



IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH

An official Publication of Human Journals

ISSN 2349-7203




Human Journals

Review Article


June 2020 Vol.:18, Issue:3

© All rights are reserved by Tulsidas P. Nimbekar et al.

Traditional Knowledge on Potential Treatment Options in Plants for COVID-19



IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals



Tulsidas P. Nimbekar*, Anil Sao, Shishupal Bodhankar

Bajiraoji Karanjekar College of Pharmacy, Sakoli, Dist. Bhandara, Maharashtra, India -441802

Submission: 22 May 2020
Accepted: 29 May 2020
Published: 30 June 2020



HUMAN JOURNALS

www.ijppr.humanjournals.com

Keywords: Acute respiratory distress syndrome (ARDS), SARS-CoV-2, COVID-19

ABSTRACT

In the course of recent months, the world has confronted an extraordinary wellbeing risk. The World Health Organization has reported pandemic contamination with obscure types of coronavirus called SARS-CoV-2. Spreading basically through the bead course, the infection causes gentle side effects in most of cases, the most widely recognized being: fever (80%), dry hack or cough (56%), weakness (22%) and pain in muscle (7%); less normal indications incorporate an irritated throat, a runny nose, diarrhea, hemoptysis and chills. A hazardous intricacy of SARS-CoV-2 contamination is an acute respiratory distress syndrome (ARDS), which happens all the more regularly in more seasoned grown-ups, those with insusceptible disarranges and co-morbidities. Herbal medicines and its secondary metabolites all time promising for health to cure chronic disorder also. No specific therapies are available and investigations regarding COVID-19 treatment are lacking. Liu *et al.* (2020) successfully crystallised the COVID-19 main protease (Mpro), which is a potential drug target. Several popular antiviral secondary metabolites has been screened by molecular docking in comparison with nelfinavir, lopinavir. Several compounds, such as flavonoids, from medicinal plants, have been reported to show antiviral bioactivities. The binding energies obtained from docking 6LU7 with the native ligand, nelfinavir, lopinavir, kaempferol, quercetin, luteolin-7-glucoside, demethoxycurcumin, naringenin, apigenine-7-glucoside, oleuropein, curcumin, catechin, epicatechin-gallate, zingerol, gingerol, and allicin were -8.37, -10.72, -9.41, -8.58, -8.47, -8.17, -7.99, -7.89, -7.83, -7.31, -7.05, -7.24, -6.67, -5.40, -5.38, -5.40, and -4.03 kcal/mol, respectively. Some traditional Chinese medicine such as Ginseng, Rhubarb, Cinnamomum, liquorice and Ephedra. This all medication gives symptomatic relief and boost immunity for this globally spreading infection. For immunity boosting purpose withanolides, andrographolides, vitamin C and zinc also used from ancient time and also recommended by AYUSH Ministry. Medicinal plants as potential inhibitors of COVID-19 should be explored in future research.

INTRODUCTION

A new type of coronavirus, novel coronavirus (COVID-19), is causing an increasing number of cases of pneumonia and was declared a Public Health Emergency of International Concern by the World Health Organization on 30 January 2020. The virus first appeared in Wuhan, China, in late December 2019, and traditional Chinese herbal medicine is being used for its treatment. This systematic review and meta-analysis will assess studies of the effects of traditional Chinese herbal medicine in COVID-19 pneumonia. After a deep exercise, they conclude and understand the pathogenesis of disease and discovered as coronavirus. But till total 4421 patient was confirmed as infected with coronavirus. COVID-19 was first identified and isolated from pneumonia patient belongs to Wuhan, China^[1-2]. Humans Coronavirus sickness was first in 1931^[3], with the first coronavirus (HCoV-229E) disengaged from people in 1965. Until the flare-up of extreme intense respiratory disorder in late 2002, just two human coronaviruses (HCoV) were known HCoV-229E and HCoV-OC43. When the SARS coronavirus (SARS-CoV) had been distinguished, two further human coronaviruses were recognized. Three groups of coronaviruses are as follows:

- Group 1 (HCoV-229E and HCoV-NL63),
- Group 2 (HCoV-OC43 and HCoV-HKU1),
- Group 3 (no human CoVs as yet).

With the COVID-19 outbreak, the use of wild plants as herbal ingredients in the formulations for Traditional Chinese Medicine (TCM), as well as other herbal-based products around the world, is anticipated to increase dramatically.^[4-5] Here, we take a look at what is known about the use of herbal ingredients in TCM in addressing the COVID-19 disease so far, and what safeguards can be put in place moving on to ensure that these and other wild plant resources are available in the long-term to support healthcare.

Approximately 60,000 plant species are used globally for medicinal purposes, of which about 28,000 have well-documented use, and approximately 3,000 species are estimated to be traded internationally, with only one-third of those known to be in commercial cultivation.^[6] A combination of TCM and Western treatments is being used extensively in China to treat COVID-19 patients, with official COVID-19 treatment versions issued by the National Health Commission of the People's Republic of China. The efficacy of the application of

herbal treatments to COVID-19 is a subject of research, for example a study that screened 125 Chinese herbal medicines with the potential directly to inhibit COVID-19,^[7] and a review of historical records and human evidence of SARS and H1N1 influenza prevention.^[8] Use of herbal-based medicines to treat COVID-19 is similar to their use in treatments for the severe acute respiratory syndrome (SARS) disease, which have been researched since that outbreak in 2002/2003.^[9] Integrated Chinese and Western medicines played an important role in the treatment of SARS in China. Among 5,327 confirmed cases, 3,104 patients received Traditional Chinese Medicine. “Current evidence shows that Chinese herbs plus Western medicine have no benefit in terms of mortality, compared with Western medicine alone. However, significant benefits in improvement of symptoms, including decreasing body temperature, cough and breathing difficulties, decreasing dosages of corticosteroids, improving absorption of pulmonary infiltration and improving quality of life, were observed. Weak evidence suggests that Chinese herbs are beneficial in shortening the number of days spent in hospital. No adverse effects of Chinese herbs were observed”.^[10]

Ayurveda, being the science of life, propagates the gifts of nature in maintaining healthy and happy living. Ayurveda’s extensive knowledge base on preventive care derives from the concepts of “Dinacharya” - daily regimes and “Ritucharya” - seasonal regimes to maintain healthy life. It is a plant-based science. The simplicity of awareness about oneself and the harmony each individual can achieve by uplifting and maintaining his or her immunity is emphasized across Ayurveda’s classical scriptures. Ministry of AYUSH recommends the following self-care guidelines for preventive health measures and boosting immunity with special reference to respiratory health. These are supported by Ayurvedic literature and scientific publications.

Herbs alone won’t reduce the severity or chance of transmission of the virus but may play a role in maintaining a high level of health to help withstand the effects of the virus. The idea is that by using plant-based medicines and optimal nutrition, we may be able to strengthen weak points leveraged by the virus — primarily involving a disruption of the virus itself and bolstering the immune system and lungs.

Bioactive compounds use as preventive Measures in COVID- 19

No specific therapies are available and investigations regarding COVID-19 treatment are lacking. Liu *et al.* (2020) successfully crystallised the COVID-19 main protease (Mpro), which is a potential drug target. Several popular antiviral secondary metabolites has been screened by molecular docking in comparison with nelfinavir, lopinavir. Several compounds, such as flavonoids, from medicinal plants, have been reported to show antiviral bioactivities^[11-13]. The binding energies obtained from docking 6LU7 with the native ligand, nelfinavir, lopinavir, kaempferol, quercetin, luteolin-7-glucoside, demethoxycurcumin, naringenin, apigenine-7glucoside, oleuropein, curcumin, catechin, epicatechin-gallate, zingerol, gingerol, and allicin were -8.37, -10.72, -9.41, -8.58, -8.47,-8.17, -7.99, -7.89,-7.83,-7.31, -7.05, -7.24, -6.67, 5.40, -5.38, -5.40, and -4.03 kcal/mol, respectively^[14-15].

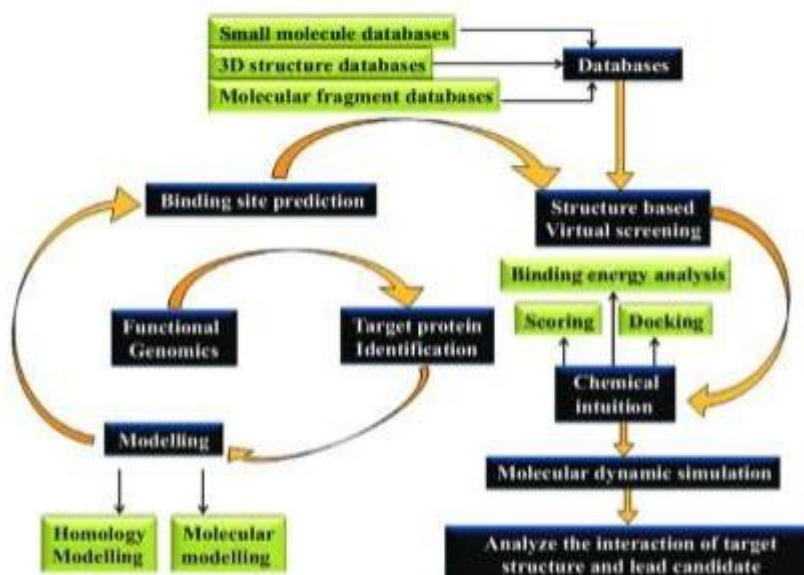


Figure No. 1: Flow chart shows Traditional medicine database screened with protein database of COVID-19 by molecular modeling.

Table No. 1: Properties of some plants to fight against COVID-19

| No | Plant Scientific Name | Secondary Metabolites | Activity |
|----|---|-----------------------------|---|
| 1 | Ashwagandha <i>Withania somnifera</i> (Apocynaceae) | Serpentine, Withanone | Adaptogenic property, AEC2-RBD complex inhibitor, nitric oxide |
| 2 | Berberin <i>Berberis aristata</i> (Berberidaceae) | Berberin | Inhibit inflammatory mediators |
| 3 | Cardamom <i>Elettaria cardamomum</i> (Zingiberaceae) | Limonene, Limonene | Anti-cancer properties, Antiviral |
| 4 | Celery <i>Apium graveolen</i> (Apiaceae) | Apigenin-7-glucoside | Contain abundant amount of minerals and vitamins. effectively strengthens the stomach, liver, and kidneys |
| 5 | Cinnamon <i>Cinnamomum zeylanicum</i> (Lauraceae) | Cinnamic aldehyde | Modulate cytokine responses, Block viral attachment to ACE-2 linkages |
| 6 | Citrus fruit <i>Citrus sinensis</i> (Rutaceae) | Naringenin | Antioxidant, antiviral, antibacterial, naringenin ability to improve endothelial function |
| 7 | Clove <i>Eugenia caryophyllus</i> (Myrtaceae) | Eugenol | Cough or throat irritation |
| 8 | Dhaniya <i>Coriandrum sativum</i> (Apiaceae) | Dietary minerals | Potent aids to increase the body's immunity against harmful viruses |
| 9 | Dill <i>Anethum graveolens</i> (Umbelliferaceae) | Kaempferol | Antioxidant, Thrombus preventive, slowdowns coagulation system |
| 10 | Fennel <i>Foeniculum vulgare</i> (Umbelliferaceae) | Quercetin | Antioxidant, Thrombus preventive |
| 11 | Garlic <i>Allium sativum</i> (Alliaceae) | Diallyl Disulfide, Allicine | Natural antibiotic, anti-virus, cures respiratory infections, capable of eliminating the biofilms of this bacterium |
| 12 | Ghee Clarified Butter | omega-3 fatty acids | Ghee in both the nostrils (PratimarshNasya) in morning and evening soothing effect, fat soluble vitamins, |
| 13 | Ginger <i>Zingibez officiale</i> (Zingiberaceae) | Zingerol, Gingerol | Work against GI disturbances, cancer, inflammation, nausea, vomiting |
| 14 | Ginkgo <i>Ginkgo biloba</i> (Ginkgoaceae) | Ginkgolides, Ginkgolic acid | Upregulate and protect ACE-2 expression, increase its activity (esp in the aged) |

| | | | |
|----|---|---|---|
| 15 | Ginseng <i>Panax ginseng</i> (Araliaceae) | Ginsenosides and Gintonin | Boosting the immune system |
| 16 | Green tea <i>Camellia sinesis</i> (Theaceae) | Epicatechinallat e, Catechin | Antioxidant, reduce inflammation |
| 17 | Guduchi <i>Tinospora cordifolia</i> (Menispermaceae) | Phytosterols | Herbs has broad-spectrum antivirals and protease inhibitors, Juice with sugar is good after malarial and typhoid fever, antioxidant |
| 18 | Kalmegh <i>Andrographis paniculata</i> (Acanthaceae) | Kalmeghin, andrographol ides | Potent inhibitory effect on the NF-κB and STAT3 signaling pathways in inflammation |
| 19 | Clove <i>Eugenia caryophyllus</i> (Myrtaceae) | Eugenol Triterpenoids | Cough or throat irritation |
| 20 | Liquorice <i>Glycyrrhiza glabra</i> (Leguminosae) | Coumarin, Glycerhizine | Glycyrrhizin, inhibiting its replication. Block viral attachment to ACE-2 linkages |
| 21 | Ma- Hung <i>Ephedra gerardiana</i> (Ephedraceae) | Coumarin, Glycerhizine | Decongestant and bronchodilator |
| 22 | Olive <i>Olea europaea</i> (Oleaceae) | Luteolin-7- glucoside, Oleuropein | Antioxidant |
| 23 | Onion <i>Allium cepa</i> (Liliaceae) | Undecane -2-6-Dimethyl | Raw bulb juice is taken to check sunstroke vomiting. Bulb extract is taken orally for curing cholera, also in indigestion and diarrhoea |
| 24 | Pennyroyal <i>Mentha pulegium</i> (Lamiaceae) | Thymol | Useful for dealing with nausea, vomiting, gastrointestinal problems, flu, asthma, cough and pertussis |
| 25 | Pepper <i>Capsicum annum</i> (Solanaceae) | Capsaicin | Reduce severity and duration of the cold, stimulates the immune system |
| 26 | Pudina <i>Mentha rotundifolia</i> (Lamiaceae) | Piperitenone oxide | Antioxidant, antibacterial, cough or throat irritation |
| 27 | Mungna <i>Moringa oleifera</i> (Moringaceae) | Quercetin Chlorogenic acid | Herb has broad-spectrum antivirals and protease inhibitors rich in healthy antioxidants and bioactive plant compounds. It's rich in Vitamins A, C, E and fiber makes it a perfect aid in boosting one's immune system |
| 28 | Rubarb <i>Rheum emodii</i> (Polygonaceae) | Emodine | Inhibit the 3a ion channel of coronavirus SARS-CoV and HCoV-OC43 as well as virus release from HCoV-OC43 |

| | | | |
|----|---|-------------------------------------|--|
| 29 | Ajwain <i>Trachyspermum ammi</i> (Apiaceae) | Terpenoids | A broad-spectrum anti-virals and protease inhibitors, relieve congestion and improves the vital capacity of the lungs. It improves breathing problem in asthmatic patients and helps improve overall lung function |
| 30 | Tragacanth <i>Astragalus gossypinus</i> (Fabaceae) | Glucuronic acid | Used as a soothing and anti-cough agent in the common cold medication |
| 31 | Turmeric <i>Curcuma longa</i> (Zingiberaceae) | Curcumin, Demethoxyc u-rcumin | Curcumin, Demethoxyc u-rcumin |
| 32 | Tulsi <i>Ocimum sanctum</i> (Labiatae) | Oleanolic acid, Ursolic acid | A broad-spectrum antivirals and protease inhibitors, Leaves are used as blood purifier and to relive cough, fever, in bronchitis and also in Respiratory Disorders |

CONCLUSION

On current literature review, it have seen that nelfinavir and lopinavir may represent potential treatment options, and kaempferol, quercetin, luteolin-7 glucoside, demethoxycurcumin, naringenin, apigenin-7-glucoside, oleuropein, curcumin, catechin, and epicatechin-gallate appeared to have the best potential to act as COVID-19 Mpro inhibitors. However, further research is necessary to investigate their potential medicinal use and some Chinese medicines such as Ginseng, Rhubarb, Cinnamomum, liquorice and Ephedra will help to give symptomatic relief and boost immunity to fight against this globally spread infection. There are 3598 AYUSH hospitals available in the country including 2818 Ayurveda hospitals. Similarly, there are 25723 AYUSH dispensaries including 15291 Ayurveda dispensaries. There are total 7.73 lakh registered AYUSH practitioners including 4.28 lakh Ayurveda practitioners. There are 8954 AYUSH drug manufacturing units (licensed pharmacies) in the country. Among these, 7718 are Ayurveda pharmacies. With this infrastructure and associated human resources, implementation of the proposed action plan seems highly feasible.

REFERENCES

1. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. Lancet. 2020.-6736(20)30185-9.
2. Coronavirus Outbreak. Available at: <https://www.worldometers.info/coronavirus/>. Accessed 26 Feb 2020.
3. Coronavirus disease 2019". World Health Organization. Retrieved 15 March 20.
4. Mailles A, Blanckaert K, Chaud P, van der Werf S, Lina B, Caro V, *et al*. First cases of Middle East respiratory syndrome Coronavirus (MERS-CoV) infections in France, investigations and
5. Saif L J. Animal coronaviruses: what can they teach us about the severe acute respiratory syndrome? Rev Sci

- Tech. 2004;23:643–60. Gwaltney JM Jr. Virology and immunology of the common cold. Rhinology. 1985;23:265.
- 6 Novel Coronavirus (2019-nCoV) Situation Report-1 [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200121-sitrep-1-2019-ncov.pdf?sfvrsn=20a99c10_4].
7. Wenjie T, Xiang Z, Xuejun M, Wenling W, Peihua N, Wenbo X, George FG, Guizhen W. A novel coronavirus genome identified in a cluster of pneumonia cases - Wuhan, China 2019–2020. China CDC Weekly. 2020;2(4):61–2.
- 8 Tan WJZX, Ma XJ. A novel coronavirus genome identified in a cluster of pneumonia cases-Wuhan, China 2019-2020. China CDC Weekly. 2020;2:61–2.
9. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, Qiu Y, Wang J, Liu Y, Wei Y, *et al.* Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet. 2020.
10. Li W, Moore MJ, Vasilieva N, Sui J, Wong SK, Berne MA, Somasundaran M, Sullivan JL, Luzuriaga K, Greenough TC *et al.* Angiotensin converting enzyme 2 is a functional receptor for the SARS coronavirus. Nature 2003;426(6965):450-454.
11. WHO Director-General's opening remarks at the media briefing on COVID-19—11 March 2020". World Health Organization. 11 March 2020. Retrieved 11 March 2020.
12. Letko M, Munster V. Functional assessment of cell entry and receptor usage for lineage B β -coronaviruses, including 2019-nCoV. bioRxiv. 22 January 2020. 915660.
13. WHO–China Joint Mission (16–24 February 2020). "Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19)" (PDF). World Health Organization. Retrieved 8 March 2020. 23.
14. Khaerunnisa Siti, Kurniawan Hendra, Awaluddin Rizki, Suhartati Suhartati, Soetjipto *et al.* Potential Inhibitor of COVID-19 Main Protease (Mpro) from Several Medicinal Plant Compounds by Molecular Docking Study. doi: 10.20944/preprints202003.0226.v1.29.
15. Press Information Bureau, Government of India, Available at <https://pib.Gov.In/newsite/printrelease.aspx?Relid=137509>, accessed on 10.4.2020.

