



# Identifying Herbal Drugs and Phytoconstituents in post-Covid 19 Indian Households

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## Abstract

**Objective:** At this time, COVID-19 poses a danger to and is affecting people all around the globe. The World Health Organisation has recognised that COVID-19 virus illness is a global epidemic. As of 6 July 2021, there were a total of 183,934,913 confirmed cases of WHO Coronavirus (COVID-19) worldwide, with 3,985,022 fatalities. As of 06 July 2021, the MOH and FW, GOI have recorded COVID-19 cases in India totaling 464357, with 403281 fatalities. Against this highly infectious and fatal sickness, there seems to be no effective antiviral medicine or vaccine treatment in the current situation of the COVID-19 pandemic. People with compromised immune systems have a much higher death risk from COVID-19. Because India is a centre for natural remedies, it may be possible to discover an effective treatment for COVID-19 there.

**Methods:** The focus of the current research is on a number of herbal plants that may be formulated into a treatment for COVID-19 or utilised in its control. The present data comes from semi-structured surveys filled out by members of hilly tribal groups (N=180, 112 men, 68 females).

**Results:** In order to strengthen their immune systems against COVID-19, local indigenous groups employ a wide variety of medicinal plants, including 17 species from 13 distinct plant families.

**Conclusion:** This page will aid scientists and business owners in their hunt for herbs that may be effective against the COVID-19 virus.

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

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## Introduction:

The global COVID-19 pandemic is now the greatest danger to humankind. Typical manifestations include the four classics: a cold, a cough, a fever, and a respiratory

problem. Droplets of saliva, or fluid from a sneeze or cough, may transfer. As with 6 July 2021, the total number of confirmed cases of COVID-19 was 183,934,913, with 3,985,022 fatalities (WHO, 2022). As of 06



July 2021, there were 464357 confirmed cases and 403281 fatalities reported by the Ministry of Health and Family Welfare, GOI-COVID-19. COVID-19 is a virus that may spread quickly and readily, especially in those with compromised immune systems (Felsenstein, 2020).

Identifying suitable phytochemicals & their derivatives for the treatment of COVID-19 has become an urgent priority for scientists and researchers in light of the present epidemic. Treatment of several viral diseases with traditional herbal treatments is already commonplace (Tabuti, Lye, Dhillion, 2003). According to the World Health Organisation, about 80% of the population relies on traditional plants for basic healthcare. Using our traditional and ethnobotanical understanding, we may be able to come up with a new way to look for potential antiviral medication compounds. The ancient Indian medical system (Ayurveda) details the utilisation of plants, many of which have active ingredients that may be incorporated into pharmaceuticals. In order to strengthen one's defences, this medical practise advocates the use of certain plants, decoctions, and a plant-based preparations. The purpose of this study is to draw attention to the possible antiviral action of plant-based natural goods, herbs, and derivatives of them against COVID-19.

### Materials and Methods

The research took place in a variety of rural communities in the Nanded District of Maharashtra state, India. Herbal medicinal plants are the subject of the present investigation, which was carried out in the Nanded District of Maharashtra.

The villages of Therban, Somthana, Shingarwadi, Dhanora, and Borgaon were chosen for this purpose. To learn more about the various medicines used by traditional healers in the Nanded area for the prevention of COVID-19 while adhering to all COVID-19 safety measures, a thorough study was conducted between June 2020 and June 2021. Tribal groups nowadays mostly use surveys and oral interviews to learn current information. Before beginning each interview for the survey, researchers verbally sought Prior Informed Consent from participants using a semi-structured questionnaire. There were a total of 180 interviewees, including 112 men and 68 women aged 20-90. Questions concerning the common names of plants, their edible portions, when they were in season, how they were prepared, and whether or not they had any therapeutic use were asked of interviewees. The majority of the 180 participants in this research were seniors (n = 93), followed by adults (n = 54) in the age range of 36 to 59. The youngest age group, those 20–35 (n = 33), was the smallest. According to the findings, more information of therapeutic value was supplied by the elderly than by any other age group.

Field trips were taken on a regular basis to identify plants and gather data on the prevalence of herbs. In order to find the precise GPS coordinates of medicinal herbs during field trips, the GPS Map Cam (an Android mobile app) was employed.

“The frequency index was calculated according to [6].

The formula is  $FI = (FC \div N) \times 100$

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

**Herb-Derived, Phytoconstituent-Based Antiviral Formulation in India**

Five distinct formulations, BITS-001 through BITS-005 (Table 1), were created using 17 extracts of medicinal plants having documented antiviral, antibacterial, and antifungal activity. Following the aforementioned procedure, the chosen plant extracts were combined. Due to the dilution factors ranging from 1 to 30, the final alcohol content in each recipe was 2.5%. Natural items certified by the Food Standards and Safety Authority of India (FSSAI) were utilised in the formulation at the recommended concentration.

The outer S protein with two other proteins form a lipid envelope around the RNA virus molecule, protecting it from degradation. The recommendation for regular hand washing is based on the idea that the virus may be disabled by disturbing its fat coat. Our alcohol-free mouthwash contains saponin-rich components that disrupt the virus's lipid envelope as it multiplies in the oral cavity, thereby lowering the viral load there (and thus the risk of transmission to the respiratory tract) and reducing its ability for shed the active virus in breathing droplets/micro-droplets.

Mannose and manan-glycans are abundant in S glycoprotein. Mannose and mannan glycosyl binders are included in some of the formulations; they bind the S protein off the surface of the virus, preventing it from interacting with new cells in the infected individual and the new

host. To gain access into host cells, SARS-CoV-2 uses its glycosylated S proteins, which cover its whole surface and attach to the host cell receptor for angiotensin-converting enzyme 2 (ACE2). Mechanisms of action for the interaction between manan-glycans and saponins are distinct. Manan-glycans inhibit ACE2 receptor-spike protein interaction. The saponin serves as a bio-surfactant by interacting with the digestion units of the spike protein, preventing enveloped viruses from gaining entry to a new host cell. Therefore, both the actively infected individual and others around them would benefit from using solutions (mouthwash) high in saponins or mannose-binding molecules.

**Traditional herbal medicinal plants suggestively active against COVID-19**

S. No.	Scientific name of plants, family, and local name
1.	<i>Curcuma longa</i> Linn. (Zingiberaceae) “Haladi is of the Rhizome family. 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” (Chen et al., 2010).
2.	<i>Trigonella foenum-graecum</i> Linn. (Fabaceae) “Methi. 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” (Madhava et al.,



S. No.	Scientific name of plants, family, and local name
	2011).
3.	<i>Zingiber officinale</i> Roscoe (Zingiberaceae) "Adrak. 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" (Chang et al., 2013).
4.	<i>Aloe vera</i> Linn. (Liliaceae) Korphad. "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" (Qazi et al., 2020).
5.	<i>Azadirachta indica</i> A. Juss (Meliaceae) Neem. "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 suffering from COVID-19" (Roy and Bhattacharyya, 2011)
6.	<i>Tribulus terrestris</i> Linn. (Zygophyllaceae) Sarata. "Leaves

S. No.	Scientific name of plants, family, and local name
	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" (Song et al., 2014)
7.	<i>Momordica charantia</i> (Cucurbitaceae) Bitter Gourd/Karela. Fruit juice is used "to cure viral infections. Its potent protein inhibits many viruses like Dengue, Herpes, hepatitis-B, and HIV" (Waiyaput et al., 2012).
8.	<i>Allium sativum</i> Linn. (Liliaceae) Lahsun. "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" (Chan et al., 2013).
9.	<i>Tinosporacordifolia</i> Rich. (Menispermaceae) Gulvel. "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" (Choudhary et al., 2013).
10	<i>Emblica officinalis</i> Gaertn., (Phyllanthaceae) Amla. "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" (Dasaroju and Gottumukkala,



S. No.	Scientific name of plants, family, and local name
	2014).
11.	<i>Withaniasomnifera</i> Linn. (Solanaceae) Ashwagandha. "In ayurvedic preparations, it is used as a general tonic and to boost immunity. According to Grover et al., (2011), Withaferin A inhibits the DNA polymerase enzyme of the virus which doesn't allow viral replication"
12.	<i>Ocimum sanctum</i> Linn. (Lamiaceae) Tulasi. "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" (Goothy et al., 2020).
13.	<i>Astragalus membranaceus</i> (Fabaceae) Astragalus. "Root extract used to enhance immunity. In an <i>in vitro/in vivo</i> study published in 2013 on H9N2 avian influenza virus-infected chickens, Astragalus polysaccharides are reported to enhance immunity and prohibit viral infection" (Kallon et al., 2013).
14.	<i>Syzygium aromaticum</i> Linn. (Myrtaceae) "Clove/Laung. Flower calyx is used as spice, flavour, and taste. The eugenin present in clove has potent antiviral activity" (Lee, Shibamoto, 2001).
15.	<i>Piper betel</i> (Piperaceae) "Betel vine/Paan. Fruits are used for chewing purposes, as they were useful on an aphrodisiac, carminative, laxative, and improve appetite. Fruits in addition to

S. No.	Scientific name of plants, family, and local name
	honey effective against cough" (Aruljothi, Uma, Sivagurunathan, 2016).

### Natural Extracts and Herb-Based Formulation BITS-003 of Phytoconstituents

BITS-003 is a herbal preparation that was tested for its phytoconstituent levels. Total polyphenol concentration was 643.63 g/mL, total flavonoid concentration was less than 2500 g/mL, and total saponin content was less than 18,000. Above, the precise concentration of each component type (total polyphenol, total saponin, and total flavonoid content) across all five formulation (BITS 001, 004, and 005) is shown. Because of its very high concentration of the bio-surfactant saponins, BITS-003 was selected.

### Use of Herbal Extracts over Time in Oral Health

One of the most accessible treatments to minimise pathogens and germs, rinses for the mouth and gargles are frequently used in oral and dental care. It is hypothesised that the oral cavity contributes significantly to the pathogenesis and transmission of SARS-CoV-2. There is currently no herbal mouthwash or gargle that effectively combats viruses, germs, and fungi. Recent research reveals that oral rinses, namely alcohol-based ones, have strong virucidal capabilities and may be able to kill enveloped viruses like SARS-Cov-2. Our results suggest that various herb-based mouth rinses examined here may lower infectious virus levels by more than 99.9 percent in as little as 10 minutes of contact. Our results showed that

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ordinary saline, such that found in a Neti-Pot, did not inhibit the infectious potential of the viruses we tested. Most commercially available mouthwashes and gargles have shown a reduction in infectious virus of around 90% when tested.

Given the global scope of the SARS-Cov-2 pandemic, efforts to curb the spread of the virus are urgently needed. Transmission and spread may be greatly reduced by mask use and maintaining social distance. An further line of defence against SARS-Cov-2 as well as other human coronaviruses may be found in the use of nasal cleans and mouthwashes, which target the primary entry and exit points for the virus.

Claims that OTC mouthwashes and gargles may speed up the healing process, protect against gingivitis, eliminate the bacteria that cause bad breath, and decrease the total number of microorganisms in the mouth are not uncommon. Mouthwashes have traditionally been used for both their cosmetic and therapeutic effects in the field of oral hygiene. The rinse proved effective even against a *Klebsiella* strain that had developed resistance. There is also a wealth of evidence showing that bacteria do not acquire the ability to withstand phytoconstituents via natural selection.

The oral microbiota consists of several species of bacteria, fungi, and protozoa and plays a crucial role in maintaining good dental health. Oral mucosal infections may be caused by a wide variety of opportunistic microorganisms, including *Candida*. Our research showed that the herbal combination may reduce the proliferation of yeast cells. Most

commercial mouthwashes include harmful chemicals such organic solvents and synthetic chemical agents, making them unsuitable for regular usage. All chemical mouthwashes have a "not to be ingested" warning because their ingredients might irritate or even ulcerate the stomach. The worldwide spread of COVID-19, a deadly illness caused by SARS-CoV-2, has prompted some public health professionals to suggest using mouthwash to contain the epidemic. Here, we detail the creation of a mouthwash based on phytoconstituents obtained from herbs, which has potent virucidal capabilities, inactivating anywhere from 2 log<sub>10</sub> (or 99%) to higher than 4 log<sub>10</sub> (or 100.99%) of enveloped viruses, in addition to antibacterial and antifungal activities. Our research suggests that mouthwash containing natural materials rich in phytoconstituents might be used as a safe supplement to existing antiviral interventions in public health and healthcare to protect against infection at the individual and community levels.

Similar to our findings, it has been reported that an aqueous extract of *Prunella vulgaris* has potent inhibitory impacts on SCoV-2 SP (including SPG614 mutant) pseudotyped viruses (SCoV-2-SP-PVs) caused infections [43]. *Prunella vulgaris* extraction and our formulation both include beneficial phytoconstituents including quercetin, ursolic acids, saponins, the stimulant caffeine, the acid rosmarinic, kaempferol, gallic acid, etc. To add to this, Balkrishna et al., 2021 discovered that the herbal drug known as Coronil successfully blocked the association of ACE-2 with the wild-type S proteins (SWT), reducing the entry of



pseudoviruses into host cells and thus avoiding the SARS-CoV-2 the S-protein pseudotyped vesicular stomatitis virus type 2 (VSVppSARS-2S) mediated cytokine response. Consequently, studies were conducted to determine whether or not certain plant extracts and combinations might effectively combat viruses, bacteria, and fungi. In this case, HEK 293TN cells were used in conjunction with a lentiviral framework to evaluate a final formulation that included four extracts.

Those who work directly with patients, such as doctors, nurses, respiratory therapists, dental professionals, dental assistants, and others, as well as their families, are at a higher risk of contracting the disease than the general population. An extraordinary healthcare crisis and far-reaching social and economic repercussions have resulted from the advent of the SARS-CoV-2 pandemic. Although it has been shown that social isolation and wearing protective masks may greatly reduce the spread of disease, these measures have not been widely implemented for a variety of reasons. More measures are needed to curb the epidemic's spread in communities and among individuals.

There are a number of potential restrictions on the scope of this study. Due to the high degree of precautions necessary while dealing with SARS-CoV-2, we opted not to utilise it as the test virus in this investigation. SARS-CoV-2, like many other enclosed RNA viruses, was replaced with large quantities of infectious engineered lentivirus. This enabled us to quickly test a wide variety of chemicals and products at different contact dilutions (data not shown) and find the best recipe

for an oral wash to use in the fight against COVID-19. Evaluation of the efficacy of these oral rinses in patients with SARS-Cov-2 infection will need further clinical studies and confirmation.

### Conclusions

Herbal mouth rinses have been shown to be effective against viruses, germs, and fungi in clinical trials. BITS-003 has significant therapeutic efficacy and is a promising new option for better dental health. Additional techniques are needed to limit viral transmission while the world awaits for definitive medicines and vaccinations for managing and avoiding the spread of SARS-CoV-2. An antiviral mouthwash may provide an extra, very safe layer of protection against SARS-CoV-2 by acting directly on the key sites of receipt and transmission of the human form of the virus. Herbal formulation BITS-003, derived from natural products and containing no drugs or alcohol, shows potent virucidal capabilities against enveloped viruses like SARS-CoV-2. The oral microbiome may be lightened with the help of the herbal rinse formulation produced here, since its antiviral, antibacterial, and antifungal capabilities have been demonstrated in vitro. The BITS-003 recipe is based on a combination of highly regarded plants from the Ayurvedic medical texts of ancient India. There are no known adverse effects from taking these herbs on a regular basis for an extended period of time, and their extensive usage in the production of nutraceuticals attests to their safety for consumption.

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