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Original Article

HERBAL MEDICINAL PLANTS ACTIVE AGAINST COVID-19 USED BY TRIBAL COMMUNITIES FROM NANDED DISTRICT (MS), INDIA

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ABSTRACT

Objective: Presently, the whole world is under threat and suffering from the disease COVID-19. WHO accepted that COVID-19 viral disease poses a serious health problem for the world and declared it as a pandemic. According to WHO Coronavirus (COVID-19), there have been 183,934,913 confirmed cases, including 3,985,022 deaths globally as of 6 July 2021. From India COVID-19 464357 active cases and 403281 deaths are being reported by MOH and FW, GOI as of 06 July 2021. The present scenario of the COVID-19 pandemic appears to provide no effective antiviral drug or vaccine therapy against this extremely contagious lethal infection. The COVID-19 mortality rate is found to be very high in people with weak immunity. India is a hub for herbals and that is the reason why the possibility to find a solution against COVID-19 is practically attainable.

Methods: The present study emphasizes various herbal plants potentially considered as part of formulation or used in the management of COVID-19. Present data is collected from hilly tribal communities (Total= 180 respondents from which males are 112 and females 68) via., semi-structured questionnaires.

Results: A total of 17 traditional herbal medicinal plant species belonging to 13 different families are being used extensively for the improved immune system of the human body to fight against COVID-19 by tribal communities in the studied area.

Conclusion: This article will help researchers and industries to identify potential herbals for the treatment of COVID-19 viral infection.

Keywords: COVID-19, WHO, MOH and FW, GOI, Herbals

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INTRODUCTION

The Whole World is at present facing the biggest threat to humanity because of the COVID-19 pandemic. The common symptoms include cold, cough, fever, and difficulty in breathing. This disease spreads through the salivary droplets or sneezing or coughing fluid through an infected person. The two ways in which this virus spreads are, direct physical contact and indirect contact with the surface on which the infected droplets fall [1]. The COVID-19 has affected 183,934,913 confirmed cases, including 3,985,022 deaths worldwide as of 6 July 2021 [2]. According to the MOH and FW, GOI-COVID-19, there are 464357 active cases and 403281 deaths as of 06 July 2021 [3]. Moreover, persons with weak immunity are easily susceptible to COVID-19 viral infection [4].

The current pandemic has created a huge burden on scientists and researchers to revisit the potential efficacy of herbal medicinal plants by identifying potential phytochemicals and their derivatives in treating COVID-19. Traditional herbal medicines are already in use for treating different viral infections [5]. Nearly 80% of the people are dependent on traditional plants for their primary health (according to a WHO report). Our traditional or ethnobotanical knowledge could help us find an alternative approach to search for possible antiviral drug molecules. The traditional Indian system of medicines (Ayurveda) has described the use of plants, which have several phytoconstituents that are useful for drug formulations. This system of medicine believes in using certain herbs, decoctions, and plant-based formulations helpful to build immunity. The research article aims to highlight the importance of plant-based natural products, herbs, and their derivatives that shows potential antiviral activity for COVID-19 viral inhibition.

MATERIALS AND METHODS

The study was conducted in different villages located in the Nanded District of Maharashtra state, India. The current study focuses on herbal medicinal plants from selected rural villages (Therban, Somthana, Somthana-tanda, Shingarwadi, Dhawari, Dhanora, and Borgaon) situated in the Nanded District of Maharashtra. A detailed survey was undertaken from Jun 2020 to Jun 2021 to collect information on different herbs which are used for the prevention of COVID-19 by traditional healers from the Nanded district by following all COVID-19 safety measurements. Present information is acquired by tribal communities by questionnaires and oral interviews. During the survey, a Semi-structured questionnaire was used to interview respondents after Prior Informed Consent was obtained verbally with them before commencing each interview. A total of 180 informants (112 males and 68 females) between the ages group 20–90 y were interviewed. During the interviews, respondents were asked questions about the local names of plants, edible parts, the season of availability, methods of consumption, and medicinal uses. Among the 180 respondents interviewed in this study, most of them were elders aged above 60 (n = 93) followed by adults aged between 36-59 (n = 54). Youth aged between 20-35 (n = 33) constituted the least category. The results show that elders contributed more information with medicinal values as compared to other age categories.

Regular field visits were done for collecting information and identification of plants the occurrence of herbals. During the field visits, the GPS Map Camera (Android Mobile app) was used to know the correct GPS latitude and longitude of herbal medicinal plants.

The frequency index was calculated according to [6].

The formula is FI= (FC÷N) ×100

Where, FI = Frequency index, FC = Number of participants and N = Total number of participants.

RESULTS AND DISCUSSION

The present study showed that the tribal healers use several traditional herbal medicinal plants practices for curing COVID-19 symptoms like cough, cold, sneezing and fever by using plant parts

like leaves (n=03), fruits (n=04), seeds (n=01), underground parts{roots/rhizome/bulb} (n=06), whole plants (n=01), flowers/floral parts (n=01), and stem (n=01) respectively as shows in (fig. 1).

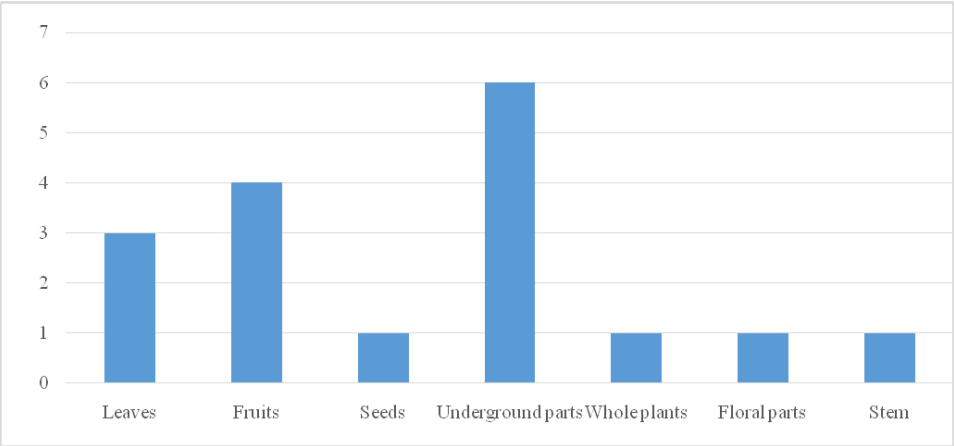

Fig. 1: Plant parts used by traditional healers for remedy preparations

A total of 17 traditional herbal medicinal plant species (i.e., *Curcuma longa*, *Allium cepa, Zingiber officinale, Withania somnifera, Azadirachta indica, Tinospora cordifolia, Emblica officinale,* etc.) of which (i.e.,07 Herbs, 05 Shrubs, 02 Trees, and 03 Climbers) belonging to 13 different families are being used extensively for curing COVID-19 by tribal communities in the studied area. *Azadirachta indica* leaves extract is useful for normal and malarial fever. It is highly recommended for the treatment of patients suffering from COVID-19 [11]. *Aloe vera* leaves sap is used for making juice and used for drinking purposes to enhance immunity both separately and in combination with other plant species. Fresh leaves of *Ocimum sanctum* are boiled in water and the decoction obtained is used in cough and cold. The fruits of *Momordica charantia, Emblica officinalis,* and *Piper betel* with honey are effective against cough [23]. Rhizome of *Curcuma longa* Linn. and Zingiber officinale Roscoe are beneficial against the human respiratory syncytial virus, thus preventing the infection [7]. Roots of *Withania somnifera* Linn. and *Astragalus membranaceus* have been used in various Indian ayurvedic medicines to enhance the immune system and fight against diseases (table 1). Stem and fresh leaves of *Tinospora cordifolia* A. Rich. are crushed and boiled in water and decoction is obtained to cure a cold and cough. Gravy is prepared by seed powder of *Trigonella foenum-graecum* Linn. by adding sugar with water and eaten during the winter season for self-immune enhancement. Bulb of *Allium cepa* Linn. and *Allium sativum* Linn. are the most important spices as well as the main ingredient in many traditional and folk medicines.

Table 1: Traditional herbal medicinal plants active against COVID-19 used by tribal communities from Nanded District (MS), India

S. No.	Scientific name of plants, family, and local name	GPS location	Habit	Edible part used	Season of availability	Commercially sold	Frequency index	Method of consumption	Medicinal properties
1.	*Curcuma longa* Linn. (Zingiberaceae) Haladi	Latitude-19*16'29"N Longitude-77*41'17"E	Herb	Rhizome	Throughout year	Yes	53	Native to India, used in food preparation as a spice and a colouring agent.	It is active against the human respiratory syncytial virus, thus preventing the infection [7].
2.	*Trigonella foenum-graecum* Linn. (Fabaceae) Methi	Latitude-19*16'18"N Longitude-77*41'47"E	Herb	Seeds	Throughout year	Yes	45	Gravy is prepared with seed powder and sugar mixed with milk/water and eaten during the winter season for self-immune enhancement	It helps in controlling various enzymatic activities, fever, body pain. So, it is considered as one of the remedies to relieve some symptoms of SARS-CoV viruses [8].
3.	*Zingiber officinale* Roscoe (Zingiberaceae) Adrak	Latitude-19*16'15"N Longitude-77*41'35"E	Herb	Rhizome	Throughout year	Yes	49	It is a very popular spice as well as the main ingredient in many traditional and folk medicines.	Ginger is beneficial against human respiratory viruses like the human respiratory syncytial virus. It is reported that ginger blocks viral attachment [9].
4.	*Aloe vera* Linn. (Liliaceae) Korphad	Latitude-19*16'15"N Longitude-77*41'36"E	Herb	Leaves	Throughout year	No	39	Leaf's sap is used for making juice. It is used for drinking purposes to enhance immunity.	Its potential antiviral activity is also reported against COVID-19, both separately or in combination with other plant species [10].
5.	*Azadirachta indica* A. Juss (Meliaceae) Neem	Latitude-19*16'33"N Longitude-77*41'24"E	Tree	Leaves	Throughout year	No	26	Leaves boiled with water; decoction obtained useful in fever.	Neem crude extract is useful to treat normal and malarial fever, which are the common systems of COVID-19, this medicinal plant is highly recommended for the treatment of patients

S. No.	Scientific name of plants, family, and local name	GPS location	Habit	Edible part used	Season of availability	Commercially sold	Frequency index	Method of consumption	Medicinal properties
									suffering from COVID-19 [11].
6.	*Tribulus terrestris* Linn. (Zygophyllaceae) Sarata	Latitude-19*16'26"N Longitude-77*41'18"E	Herb	Whole plant	Rainy	No	24	Leaves extract is helpful to enhance immunity.	Major bioactive compounds are six cinnamic amides and ferulic acid was showing inhibition of Papain-like protease (PLpro), which is a major protein target of COV-19 [12].
7.	*Allium cepa* Linn. (Liliaceae) Kanda	Latitude-19*16'18"N Longitude-77*41'30"E	Herb	Bulb	Throughout year	Yes	49	It is used for flavour and taste.	Various studies concluded that it has antiviral activity against respiratory viruses [13].
8.	*Punica granatum* (Lythraceae) Pomegranate	Latitude-19*16'20"N Longitude-77*42'1"E	Shrub	Fruits	Winter	Yes	36	Fruit juice of pomegranate is useful in clinical conditions.	Beneficial in anaemia, colic, acute dermatitis, oral diseases, acne, and many others. Pomegranate also has an observed effect to reduce angiotensin-converting enzymes [14].
9.	*Momordica charantia* (Cucurbitaceae) Bitter Gourd/Karela	Latitude-19*16'26"N Longitude-77*41'18"E	Climber	Fruits	Winter	Yes	28	Fruit juice is used to cure viral infections.	Its potent protein inhibits many viruses like Dengue, Herpes, hepatitis-B, and HIV [15].
10.	*Allium sativum* Linn. (Liliaceae) Lahsun	Latitude-19*16'18"N Longitude-77*41'31"E	Herb	Bulb	Throughout year	Yes	36	It is one of the spices as well as the main ingredient in many traditional and folk medicines.	Its potent compound is allicin active against cardiovascular disease [16].
11.	*Tinospora cordifolia* Rich. (Menispermaceae) Gulvel	Latitude-19*16'20"N Longitude-77*41'29"E	Climber	Stem and Leaves	Throughout year	No	32	Stem and fresh leaves of the herb are crushed and boiled in water, so decoction is obtained used to cure a cold and cough.	It is useful against viruses by blocking fusion or adsorption [17].
12.	*Emblica officinalis* Gaertn., (Phyllanthaceae) Amla	Latitude-19*13'34"N Longitude-77*40'20"E	Tree	Fruits	Winter	Yes	25	Fruits are the most widely used in medicine as a diuretic, restorative, liver tonic, and for common cold and fever.	Pentagalloyl glucose, found in the amla fruit can inhibit replication of the Influenza-A virus [18].
13.	*Withania somnifera* Linn. (Solanaceae) Ashwagandha	Latitude-19*16'21"N Longitude-77*41'34"E	Shrub	Root	Throughout year	No	29	In ayurvedic preparations, it is used as a general tonic and to boost immunity	According to Grover [19], Withaferin A inhibits the DNA polymerase enzyme of the virus which doesn't allow viral replication.
14.	*Ocimum sanctum* Linn. (Lamiaceae) Tulasi	Latitude-19*16'16"N Longitude-77*41'20"E	Shrub	Leaves	Throughout year	No	51	Fresh leaves boiled with water, decoction obtained useful in cough and cold.	Being used for curing pain, diarrhoea, cough, and fever, which are common symptoms related to COVID-19 [20].
15.	*Astragalus membranaceus* (Fabaceae) Astragalus	Latitude-19*15'15"N Longitude-77*40'28"E	Shrub	Roots	Winter	No	22	Root extract used to enhance immunity.	In an *in vitro*/*in vivo* study published in 2013 on H9N2 avian influenza virus-infected chickens, Astragalus polysaccharides are reported to enhance immunity and prohibit viral infection [21].
16.	*Syzygium aromaticum* Linn. (Myrtaceae) Clove/Laung	Latitude-19*16'16"N Longitude-77*41'20"E	Shrub	Flowers	Winter	Yes	31	Flower calyx is used as spice, flavour, and taste.	The eugeniin present in clove has potent antiviral activity [22].
17.	*Piper betel* (Piperaceae) Betel vine/Paan	Latitude-19*16'18"N Longitude-77*41'31"E	Climber	Fruits	Winter	No	18	Fruits are used for chewing purposes, as they were useful on an aphrodisiac, carminative, laxative, and improve appetite.	Fruits in addition to honey effective against cough [23].

CONCLUSION

The selected traditional herbal medicinal plants used in Indian traditional medicine offer an effective solution or may help in the discovery of new drug molecules. The extracts or formulations of these herbal medicinal plants work as a potential antiviral remedy. They also have phytochemicals and other metabolites that offer a plethora of immunity-boosting properties resulting in an improved

immune system of the human body to fight against COVID-19. The leaves of *Azadirachta indica*, *Aloe vera,* and *Ocimum sanctum* are used to treat colds. The fruits of *Momordica charantia*, *Emblica officinalis,* and *Piper betel* are effective remedies for cough treatment. Rhizome of *Curcuma longa* Linn. and *Zingiber officinale* Roscoe beneficial against viral infections. Roots of *Withania somnifera* Linn. and *Astragalus membranaceus* are used to enhance the immune system. Stem and leaves decoction of *Tinospora cordifolia* is used to cure a cold and cough. Seed gravy prepared from *Trigonella foenum-graecum* Linn. is used for self-immune enhancement. Bulb of *Allium cepa* Linn. and *Allium sativum* Linn. has been used from ancient times in many traditional and folk medicines. A holistic approach with the above selected herbal medicinal plant formulations will help to build immunity. Further studies will help to explore the possibility of combined therapies with other naturally derived substances or standard therapeutics resulting in the development of broad‐spectrum antidotes for the prevention and control of viral diseases like COVID-19. The study is primitive and based on an inadequate sample structure. The findings of the study are not directly implementable as a medical practice since it would amount to be an audacious step. Some of the plants found are rare and grow only in hilly and deep forest areas, thus marring its availability.

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AUTHORS CONTRIBUTIONS

In this work, the Actual data collection and referencing have done by Mr. S. S. Shinde, Dr. SD Raut has contributed to the preparation of the manuscript all this has been done under the supervision of Dr. B. D. Gachande. All authors read and approved the final manuscript

CONFLICT OF INTERESTS

The authors declare no conflict of interest

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