Indian Traditional Systems of Medicine (AYUSH) in Pandemics With Special Reference to COVID- 19

Anil Kishore Sinha[1]

KEYWORDS
Traditional (herbal), Medicine, COVID-19, Pandemic, AYUSH, Mortality
.

ABSTRACT:
There is some evidence that traditional Indian medical methods can help reduce pandemic mortality, moderate and severe mortality rates, and illness duration. The combination of modern biomedicine with traditional herbal medicines may cure hypoxaemia, COPD, and infections (Luo et al., 2020). Herbal remedies have a history of reducing the severity of infectious diseases, including Severe Acute Respiratory Syndrome (SARS-CoV-2). Traditional methods of treating it have no doubt been unsuccessful, but popular herbal remedies with antiviral properties are now being employed in addition to conventional medicine in the management of COVID-19 in India, Africa and South East Asian countries. A combination of modern medication and vaccines with traditional remedies is being popularly used. Based on the research that is currently available, herbal therapies have demonstrated potential in reducing and decreasing the risk of COVID-19. Ang et al. (2020) noted that herbal therapy, has been proposed multiple times as alternative treatment. The fact that traditional herbal therapy is plant-based is no reason to disregard its effectiveness, particularly since most botanical medications possess antiviral characteristics.

1. Introduction

Although pandemics have altered human life, they have also been managed and influenced by plants and traditional medicine, which were typically the first line of treatment. The herbal remedies utilized by the Egyptians circa 1500 BC, which were later refined by the Greeks and Romans, and which are extensively recorded in the pharmacopoeias used to cure pandemics throughout human history serve as evidence of this (Akerele, 1993; Garcia, 2020). Traditional medicine has garnered increased attention as a treatment option for treating and curing the current COVID-19 outbreak.

Since the health care needs and common diseases were documented in ancient literature, when the use of plants and polyherbal formulations was emphasized and widely practiced, traditional complementary and alternative medicine and its resulting medical record in India date back 5000 years BCE. Indian culture is renowned for its extensive collection of medicinal plant species. The *Rig Veda* (c. 1700-1100 BC), the earliest Vedic literature has recorded around 67 medicinal plants, the *Yajur Veda* (c.1400-1000 BC) has 81 and the *Atharva Veda* (c.900 BC) has described 290 medical plants. The two earliest treatises on medicine and surgery, viz., *Charak Samhita* (c.300-200 BC) and *Suśruta Samhita* (c.200 BC) have mentioned properties and uses of 1,100 and 1,270 species of plants and herbs respectively. In this way medicines of herbal origin have traditionally been used in India since the very inception of the Indian civilization. Apart from Ayurveda, the oldest system of the indigenous medical systems Unani is the later developed healing system which together use over 700 species of herbs for medicine; modern medicine and even allopathic systems use a large number of herbs in preparing drugs generally derived from different parts of plants like leaves, stem, bark, root, flower, seed, etc. (Saha, 2015). In the Indian medical system, plants, minerals, and animal products are the main sources of medications. Indian medicine has employed some 25,000 plant-based formulations as folk medicines (Joshi et al., 2017).

In the old world civilizations, more particularly the Asian civilizations, treatment traditions like Ayurveda, Yoga, Chinese, Unani, etc. were developed by the reflective urban elite and intellectuals by studying the clinical evidence of their own experiences and of the indigenous healers related to the traditional healing practices (Mutatkar, 2016). According to the World Health Organization (2000), traditional medicine encompasses a wide range of therapies, restoration methods, diagnostic tools, and practices that draw from the accumulated wisdom of indigenous peoples around the world.

[1] Dr Anil Kishore Sinha, Professor (Retd.), Senior Fellow (Indian Council of Social Science Research, Ministry of Education, New Delhi, 110 067), Department of Anthropology, Panjab University, Chandigarh 160014. Email: aksinha58@gmail.com

Many different types of illnesses are still treated with herbal treatments, which have been utilized for a very long time. Herbal therapy is especially well-liked in parts of Africa and Asia, especially in nations like China, India, and Japan. The accessibility and cost-effectiveness of medicinal herbs in particular areas may be one reason, claim Jahan and Ahmet (2020). According to Emon et al. (2021), bioactive ingredients in plants may offer novel medications with anti-COVID-19 properties. It has been demonstrated that phytochemical metabolites, including flavonoids, polyphenols, coumarins, alkaloids, terpenoids, and tannins, can successfully fight off harmful microorganisms. They might accomplish this by blocking the enzymatic and protein activities of the virus, which prevents the virus from entering host cells and growing there (Jahan and Ahmet, 2020). It can be a wise investment to supplement defenses against COVID-19 with food and herbal remedies.

A first line of protection against viruses, particularly those caused by the SARS-CoV-2, has long been traditional medicinal plants in many regions of the world. Evidence suggests that Daralu *(Toona sinensis)* leaf extracts can reduce the SARS-CoV-2 transmission rate (Chen et al., 2020). As for SARS-CoV-2, liquorice has also been proposed as a potential therapy. One study found that curcumin, together with diterpenoids, triterpenoids, and sesquiterpenoids, could halt the transmission of SARS-CoV-2. Some plants and foods include bioactive compounds that suppress inflammation, free radicals, and bacteria. Possible outcomes include a rise in natural killer cells, macrophages, lymphocytes, and cytokine suppressors; these factors could aid in pre- and post-exposure prevention efforts. Extracts from medicinal plants have the potential to reduce inflammation and respiratory illness symptoms, which could hasten recovery (Panyod et al., 2020). Research by Jahan and Ahmet (2020) and others has shown that SARS-CoV-2 risk can be reduced and controlled by using herbs that contain bioactive ingredients.

India is home to a wealth of traditional medical practices, including Ayurveda, Homoeopathy, Unani, Siddha, and Sowa-Rigpa, all of which are now recognized as AYUSH. There was a name change in 2003 from the Department of Indian Systems of Medicine and Homoeopathy (ISM&H) to the Ministry of AYUSH, which is the current name of the organization. This marked the beginning of the Department of AYUSH's evolution into its current form as the Ministry of AYUSH, which in turn reports to India's Ministry of Health and Family Welfare. A new definition of traditional Indian medicine has emerged as a result of the groundbreaking work done by the Ministry of Ayurveda, Yoga, and Homeopathy (AYUSH) in the decade after its establishment in 2014.

In addition to curing some infections, Indian and Tibetan traditional medicine try to fix a lot of different illnesses. India has had an ancient medicine system for more than 5,000 years (Kumar et al., 2019).

2. COVID- 19 as a global pandemic

In December 2019, the source of COVID-19 was identified as SARS-CoV-2 in Wuhan, China. The coronavirus disease (COVID-19) pandemic of 2019 was the seventh major outbreak of its kind since the flu pandemic of 1918. The reason of the pneumonia reports that were reported to the World Health Organization (WHO) on December 31, 2019, remained unclear. The earliest confirmed instances of COVID-19 were recorded on 31st December 2019. On January 7, the Chinese authorities eventually discovered this novel coronavirus, which is now known as 2019-n CoV. World Health Organization (WHO) officials finally declared a worldwide public health emergency due to the rapidly expanding COVID-19 epidemic on January 30, 2020. The name of the new coronavirus, COVID-19, was announced on February 11. Nine days later, the first death in the US was proven to have been caused by COVID-19. The guy was a Washington State native and was in his sixties. Officials in-charge of population health, government agencies, and the general public were in the dark about the spread and impact of COVID-19 in the early months of the pandemic. The United Nations provided $15 million on March 1, 2020, to aid in the global response to the COVID-19 epidemic. A week later, on March 7, 100,000 cases of COVID-19 were reported. A few days later, on March 11, the World Health Organization declared COVID-19 a pandemic. Covid-19, which had previously only been an issue in China, has now unexpectedly gone global (Moore, 2021).

Signs of an infection can include a high temperature, dry cough, difficulty breathing, lethargy, headache, weakness, diminished sense of smell, ageusia, and a stuffy nose. The majority of hospitalized patients experienced severe cases of ARDS, neurologic symptoms, infections, acute liver injury, and prothrombotic coagulopathy. Extremely ill individuals may also experience cytokine storms and indications of microglia activation. Chronic liver disease, diabetes, hypertension, kidney disease, malignancy, heart disease, and cancer accounted for one hundred to ninety percent of the admitted patients (Richardson et al., 2020).

Worldwide, there were 364,191,494 confirmed cases of COVID-19 in 2022, with 5,631,451 of those instances occurring on January 22nd. A total of 9,854,237,363 doses of vaccination were provided. There were 40,858,241 confirmed cases of COVID-19 in India as of January 22, 2022, with 493,218 fatalities and 50.6% of the population having received the vaccine.

3. Historical perspective on pandemics/ epidemic and traditional medicinal treatments

3.1. The Black death or Black plague

During the Middle Ages (1347–1341), a pandemic known as the Black Death struck Eurasia. Nearly two hundred million people died as a result of the pandemic, which in just four years eliminated thirty to fifty percent of Europe's population (DeLeo and Hinnebusch, 2005). About 50 million people perished during the two-century-long "Plague of Justinian" that occurred between 541 and 750 AD (Harbeck et al., 2013). The most current one in Madagascar was introduced by rat fleas carried by trade ships from China. The flea bite was the first vector for the transmission of the bacteria to humans, who subsequently contracted the disease through close personal contact or inhaled aerosols. The bubonic plague, which caused inflammation of the lymph nodes (buboes), was the most frequent. The second, more lethal kind was the pneumonic plague, which mostly afflicted the lungs. Septicaemic plague, the third type, was extremely rare yet fatal (Byrne, 2004). Once hovering between 40% and 60% in the past, the death rate dropped to 1% to 5% once antibiotic treatments began in the early 1900s. Carrying fragrant herbs around one's person was thought to clear "the evil air" (the pathogen) in the Middle Ages (Jones, 2000), garlic was believed to cleanse the kidneys and liver, and bile-calming lavender or chamomile teas were recommended by Khaytin (2019) among the preventative measures. Herbs like angelica, camphor, cloves, garlic, marjoram, meadowsweet, wormwood, and sage were brewed in vinegar to make a remedy known as "the four thieves vinegar" (Garcia, 2020). On protect oneself from the plague, this mixture was applied topically on the face and hands. This might be because it contains some of these herbs, which have a reputation for keeping fleas at bay. Meadowsweet and other plants were added to alleviate pain and conceal smells. Meadowsweet contains salicylic acid, a predecessor to aspirin. Thieves presumably got the idea for the remedy's name from their practice of stealing plague victims' bodies (Lucas, 1969). The ancient Greeks were famous for a treatment that became popular. Totelin (2004) referred to this paste as the King Mithridates antidote, and it was prepared by combining an extract of approximately fifty herbs with opium (*Papaver somniferum*) in order to alleviate the pain. Lavender and rosewater baths were also prescribed, likely because of the antibacterial and therapeutic effects of the flowers. According to Khaytin (2019), willow bark, which contains salicylates, was also used as a pain reliever.

3.2. Smallpox

Infectious smallpox is caused by the Variola virus, which can be differentiated as either V. major or V. minor. While the exact origins of the disease are unknown, the first known cases were in the third century BC in ancient Egypt, where mummies were found with eruptions that looked like the macules that are characteristic of the disease. Its spread occurred in waves around the world, as has happened with previous global epidemics; the most recent of these occurred in the late 1960s. According to Kaplow (2003), 500 million people died as a result of the virus in the twentieth century. The World Health Organization (WHO) began its eradication campaign in 1967. The use of vaccines to prevent the spread of several infectious diseases was popularized by Edward Jenner. Native American medicine relied on a combination of plants including *Sarracenia purpurea* (family Sarraceniaceae) to treat smallpox (Lawrence-Mackey, 2019). God revealed which plants would be good for humanity based on the appearance of certain symbols, according to an old theory called the ‘theology of

signatures' (Coles, 1657). There was a term used to describe it: pseudoscience. Although there are in vitro evidence of antiviral properties in *Sarracenia purpurea*, the botanical remedy is primarily utilized in vaccinations (Arndt et al., 2012).

3.3. Spanish Flu

The spring of 1918 saw the start of a devastating pandemic that was unmatched in its destructiveness. It was brought on by an especially virulent strain of the H1N1 influenza virus, which also caused the swine flu pandemic in 2009. The Spanish flu was the name given to the sickness. The disease spread in three waves during the fifteen months until it ended in the summer of 1919. Following a fourth, somewhat smaller wave in the early 1920s, the virus vanished. Forty million of the fifty million afflicted people died. For one hundred years, researchers have been studying the very virulent H1N1 flu strain, but little is known about why this virus proved so deadly to children (Tumpey et al., 2005). The primary preventive measures were to increase personal hygiene, use disinfectants often, and avoid contact through lockdowns and quarantines because there was no vaccine or treatment to treat secondary pneumonia. These actions were done even during the COVID-19 pandemic. Advice like "Eat more onions!" quickly spread as a result of people using traditional cures. The plant family *Allium cepa,* which includes garlic and onions, contains compounds such as quercetin, a polyphenol with antiviral qualities (Lee et al., 2012; Sharma, 2019). Using herbal medicines, a group of American doctors known as the "Eclectics" successfully treated flu symptoms. The Native Americans used a wide variety of herbs to treat a variety of illnesses. For instance, they used Pleurisy root (*Asclepias tuberosa*), which was believed to relieve respiratory issues and have expectorating properties, Boneset (*Eupatorium perfoliatum*), Black Cohosh (*Actea racemosa*), which was believed to have analgesic effects because of the salicylic acid in its roots, and Yellow Yasmine (*Gelsemium sempervirens*) (Abascal, 2006). Oseltamivir, a drug made from the *Schisandraceae* family's star anise plant, was used to treat the 2009 flu pandemic's most severe cases in order to supplement the vaccine. Due to the tree's low output, scientists are trying to synthesise synthetic copies of this chemical (Macip, 2020). Since most epidemiologists are constantly concerned about a pandemic like the one that happened in 1918, developing effective flu medications is crucial (Garcia, 2020).

3.4. Hepatitis B

Most patients infected with Hepatitis B do not experience any symptoms at the time of infection or throughout chronic infection, which is why the disease is sometimes referred to as a "silent epidemic." Thus, individuals can continue the stealthy spread of Hepatitis B by unwittingly infecting others. In 1885, a German scientist named Lurman isolated the Hepatitis B virus (HBV) after seeing multiple cases of chronic jaundice in shipyard employees. This virus affects all Hominidae, including humans. The American doctor, Baruch Blumberg, deserves the credit for finding the virus. He and his colleagues developed a blood test in 1965 to detect the virus, which led to its name, Australia antigen (Au antigen), among some Australian aborigines. Blumberg received the Noble Prize in Medicine in 1976 for his invention of the first hepatitis B vaccine in 1969. The full HBV particle, sometimes called the Dane particle, was found in 1970 by a British pathologist named D.S. Dane. After that, in 1972, Magnius and Espmark found HBeAg (Saha, 2015).

Bhui Amla *(Phyllanthus niruri)*, Kutaki *(Picorrhiza kurroa),*Haritaki *(Terminalia chebula),* Indian Rhubarb/Revand Chini *(Rheum Sps.),* Amla *(Emblica officianalis),* Tulsi *(Ocimum tenuiflorum),* Kalmegh *(Andrographis paniculata),* Makoi *(Solanum nigrum),* Kasni (*Cichorium intybus*). Neem (Azadirachta indica), Daruharidra *(Berberis aristata*), Yashti Madhu *(Glycyrrhiza glabra),* Sharpunkha Mool *(Tephrosia purpurea),* Giloy/Guduchi *(Tinospora cordifolia),* Bhringraj *(Eclipta alba)* and Punernava *(Boerhaavia diffusa)* are some of the significant herbs and plants which have been traditionally used by the indigenous medical practitioners to cure jaundice and Hepatitis B (Saha, 2015).

Hundreds of Indian medicinal plants are being used for jaundice and liver diseases under indigenous medical systems like Ayurveda and Unani. Only three terrestrial plants, i.e. Yashti Madhu *(Glycyrrhiza glabra),* Kutaki *(Picorrhiza kurroa)* and Bhui Amla have been scientifically elucidated

while adhering to the internationally acceptable scientific protocol. A fourth plant *Sylibum marianum* or milk thistle generally used in Europe also falls in this category and the medicines produced by using these plants are used for Hepatitis B and C viruses. For the first time in the Indian systems of medicine, a chemo-biological fingerprinting method for standardization of Bhui Amla (*Phyllanthus niruri)* preparation has been patented (Saha, 2015).

4. Efficacy of AYUSH systems of medicine in COVID- 19

In order to prevent and treat COVID-19, traditional drugs and therapies have been utilised. Relief from the symptoms of COVID-19 was obtained with the help of several traditional medicinal medicines from the AYUSH systems (Table - 1). When it comes to managing diseases and keeping people healthy, the AYUSH systems take a comprehensive approach. In order to prevent diseases, it offers comprehensive advocacy and interventions. A number of AYUSH system therapies are now being incorporated in COVID-19 management and prevention strategies, with promising outcomes. On top of that, they are helpful for COVID-19 symptom treatment.

Table 1: Traditional medicine for COVID- 19

Sr. No	Siddha Medicine	Ayurveda Medicine
1.	*Kabasura kudineer*	*Chyavanprasha*
2.	*Nilavembu kudineer*	*Brahma rasayana*
3.	*Vishasura kudineer*	*Sanjeevani vati*
4.	*Seerana kudineer*	*Chitrakatdi vati*
5.	*Thonthasura kudineer*	*Pippali rasayana*
6.	*Ammaiyarkoondal kudineer*	*Vyaghri haritaki*
7.	*Deva chooranam*	*Sitopaladi churna*
8.	*Adathodai manapagu*	*Yashtimadhu churna*
9.	*Urai mathirai*	*Talisadi churna*
10.	*Pachai karpoora mathirai*	*Tribhuvana kirti rasa*
11.	*Swasa kudori mathirai*	*Gojihvadi kwath*
12.	*Thippili rasayanam*	*Laguvasanth malati*
13.		*Mrityunjaya rasa*

Source: Sundarasamy et al., 2023

4.1. Research work conducted on effect of COVID- 19

To plan and carry out COVID-19 research projects (clinical, preclinical, observational, etc.), the Ministry of AYUSH has set up a multidisciplinary AYUSH R & D task force. After hearing back from the Taskforce that made the general rules, universities, state governments, research councils, and COVID-19 hospitals all started their own investigations. These groups are overseen by the Ministry of AYUSH. These bodies began studies all over the country that included clinical, observational, in-silico, and preclinical investigations. They worked with and consulted with prestigious scientific groups like the CSIR, ICMR, Public Health Foundation of India (PHFI), DST, and DBT. The AYUSH-CSIR collaborative studies include four clinical trials that test the effectiveness of AYUSH medicines for COVID-19 as either a preventative measure or as an addition to more traditional treatments. The studies are a joint effort between the AYUSH, Health and Family Welfare, and Science and Technology Ministries, with ICMR providing technical support. To date, the Ministry has started 68 studies at 112 places, working with national institutions, research councils, universities, state governments, and other hospitals (Ministry of AYUSH, 2024) The studies include AYUSH-CSIR studies.

4.2. Government protocol based Ayurvedic recommendations to COVID- 19

4.2.1. Guduchi: Research on its effects as an anti-inflammatory, antipyretic, and immunomodulatory treatment for viral fevers has shown promising results. Under the auspices of the Ministry of AYUSH, seven trials have been conducted for investigating the efficacy of Guduchi as a

preventative measure against COVID-19 and its symptoms, with promising results and no reported adverse effects. The study population is estimated to be 1.33 lakh. The Interdisciplinary Committee for Integration has determined that the "National Clinical Management Protocol: COVID-19" includes Ayurveda and Yoga Interventions, and the rationale for this decision is publicly published on the Ministry of AYUSH website. Three in silico studies comparing it to Remdesivir, Favipiravir, and Lopinavir/Ritonavir show that it binds effectively to SARS-CoV-2 attachment and replication sites.

4.2.2. Ashwagandha: Ashwagandha (*Withania somnifera*) (WS) has a long history of usage in Ayurvedic medicine. The immune-modulatory, anti-stress, and antiviral effects of ashwagandha were major factors in its selection. As a preventative medication, WS root extract is useful because of the favourable effects it has on anxiety and stress brought on by long-term social isolation. Additionally, the drug is helpful in post-COVID-19 care due to its excellent lung protective role.

4.2.3. Decoction of Guduchi and Pippali combination: In Ayurveda, a mixture of Guduchi and Pippali is used to treat a condition (*Vata Kaphaja Sannipatik Jvara*) that mimics the symptoms of COVID-19. When it comes to treating respiratory illnesses, these two plants are staples in Ayurvedic medicine. The safety, immuno-modulatory, antipyretic, antiviral, and anti-inflammatory activities of the plants and their phytoconstituents have been established via substantial research. Research on Pippali (*Piper longum*) and Guduchi (*Tinospora cordifolia*) in vitro has revealed that they bind very well to substances that may be targets of SARS-COV-2 (the COVID-19 viruses).

4.2.4. AYUSH 64: Ayurvedic medicine's highest authority, the Central Council for Research in Ayurvedic Sciences (CCRAS), oversees the drug development process and ensures that all regulations, quality standards, and pharmacopoeia criteria are met. The result is the AYUSH 64 formulation, which was developed for malaria after extensive scientific research. Due to its remarkable antiviral, immune-modulator, and antipyretic effects, this medication was repurposed. One in silico analysis of AYUSH 64 found that 35 of its phyto-constituents bind strongly to the COVID-19 virus. The results of the six AYUSH 64 clinical trials conducted in India have been extremely encouraging. In COVID-19 treatment, it was suggested due to these considerations as well as its safety profile and clinical utility. Concerning COVID-19, the committee looked over the National Clinical Management protocol and the reasoning behind the actions outlined in it. It is possible that the National Clinical Management protocol may incorporate comparable studies that evaluate and scientifically analyse more AYUSH therapies from Siddha, Unani, Homoeopathy, and Sowa-Rigpa in the near future.

4.3. AYUSH Sanjivani Mobile app study

A smartphone app called AYUSH Sanjivani was created by the Ministry of AYUSH to measure the performance, reception, and utilisation of the various AYUSH advisories released by the Ministry to combat the spread of COVID-19. According to Srikanth et al. (2021), a significant number of people in various parts of the nation took part in AYUSH practices during the COVID-19 pandemic, which had a positive effect on their overall health, quality of life, and other aspects of their health.

4.4. AYURAKSHA 'Corona se Jung – Delhi Police ke Rang'

New Delhi's police officers participated in an AYURAKSHA program put on by the All-India Institute of Ayurveda (AIIA), which is part of the Ministry of Ayurveda and Home Affairs (AYUSH). The combined effort will use tried- and-true Ayurvedic methods of strengthening the immune system in an effort to stave off corona. 80000 Delhi Police Personnel were given Ayurvedic cures through the AYURAKSHA Kit by AIIA. The purpose of this research was to evaluate the AYURAKSHA kit's performance in preventing the spread of COVID-19, as measured by post-interventional proportion of COVID-19 1g G positively, immune levels, and quality of life. According to Nesari et al. (2022), the AYURAKSHA Kit has a good association with lower COVID-19 and an improved quality of life. Anu Taila, Sanshamani Vati, and AYUSH Kwath are all part of the AYURAKSHA kit.

4.4.1. **AYUSH Kwath:** With a 4:2:2:1 ratio, the mixture consists of four medicinal herbs. Among these, the holy basil (*Ocimum sanctum*), cinnamon (*Cinnamomum zeylanicum*), the ginger (*Zingiber officinale*), and black pepper (Marich) varieties can be found. It helps the immune system deal

with viruses and their symptoms by acting as an antioxidant, reducing inflammation, protecting the liver and kidneys from damage, and lowering the risk of atherosclerosis. According to previous studies, when consumed in the prescribed amounts, the four medicinal ingredients that make up AYUSH Kwath—tulsi, cinnamon, ginger, and black pepper—do not pose any health risks and are entirely safe to consume. It contains cinnamon and black pepper, however studies have shown that using these spices for an extended period of time might lead to oxidative stress, enlarged spleens, and increased lung weight (Nesari et al., 2022).

4.4.2. **Sanshamanivati *(Tinospora cordifolia):*** For any kind of fever, this Ayurvedic herbal concoction is applied as a Rasayana. Ginseng, or *Tinospora cordifolia*, is a member of the *Menispermaceae* family. With its hypoglycemic, antioxidant, anti-hyperglycemic, antiallergic, anti-inflammatory, and hypoglycemic effects, it is an important immunomodulatory agent, either by increasing macrophage phagocytic activity or by stimulating the differentiation of cytotoxic T cells and B cells. It has recently been discovered that humanized Zebrafish can reverse the phenotype of SARS-CoV-2 sickness. Previous research has found no evidence of toxicity in *T .cordifolia* (Nesari et al., 2022).

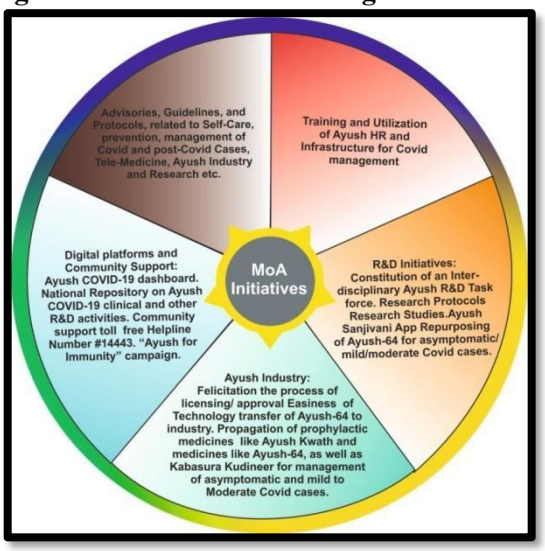
4.4.3. **Anu Taila (Oil):** An intra-nasal administration of a TLR2/6 agonist is one of the pharmacological medicines being researched for their potential to regulate infections and inhibit virus entrance. Anu Taila (Oil) derived from a number of significant medicinal herbs aids in the relief of nasal congestion, chronic sinusitis, and the regulation of pro-inflammatory cytokines. The preventive nasal instillation of Anu Taila was found by multiple authors to lower the viral load in the lungs. As far as anyone can tell, Anu taila has no known harmful side effects (Nesari et al., 2022).

More than 150 investigations during the pandemic, the patented medicines AYUSH-64 and Kabasura Kudineer, a Siddha medicine, were widely supplied and received positively by the populace. During this period, 49 studies were carried out, with observations accounting for 17, preclinical experiments for 24, and surveys and systematic reviews for 14 (Ministry of AYUSH, 2024).

5. Ministry of AYUSH response to COVID- 19

COVID-19 has been a challenging period for mankind. The effects were as devastating in India. The world came to appreciate the efficacy of Indian traditional medical systems during the COVID-19 pandemic, when they responded with effective treatment protocols and prevention measures based on AYUSH. The initiatives of the Ministry of AYUSH are shown in Figure 1.

Fig-1: National Clinical Management Protocol



Source: Ministry of AYUSH, 2024)

The government agency in charge of public health has made public the COVID-19 National Clinical Management Protocol, which is rooted in Ayurveda and Yoga.

5.1. Ministry of AYUSH prescribed guidelines for COVID- 19 care-givers

Individuals who are exposed or in contact with COVID- 19 patients are recommended to use the following:

5.1.1. The following dosages are recommended for the Ayu Raksha Kit, which consists of four interventions: Chyawanprash, Samshamani Vati, AYUSH Kwath, and Anu Taila.

- Once day, take 6 grammes of Chyawanprash.
- AYUSH Kwath 75 ml; once daily, boil 3 grammes of powder in 150 millilitres of water until it reduces to 75 millilitres.
- Half a milligramme of Samshamani Vati taken twice daily
- The suggested dosage of Anu Taila is two drops, used in each nostril twice a day.

(i) Sodium arsenate (30C) Take four 30-milligram globules first thing in the morning, ideally on an empty stomach, for three days. After three weeks, repeat the process.

(ii) Kharma Marwareed 5 grammes daily for 15 days.

5.1.2. Dosage as per Ayur Care Kit for patients in home isolation

- AYUSH 64 – 40 Tablets – 1 Unit
- AYUSH Kwatha – 100g – 1 Unit
- Sudersan Ghan Vati 1 – 30 Tablets – 1 Unit
- Anu Taila – 10ml – 1 Unit
- Vyoshadi Vati – 10g – 1 unit

5.2. Ministry of AYUSH therapeutic approach for COVID-19

The Ministry of AYUSH has proposed a number of measures to address the condition, including both preventative measures and treatment approaches, as shown in Table 2. The medicine, herb, and plant suggestions made by the Ministry of AYUSH have been divided into three groups: COVID-19 symptomatic management, preventative and prophylactic measures, and supplementary treatments. Antiviral, anti-inflammatory, antibacterial, immunomodulatory, respiratory infection, fever, cough, and cold are some of the medicinal activities shown in Table 2 of the drug impact provided by Akoachere et al. (2002).

Table 2: AYUSH Ministry of Government of India list of medications, plants, and herbs recommended as a treatment for COVID-19

Sr. No.	Drug	AYUSH System of medicine	Administration	Reported Activities
I	**Preventive and Prophylactic Covid-19 Management**			
	Tinospora cordifolia Decoctionor Samshamani Vati	Ayurveda	Samshamani Vati, or *Tinospora cordifolia* Decoction, taken twice daily with lukewarm water for fifteen days.	Inflammatory, antiviral, antipyretic, immunomodulatory, chronic fever, etc.
	Andrograhis paniculat	Siddha	Take 60 millilitres of the decoction two times day for a week.	Cold and Fever
	Cydonia oblonga, Zizyphus jujube, Cordia myxa	Unani	In 250 millilitres of water, bring three parts *Cydonia oblonga,* five parts *Zizyphus jujube,* and nine parts *Cordia*	Smooth muscle relaxant, immune-modulatory, anti-allergic, antioxidant, and anti-influenza properties

			myxa to a boil, then reduce by half. For 14 days, use the decoction twice daily.	
	Arsenicum album 30	Homeopathy	Once daily on an empty stomach for three days (repeat after one month or as long as the infection continues).	Protects against SARS-CoV-2 and modulates the immune system immune-modulator, and efficacious against it.
II	**Symptomatic Management for COVID- 19**			
	AYUSH-64	Ayurveda	Two pills taken twice day	Colds and flu-like symptoms
	Agastya Haritaki	Ayurveda	5 grammes, taken twice daily.	Upper respiratory infections and immunomodulato
	Anu Taila	Ayurveda	Two drops into each non-stimulating morning beverage	Colds and flu-like symptoms
	Adathodai Manapagu	Siddha	use 10 millilitres (ml) twice daily	Cold and Fever
	Bryoniaalba	Homeopathy	Pills in the dosage and manner recommended by the doctor	Lessen the inflammation in the lungs
	Rhus toxicodendron	Homeopathy	Pills in the dosage and manner recommended by the doctor	An infection caused by a virus
	Atropa belladonna	Homeopathy	Pills in the dosage and manner recommended by the doctor	Covid-19 and other long-term lung conditions
	Bignonia sempervirens	Homeopathy	Pills in the dosage and manner recommended by the doctor	Asthma
	Eupatorium perfoliatum	Homeopathy	Pills in the dosage and manner recommended by the doctor	Nose and throat issues
III	**Add on interventions to the conventional care**			
	Visha sura kudineer	Siddha	Drink 60 millilitres of the decoction two times day.	Coughing up a fever
	Kaba sura kudineer	Siddha	Drink 60 millilitres of the decoction two times day.	Chest pain, fever, coughing, difficulty breathing

Source: Compiled by author

6. India's governmental response to COVID- 19 at the Centre and States

A variety of infectious diseases can be better prevented with the support of lifestyle recommendations made by the country's traditional healthcare system. Consistent with the date of the initial case detection in India, which was January 29, the AYUSH Ministry issued a public advisory outlining preventative measures that were informed by the AYUSH systems (Priya and Sujatha, 2020). It is not the intention of the recommendation to cure the condition, but rather to prevent its spread.On March 6, the ministry dispatched a second advisory that encompassed the different systems to the chief secretaries of every state and union territory.

Starting on April 1, 2020, the Ministry of Health and Family Welfare established an online forum to gather ideas for COVID-19 control or management techniques that are grounded in AYUSH explanations, treatments, and procedures that have scientific backing. In order to investigate and develop a reaction to COVID-19, AYUSH established an interdisciplinary task force on April 2, 2020. The mission of the Task Force was to identify AYUSH-based therapies and preventative measures that may be utilized at different points in the COVID-19 treatment process, either in place of or in addition to conventional medicine. Governments at the state level, as well as the Indian Council of Medical Research, the Department of Biotechnology, the Department of Science and Technology, the Pharmaceutical Industry, the IT industry, and the AYUSH industry were all anticipated to work together after a coordination mechanism among scientists, agencies, and regulatory bodies. In addition, Priya and Sujatha (2020) noted that the purpose of the workshop was to create national ethical guidelines for conventional and AYUSH approaches to treating COVID-19 in humans. These guidelines would cover topics such as preventing the virus in healthy individuals, treating severe cases, alleviating milder symptoms, and providing additional treatment for patients with advanced stages of the illness.

State/Regional/District Ayurveda, Niramaya, an official online platform for the efficient application of AYUSH strategies to COVID-19 patients, Ayur Raksha Clinics for preventative work and the operationalization of Swasthyam regimens incorporating lifestyle, food, and medicine for different age groups and risk categories COVID-19 reaction. The State of Kerala set up cells during the pandemic[2].

Protocols for managing COVID-19 were developed by the Siddha sector, which included using different herbal decoctions at different stages of the illness. Since April 2020, Tamil Nadu has been using them since they are inexpensive, simple to prepare, and convenient to distribute. As evidenced by press accounts of large lines at Siddha pharmacies and clinics, the public has been preparing and consuming herbal decoctions since the virus was first made public in March 2020[3]. Despite the high number of COVID-19 cases, Kerala had the lowest fatality rates, which is an interesting statistic. This might applied to the Siddha interventions in Tamil Nadu as well.

The Directorate of AYUSH, Chandigarh, also created a number of COVID-19 protocols, including alerts and notifications that ranged from helpline numbers to information on increasing immunity. An AYUSH Kwath was widely accessible and dispersed as an immune-stimulating medication. Despite the fact that several manufacturing businesses were producing COVID-19 vaccines, the world was still depending on self-care methods, such as using traditional medicine (Paudyal et al., 2021).

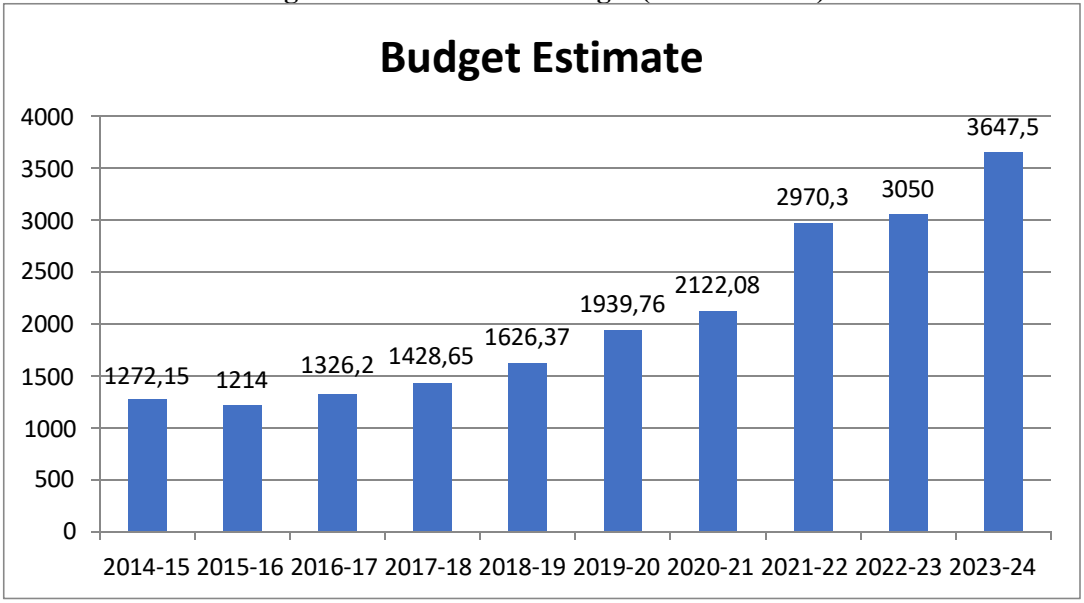
6.1. Ministerial budget allocation for AYUSH

Increased budget allocation has been a recurring pattern over time (Figure 2), indicating a growing understanding of the sector's significance and a dedication to supporting its projects and programs.

[2](https://www.thehindu.com/news/cities/chennai/COVID19-people-throng-to-buy-siddha-drug-kabasura-kudineer/article31225180.ece)

[3](https://www.thehindu.com/news/cities/chennai/COVID19-people-throng-to-buy-siddha-drug-kabasura-kudineer/article31225180.ece)

Figure 2: Allocation of Budget (Rs. In Crores)



Source: Ministry of AYUSH (2024)

7. Ayurvedic Medicinal Treatment in COVID-19

The world's oldest medical system, Ayurveda, is thought to be effective in treating a variety of infections without causing any negative side effects. It has a wide range of therapeutic modalities for complex harmful illnesses, Ayurveda is well-equipped (Goothy et al., 2020). Experts in Ayurvedic medicine are aware of a variety of bacteria and the diseases they might cause. Originally developed in India, Ayurveda and Siddha practice are widely utilized to treat a variety of illnesses (Janiaud et al., 2021). Identifying, isolating, and characterizing the bioactive phytochemicals found in medicinal herbs may help combat a number of illnesses. Therefore, repurposing traditional medicinal herbs may offer a fresh approach to fighting different viral infections. The following medications were utilised during COVID-19:

7.1. Ayurvedic *kadha*

Viral diseases can be prevented and treated with Ayurvedic medicines and extracts. *Kadha* was the first type of medication created by combining spices and plant-based medicines. The extract is made from herbs and spices that are not very juicy or dry and are utilised in a variety of Indian herbal treatments (Maurya and Sharma, 2022). *Kadha* is made for oral administration, which is a crucial Ayurvedic technique for enhancing the pharmacological effects of botanical treatments' active ingredients. *Kadha* was allegedly suggested by the Indian government as a way to boost immunity and encourage healing during the COVID-19 epidemic (Maurya and Sharma, 2022). The phytochemical constituents of Ayurvedic *Kadha* have the ability to bind to a variety of host and viral targets. They can control the reproduction of viruses in host cells, which supports their antiviral properties (Maurya and Sharma, 2022).

7.2. Guduchi Ghan Vati

The immunomodulatory and antioxidant properties of this traditional Indian medicine make it a popular choice. Furthermore, it was proven effective in combating SARS-CoV-2 infections (Bala et al, 2020). Among the many Ayurvedic remedies found in India's pharmacopoeia is the well-known Guduchi Ghan Vati. The *Tinospora cordifolia* extract used to make it is water-based. The *Menispermaceae* family counts the enormous climbing tree *T. cordifolia* among its members; the names "Guduchi" and "Giloy" are common. One can find it in the tropical regions of both India and China. It has a long history of use in traditional medicine (Alam et al., 2021).

7.3. Giloy *(Tinospora cordifolia)* and Pippali (*Piper longum)*

Patgiri et al. (2014) noted that the traditional Ayurvedic remedy Guduchi Ghan Vati is prepared using the herb *Tinospora cordifolia.* One such plant that goes well with it is *Piper longum* L., which is in the

Piperaceae family. Pippali is also a well-known traditional Ayurvedic medication that boosts the absorption and bioavailability of other bioactive substances. Alam et al. (2021) also noted that it has significant antiviral effects.

7.4. Plant secondary metabolites:

Stress exposure results in the formation of intermediate complexes known as secondary metabolites (PSMs) in plants. PSMs can help the host communicate and cope with a range of environmental stressors. Their antiviral, antifungal, and antimicrobial properties are potent (Korkina et al., 2018). After looking over the available data on plant active metabolites for COVID-19 prevention and therapy, it was found that several bioactive phytochemical components have effects on different diseases. Some of the possible mechanisms include modifications to COVID-19 biomarkers, changes to important immunomodulatory functions, and modifications or suppression of SARS-CoV-2 itself. Several studies have shown that PSMs groups in terpenes, glycyrrhizin, and alkaloids have therapeutic potential. One study found that these groups can be used to treat COVID-19 by utilising the multi-target model of action and the pharmacological effects of bioactive metabolites.

7.5. Functional

The new coronavirus epidemic and the dearth of available treatments have resulted in a high death rate. Because of their nutritional benefits and perceived safety when compared to manufactured medications, biologically active functional foods have recently attracted more attention as drug design models (Cheung and Yada, 2022). Reider et al. (2020) claim that by preventing the synthesis of inflammatory mediators, the expression of ACE2 receptors, and important SARS-CoV-2 enzymes, certain functional foods can help the body fight off COVID-19 infection. Supplementing with vitamins and minerals is generally thought to strengthen the immune system's defences against viral infections. Because nutritional status has a significant impact on the result of COVID-19 patients, clinicians worldwide are paying close attention to vitamin and mineral supplements as a potential weapon in the fight against the virus, both in prevention and therapy (Chowdhury, 2020).

8. Indian herbal therapeutic approaches against COVID- 19

According to Alzahrani et al. (2021), these encompassed practices such as Yoga, relaxation techniques, spiritual healers, herbal remedies, and animal products. It was vital for patients to have immunity when dealing with COVID-19. When it comes to preventing and treating COVID-19, standard medicines with immunomodulatory activities have demonstrated potential (Zhang and Liu, 2020).

Possible COVID-19 treatments include medicinal plants like *Artemisia annua* (Orege et al., 2021). Members of the community assert that traditional medicinal practices were crucial in the fight against and treatment of the COVID-19 pandemic. Additionally, they have the potential to assist scientists and pharmaceutical businesses in developing novel medications for the treatment and prevention of medical conditions.

There is a lot of interest in finding herbal medications that may work against COVID-19 because plant-based remedies have demonstrated encouraging outcomes in boosting immunity to other viruses (Alam et al., 2021). One of the oldest and most essential parts of the global healthcare system is traditional Indian medicine, according to Guo et al. (2020).

Both healthy individuals and COVID-19 patients have been advised to take a mixture of *sunthi* (*Zingiber officinale* Roscoe.), *maricha* (*Piper nigrum*), and *lavanga* (*Syzygium aromaticum*). By enhancing humoral and cell-mediated anti-inflammatory responses and decreasing airway hypersensitivity, it does this. Inhibition of cytokine secretion has been demonstrated for curcumin, the main component of *Curcuma longa*, including pro-inflammatory cytokines, interleukin-1, interleukin-6, and tumour necrosis factor-α. Milk should be consumed with it (Zeng et al., 2020). Research on the flu and other infections focusses on finding ways to decrease cytokine release. It's also been applied to COVID-19, where cytokine storm is a major factor in the disease's progression (Zeng et al., 2020).

Herbal and non-herbal treatments have been used as traditional COVID-19 treatments. This group included garlic, ginger, lemon, gardencress, and damakase. Table 3 lists all of the community's alleged herbal goods.

Table 3: Detailed description of traditional herbal based medicines claimed by the community for the prevention and treatment of COVID- 19

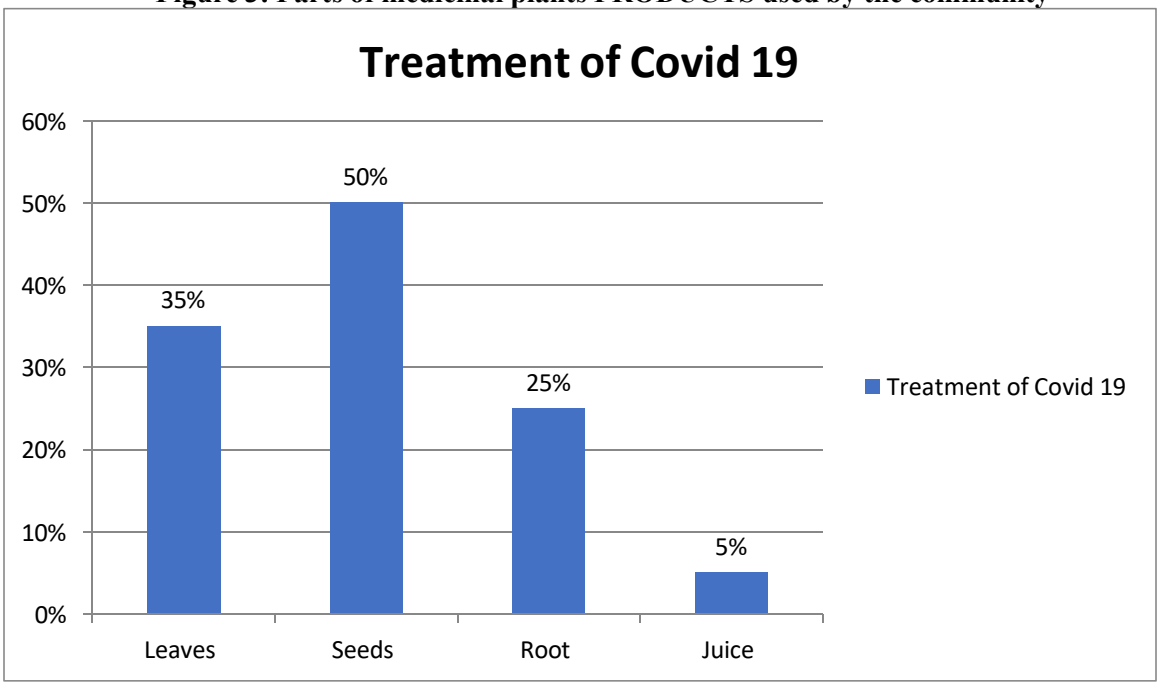
No.	Local/ Vernacular (English Name)	Family	Part of Plant Used	Dosage Form Used	Route of Administration	Method of Preparation	Duration of Treatment	Frequency fuse/Day	Source of Plant
1	The lemon	The Rutaceae family	Juice	Liquid	Oral	Cold water is added to the juice. The juice is either spindled or boiled with tea.	1–14 days, 2–5 days, 2 days	Once	Local market
2	Ginger	The Zingiberaceae family	Root	Liquid	Oral	Boiled with tea.	7–30 days	Once	Home garden/ market
3	Garlic and garden cress	Brassicaceae, Alliaceae respectively	Seed and root, respectively	Semi-solid	Oral	Paste used in cooking food	15-days	Twice	Home garden/ market
4	Black cumin	Ranunculaceae	Seed	Solid	Oral	Eaten whole with jaggery	1-month	Once	Local market
5	Garlic, garden cress and lemon)	Alliaceae, Brassicaceae, Rutaceae, respectively	Root, seed and seed respectively	Liquid	Oral	Paste made for cooking meals	1-month	Once at day	Local market
6	Garlic	Alliaceae	Root	Solid	Oral	Paste used for cooking meals	1 month, 3-days, respectively	Once at day	Local market
7	Garden cress, jalapeño, and garlic	Brassicaceae, Solanaceae, and Alliaceae, in that order	Bulb, seed	Semi-solid	Oral	Paste made and uniformly mixed in butter and eaten raw or after frying	60-days	Once	Home garden/ market
8	Black Mustard	Brassicanigra, Brassicaceae	Seed	Semi solid	Oral	Powdered and eaten with food	1-month	Twice	Local market

9	Gardencress	Brassicaceae	Seed	Solid	Oral	Eaten with food after boiling	2–5 days	Once	Local market
10	Nigella seed	Solanaceae	Seed	Solid	Oral	The seeds are grinded and eaten with food	3-days	Three times	Home garden
11	Ginger and garlic paste	Zingiberaceae, Alliaceae respectively	Root	Liquid	Oral	Fried in Food	Regularly	Once	Home garden/ market
12	Honey / Shahad	Not Applicable	Fresh Honey	Semi solid	Oral	Taken raw	2-5 days	Once	Market
13	Cloves	Myrtaceae	Seed	Liquid	Oral	After the coffee is boiled, the seed is consumed.	1 day	Three times	Local market
14	Cinnamon	Capsicum pepper	Leaves	Liquid	Oral	Coffee and fresh leaves are cooked, then consumed.	≥ 3 days	Three times	Local market
15	Black cumin and garlic	Ranunculaceae, Alliaceae respectively	Seed, root	Semisolid paste	Oral	Honey is added to the seed and root, which are then consumed.	2 weeks	Twice	Home garden/ farmland

Source: Umeta Chali et al., (2021)

Parts of medicinal herbs utilized for COVID-19 prevention and therapy are shown in Figure 3.

Figure 3: Parts of medicinal plants PRODUCTS used by the community



Source: Umeta Chali et al., (2021)

The most commonly utilised method of administration was oral, and the most commonly used portions of medicinal plants (herbal preparations) were seeds, followed by leaves, roots, and fluids. According to multiple researches, herbal therapy has the potential to both prevent and mitigate the effects of COVID-19 (Chan et al., 2020). Traditional Chinese and Indian medicine often work hand in hand with Western therapy to strengthen patients' immune systems (Shankar et al., 2020). Luo et al. (2020) found that traditional Chinese medicine significantly reduced viral recurrence, mortality, and clinical symptoms. Researchers and the pharmaceutical industry may be able to test the effectiveness and safety of supposedly helpful treatments thanks to the broad usage of herbal medicine, which is also likely making it difficult to curb the epidemic.

9. Immunity boosting potential of traditional medicines

For the majority of disorders, Ayurveda offers both preventive and curative therapy options. The idea behind Ayurvedic treatment for any sickness is to balance the three bodily humours (*Pitta, Kapha,* and *Vata*) and, by correcting the *Agni* (metabolism), optimize the *Ojus* (immunity level), which in turn improves the *Dhatu Sarata* (quality of body tissue at different levels). According to Sushruta, no sickness can develop if any of the three Doshas are not vitiated, hence it is recommended that the ailment be treated using the distinctive symptoms of the appropriate *Dosha.* In addition to prevention, Ayurveda can effectively treat the pathophysiological circumstances of patients with mild to moderate COVID-19 symptoms (John et al., 2015). The main area that Ayurveda can influence is the function of immunity against the illness. Under the direction of sixteen distinguished traditional physicians, the Ministry of AYUSH released a recommendation to increase immunity. Research has shown that stress can have a psychoneuroimmunology effect, which disrupts the immune system (Kim and Su, 2020). According to the scientific term psycho-neuro-immunology, emotional disorders and stress impair immunity and cause infection. The respiratory system can be disrupted by mental stress (Pedersen et al., 2010). Many people, especially corona warriors (health workers, police, paramedical staff, etc.) and corona patients, are under stress as a result of the COVID-19 pandemic (Monserrate et al., 2020). Rajkumar (2020) elucidated that the preventive measures outlined in the AYUSH Ministry's advise

have their own psycho-neuro-immunological effects and have received positive scientific validation. These include the following:

- Consistent, committed Yoga practice promotes physical fitness.
- The body will be cleansed when lukewarm water is consumed.
- Using nutrient-rich turmeric, garlic, and cumin on a daily basis improves health.
- Chyawanprash, an Ayurvedic "Rasayana," offers rejuvenating properties for the body.
- A specific treatment for coughing is the use of herbal tea made from four parts *Ocimum sanctum* leaves, two parts *Cinnamomum zeylanicum* stem bark, two parts *Zingiber ocinale rhizome*, and one part *Piper nigrum* fruits.
- Golden milk, which contains turmeric, is a nutritious beverage; the colour gold represents affluence and good health.
- Ghee, coconut oil, or sesame oil can be used as a cooling and therapeutic agent. When it comes to throat infections, gargling with oil and *Trachyspermum ammi* extract works well.
- Clove powder is a traditional treatment for throat infections when combined with honey or brown sugar. Mint inhalation has a beneficial effect on respiratory conditions.

According to Rajkumar (2020), the mechanism underlying the aforementioned beneficial responses is the regulation of the body's psycho-neuro-immunological reactions, such as the decrease in anxiety, depression, stress response, monoamine function, and parasympathetic activities.

10. Conclusions and future perspectives

Traditional Indian medical methods are essential for treating a number of illnesses. Ayurveda, Siddha, Sowa-Rigpa Unani, homoeopathy, naturopathy, and yoga are some of the traditional medical systems practiced in India. Of these, the Ayurvedic and Siddha systems are more widely used than the others. The Tri- humoral theory known as *Tridosha (Vata, Pitta, Kapha)* is the foundation of Siddha and Ayurvedic systems. It is believed that disease results from an imbalance of *tridosha* in the human body. The *Tridosha* is balanced using Ayurvedic and Siddha medicines. These traditional herbal compositions are made in accordance with ancient texts including the Susrutha Samhita, Saraha Samhita, and Siddha Vaithiya Thirattu. For COVID-19 infection, the Indian Ministry of AYUSH suggests a variety of Siddha and Ayurvedic formulations.

Herbs and/or their active metabolites have been proposed as viable treatments for COVID-19 in a number of recent research because of their significant therapeutic contributions in the past. When treating COVID-19 infections, they can be taken alone or in conjunction with other drugs. Plant-based herbal treatments, functional foods, nutraceutical goods, and a number of interesting bioactive metabolites have all shown promising anti-COVID-19 qualities. For the purpose of treating COVID-19, these products are presently going through several phases of clinical studies. Although these herbal remedies may not be able to prevent viral infections, they can help patients by preserving their immune systems. Evaluating the safety and effectiveness of these phytochemicals and herbal preparations is crucial in order to utilise their medicinal properties for the treatment of COVID-19 patients. In order to battle the COVID-19 pandemic, both individual efforts and the international cooperation of researchers, experts, and authorities are needed. In addition to traditional herbs, a number of functional foods, healthy lifestyle choices, and nutritional supplements can greatly lower the cost of COVID-19 patients and the worldwide mortality rates during this pandemic.

An comprehensive strategy is needed to combat the outbreak, with the Indian Medical System playing a key role as over 75% of infections are caused by patents' weak immune system. During this outbreak, the Indian medical system can help by providing immunity-boosting "Rasayana" and herbs. For every illness, Ayurveda uses a variety of herbal classes and formulations. 6000 years old, Ayurveda can be a life-changing treasure trove.

The most popular complementary and alternative medicine (CAM) in India is Ayurveda, which serves the medical needs of 80% of the population. CAM practices are defined by the National Centre for Complementary and Alternative care (NCCAM) as those that are not currently regarded as an essential component of conventional care. That being said, the use of CAM is a worldwide occurrence in both developed and developing nations.

The Department of Biotechnology (DBT) and the National Medicinal Plants Board (NMPB), which is part of the Ministry of AYUSH, worked together to help India achieve a major milestone in COVID-19 research. Because to this partnership, the country's first oral anti-SARS-CoV-2 virus trial was conducted in vivo. To mitigate SARS-CoV-2 and related diseases, AYUSH Network Research Projects evaluated a few AYUSH herbal extracts in pre-clinical settings. These investigations were conducted at the Translational Health Science and Technology Institute with the goal of evaluating the immune- modulatory and antiviral properties of several herbal remedies. Significantly, Anu taila showed encouraging outcomes in preventing SAR-CoV-2 infection, as shown by a decreased viral load in the lungs of Golden Syrian hamsters infected with the virus.

It would be beneficial for both qualified Ayurvedic and allopathic practitioners to observe a variety of techniques. It is noteworthy that the Medical Council of India (MCI) expressly forbids allopathic physicians from prescribing medications from the Ayurvedic system of medicine, as well as allopathic physicians from prescribing Ayurvedic medications. However, patients benefit from the best possible balance and evidence-based application of both systems, which should be promoted, particularly in developing nations like India where the doctor-to-patient ratio is insufficient.

Acknowledgement
This article is a part of my ongoing research project for ICSSR Senior Fellowship, being pursued in the Department of Anthropology, Panjab University, Chandigarh. The present researcher is immensely grateful to ICSSR, New Delhi, for funding the project. The researcher is highly indebted to Dean of University Instruction, Panjab University, Chandigarh for her kind help and the Chairperson of the Department for providing essential facilities for the research work.

References

Abascal, K. (2006). *Herbs and influenza: how herbs used in the 1918 flu pandemic can be effective in the next*. Tigana Press.
Akerele, O. (1993). Nature's medicinal bounty: Don't throw it away, in World health forum 1993, *14*: 390–395.
Akoachere, J.F.T.K., Ndip, R.N., Chenwi, E.B. Ndip, L.M., Njock, T.E. et al. (2002). Antibacterial effects of *Zingiber officinale* and *Garcinia kola* on respiratory tract pathogens. *East African Medical Journal, 79*, 588–592.
Alam, S., Sarker, M.R. Md., Afrin, S., Richi, F.T., Zhao, C. et al. (2021). Traditional herbal medicines, bioactive metabolites, and plant products against COVID- 19: Update on clinical trials and mechanism of actions. *Frontiers in Pharmacology*, *12*, Article 671498.
Alzahrani A.S., Price M.J., Greenfield, S.M., & Paudyal V. (2021) Global prevalence and types of complementary and alternative medicines use amongst adults with diabetes: systematic review and meta-analysis. *European Journal of Clinical Pharmacology*. *8*:1–6.
Ang, L., Song, E., Lee, H.W., Lee, M.S. (2020). Herbal medicine for the treatment of coronavirus disease 2019 (COVID- 19): A systematic review and meta-analysis of randomized controlled trials. *Journal of Clinical Medicine*, *9*(5), 1583
Arndt, W., Mitnik, C., Denzler, K. L., White, S., Waters, et al. (2012). In vitro characterization of a nineteenth-century therapy for smallpox. *PloS One* 7, e32610. doi: 10.1371/journal.pone.0032610
Arnold, C. (2018). *Pandemic 1918: The story of the deadliest influenza in history.* Michael O'Mara Books.
Bala, P.C., Eisenreich, B.R., Yoo, S.B.M., Hayden, B.Y., Park, H.S., et al. (2020). Automated markerless pose estimation in freely moving macaques with OpenMonkeyStudio. *Nature Communication, 11*(1):4560.
Bribi, N. (2018). Pharmacological activity of alkaloids: A review. *Asian Journal of Botany, 1*(1),1–6.
Byrne, J. P. (2004). *The black death.* Greenwood Publishing Group.
Chan, K.W., Wong, V.T., & Tang, S.C.W. (2020). COVID- 19: An update on the epidemiological, clinical, preventive and therapeutic evidence and guidelines of integrative Chinese–Western medicine

for the management of 2019 novel coronavirus disease. *American Journal of Chinese Medicine*, *48*(3)*,* 737–62.
Chen, X., Yin, Y.H., Zhang, M.Y., Liu, J.Y., Li, R., et al. (2020). Investigating the mechanism of Shu Feng Jie Du capsule for the treatment of novel Coronavirus pneumonia (COVID- 19) based on network pharmacology. *International Journal of Medical Sciences, 17*(16), 2511-2530.
Cheung, L.K. & Yada, R.Y. (2022). Predicting global diet-disease relationships at the atomic level: A COVID- 19 case study. *Current Opinion in Food Science, 44,* 100804.
Chowdhury, A.I. (2020). Role and effects of micronutrients supplementation in immune system and SARS-Cov-2 (COVID- 19). *Asian Journal of Immunology, 4*(2):47–55.
Coles, W. (1657). *Adam in Eden, or Nature's Paradise.* J. Streater.
DeLeo, F. R., & Hinnebusch, B. J. (2005). A plague upon the phagocytes. *Natural medicine, 11*, 927–928.
Emon, N.U., Alam, S., Rudra, S., Riya, S.R., Paul, A., et al. (2021). Antidepressant, anxiolytic, antipyretic, and thrombolyticprofiling of methanol extract of the aerial part of Piper nigrum: In vivo, in vitro, and in silico approaches. *Food Science & Nutrition,9*(2),833–46.
Garcia, S. (2020). Pandemics and traditional plant based remedies. A historical botanical review in the era of COVID-19. *Frontiers in Plant Science,* 11:571042.doi: 10.3389/fpls.2020.571042.
Gomaa, A.A., Mohamed, H.S., Abd-Ellatief, R.B., Gomaa, M.A., & Hammam, D.S. (2022). Advancing combination treatment with glycyrrhizin and boswellic acids for hospitalized patients with moderate COVID- 19 infection: a randomized clinical trial. *Inflammopharmacology, 30*(2):477–86.
Gonzalez, B.L., de Oliveira, N.C., Ritter, M.R., Tonin, F.S., Melo, E.B., et al. (2022) The naturally-derived alkaloids as a potential treatment for COVID- 19: a scoping review. *Phytotherapy Research, 36*(7), 2686-2709
Goothy, S.S.K., Goothy, S., Choudhary, A., Potey, G., Chakraborty, H., et al. (2020) Ayurveda's holistic lifestyle approach for the management of coronavirus disease (COVID- 19): Possible role of tulsi. *International Journal of Research in Pharmaceutical Sciences, 11*(SPL)(1), 16-18.
Guo, Y.R., Cao, Q.D., Hong, Z.S., Tan, Y.Y., Chen, S.D., et al. (2020). The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID- 19) outbreak–an update on the status. *Military Medical Research, 7*(1),1–10.
Harbeck, M., Seifert, L., Hänsch, S., Wagner, D.M., Birdsell, D., et al. (2013) *Yersinia pestis* DNA from Skeletal Remains from the 6th Century AD Reveals Insights into Justinianic Plague. *PLoS Pathog, 9*(5), e1003349.
Jahan, I., & Ahmet. O. (2020). Potentials of plant-based substance to inhabit and probable cure for the COVID- 19. *Turkish Journal of Biology, 44*(1), 228–41.
Janiaud, P., Axfors, C., Schmitt, A.M., Gloy, V., Ebrahimi, F. et al. (2021). Association of convalescent plasma treatment with clinical outcomes in patients with COVID- 19: A systematic review and meta-analysis. *Journal of the American Medical Association*, *325*(12), 1185–95.
Jones, M. (2000). *The New Cambridge Medieval History: C. 1300-c. 1415*. Cambridge University Press.
John, K.M., Enkhtaivan, G., Ayyanar, M., Jin, K., Yeon, J.B. et al. (2015). Screening of ethnic medicinal plants of South India against influenza (H1N1) and their anti- oxidant activity, Saudi. *Journal of Biological Sciences, 22*(2), 191–197.
Joshi, V.K., Joshi, A. & Dhiman, K.S. (2017). The ayurvedic pharmacopoeia of India, devel- opment and perspectives. *Journal of Ethnopharmacology*. 197 32–38.
Khan, M., Zaeem, A., Munir, A., Ulfat, A., & Mumtaz, A. (2022). Plants secondary metabolites (PSMS), AS an investigational source against COVID- 19 from flora of Pakistan. *Pakistan Journal of Botany*, *54*(4),1485–93.
Khaytin, (2019). *ArcGIS StoryMaps. Herbal Medicine in the Black Plague*. Available at: https://storymaps.arcgis.com/stories/4a9ae6b9dcc1460b8e97775b285592e9 (Accessed April 10, 2020).

Kim, S.W., & Su, K.P. (2020). Using psychoneuroimmunity against COVID- 19. *Brain Behavior and Immunity, 87,* 4-7.
Koplow, D. A. (2003). *Smallpox: The fight to eradicate a global scourge*, University of California Press: Berkeley.
Korkina, L., Kostyuk, V., Potapovich, A., Mayer, W., Talib, N., et al. (2018). Secondary plant metabolites for sun protective cosmetics: from pre-selection to product formulation. *Cosmetics,5*(2), 32.
Kumar, V., Singh, S., Singh, A., Subhose, V., & Prakash, O. (2019). Assessment of heavy metal ions, essential metal ions, and antioxidant properties of the most common herbal drugs in Indian Ayurvedic hospital: for ensuring quality assurance of certain ayurvedic drugs. *Biocatalysis and Agricultural Biotechnology*, 18, 101018.
Lawrence-Mackey, F. (2019). *Medical Appropriation in the 'Red'Atlantic: Translating a Mi'kmaq smallpox cure in the mid-nineteenth century.* Doctoral dissertation, University College London (UCL): London, UK.
Lee, J. B., Miyake, S., Umetsu, R., Hayashi, K., Chijimatsu, T., et al (2012). Anti-influenza A virus effects of fructan from Welsh onion (*Allium fistulosum* L.). *Food Chemistry, 134*, 2164–2168. doi: 10.1016/j.foodchem.2012.04.016
Luo, L., Jiang, J., Wang, C., Fitzgerald, M., Hu, W., et al. (2020). Analysis on herbal medicines utilized for treatment of COVID- 19. *Acta Pharmaceutica Sinica B*, *10*(7),1192–204.
Liu, L., Lei, N., Lin, Q., Wang, W., Yan, H., et al. (2015). The effects and mechanism of Yinqiao Powder on upper respiratory tract infection. *International Journal of Biotechnology for Wellness Industries, 4*(2),57–60.
Lucas, R. M. (1969). *Nature's medicines; the folklore, romance, and value of herbal remedies*, Parker Pub. Co.
Macip, S. (2020). *Les grans epidèmies modernes (edició actualitzada): La lluita de l'home contra els enemics invisibles*, La Campana edicions: Barcelona.
Magnius, L.O., & Espmark. A., (1972). A new antigen complex co-occurring with Australia antigen. *Acta pathologica, microbiologica, et immunologica Scandinavica. Section B, Microbiology, 10*, 335–337.
Maurya, D.K., & Sharma, D. (2022). Evaluation of traditional ayurvedic kadha for prevention and management of the novel coronavirus (SARS-CoV-2) using in silico approach. *Journal of Biomolecular Structure and Dynamics, 40*(9), 3949–64.
Ministry of AYUSH (2024). *A decade of transformative growth in AYUSH: Towards holistic health for all 2014-2024.* Government of India. https://ayush.gov.in/#!/ar
Monserrate, M.A.Z., Ruano, M.A., & Sanchez-AlcaldeL., (2020). Indirect effects of COVID- 19 on the environment, *Science of the Total Environment,* 728, 138813
Moore, S. (2021). History of COVID-19. https://www.news-medical.net/health/History-of-COVID-19.aspx
Mutatkar, R.K. (2016). *AYUSH in Public Health Volume One.* Concept Publishing Company Pvt. Ltd. New Delhi.
Nesari, T., Kadam, S., Vyas, M., Huddar, V.G., Prajapati, P.K., et al. (2022). AYURAKSHA, a prophylactic Ayurvedic immunity boosting kit reducing positivity percentage of IgG COVID- 19 among frontline Indian Delhi police personnel: A non-randomized controlled intervention trial. *Frontier in Public Health*. doi: 10.3389/fpubh.2022.920126. eCollection 2022.
Orege, J.I., Adeyemi, S.B., Tiamiyu, B.B., Akinyemi, T.O., Ibrahim, Y.A., et al (2021) Artemisia and Artemisia-based products for COVID- 19 management: current state and future perspective. *Advances in Traditional Medicine, 23*(1):85–96.
Panyod, S., Ho, C.T., & Sheen, L.Y. (2020). Dietary therapy and herbal medicine for COVID- 19 prevention: a review and perspective.*Journal of Traditional and Complementary Medicine, 10*(4), 420–7.

Paudyal, V., Sun, S., Hussain, R., Abutaleb, M.H., & Hedima, E.W. (2021). Complementary and alternative medicines use in COVID- 19: A global perspective on practice, policy and research. *Research in Social and Administrative Pharmacy, 18*(3), 2524-2528

Pedersen, A., Zachariae, R., & Bovbjerg, D.B. (2010) Influence of psychological stress on upper respiratory infection – a meta-analysis of prospective studies. *Psychosomatic Medicine, 72*(8), 823-32

Priya, R. & Sujatha, V. (2020). AYUSH for COVID-19: Science or Superstition?. *Indian Journal of Public Health*, *64*(6), 105-107

Rajkumar, R.P. (2020). COVID- 19 and mental health: a review of the existing literature. *Asian Journal of Psychiatry,52*, 102066

Reider, C.A., Chung, R.Y., Devarshi, P.P., Grant, R.W., & Hazels Mitmesser, S. (2020). Inadequacy of immune health nutrients: Intakes in US adults, the 2005–2016 NHANES. *Nutrients, 12*(6), 1735.

Richardson, S., Hirsch, J.S., Narasimhan, M., Crawford, J.M., McGinn, T., et al. (2020). Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York City area.*Journal of the American Medical Association, 323*(20), 2052-2059

Saha, M. (2015). Indian herbs and plants for treatment of liver disorder / Hepatite B. In S.E. Hussain and Mohit Saha (Eds.), *Indian indigenous medical systems* (pp. 227-240). Primus Books.

Shankar, A, Dubey, A., Saini, D., & Prasad, C.P. (2020). Role of complementary and alternative medicine in prevention and treatment of COVID- 19: An overhyped hope. *Chinese Journal of Integrative Medicine, 26*, (8), 565-567

Sharma, N. (2019). Efficacy of garlic and onion against virus. *International Journal of Research in Pharmaceutical Sciences, 10*(4), 3578-3586

Srikanth, N., Rana, R., Singhal, R., Jamella, S., Singh, R. et al. (2021). Mobile App – Reported use of traditional medicine for maintenance of health in India during the COVID- 19 Pandemic: Cross-sectional questionnaire study. *Journal of Medical Internet Research, 2*(2), e25703

Sundarasamy, A., Suresh, T., Senniappan, T.S. & Muthukaliannan, G.K. (2023) Indian traditional medicine for COVID- 19. *Current Traditional Medicine*, 9 (6), 1-25.

Totelin, L. (2004). Mithradates' Antidote–A Pharmacological Ghost. *Early Science and Medicine,* 9(1), 1–19.

Tumpey, T. M., Basler, C. F., Aguilar, P. V., Zeng, H., Solórzano, A., Swayne, D. E., et al. (2005). Characterization of the reconstructed 1918 Spanish influenza pandemic virus. *Science, 310*(5745),77-80

Umeta Chali, B., Melaku, T., Berhanu, N., Mengistu, B., Milkessa, G., et al. (2021) Traditional medicine practice in the context of COVID-19 Pandemic: Community claim in Jimma Zone, Oromia, Ethiopia. *Infection and Drug Resistance, 16*(14)*,* 3773–3783.

WHO (2000). General guidelines for methodologies on research and evaluation of traditional medicine. Geneva, WHO/EDM/TRM/2000.1.

Xu. J, & Zhang, Y. (2020). Traditional Chinese medicine treatment of COVID- 19. *Complementary Therapies in Clinical Practice,39*, 101165.

Zalpoor, H., Akbari, A., Samei, A., Forghaniesfidvajani, R., Kamali, M., et al. (2022). The roles of Eph receptors, neuropilin-1, P2X7, and CD147 in COVID- 19-associated neurodegenerative diseases: inflammasome and JaK inhibitors as potential promising therapies. *Cellular & Molecular Biology Letters, 27*(1), 1–21.

Zeng, F., Huang, Y., Guo, Y., Yin, M., Chen, X., et al. (2020). Association of inflammatory markers with the severity of COVID- 19: a meta-analysis. *International Journal of Infectious Diseases, 18*(96), 467–474.

Zhang. L, & Liu, Y. (2020). Potential interventions for novel coronavirus in China: a systematic review. *Journal of Medical Virology, 92*(5),479–490.