prevent viral infection. Protease enzyme also plays an important role in the generation of viral cells and genome maturation. A recent study suggests that these drugs may be useful for controlling

the COVID-19 infections. In contrast, another clinical study shows the result that no benefit was observed by the Ritonavir/Lopinavir Umifenovir/Arbidol drug was developed for the treatment of the uenza virus. It acts as a blocking agent for the virus and cell membrane fusion process and also inhibits the virus-endosome fusion process.[27] This drug may be useful for the treatment of COVID-19 infection. Favipiravir/6-fluro-3-hydroxy-2-pyrazinecarboxamide was used for the treatment of RNA viruslike avian uenza virus. It entered infected cells by endocytosis and was converted to its active form as favipiravir phosphate by a phosphorylation process. This drug exerts an inhibitory effect on RNA-dependent RNA polymerase. As a result, RNA replication is blocked. Recent studies suggest that favipiravir may be another approach to treat COVID-19 infection. Oseltamivir was originally used to treat influenza A and B. It was created and works by stopping the spread of the virus to humans. Various clinical trials are underway. The drug oseltamivir alone and in combination with other drugs to control COVID-19 infection.

Corticosteroids

Various corticosteroids such as dexamethasone, prednisone, methylprednisolone, and hydrocortisone are used to treat COVID-19 infection. Corticosteroids are primarily useful for lower respiratory tract infections and other allergies. Various studies suggest that corticosteroids help clear inflammation from her lungs during her COVID-19 infection. Dexamethasone can control COVID-19 infection All the symptomatic drugs described above have been used against COVID-19, but these drugs require longer recovery times and are less effective against all COVID-19 infections. It also shows its limitations as it is not effective in stages. These drugs have been incorporated into the routine care of his hospitalized COVID-19 patients at many hospitals. However, the lack of evidence on safety and efficacy continues to encourage large-scale clinical trials to evaluate these agents as future treatments for COVID-19 patients. Some clinical trials of these antiviral drugs have been conducted, but only in hospitalized patients. Therefore, further research is needed to develop more potent antiviral molecules with specific mechanisms of action and other evidence.

CONCLUSION

COVID-19 is spreading rapidly and causing a global pandemic. Many approaches have been implemented for prevention or treatment. Some synthetic drugs in various combinations inhibit COVID-19 infection. Many people around the world rely on traditional herbal supplements to treat chronic diseases because they are readily available, inexpensive, and

have minimal side effects. Medicinal plants support the immune system. Offering options, herbs can build the body's immunity in the early stages of COVID-19 infection. Due to the presence of active medicinal properties, herbs play a large role in immunomodulatory mechanisms. Facing serious problems with COVID-19, despite the amazing advances in modern science and technology, symptomatic therapy cannot provide a satisfactory treatment for his COVID-19. Therefore, we should consider adopting a holistic approach of integrating symptomatic treatment and traditional medicine for more effective diagnosis and treatment of disease. Currently, there is no precise monotherapy or combination therapy to prevent COVID-19 infection. We hope that other potential treatments for COVID-19 infection will become available soon. There is a possibility There are currently no effective chemicals to treat COVID-19. Available chemicals show very strong side effects and limitations in humans, the well-known post-COVID-19 effects. Available chemicals can reduce certain symptoms such as inflammation and fever, but are unable to perform multiple actions on the human body during COVID-19 infection. High mortality rates worldwide are due to shortages of medicines. Therefore, there is an urgent need for effective therapeutics to control COVID-19 infection.

REFERENCES

1. Yang, Y., Islam, M. S., Wang, J., Li, Y., Chen, X. Traditional Chinese medicine in the treatment of patients infected with 2019-new coronavirus (SARS-CoV-2): a review and perspective. International journal of biological sciences, 2020; 16(10): 1708.
2. Misbah, S., Ahmad, A., Butt, M. H., Khan, Y. H., Alotaibi, N. H., & Mallhi, T. H. A Systematic Analysis of Studies on Corona Virus Disease 19 (COVID-19) from Viral Emergence to Treatment. Journal of the College of Physicians and Surgeons--Pakistan: JCPSP, 2020; 30(6): 9-18.
3. El Alami, A., Fattah, A., Chait, A. Medicinal plants used for the prevention purposes during the covid-19 pandemic in Morocco. Journal of Analytical Sciences and Applied Biotechnology, 2020; 2(1): 4-11.
4. Hammoumi, A. & Qesmi, R. Impact assessment of containment measure against COVID-19 spread in Morocco. Chaos, Solitons & Fractals, 2020; 140: 1-8.
5. Zougagh, S., Belghiti, A., Rochd, T., Zerdani, I., Mouslim, J. Medicinal and aromatic plants used in traditional treatment of the oral pathology: The ethnobotanical survey in the economic capital Casablanca, Morocco (North Africa). Natural products and bioprospecting, 2019; 9(1): 35-48.

6. Ali, A., Textbook of Pharmacognosy. Publication and Information Directorate., New Delhi, India, 1993.
7. Hossain, M.A., Shah, M.D., Sakari, M., Gas chromatography–mass spectrometry analysis of various organic extracts of Merremia borneensis from Sabah. Asian Pac. J.Trop. Med, 2011; 4(8): 637–641.
8. Thatte, U.M., Dhanukar, S.A., The rasayan concept: clues from immunomoldulatory therapy. In: Upadhayaya, S.N. (Ed.), Immunomodulation. Narosa Publishing House, New Delhi, India, 1997; 141–148.
9. Shah, A.S., Gunjal, M.A., Juvekar, A.R., Immunomostimulatory activity of aqueous extract of Azadirachta indica flowers on specific and non specific immune response.J. Nat. Remedies, 2009; 9(1): 35–42.
10. Wang, Y.F., Wang, X.Y., Ren, Z., Qian, C.W., Li, Y.C., Kaio, K., Wang, Q.D., Zhang, Y.,Zheng, L.Y., Jiang, J.H., Yang, C.R., Phyllaemblicin B inhibits Coxsackie virus B3 induced apoptosis and myocarditis. Antiviral Res, 2009; 84(2): 150–158.
11. Sharma, U., Bala, M., Kumar, N., Singh, B., Munshi, R.K., Bhalerao, S., Immunomodulatory active compounds from Tinospora cordifolia. J. Ethnopharmacol, 2012; 141: 918–926.
12. Ignatov, I., Anti Inflammatory and anti viral effects of Potassium (K) and chemical composition of Moringa. Asian J. Biol, 2020; 9(2): 1–7.
13. Mondal, S., Varma, S., Bamola, V.D., Naik, S.N., Mirdha, B.R., Padhi, M.M., Mehta, N., Mahapatra, S.C., Double-blinded randomized controlled trial for immunomodulatory effects of Tulsi (Ocimum sanctum Linn.) leaf extract on healthy volunteers. J. Ethnopharmacol, 2011; 136: 452–456.
14. Venkatachalam, V.V., Rajinikanth, B., Immunomodulatory activity of aqueous leaf extract of Ocimum sanctum. In: Malathi, R., Krishnan, J. (Eds.), Recent Advancements in System Modelling Applications. 188. Springer, India, 2013.
15. Patil, U., Studies on antiviral activity of tulsi (Ocimum sanctum) crude extracts on selected viruses of veterinary importance. Int. J. Ayur. Pharm. Res, 2018; 6(4): 17–21.
16. Cai, Z., Zhang, G., Tang, B., Liu, Y., Fu, X., Zhang, X., Promising anti-influenza properties of active constituent of Withania somnifera ayurvedic herb in targeting neuraminidase of H1N1 influenza: computational study. Cell Biochem. Biophys, 2015; 72(3): 727–739.

17. Niphade, S.R., Asad, M., Gowda, K.C., Emmanuel, T., Deshmukh, P., Immunomodulatory activity of Cinnamomumzeylanicum bark. Pharm. Biol, 2009; 47(12): 1168–1173.
18. Jiang, Z.Y., Liu, W.F., Zhang, X.M., Luo, J., Ma, Y.B., Chen, J.J., Anti-HBV active constituents from Piper longum. Bioorg. Med. Chem. Lett, 2013; 23(7): 2123–2127.
19. Grzanna, R., Lindmark, L., Frondoza, C.G., Ginger—an herbal medicinal product with broad anti-inflammatory actions. J. Med. Food, 2005; 8(2): 125–132.
20. Ikawati, Z., Hertiani, T., Izzati, F., Immunomodulatory activity of an Indonesian herbal formulation for respiratory disorder. Phcog Mag, 2019; 15: 130–134.
21. Ashfaq, U.A., Masoud, M.S., Nawaz, Z., Raizuddin, S., Glycyrrhizin as antiviral agent against hepatitis C virus. J. Transl. Med, 2011; 9: 112.
22. Pise, M.V., Rudra, J.A., Upadhyay, A., Immunomodulatory potential of shatavarins produced from Asparagus racemosus tissue cultures. J. Nat. Sci. Biol. Med, 2015; 6(2): 415–420.
23. AYUSH, AYUSH Reiterates Immunity Boosting Measures for Self-care During COVID 19 Crises. Available from: Press Information Bureau Government of India AYUSH, 2020.
24. Schrezenmeier E, Dörner T. Mechanisms of action of hydroxychloroquine and chloroquine: implications for rheumatology. Nat Rev Rheumatol, 2020; 16: 155-166.
25. Agostini ML, Andres EL, Sims AC, Graham RL, Sheahan TP, Lu X, et al. Coronavirus susceptibility to the antiviral Remdesivir (GS-5734) is mediated by the viral polymerase and the proofreading exoribonuclease. MBio, 2018; 9e002: 21-18.
26. McClellan K, Perry CM. Oseltamivir: a review of its use in infl uenza. Drugs, 2001; 61: 263-283.
27. Furuta Y, Komeno T, Nakamura T. Favipiravir (T-705), a broad spectrum inhibitor of viral RNA polymerase. Proc Jpn Acad B: Phys Biol Sci, 2017; 93: 449-463.