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Medicinal plants as good source for treatment of COVID-19: A short review

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Abstract

The search to identify treatments and vaccines for novel coronavirus disease (COVID-19) are ongoing. There are some selected medicinal plants (*Nigella sativa*, *Vernonia amygdalina*, *Azadirachta indica*, *Eurycoma longifolia* and others), with reported antiviral, anti-inflammatory, and immunomodulatory effects that might be interesting for further investigation. Results proved that *A. indica* reported positive antiviral evidence specific to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) based on preliminary in silico data while the other medicinal plants proved differential anti-inflammatory or immunomodulatory effects. Quality control and standardisation of medicinal plant-based products also needs to be emphasized. However, given the unprecedented challenges faced, ethnopharmacological research should be given a fair amount of consideration for contribution in this pandemic.

Keywords: COVID-19, medicinal plants, health authorities

Introduction

The first case of Covid-19 was reported in Wuhan, China, in December 2019, and due to its rapid increase and high incidence rate, it has become a pandemic health problem worldwide. It mainly attacks the host's immune system and impairs the regulation system, playing a significant role in its pathogenesis, causing covid-19 disease. Still, we are waiting for such molecules that can act as immunomodulators and enhance the body's immune system against the disease [1]. Many of studies on traditional Chinese medicine for human severe acute respiratory syndrome (SARS), they found positive but inconclusive results on the effectiveness of the combination treatment, using traditional Chinese medicine as complementary agent. Based on previous experience of treating SARS with traditional Chinese herbal medicines, the General Office of the National Health and Health Commission of China and the Office of the State Administration of Traditional Chinese Medicine have encouraged the integration of traditional Chinese medicine and Western medicine. Different prescriptions are recommended at different stages of the disease. Compared to chemical medicines, herbal medicines and natural plant products are less understood in terms of their mechanism of action, but more clinical investigations have been started to more accurately assess their effects. Like chloroquine phosphate, these herbal medicines are generally not very potent and therefore cannot be considered a treatment in themselves. However, as a complementary treatment recovery rates may increase when combined with other treatments [2]. The plants have given and continue to give compounds with great efficiency, some of them being a starting point for easy to obtain and highly effective synthetic substances. An example is chloroquine, a structural analog of quinine, originally extracted from the bark of cinchona trees, which has been shown to be effective in treating COVID-19. By now, among the most used herbal species are *Astragalus mongholicus* Bunge, *Glycyrrhiza glabra* L., *Saposhnikovia divaricata* (Turcz. ex Ledeb.) Schischk., *Actinopycnis lancea* (Thunb.) DC., *Actinopycnis macrocephala* Koidz., *Lonicera japonica* Thunb., and *Forsythia suspensa* (Thunb.) Vahl [3]. Several herbal medicines as very likely to appeal to the COVID-19 patient – positive in 5 cases (*Althaea officinalis*, *Commiphora molmol*, *Glycyrrhiza glabra*, *Hedera helix* and *Sambucus nigra*) and promising in 10 cases (*Allium sativum*, *Andrographis paniculata*, *Echinacea angustifolia*, *Echinacea purpurea*, *Eucalyptus globulus* essential oil, *Justicia pectoralis*, *Magnolia officinalis*, *Pelargonium sidoides*, *Salix* sp, *Zingiber officinale*) [4]. This review paper gave some medicinal plants that have previously proven effective in counteracting some coronaviruses.

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Medicinal Plants with Anti-HCoV effects

Without doubt, it is evident that people from different parts of the world, especially Asian countries, like India, China, Japan, Pakistan, and some parts of Africa have been utilizing plant as the herbal medicine since the prehistoric times [5].

Echinacea purpurea

E. purpurea is one of the most popular herbal medicines in Europe and North America because it shows promising effects against viral infections. It contains several bioactive compounds like chiroic acid and caffeic acids, alkylamides, and polysaccharides [6].

Turmeric

Turmeric is an herbal plant and is also known as *Curcuma longa* (*C. longa*). Turmeric is mostly used as an important spice, a natural food colouring and as food flavour. For many years, turmeric has been widely known as a medicinal plant to treat various diseases [7].

Chincona L., Raiatea

The bark of the trees produces quinine alkaloids, which were effective treatment of malaria for more than several centuries. Quinine has a mode of action that is similar to that of chloroquine, a synthetic antimalaria agent to treat malaria. Nowadays, quinine sulphate has become one of the most wanted drugs in the society for COVID-19 treatment. Inappropriate statements had been made by state officials and doctors that caused public panic. So, people looked for quinine-containing drugs competitively. The behaviour of the people was triggered by a spontaneous reaction because of the high incidence and mortality rate of COVID-19 worldwide [8, 9].

Curcuma xanthorrhiza Roxb

It is an herbal plant that is widely used in Southeast Asian countries. The plant belongs to the Zingiberaceae and *Curcuma* genus. It also has been used as a food additive to enhance the flavour of food. In addition, this plant has been used in the medicine world, and its benefits have been scientifically proven. The plant is used to treat some diseases [10, 11, 12].

Achyranthes aspera

It has anti-viral activity however; it has good antioxidant and anti-inflammatory properties. It is rich in ascorbic acid which confers the antioxidant property that boosts immunity against infections like SARS-coronavirus [13, 14].

Nigella sativa

It is a flowering plant native to North Africa and some other regions like Eastern Medi-terranean, the Indian subcontinent, and Southwest Asia. The seed of the plant has been in use for centuries in Africa and across many continents. It is widely used traditionally to treat asthma, cough, bronchitis, rheumatoid arthritis, diabetes, and hypertension, and to boost the body's immune system to fight illness [15]. It has pharmacological properties such as anti-inflammatory, anti-cancer, analgesic, antioxidant, anti-microbial, anti-parasitic, and anti-viral properties [16, 17]. Ulasli et al. reported a decrease in the replication of Coronavirus with ethanol extract of *Nigella sativa* seed.

There are more recent studies which showed that *Nigella sativa* possesses potential anti-coronavirus effect [18, 19].

Psidium guajava

The leaves and bark of this plant have been used for several decades in African traditional medicine. It is used for the treatment of mal-aria in South Africa, Nigeria, and Tanzania; treatment of hypertension and diabetes in Togo and Nigeria; tuberculosis in Nigeria; HIV in Tanzania; and bacterial infection in South Africa and Guinea. It was reported that it has anti-SARS corona-virus activity. Some studies have been carried out showing that *Psidium guajava* has some potential bio-active compounds that can breakdown coronavirus proteins [20, 21].

Zingiber officinale

It has high pharmacological effects such as antioxidant, anti-microbial, anti-inflammatory, anti-arthritis, anti-platelet, anti-rhinoviral, cardiovascular protection, glucose lowering, and anti-cancer activities. Several studies on *Zingiber officinale* as a potential in-hibitor of infections from coronaviruses have been re-ported in literature. It was recommended as a component of a formulation for the treatment of SARS-CoV-2 [22, 23].

Moringa oleifera

It has some anti-viral activities but not on coronaviruses [24]. However, they could be used to complement and supplement the management of SARS-CoV diseases because of its richness in minerals, zinc, potassium, calcium, magnesium, and vitamins (vitamin C) [25, 26]. Adejuwon et al. reported an herbal mixture formulation containing *Moringa oleifera* to possess SARS-CoV-2 inhibitory activity [27].

Other plants

Extracts from medicinal plants such as *Dioscorea batatas*, *Glycyrrhiza radix*, *Mollugo cerviana*, *Polygonum multiflorum Thunb.*, *Psoralea corylifolia*, *Rheum officinale* Baill., *Salvia miltiorrhiza*, and *Trichosanthes cucumerina* L. were shown active against coronavirus) [28, 29]. In a study, herbal extracts of plants like *Tinospora cordifolia* have already been urged to be used for the patients infected by SARS-CoV-2 [30]. In a study reported by Li et al. (2005), herbal extracts obtained from four different plants *Artemisia annua*, *Lindera aggregata*, *Pyrrosia lingua*, and *Lycoris radiata* have shown remarkable antiviral activity in a cell-based assay against the SARS-CoV where the alkaloid, has shown effective inhibitory activity to stop the infection caused by SARS-CoV on HepG2 and Vero E6 cells culture [30]. Similarly, plant-based phenolic compounds proved anti-SARS-CoV activity in the cell-based study [31]. Another study reported by Lau et al. (2008) has shown that the extract of *Houttuynia cordata* is safe and effective for the treatment of pneumonia caused by SARS-CoV [32].

Conclusion

Medicinal plants could be applied as diet or supplement to prevent infection and strengthen the immunity or as supportive therapy in combination with validated anti-COVID drugs to modulate the cellular and humoral immune responses, to limit co-infections or even to reduce virus titers. Since some natural products with IC50 below 10 µM could be also considered as promising anti-SARS-CoV-2

agents, but this effect must be evaluated through prospective and interventional studies paying attention to the specificity of the action exerted by such products, sustainable sourcing of the species, doses range used, or the use of appropriate controls.

References

1. WHO. Statement on the Second Meeting of the International Health Regulations. Emergency Committee Regarding the Outbreak of Novel Coronavirus 2020.
2. Redeploying Plant Defenses. *Nat. Plants* 2020;6:177.
3. Benarba B, Pandiella A. Medicinal Plants as Sources of Active Molecules against COVID-19. *Front. Pharmacol* 2020;11:1189.
4. Silveira D, Prieto-Garcia JM, Boylan F, Estrada O, Fonseca-Bazzo YM, Jamal CM, *et al.* COVID-19: Is There Evidence for the Use of Herbal Medicines as Adjuvant Symptomatic Therapy. *Front. Pharmacol* 2020;11:1479.
5. Hoareau L, DaSilva EJ. Medicinal plants: a re-emerging health aid. *Electronic Journal of Biotechnology* 1999;2(2):56-70.
6. Hudson J, Vimalanathan S. "Echinacea-a source of potent antivirals for respiratory virus infections," *Pharma-euticals* 2011;4(7):1019-1031.
7. Hewlings S, Kalman D. "Curcumin: a review of its' effects on human health," *Foods* 2017;6(92):1-11.
8. Maldonado C, Barnes CJ, Cornett C. "Phylogeny predicts the quantity of antimalarial alkaloids within the iconic yellow Cinchona bark (Rubiaceae: Cinchona calisaya)," *Frontiers in Plant Science* 2017;8:1-16.
9. Abolghasemi E, Moosa-Kazemi SH, Davoudi M, Reisi A, Satvat MT. "Comparative study of chloroquine and quinine on malaria rodents and their effects on the mouse testis," *Asian Pacific Journal of Tropical Biomedicine* 2012;2(4):311-314.
10. Vesely SF, Nallappan M, Tee TT. "Xanthorrhizol: a review of its pharmacological activities and anticancer properties," *Cancer Cell International* 2015;15(100):1-15.
11. Singgih Wahono C, Diah Setyorini C, Kalim H, Nurdiana N, Handono K. "Effect of Curcuma xanthorrhiza supplementation on systemic lupus erythematosus patients with hypovitamin D which were given vitamin D3 towards disease activity (SLEDAI), IL-6, and TGF- β 1 serum. *International Journal of Rheumatology* 2017, 137-154.
12. Kim M-B, Kim C, Song Y, Hwang J-K. "Anti-hyperglycemic and anti-inflammatory effects of standardized Curcuma xanthorrhiza Roxb. extract and its active compound xanthorrhizol in high-fat diet-induced obese mice," *Evidence-Based Complementary and Alternative Medicine* 2014, 241-251.
13. Beulah A, Sadiq M, Santhi J. Antioxidant and antibacterial activity of *Achyranthes aspera*: An *in vitro* study. *Der Pharma Chemica* 2011;3(5):662-670.
14. Carr AC, Maggini S. Vitamin C and immune function. *Nutrients* 2017;9(11):1211.
15. Ahmad A, Husain A, Mujeeb M, Khan SA, Najmi AK, Siddique NA. A review on therapeutic potential of *Nigella sativa*: A miracle herb. *Asian Pac J Trop Biomed* 2013;3(5):337-352.
16. Islam MT, Khan MR, Mishra SK. Phytochemistry, pharmacology and therapeutic promises of *Nigella sativa* L. *Orient Pharm Exp Med* 2018;19(2):115129.
17. Molla S, Azad MK, Al Hasib MA, Hossain MM, Ahammed MS, Rana S. A review on antiviral effects of *Nigella sativa* L. *Pharmacologyonline* 2019;53:2-47.
18. Ulasli M, Gurses SA, Bayraktar R, Yumrutas O, Oztuzcu S, Igci M, *et al.* The effects of *Nigella sativa* (Ns), *Anthemis hyalina* (Ah) and *Citrus sinensis* (Cs) extracts on the replication of coronavirus and the expression of TRP genes family. *Mol Biol Rep* 2014;41(3):1710-1711.
19. Eldeeb E, Belal A. Two promising herbs that may help in delaying corona virus progression. *Int J Trend Sci Res Dev* 2020;4(4):764-766.
20. Tungadi R, Tuloli TS, Abdulkadir W, Thomas N, Hasan AM, Sapiun Z. COVID-19: Clinical characteristics and molecular levels of candidate compounds of prospective herbal and modern drugs in Indonesia. *Pharm Sci* 2020;26(Covid-19):S12-S23.
21. Erlina L, Paramita RI, Kusuma WA, Fadilah F, Tedjo A, Pratomo IP, *et al.* Virtual screening on Indonesian herbal compounds as COVID-19 supportivetherapy: machine learning and pharmacophore modeling approaches. *BMC Med Inform Decis* 2020;1(6):2-35.
22. Prasad A, Muthamilarasan M, Prasad M. Synergistic antiviral effects against SARS-CoV-2 by plant-based molecules. *Plant Cell Rep* 2020;39(9):1109-1114.
23. Cinatl J, Morgenstern B, Bauer G, Chandra P, Rabenau H, Doerr HW. Glycyrrhizin, an active component of liquorice roots, and replication of SARS-associated coronavirus. *Lancet* 2003;361(9374):2045-6.
24. Imran I, Altaf I, Ashraf M, Javeed A, Munir N. *In vitro* evaluation of antiviral activity of leaf extracts of *Azadirachta indica*, *Moringa oleifera*, and *Morus alba* against the foot and mouth disease virus on BHK-21 cell line. *Sci Asia* 2016;42(6):392-396.
25. Olson ME, Sankaran RP, Fahey JW, Grusak MA, Odee D, Nouman W. Leaf protein and mineral concentrations across the "miracle tree" genus *Moringa*. *PLoS ONE* 2016;11(7):e0159782.
26. Rasha KA, Elsharbasy FS, Fadlemula AA. Nutritional values of *Moringa oleifera*, total protein, amino acid, vitamins, minerals, carbohydrates, total fat and crude fiber, under the semi-arid conditions of Sudan. *J Microb Biochem Technol* 2018;10(2):56-58.
27. Shaji D. Computational Identification of drug lead compounds for COVID-19 from *Moringa oleifera*. *ChemRxiv* 2020. DOI 10.26434/chemrxiv.12535913.v1
28. Alagu Lakshmi S, Shafreen RMB, Priya A, Shunmugiah KP. Ethnomedicines of Indian origin for combating COVID-19 infection by hampering the viral replication: Using structure-based drug discovery approach. *Journal of Biomolecular Structure & Dynamics* 2020;22:1-16.
29. Ho T, Wu S, Chen J, Li C, Hsiang C. Emodin blocks the SARS coronavirus spike protein and angiotensin-converting enzyme 2 inter-action. *Antiviral Research*, 2007;74(2):92-101.
30. Li S, Chen C, Zhang H, Guo H, Wang H, Wang L, *et al.* Identification of natural compounds with antiviral activities against SARS-associated coronavirus. *Antiviral Research* 2005;67(1):18-23.

31. Lin C-W, Tsai F-J, Tsai C-H, Lai C-C, Wan L, Ho T-Y, *et al.* Anti-SARS coronavirus 3C-like protease effect of *Isatis indigotica* root and plant-derived phenolic compounds. *Antiviral Research* 2005;68(1):36-42.
32. Lau K-M, Lee K-M, Koon C-M, Cheung CS-F, Lau C-P, Ho H-M, *et al.* Immunomodulatory and anti-SARS activities of *Houttuynia cordata*. *Journal of Ethnopharmacology* 2008;118(1):79-85.