



Asian Journal of Research in Pharmaceutical Sciences and Biotechnology

Journal home page: www.ajrpsb.com
<https://doi.org/10.36673/AJRPSB.2020.v08.i02.A07>



NATIVE ANTIVIRAL MEDICINAL PLANTS AGAINST COVID-19: A REVIEW

M. Bhuvaneswari¹, M. Srilatha*¹, Panagal Mani²

¹Department of Biotechnology, Sona College of Arts and Science, Salem, Tamilnadu, India.

²Annai College of Arts and Science, Kovilacheri, Tamilnadu, India.

ABSTRACT

There is a new public health crisis threatening the world with the emergence and spread of 2019 novel corona virus (2019-nCoV) or the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2). The virus was first found in bats and was transmitted to humans through yet unknown intermediary animals in Wuhan, Hubei province, China in December 2019. There have been around 6,589,291 reported cases of corona virus disease 2019 (COVID-2019) and 388,317 reported deaths to date 04/06/2020 in world wide. The transmission of disease is by inhalation or contact with infected droplets and the incubated period ranges from 2 to 14 d. The COVID-19 symptoms are start with fever, cough, sore throat, breathlessness, fatigue, malaise among others. The disease is occur in most people and it may progress to pneumonia, acute respiratory distress syndrome (ARDS) and multi organ dysfunction. Many people are asymptomatic. The fatality rate of COVID-19 is estimated to range from 11-12%. In this review signs and symptoms of virus, prevention of COVID-19 and suggestive medicinal value of south Indian plant sources has been reported. Though the varieties of improved approaches have been taken in scientific and medicinal concern, we have to pay attention on medicinal value of the plant based sources to prevent these types of endemic diseases. Treatment is essentially supportive; role of antiviral agents is yet to be established, in order to overcome this some of the most effective medicinal plants with immune enhancing properties according to the native ethno botanical documents has been reported. Based on the available evidence of the studies on ethnobotany, certain medicinal plants such as *Cayratia trifolia*, *Azadirachta indica*, *Andrographis paniculata*, *Ficus religiosa*, *Curcuma longa*, *Sesbania grandiflora*, *Zingiber officinale*, *Punica granatum*, *Phyllanthus amarus* and *Avicennia marina* they are inexpensive but also for better cultural acceptability, better compatibility with the human body and minimal side effects. This review gives an overview of some important medicinal plants with antiviral activities which are traditionally used in India.

KEYWORDS

Antiviral, Herbal medicine, Immunomodulating effects and COVID-19.

Author for Correspondence:

Srilatha M,
Department of Biotechnology,
Sona College of Arts and Science, Salem, Tamilnadu, India.
Email: sripathy1331@gmail.com

INTRODUCTION

The family of Coronavirus has significant in human and animal pathogens. At the end of December 2019, a novel coronavirus was recognized as the reason of a group of pneumonia cases of unidentified etiology in Wuhan, Huanan Seafood

Wholesale Market, the preliminary site to which cases of coronavirus disease 2019 (COVID-19) were related, a city in the Hubei Province of China¹. The novel coronavirus has quickly become widespread, resulting in an epidemic throughout China, followed by a pandemic, an increasing number of cases in various countries throughout the world². Since the first reports of COVID-19, the infection has spread to contain more than 81,552 cases in China and growing cases (>1,400,000) worldwide, prompting the World Health Organization (WHO) to announce a public health emergency in late January 2020 and describe it as a pandemic in March 2020³. Currently, as epidemics have developed in different nations, escalating numbers of cases have also been described in other countries from all continents, excluding Antarctica. The velocity of new cases outside of China, including the USA, Italy and Spain, has overcome the rate in China. In February 2020, the WHO named the disease as COVID-19. The virus that causes COVID-19 is nominated as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2); it was formerly described as 2019-nCoV (the novel coronavirus)⁴. In order to protect and prevent from corona we preferred herbal based drugs and their active compounds which enhance the immune system of humans and positive effects on human health.

Medicinal plants have biologically active compounds with therapeutic properties that over time have been reported and used by diverse groups of people for treatment of various diseases. Natural products, especially those derived from plants, have been used to help mankind sustain human health since the dawn of medicine. Traditional medicine has been used, since time immemorial and has been well accepted and utilized by the people throughout history. Since from ancient period, plants have been an exemplary source of medicines. Plant-derived medicinal products have attracted the attention of scientists around the world for many years due to their minimum side effects and positive effects on human health. In the pharmaceutical industry, plants with a long history of use in ethnomedicine

can be a rich source of substances for the treatment of various ailments and infectious diseases. Medicinal plants have numerous types of bioactive compounds possessing varied therapeutic properties. The vast array of therapeutic effects associated with medicinal plants includes anti-inflammatory, antiviral, antitumor, antimalarial, and analgesic properties⁵.

The traditional healers in so use a lot of species of plants that serve as regular sources of medicine and there is a need to preserve the traditional knowledge on the uses of these medicinal plants. A total of 10 medicinal plants, which belong to different families and genera were recorded in this review. The results are summarized in Table No.1, which provides the following information for each species: scientific name, botanical family and plant part used. The primary objective of this study is to present a database of the indigenous knowledge on medicinal herbs used for viral diseases among the local traditional healers of Tamilnadu. The focus of this review is to provide information on the phytochemical constituents reported in the literature and published biological and pharmaceutical activities of ten medicinal plants from Indian.

SIGN AND CLINICAL OUTCOMES

Symptoms

The symptoms of infections become visible clearly after an incubation period of 5-6 days¹⁴. The inceptions of nCoV with common symptoms are cough, fever, headache, sore throat, diarrhoea, rhinorrhoea, sneezing, hypoxemia and recently bland diet^{15,16}.

Diagnosis

The COVID-19 was confirmed with diagnosis of lower respiratory tract sample to detect the RNA viral detection with majority of 41 patients. Adding up with nucleic acid tests as the diagnosis (Collection of blood, nasal and throat swabs) of COVID-19 pneumonia; it undergoes several clinical examinations such as chest CT, blood counts, medical history of the affected person and exposure to the specific symptoms¹⁷. Apart from them Remdesivir (RDV), this could inhibit corona

infection *in vitro*. It is a novel nucleotide analogue that proved to be an effective Pan-CoV antiviral¹⁸. In advance a phase 3 clinical trial of secure and protective effect of RDV is ongoing in Wuhan¹⁹.

In molecular biology one of the advantage techniques is Real time reverse transcriptase (RT-PCR) detection methods of corona virus, which has been diagnosed as helpful in the way of early infections. This assay is still leading method to be applied for detecting corona virus (All type). The broad spectrum of an antiviral medicine such as nucleoside analogues and HIV protease inhibitors could attenuated these infectious virus in anticipation of specific antiviral befall accessible. Further, the clinical agent EIDD-2801 has high therapeutic efficiency against pandemic viral infection as it to be considered for the treatment of COVID-19. Preclinical basis effectiveness of chloroquine for to treat COVID-19, it is safety from long term usage medical proven customs. The high quality clinical trials from various locations are needed in emergency worldwide for COVID-19²⁰⁻²⁴.

PREVENTION FOR 2019-NCOV

According to WHO subjecting counsel on preventing the spread of COVID-19²⁵. They advise to avoid travel at highly risk areas as well as to prevent the entry of the people who are from closely affected region, consuming meat from known nCoV affected province and contact with symptomatic individuals. Personal hygiene can be determining the self as well as society health. Cleaning hands with soap than using sanitizer can reduce the risk of viruses on hand. Using of face masks is also important to prevent the entry of pathogen via respiratory system. For huge community social distancing could be maintained to reduce the interaction of the public. Symptom detector is used for the preventive channel for the 2019-nCoV outbreak²⁶.

NATURAL MEDICINE TO CONTROL VIRUS South Indian medicine for the control of virus

India has prosperous and unique collection of plants and still now estimated 45,000 species of plants have been used in traditional medicine systems. Tamilnadu is one of the mainly botanized zones of south India. The researchers of Tamilnadu were analysed with various types of medicinal properties of plants. It is well documented and provides huge information regarding the various medicinal plants from traditional healers to protect the fact of plant usage. Spread of infection while epidemic can be controlled with persuasive antiviral herbal interference²⁷.

Herbal plants have been used by all cultures throughout history. A mainstream of world population in developing and squat earning countries relies for primary health care using traditional medicine²⁸. An extensive assortment of pharmaceutical attention has been expressed in plants widely. Plant based vaccines are being evaluated in clinical trials for HIV, influenza, hepatitis B etc., People have been used medicinal plants to cure severe disease habitually and also Indian medicinal plants have been examined for antiviral properties²⁹. Only some reported on plants from Tamilnadu in spite of the plants used by many tribal people throughout for the management of viral infections³⁰.

However, herbal remedies have been used in developing countries since ancient times, for example Neem (*Azadirachta indica*) extract is used for antiviral effects and the results exhibited that neem leaf and bark basically blocked small pox virus entry into cells at obsessions³¹. On the other hand, Curcumin (*Curcuma longa*) a natural compound and ingredient in curry, has antiinflammatory, antioxidant, anticarcinogenic and antiviral properties. Previous report showed that Curcumin abrogated influenza virus infectivity by inhibiting hemagglutination (HA) activity³². More than 85% of individuals in developing countries use these medicines for health concern. It is stressed necessitate for further investigation and incorporation towards modern plant based

medicines³³⁻³⁶. These reports are good examples for the production of antiviral drug against COVID-19 and demonstrate a novel mechanism by which herbal drug inhibits the infectivity of pandemic viruses.

Table No.1: List of south Indian medicinal plants inhibits several types of viruses

S.No	Indian Medicinal plants (Scientific Name)	Family name	Virus	Effectiveness	Reference
1	<i>Cayratia trifolia</i>	Vitaceae	herpes simplex virus Type 1 and 2	Inhibit the replication	6
2	<i>Azadirachta indica</i>	Meliaceae	Dengue virus	Leaf extract (Aqueous) inhibits DEN-2 <i>in vivo</i>	7
3	<i>Andrographis paniculata</i>	Acanthaceae	Dengue virus Chikungunya virus	NVK provides protection against DENV and CHIKV	8
4	<i>Ficus religiosa</i>	Moraceae	Human rhino virus (HRV) and Respiratory syncytial virus (RSV)	Bark extract endowed with antivirus activity against HRV and RSV	9
5	<i>Curcuma longa</i>	Zingiberaceae	HIV-1	Inhibition of HIV-1 LTR-directed gene expression	10
6	<i>Sesbania grandiflora</i>	Fabaceae	Herpes simplex virus	Extract possess strong antiviral against HSV	9
7	<i>Zingiber officinale</i>	Zingiberaceae	human respiratory syncytial virus	dose-dependently inhibited HRSV-induced plaque formation	11
8	<i>Punica granatum</i>	Lythraceae	Human herpes virus-3	Phytochemical extract exhibits potential anti-viral activity	12
9	<i>Phyllanthus amarus</i>	Lamiaceae	Human immuno deficiency virus	Inhibits HIV replication	12
10	<i>Avicennia marina</i>	Fabaceae	Hepatitis B virus	Inhibits HBV antigen	13

CONCLUSION

To conclude the importance of plant based medicine constitutes an applicable way for the expansion of vaccines with attractive features. Seeing as noteworthy add up to plant extracts have capitulate positive outcomes it seems reasonable potential antiviral agents so far reported. The pharmacological characteristic of major south Indian medicinal plants further needs to investigate the exploration of producing vaccines to treat several viral diseases. It is very important that these plant based concern not only focused on vaccines and medicines but also the plant based coated clinical equipments like masks, soap and sanitizers etc., As the review concluded the plant based sources has may have the ability to kill the viral based diseases so far, hence it is proven that variety of plant compounds yet to be examined for future invention for the control of COVID-19 like deadly diseases. The unknown fact and formulae about the effectiveness of some plants may be there, therefore medicinal plant and its compound may have the ability to fight against 19-nCoV.

ACKNOWLEDGMENT

The author gratefully acknowledges the institution for supporting the work.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no competing interests.

CONFLICT OF INTEREST

There is no conflict of interest.

BIBLIOGRAPHY

1. WHO Q, Amp, A on coronaviruses (COVID-19), 2020, <https://www.who.int/news-room/q-a-detail/q-a-coronaviruses>.
2. Murphy A, and Bell D J, et al. COVID-19, *Radiopedia*, <https://radiopaedia.org/articles/covid-19-2?lang=us>.
3. Singhal T. A Review of Coronavirus Disease-2019 (COVID-19), *Indian Journal of Pediatrics*, 87(4), 2020, 281-286.
4. Center for disease controle and prevention, corona-virus disease 2019 (COVID-19). <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>.
5. Aye M M, Aung H T, Sein M M, Armijos C. A review on the phytochemistry, medicinal properties and pharmacological activities of 15 selected myanmar medicinal plants, *Molecules*, 24(2), 2019, 293.
6. Docherty J J, Fu M M, Stifer B S, Limperos R J, Pokabla C M, DeLucia A L. Resveratrol inhibition of herpes simplex virus replication, *Antiviral Research*, 43(3), 1999, 145-155.
7. Sivasankari B, Pitchaimani S, Anandharaj M. A study on traditional medicinal plants of Uthapuram, Madurai District, Tamilnadu, south India, *Asian Pacific Journal of Tropical Biomedicine*, 3(12), 2013, 975-979.
8. Monika Jaina L, Yogendraa R C. Effect of *Hippophae rhamnoides* leaf extract against Dengue virus infection in human blood-derived macrophages, *Phytomedicine*, 15(10), 2008, 793-799.
9. Cagno V, Lembo D. *Ficus religiosa* L. bark extracts inhibit human rhinovirus and respiratory syncytial virus infection *in vitro*, *Journal of Ethnopharmacology*, 176, 2015, 252-257.
10. Moghadamtousi S Z, Habsah Abdul Kadir, Pouya Hassandarvish, Hassan Tajik, Sazaly Abubakar, Keivan Zandi. A review on antibacterial, antiviral, and antifungal activity of curcumin, *Biomed Research International*, 2014, Article ID 186864, 2014, 12.
11. Chang J S, Wang K C, Yeh C F, Shieh D E, Chaing L C. Fresh ginger (*zingiber officinale*) has anti-viral activity against human respiratory syncytial virus in human respiratory tract cell lines, *Journal of Ethnopharmacology*, 145(1), 2013, 146-151.
12. Angamuthu D, Swaminathan R. Antiviral study on *Punica granatum* L., *Momordica*

- charantia L.*, *Andrographis paniculata* Nees and *Melia azedarach L* to human herpes virus-3, *European Journal of Integrative Medicine*, 28, 2019, 98-108.
13. Thyagarajan S P, Blumberg B S. Effect of *Phyllanthus amarus* on chronic carriers of hepatitis B virus, *Lancet*, 332(8614), 1988, 764-766.
 14. Luo H, Tang Q L, Shang Y X, Liang S B, Yang M, Robinson N, Liu J P. Can Chinese medicine be used for prevention of corona virus disease 2019 (COVID-19)? A review of historical classics, research evidence and current prevention programs, *Chinese Journal of Integrative Medicine*, 26, 2020, 1-8.
 15. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, Zhang L, Fan G, Xu J, Gu X. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China, *Lancet*, 395(10223), 2020, 497-506.
 16. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, Ren R, Leung K S, Lau E H, Wong J Y, Xing X. Early transmission dynamics in Wuhan, China, of novel coronavirus- infected pneumonia, *New England Journal of Medicine*, 382(13), 2020, 1199-1207.
 17. Ren L L, Wang Y M, Wu Z Q, Xiang Z C, Guo L, Xu T, Jiang Y Z, Xiong Y, Li Y J, Li H, Fan G H. Identification of a novel coronavirus causing severe pneumonia in human: a descriptive study, *Chinese Medical Journal*, 133(9), 2020, 1015-1024.
 18. Wang W, Tang J, Wei F. Updated understanding of the outbreak of 2019 novel coronavirus (2019-nCoV) in Wuhan, China, *Journal of Medicine Virology*, 92(4), 2020, 441-447.
 19. Chen H, Guo J, Wang C, Luo F, Yu X, Zhang W, Li J, Zhao D, Xu D, Gong Q, Liao J. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records, *Lancet*, 395(10226), 2020, 809-815.
 20. Sheahan T P, Sims A C, Leist S R. Comparative therapeutic efficacy of Remdesivir and combination Lopinavir, ritonavir, and interferon beta against MERS-COV, *Nat. Commun*, 11(1), 2020, 222.
 21. Agostini M L, Andres E L, Sims A C, et al. Coronavirus susceptibility to the antiviral 256 Remdesivir (GS-5734) is mediated by the viral polymerase and the proofreading 257 exoribonuclease, *MBio*, 9(2), 2018, e00221-218.
 22. Cortegiani A, Ingoglia G, Ippolito M, Giarratano A, Einav S. A systematic review 278 on the efficacy and safety of chloroquine for the treatment of COVID-19, *J Critic, Care*, 57, 2020, 279-283.
 23. Han Q, Lin Q, Jin S, You L. Coronavirus 2019-nCoV: a brief perspective from the front line, *Journal of infection*, 80(4), 2020, 373-377.
 24. Wan Z Z, Zhang YN, He Z X. A melting curve-based multiplex RT-qPCR assay for simultaneous detection of four human coronaviruses, *International Journal of Molecular Science*, 17(11), 2016, 1880.
 25. Noh J Y, Yoon S W, Kim D J. Simultaneous detection of severe acute respiratory syndrome, Middle East respiratory syndrome, and related bat coronaviruses by real-time reverse transcription PCR, *Arch. Virol*, 162(6), 2017, 1617-1623.
 26. Shen M, Zhou Y, Ye J, AL-maskri A A, Kang Y, Zeng S, Cai S. Recent advances and perspectives of nucleic acid detection for coronavirus, *Journal of Pharmacology*, 10(2), 2020, 97-101.
 27. Colson P, Rolain J M, Raoult D. Chloroquine for the 2019 novel coronavirus, *International Journal of Antimicrobial Agents*, 55(3), 2020, 105923.
 28. Al-Abaidani I S, Al-Maani A S, Al-Kindi H S. Overview of preparedness and response for Middle East respiratory syndrome coronavirus (MERS-CoV) in Oman,

International Journal of Infectious Diseases, 29(C), 2014, 309-310.

29. Pal D C, Jain S K. Tribal Medicine, Prokash Naya Bidhan Sarani, Calcutta, India, 1998, 316-206.
30. Munuswamy H, Thirunavukkarasu T, Rajamani S, Elumalai E K, Ernest D. A review on antimicrobial efficacy of some traditional medicinal plants in Tamilnadu, *Journal of Acute Diseases*, 2(2), 2013, 99-105.
31. Khan I, Rao S S, Darsipudi S, Divya S G, Amaranad H. Phytochemical studies and screening of leaves extracts of *Azadirachta indica* for its anti-microbial activity against dental pathogens, *Archives of Applied Science Research*, 2(2), 2010, 246-250.
32. Chen T Y, Chen D Y, Wen H W, Ou J L, Chiou S S. Inhibition of Enveloped Viruses Infectivity by Curcumin, *Plos One*, 8(5), 2013, e62482.
33. Kumar V S, Navaratnam V. Neem (*Azadirachta indica*): prehistory to contemporary medicinal uses to humankind, *Asian Pacific Journal of Tropical Biomed*, 3(7), 2013, 505-514.
34. Salazar-González J A, Angulo C, Rosales-Mendoza S. Chikungunya virus vaccines: current strategies and prospects for developing plant-made vaccines, *Vaccine*, 3(3), 2015, 3650-3658.
35. Subba Rao G, Sinsheimer J E, Cochran K W. Antiviral activity of triterpenoid saponins containing acylated α -amyrin aglycones, *Journal of Pharmacology Sciences*, 63(3), 1974, 471-473.
36. Jain S K. Ethnobotany and research on medicinal plants in India, *Ciba Found Symp*, 185, 1994, 153-164.

Please cite this article in press as: Srilatha M et al. Native antiviral medicinal plants against COVID-19: A review, *Asian Journal of Research in Pharmaceutical Sciences and Biotechnology*, 8(2), 2020, 51-57.