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Medicinal Plants and Herbal Concoctions on the Rise Post Covid-19 Pandemic Threat – An Exploratory Study

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Abstract
In light of the recent global spread of the coronavirus pandemic and the human toll it has taken, it is crucial that the country has access to effective and safe medications that are manufactured locally. Particularly pertinent in this context are herbal medications, which have a broad spectrum of therapeutic activity and various benefits over medicines of synthetic origin. Herbal remedies have the advantages of being less likely to cause allergic reactions, having a less intense therapeutic impact, and being safe. Herbal raw materials are chosen as a source of pharmacologically active substances based on three primary criteria: a high concentration of active agents, a ready supply of raw materials in the wild, and easy methods of cultivation. It's no surprise that the COVID-19 outbreak has encouraged individuals to try more natural remedies. The current research builds up the usefulness of herbal concoctions.

1. INTRODUCTION
In response to the fast expansion of coronavirus illness, the need for medicinal plant raw materials has increased. The extraordinary spread of the pandemic likely contributed to the issue of drug scarcity, “since prices on the global market were inflated and transit was hampered by restricted borders. The public's easy access to health information, fear of adverse reactions to chemical treatments, and the need to personalise healthcare all played a role in the rise of alternative medicine. Moreover, there is a long list of aftereffects after COVID-19 symptoms have shown, and in some individuals, these aftereffects persisted even once a number of months.” No medications exist to treat these symptoms. As a result, many people turned to alternative and complementary treatment.

Traditional medicine has always made use of plants. There are chemicals in plants, and the activity of those chemicals is channelled towards different processes, which then enter into intricate interactions with the organism. “The presence of active substances (alkaloids, flavonoids, glycosides, vitamins, tannins, and coumarin compounds) in plants is what gives them their medicinal qualities, as these substances have a physiological effect on human and animal organisms or have biological activity against pathogens of various diseases”. Aromatic chemicals, mostly phenols, are produced by plants, and oxygen-substituting derivatives of these compounds have medical use. Diseases affecting several organs and systems, as well as disorders that are secondary or tertiary to the primary ailment, may be treated with a single medicinal plant derivative. Plants, in all its guises, have been known to have a wide range of impacts on the human body for quite some time. Here are a few examples:

(i) Alkaloids are a kind of plant defence used to ward off pests like insects and larger animals. It has been shown that certain plant-based bioactive chemicals are effective against drug-resistant viral strains.

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(ii) Flavonoids are thought to block prostaglandins from triggering COX inflamed tissues. Apigenin has been shown to inhibit the transport of lipids that are pivotal in the transmission of pain signals. That's why flavonoids are so helpful for reducing inflammatory pain; they do so by blocking receptors and signalling pathways.

2. AIMS AND OBJECTIVES

It is still important to find medications that can cure COVID-19 and get rid of any lingering symptoms of the condition. The illness evolves and new symptoms arise, while treatment recommendations are continually being revised. The severity of the illness is proportional to the health of the body's immune system, and coexisting chronic conditions increase the risk of complications. Despite their tremendous biological activity, treatments are employed in the pharmaceutical business because of their low toxicity (Leigh-de Rapper and van Vuuren, 2020)[2].

3. MATERIALS AND METHODOLOGY

This study's approach is grounded on a survey of the current literature on the topic of the influence of biologically active compounds in plants on coronavirus infection, including their chemical makeup and pharmacognostic qualities.

4. RESULTS AND DISCUSSION

For the most part, viruses spread mostly by respiratory contact, either immediate or delayed. There is a risk of spreading the virus to others, even during the incubation period. This virus spreads via casual, open, and airborne interactions. The air, particularly in confined and poorly ventilated spaces, the food, and any infected items or surfaces are the vectors for the spread of the disease. In most cases, the incubation time ranges from 2 days to 14 days.

The progression of infection involves a number of distinct phases. Reproduction of the virus is necessary at this stage, and it causes modest symptoms for the body's natural defences to go into action. After activating adaptive immunity, the infection may be transmitted, the virus may be eliminated, or the condition may progress to acute or chronic stages. The viral load and the patient's immunological status are two factors that affect the clinical range. Acute coronavirus is more likely to occur in people with preexisting conditions, such as those who are old, have hypertension, diabetes, or several other medical issues.

Plants used for medicinal purposes have an antiviral impact and boost the body's resilience against epidemic illnesses, both of which are urgent needs right now. “Study after study has proven that severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) may be effectively treated by the activity of medicinal plants (MERS). Also, the use of glucocorticoids, antibiotics, and antiviral medications in conjunction with traditional and folk medicine has lessened the side effects associated with treatment for SARS.” While coronavirus treatments based on medicinal plants show promise, rigorous clinical testing is necessary to determine their safety and efficacy.

The following plants were identified via an analysis of medicinal plant flora as effective in treating coronavirus infection.

Efficacious Medicinal Plant Concoctions

Medicinal plants having potential for prevention and treatment of COVID-19 and likewise infections:

S. No.	Binomial Name	Common Name	Used For
1	Nigella Sativa L.	Black Cumin	Boosts immunological system
2	Glycyrrhiza glabra, Glycyrrhiza uralensis	Licorice	cough suppressant, laxative, circulatory, respiratory, immunological, anti-inflammatory, analgesic, and antipyretic
3	Artemisia annua L	Artemisinin	Malaria
4	Artemisia vulgaris	Arglabin	Gastrointestinal disorders
5	Colchicum autumnale	Colchicine	Gout
6	Aloe vera	Aloe	Anti-flu
7	Filipendula	Filipendula	Varicose veins
8	Chamaenerion angustifoliumSeg. (L.) Scop.	Ivan-Tea, Kapor Tea	Immunity builder

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A detailed discussion on these has been presented below:

1. **Nigella Sativa L. (Black Cumin)**

   As a traditional remedy, Nigella Sativa L. has been used for centuries. Black cumin seeds have several therapeutic characteristics and are used to treat a wide range of illnesses and conditions, including but not limited to those related to the cardiovascular system, the respiratory system, the digestive system, the oncology system, the immunological system, and the nervous system. Animal research has shown that N. Sativa extracts and oil may have a beneficial impact in treating a wide range of illnesses, from arthritis and high blood pressure to bacterial and viral infections, diabetes type 2, asthma, neurological disorders, and even skin conditions (Kon and Rai, 2012)[4]. Although black cumin has been shown to be effective in antiviral treatment, it is now being compared to standard pharmaceuticals including "hydroxychloroquine, chloroquine, azithromycin, arbidol, remdesivir, ribavirin, chloroquine phosphate, lopinavir/ritonavir, and favipiravir." The most up-to-date research suggests that black cumin can be utilised as a novel treatment for COVID-19. According to studies conducted by Shad et al., thymoquinone and other chemicals isolated from N. Sativa may block SARS-CoV-2 from binding to and replicating on specialised cell receptors.

2. **Glycyrrhiza glabra, Glycyrrhiza uralensis (Licorice)**

   Medicinally, “licorice is used for a wide variety of purposes, including as an expectorant, cough suppressant, laxative, circulatory, respiratory, immunological, anti-inflammatory, analgesic, and antipyretic. Glycyrrhizin, a saponin chemical isolated from the roots of Glycyrrhizaglabra”, is one of more than 20 triterpenoids and about 300 flavonoids found in the plant. Several studies have revealed that glycyrrhizin has a powerful antiviral impact against the hepatitis C virus and the influenza virus (HCV).

3. **Artemisia annua L**

   Artemisinin, a sesquiterpene lactone with a unique peroxide bridge that is isolated from wormwood, is Artemisia's primary bioactive chemical and is used to treat malaria. Several parasite illnesses, various forms of cancer in vitro, and individual scientific tests have shown strong effects against artemisinin and its synthetic variants.

4. **Artemisia vulgaris**

   Secondary metabolites in artemisia include flavonoids, terpenoids, saponins, and polysaccharides. Arglabin is a sesquiterpene lactone that is primarily found in all wormwood species and has been shown to have a significant anticancer impact against many distinct tumour cell lines. Several analogues are available and effective against multidrug-resistant malaria, including artesunic acid, artelic acid, and artemether. In traditional medicine, artemisia is often used to treat gastrointestinal disorders including ulcers, indigestion and liver issues. “Worm infestation, anxiety, epilepsy, vegetative neurosis, insomnia, neurasthenia, and general irritability” are among conditions that the herb has been shown to alleviate. The pharmacological activity of the plant's essential, along with a wider spectrum of bioactivity, is “hypothesised to result from the metabolites' action of auxiliary chemical components that allow them to work through various mechanisms (de Rapper et al., 2013).” In order to alleviate the pain associated with skin diseases, the powder or paste made from the leaves is applied topically.

5. **Colchicum autumnale**

   Among the constituents of colchicum autumnale are Colchicine is a well-known natural substance that belongs to the family of chemical compounds known as tropines; it is an alkaloid. Colchicine has been used to treat gout for a long time, but recently, researchers have been more interested in it due to its potential as an antimitotic agent. Colchicine is now being researched for potential new therapeutic purposes beyond gout therapy.

6. **Aloe vera**

   Its pharmacological qualities are well-known, and it is one of the most studied and widely used medicinal herbs in the world. Aloe's beneficial characteristics are utilised as a laxative in traditional medicine, where it has been shown to stimulate colonic peristalsis at low dosages while also enhancing digestion and stimulating appetite. The ethanol extract of aloe vera (AVE) has been shown to have potent anti-flu effects. In addition to quercetin, catechin hydrate, kaempferol, acemannan, azidothymidine, acyclovir, aloin, and emodin, aloe vera contains a number of other

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CODEN: JCLMC4
Journal of Coastal Life Medicine

chemicals that contribute to its antiviral action. Human cytomegalovirus, herpes simplex virus type 1, and poliovirus are just a few of the viruses that emodin may inhibit. Calories, Magnesium, Sodium, Potassium, Iron, Cobalt, and Zinc are just few of the minerals found in aloe vera. Zinc ionophores have been shown to prevent the replication of coronaviruses in cell culture, and there is evidence that Zn2+ inhibits RNA and polymerase function in vitro.

7. **Filipendula**

The ascorbic acid in the plant has a strengthening and immune-modulating impact. Filipendula is useful for treating varicose veins and thrombophlebitis due to the anticoagulant heparin found in the plant's blossoms. Filipendula flower infusions are used as an astringent for the treatment of gastrointestinal ailments because of the presence of salicylates, which account for the plant's anti-inflammatory effect. "Filipendula rhizome preparations are used to treat eczema of the extremities, trophic ulcers, haemorrhoids, itchy dermatoses, bedsores, scabs, and diaper rash, as well as oral illnesses, purulent wounds, ulcers, furuncles, and boils, and the itching and inflammation that accompany them. Filipendula'sinfusion of stem tips, leaves, and flowers is used to treat gout, rheumatism, stomach pain, diaphoresis, heart illness, choking, headache, diarrhoea, dysentery, hysterical convulsions, pain in the stomach and intestines, chest discomfort, and sore throat." Blood pressure may be lowered by 40% in only 20 minutes with the help of Filipendula medicine, according to clinical trials. Filipendula's flowers and herbs are used as a diaphoretic, in cases of bronchial asthma, and as an antispasmodic. Sleeping pills, anticonvulsants, and medications for epilepsy, hypertension, neurasthenia, hypochondria, and other neuroses all have a sedative effect.

8. **ChamaenerionangustifoliumSeg. (L.) Scop. (Ivan-Tea, Kapor Tea)**

Almost every part of Chamaenerion angustifoliumSeg.—from seeds to leaves—can be used for anything useful. "There are some minor discrepancies in the chemical composition of Chamaenerion angustifoliumSeg. and those described by R. Valov (in the shoot part of the plant, containing leaves, stems, and inflorescence). Studying the plant's above-ground parts is more important. Certain features of its chemical make-up are as follows: Proteins (12.2-16.4%), mucus (polysaccharides that are readily hydrolyzed) - 8.8-19.4%, cellulose (13.1-25.0%), tannins (6.1%), anthocyanins (1.0%), lignin (8.7%), chlorophyll (5.1-8.0 mg/l), chlorophyll b (9.3-13.6 mg/l), carotene (3.7-6.9 mg%), rutin (160,272.7)."

Therefore, "lot of studies are devoted to the potential effect of medicinal plants and preparations on the treatment and prevention of COVID-19. For example, the research of Sankar et al. reported the presence of potent phytocompounds in the composition of some medicinal plants. The study showed that the identified phytocompounds could be considered promising medicinal compounds. Shree et al. attempted to recognize natural phytochemicals from medicinal plants to use against COVID-19 using molecular docking and molecular dynamics studies." Based on their findings, they suggest that active phytochemicals from medicinal plants might inhibit Mpro SARS-CoV-2. Hu et al., in their research, revealed that the citrus flavonoid rutin could affect the assembly of viral functional proteins and suppress inflammation in the host.

Complementary and alternative medicine is often undervalued by the medical system. For many people, however, complementary herbal remedies and medicines are the main source of medical care, and sometimes the only one, because of their territorial and financial accessibility. In addition, because of the COVID-19 pandemic, the affordability of most herbal remedies makes them more attractive than classic medicines (Honório et al, 2015)[6]. Undoubtedly, remedies of herbal origin require research, the main difficulty in studying them is and remains a large list of studies. A more extensive study of Chamaenerion angustifoliumSeg. and other medicinal plants requires the study of their biological and pharmacological properties, as well as technological features of processing, conducting clinical trials to get high-quality, safe drugs, and working out the best ways of its reception considering the characteristics of patients (Orchard et al, 2019)[7].

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Seeking Alternatives to Boosting Immunity

There has been a rise in curiosity in the potential benefits of medicinal plants as treatments as the population, particularly those in the middle and lower classes who have felt the economic effects of lockdowns most directly, becomes more desperate. The proliferation of statements on social media about the effectiveness of these therapies without any evidence supports this conclusion. In response to questions, our research team has compiled summaries of data to assess the efficacy of complementary therapies for controlling COVID-19.

Herbal treatments for a variety of illnesses have been used by humans for thousands of years, mainly in Asia (particularly Japan, India, and China) and in certain parts of Africa (Leigh-de Rapper and van Vuuren, 2020)[2]. The widespread availability and inexpensive cost of therapeutic herbs among these communities is likely to blame. As a result, herbs and their bioactive components may provide a promising source for the creation of new medicines with potential anti-COVID-19 potency. Several phytochemical metabolites have been found to be effective against pathogenic bacteria. They include tannins, terpenoids, alkaloids, coumarins, flavonoids, and polyphenols. They may be able to prevent viral entrance and reproduction in the afflicted host cells by blocking viral enzymatic and protein activities. Several studies have shown that herbal bioactive components are effective in lowering and controlling SARS-CoV-2 risk.

It is possible that a single plant species has a large variety of bioactive phytochemicals, making it of tremendous medicinal value in the area of herbal medicine research (Darwish et al, 2020)[8]. These phytochemical components may exert the desired pharmacological effects either alone or in concert with other components. Alkaloids, steroids, triterpenes, and glycosides are all examples of the bioactive secondary metabolites found in therapeutic plants. It is difficult to assess the pharmacological effects of plants.

When it comes to the history of medicine and its place in modern healthcare, traditional Indian medicine is among the oldest components. Siddha, Unani, Ayurveda, Yoga, Naturopathy, and Homeopathy are just few of the effective ancient practises that have been used for centuries to treat a wide range of illnesses. Animal products, herbs, and minerals are used in these age-old treatments. Around 25,000 different herbal formulations and extracts have been used in South Asian folk medicine (Carrasco et al, 2016)[10].

Medicinal Plants in COVID 19: Efficacy, Safety, and Research Gaps

Several pharmacological effects from a single plant are often seen in studies of phytomedicine. Because of the huge variety of phytochemicals that a single plant might contain, ethnopharmacology study is both exciting and difficult. On the whole, the existing data classifies the therapies of relevance here as having either 1) antiviral effects, 2) anti-inflammatory effects, 3) immunomodulatory effects, or 4) a combination of these effects (Table 1). Supplemental Table S1 provides information on the quality, effectiveness, and safety of particular research. “The elevation of inflammatory markers like interleukin (IL)-6, erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP) has been associated with severe disease and worse outcomes among COVID-19 patients, most likely due to cytokine storm, suggesting that medicinal plants with reported anti-inflammatory activities may have pleiotropic roles in COVID-19 management”.

One of the therapeutic herbs with the most reported favourable data is N. sativa (black cumin) seed. It has been shown that ethanolic extracts of N. sativa seeds have antiviral characteristics, as measured by a reduction in viral load and alpha fetoprotein, as well as an improvement in liver function indices in hepatitis C infected individuals. Animal studies showed that N. sativa seed oil effectively suppressed CMV infections by acting as an antiviral and an immunomodulatory agent. Besides boosting CD3 and CD4 cell numbers, it also encourages Natural Killer T-cells and macrophages to produce more of the immune-boosting cytokine interferon gamma (IFN-). Ethanolic extracts of N. sativa seeds have been shown to inhibit the replication of the coronavirus species MHVA59 (mouse hepatitis virus-A59) in cell cultures. This is accomplished by reducing the expression of several genes encoding transient receptor proteins (TRPs) found on leukocytes, including TRPA1, TRPC4, TRPM6, TRPM7, TRPM8, and TRPV4. N. sativa has a long history of medical use, particularly in the treatment of respiratory conditions like asthma. Improvements in asthmatic symptoms have also been recorded after supplementation with N. sativa (formulation details

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Journal of Coastal Life Medicine

are unknown), which is believed to have anti-hypersensitivity and maybe anti-inflammatory effects. A famous Indian plant, neem (A. indica) has anti-inflammatory actions that have been seen in animal studies and have historically been used in the treatment of fever by boiling the leaves and eating them. "Neem leaf extracts and its phytochemicals, such as flavonoids and polysaccharides, have been shown to have direct antiviral effects against many viruses, including dengue and Hepatitis C Virus, in in vitro and in silico docking investigations. Molecular docking experiments have shown that the neem-derived chemicals nimbolin A, nimocin, and cycloartanols may bind to the envelope (E) and membrane (M) glycoproteins of SARS-CoV-2 and hinder the virus's replication". Whereas both neem seeds and leaves have been shown to have beneficial immunomodulatory effects by certain researchers, the traditional usage of neem for medical reasons is concentrated on the ingestion of the leaves, which are traditionally cooked in water and drunk. In light of these safety considerations, it is necessary to first determine what dosages of neem leaves are appropriate for the planned formulation.

Precautions while using Plant Extracts

The same idea may be used to natural goods, however it's important to bear in mind that even though they may all include the same plant, each formulation and product will have its own distinct characteristics. When it comes to emergency medicine, having access to a well-developed, standardised herbal product with acceptable safety data is just as useful as the creation of a most potentially effective agent (de Veras et al, 2021)[12].

5. CONCLUSION

High mortality due to the new coronavirus worldwide pandemic has been met with few therapeutic options. Most vaccinations are unproven or unavailable in certain countries because to a lack of resources (such as time, money, and research). Yet, a slew of recent research propose a number of other or supplementary treatments for COVID-19, some of which include functional foods. Nutraceuticals are a synonym for functional foods. These foods are those that contain bioactive substances that, whether ingested as supplements or as whole foods, have positive effects on the health of the consumer. The consumption of functional food has increased in popularity as a means of illness prevention. With the present COVID-19 epidemic and the lack of a particular preventative or therapeutic drug, a well-planned strategy for maintaining a strong immune system is of the utmost importance. There has been a recent uptick in interest in using functional foods as models for medication creation due to the widespread belief that they are safer than conventional pharmaceuticals. Certain functional foods may help the body fight COVID-19 infection by decreasing the expression of ACE2 receptors, blocking key enzymes in SARS-CoV-2, and lowering the production of pro-inflammatory mediators.

It's common knowledge that taking a multivitamin or mineral supplement will help your body better defend itself against viral infections. Doctors all around the globe are looking at vitamin and mineral supplements as a means of preventing or treating COVID-19, since the patients' nutritional condition is a major determinant of their prognosis.

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