



Journal homepage: www.sciencearchives.org

ISSN: 2582-6697



Review Article

<http://dx.doi.org/10.47587/SA.2020.1317>



The role of wild plants and herbs in restoring holistic health and fighting the infections borne by the epidemic COVID-19

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Received: Nov 11, 2020 / Revised: Dec 25, 2020/ Accepted: Dec 26, 2020

Abstract

COVID-19 also named as extreme coronavirus acute respiratory syndrome 2 (SARS-CoV-2), is a new strain of coronavirus that affects humans and was formally identified in 2019, after its recent discovery in Severe pneumonia patients in Wuhan (China). Globally, there is an unprecedented rise in COVID-19 positive cases. India has long surpassed many countries and is now the worst-affected country. Despite the best efforts of scientists around the world, no cure or vaccine has yet been developed. With this in mind, the government is trying to come up with a solution to treat patients affected by this deadly pandemic. It is possible to foresee various options to monitor or avoid emerging 2019-nCoV infections, including vaccines, interferon therapies, and small-molecule drugs. New interventions, however, are likely to take months to years to grow. Furthermore, the majority of current antiviral therapies also contribute to the production of viral resistance. To classify lead, the pharmaceutical industry is increasingly targeting phytochemical extracts, medicinal plants, and aromatic herbs. Here, we take a look at what is known about the use of herbal ingredients in the treatment of COVID-19 disease.

Keywords Coronavirus, COVID -19, Phytochemicals, Wild Plants, Herbs

Introduction

Almost after a year, severe acute respiratory syndrome-coronavirus 2 (SARC-COV-2) outbreaks, coronavirus infections are now increasing by more than a million globally. Globally, as of December 2020, WHO reported 6,81,65,877 confirmed cases of COVID-19, including 15,57,385 deaths. We still do not know enough about post-recovery immune response and environmental and seasonal transmission effects to accurately predict transmission dynamics. The long-term dynamics of SARS-CoV-2 are highly dependent on the Immune and cross-reaction immune responses between coronary viruses, as well as on the timing of the introduction of the new virus to the population. Signs and symptoms usually occur 2–14 days after exposure, including respiratory disorders, coughing, fever, shortness of breath, pain or pressure in the chest, confusion, bluish lips, and difficulty breathing. Potentially fatal complications include pneumonia, severe acute respiratory syndrome, kidney failure, and sepsis. Although clinical reports have shown that most infections with COVID-19 are mild to date, a recent investigation (Guan

et al., 2020) from China indicates that severe illness occurs in 16% of cases. Older individuals and different age groups with serious chronic medical conditions such as respiratory disease, cardiovascular disease, and diabetes tend to be at higher risk of contracting extreme COVID-19 (Zheng et al., 2020; Liu et al., 2020). As individuals, practicing prevention measures and good hygiene as well as applying actions of social distancing, including avoiding crowded places, remain to be very Crucially important (Boukhatem et al., 2020; Dalton et al., 2020). Although successful vaccinations and antiviral medicines are the most effective means of combating or avoiding virus diseases and contaminations, there are no cures yet for 2019-nCoV infection. The creation and production of such medications may take several months or years, thereby Indicating the necessity of finding alternative rapid treatment or control strategies.

According to the NIH (National Institutes of Health, USA), COVID-19 "is stable for several hours to days in aerosols and on surfaces". Preventive recommendations include social distancing, hand washing, covering the nose and mouth.

When sneezing or coughing, and thorough cooking of both meat and eggs. It is recommended not to touch the mouth, nose, and eyes with unwashed hands, and to clean and disinfect surfaces. Chlorine and alcohol-based disinfectants, along with other EPA-registered disinfectants, are currently recommended by the CDC (Centers for Disease Control and Prevention, USA).

Coronavirus

CoV is an envelope, positive-sense single-stranded RNA (ss RNA) virus belonging to the *Coronaviridae* family. The CoV family consists of many animals and causes mammals and birds to have upper respiratory tract and gastrointestinal infections. It primarily causes the common cold in humans, but complications such as pneumonia and SARS may occur (Van der Hoek L, 2007). The identified human CoV (HCoV) includes HCoV-229E, -OC43, -NL63, -HKU1, and the more generally recognized extreme acute respiratory syndrome coronavirus (SARS-CoV), which in 2003 caused a high global mortality danger (Geller C, 2012). In 2012, the World Health Organization (WHO) reported the sixth form of HCoV infection known as the highly lethal Middle East respiratory syndrome coronavirus (MERS-CoV). No specific CoV infection therapies are available and preventive vaccinations are still being investigated. Therefore, the situation illustrates the need to establish appropriate antivirals for CoV infection control.

The novelty of the 2019 novel coronavirus (2019-nCoV) means that its activity is subject to various uncertainties; it is therefore too early to conclude whether herbal and medicinal herbs, spices, or isolated compounds and molecules may be used against COVID-19 as prophylactic/preventive drugs or as suitable therapeutic compounds. Nevertheless, due to the high similarity of SARS-CoV-2 with the previously reported MERS-CoV and SARS-CoV viruses, previous research articles on phytomedicine and herbal compounds, which have been demonstrated to have anti-coronavirus properties, maybe an appreciated guide to searching and discovering antiviral phytochemical extracts that may be effective against SARS-CoV-2 virus. (Chang et al., 2012; Boukhatem et al., 2020). Antiviral properties against various CoVs from multiple phytochemical extracts, aromatic herbs, and medicinal plants. These medicinal plants and phytochemical extracts provide an important source for the discovery of new and effective antiviral drugs, enabling the production of drugs in a cheap and relatively safe manner.

Use of wild plants and herbs in COVID 19 control

Several hundred species of plants and herbs have been studied, with relatively little overlap that has potential as novel antiviral agents. A wide variety of active phytochemicals, including flavonoids, terpenoids, lignans, sulphides, polyphenolics, coumarins, saponins, feryl compounds, alkaloids, polyines, thiophenes, proteins, and peptides have been identified. Some volatile essential oils of commonly used culinary herbs, spices, and herbal teas have also exhibited a high level of antiviral activity. There have

been reports of strong antiviral activity in many conventional medicinal plants and some of them have even been used to treat animals and people suffering from viral infection (Hudson 1990; Venkateswaran et al., 1987; Thyagarajan et al., 1988, 1990). A wide and ever-expanding global population base currently exists that prefers the use of natural products to treat and prevent medical problems. Many pharmaceutical firms have been inspired by this to produce new antimicrobial formulations derived from plants or herbs. We wouldn't have the drugs, the cosmetics, the beauty goods, the furniture, the food, the drink, or the spices that we all love without wild plants. Since ancient times, wild plants and herbs have been used as natural remedies for various diseases, including viral infections including common colds, diarrhea, fever, and even herpes. Many herbs help combat viruses because of their concentration of potent plant compounds and are preferred by natural medicine practitioners. Approximately 60,000 plant species are used globally for medicinal purposes, of which approximately 28,000 are well documented and approximately 3,000 are estimated to be traded internationally, with only one-third of those known to be commercially cultivated. Strong antiviral activity has been documented in many conventional medicinal plants and herbs. It is arguable that the use of medicinal plants for the treatment of viral infections is primarily dependent on historical and anecdotal proof. There are three major traditional medicine systems in India, namely, the Ayurvedic, Siddha, and Unani systems that have standard clinical jaundice treatments. These treatments consist of oral administration, in the form of tablets or capsules, of one or more dried plant extracts. Plant extracts have also been used for the same purpose by other cultures in various parts of the globe, such as the licorice root *Glycyrrhiza glabra* in China. Extracts from the genus *Phyllanthus* of the Euphorbiaceae family are the most popular ingredients in the Indian method. Plants are widely spread in most tropical and subtropical countries and have long been used for the treatment of diabetes, kidney and urinary bladder disorders, intestinal infections, and the treatment of viral, bacterial, and parasitic infections in folk medicine (Calixto et al., 1998; Sanchez-Lamar et al., 1999).

More recently, Baba Ramdev's Patanjali Research Institute (PRI) submitted a proposal to the Narendra Modi government that phytochemicals in herbs such as ashwagandha, giloy, and tulsi that provide defense against COVID-19. We will also be raising our chance of catching COVID-19. But health professionals warn that while you can use these herbs to boost your immunity, you must not use them as deadly contagion remedies. They warn that we do not have ample evidence to support the use of COVID-19 herbal remedies. Job has been a bit sporadic as well.

There are so many sections of a plant root, stem, leaf, flower, and studies that continuously investigate the same part of a plant are difficult to obtain. And, if misused, some herbs could boost the immune system further and lead to a "cytokine storm." In its form and behavior, each virus is unique. To see whether they are still resistant to COVID-19, herbs that appear to work for other viral infections can need

to be tested. The herbs and COVID-19 are not sufficiently detailed. People have reported that herbal drugs have kept them healthy or improved their symptoms, but the majority of herbal research is inconclusive. And it has been stated in COVID-19 cases that “the stronger the immunity, the better you are, the weaker the immunity, the more susceptible you are,” Ayurvedic Rasayana-herbs and wild plants may be helpful in all three phases in the case of covid-19 infection. In step one, improving the immune system will very effectively prevent a person from being infected. In stage two if someone has got infected, the only way he can come out of infection is due to his immunity and that is apparent from the available data, which shows despite the reality that there is no counseling for covid-19 infection, more than 83 percent of closed cases, people get cured of the infection. It is because of their defense mechanism. It is quite logical that if the defense mechanism of an individual is strengthened with any effective Ayurvedic Rasayana he will come out of the infection faster and with much fewer damages as compared to just on his own. When a person comes out of infection, the third stage is a post-covid-19 infection, he comes out with some serious morbid conditions that can be strengthened with the aid of some unique Ayurvedic medicines, because if ignored, this could cause lifelong problems. The Ayurvedic Rasayanas, in the form of single herbs except for Ayush-64, which have recently got the nod for the trial by the Govt. have almost all the characteristics to bring holistic health, strengthening immunity but our rich Ayurvedic heritage have a long list of Rasayanas having multiple herbs working in synergy to create a much greater effect. Our immunity or protective mechanism is the secret to safeguarding us from any infection, so it has to be improved as much as possible. It's COVID-19 today, and tomorrow might be something else, maybe more deadly, maybe less. But one thing is certain that fresh viruses will keep coming, and with good immunity, we must keep ourselves prepared. The role of wild plants and herbs in restoring holistic health and fighting the infections borne by the epidemics is predominant. One of such Rasayana products is Maharishi Amrit Kalash well-known and well researched, with about 40 non-clinical and 4 clinical studies, conducted in renowned institutions around the world, to its credit.

Recently, researchers from IIT-Delhi and the National Institute of Advanced Industrial Science and Technology – Japan found, in a collaborative study, that Ashwagandha may indeed be beneficial in fighting this new variant of coronavirus. They found that Ashwagandha has a natural compound called Withanone (Wi-N), which can block Mpro or Main protease activity, a type of protein that is necessary for the coronavirus to replicate. But there is no arguing the fact that both ashwagandha and giloy come with immense health benefits. Both of these herbs have remarkable immunity-enhancing properties and protect against several diseases. It has been used in India to tackle diseases since time immemorial. There are also many of Ayurveda's widely used herbs.

Antiviral activity of herbal medicines and phytochemicals against Coronaviruses

There are more than 5000 different types of viruses that can cause serious diseases like the common cold, the flu, hepatitis, mononucleosis, and HIV. A virus is a tiny infectious agent that only replicates within a living cell and can affect all life forms, including humans, animals, plants, and microorganisms. A viral infection is mostly seasonal and is often treated with proper medication. However, there are some herbs, which have antiviral properties and can be used in moderation when you are under the sun. It inhibits the growth of the virus boosts immunity and fight foreign pathogens. Here are some safe and effective herbs that we can use. To this end, highly useful sources may be aromatic herbs, herbal teas, culinary spices, and medicinal plants used in ethnobotanical treatments.

During the 2003 SARS outbreak (Chen et al., 2004) the performance of herbal therapy and phytomedicine for preventing viral infections was illustrated. As such, the use of herbal and medicinal plants to combat SARS-CoV-2 infections is promoted by various countries, including Algeria (Chen et al., 2004; Cheng et al., 2006; Kim et al., 2010; Kim et al., 2019; Li et al., 2000; Lin et al., 2005; Mc Cutcheon et al., 1995 and Tsai et al., 2020). After the outbreak of SARS-CoV, first described in early 2003, researchers and scientists have been dynamically trying to explore different antiviral extracts, drugs, and molecules against SARS-CoV. This had led a group of experts to screen more than 200 medicinal plants, culinary spices, and aromatic herbs for their antiviral properties against this SARS-CoV strain. In fact, after the outbreak of SARS, many groups started to search for anti-coronavirus agents, including some natural compounds and phytochemical extracts that exist in traditional herbal medicines (Hoever et al., 2005; Kim et al., 2010; Li et al., 2005; Wu et al., 2004). The inhibitory effect of medicinal plants or isolated compounds on different human coronavirus strains has been documented in several studies.



Fig. 1 Natural herbs that may help reduce symptoms of coronavirus

Curcuma Longa (Turmeric Root)

Turmeric is well-known as the orange-yellow spice used in curry powder, but turmeric, or curcumin, supplements are also among the top-selling herbal supplements in India. Curcumin is best known for its association with a decreased inflammatory response to exercise, with many people using it for recovery from delayed-onset muscle soreness. In the past two decades, however, research has shown that curcumin is also a powerful immune modulator. In particular, it modulates the activation of T cells, B cells, and numerous other immune cells, all of which are frequent actors in both innate and adaptive immune systems responses. (Jagetia et al., 2007). Many *Curcuma longa* supplements on the market focus on bioavailability and absorption of turmeric by adding black pepper or changing turmeric into liposomal or nanoparticle forms; however, the benefits to the immune system may come more from how your gut bacteria and turmeric interact inside the digestive tracts as opposed to absorption into the bloodstream. One study describes turmeric as having "prebiotic-like" effects on gut bacteria without being prebiotic because it cannot provide energy for gut bacteria. (Peterson, et al., 2018). It seems to have more of a modbiotic effect by changing the composition of the gut and increasing the richness of bacterial species. The gut wall contains 70 percent of the cells that make up your immune system, and a healthy gut microbiome houses bacterial species that have a host of beneficial effects. Compounds produced by gut bacteria through the processing of turmeric and other herbs can trigger the release of signaling molecules in the bloodstream that provide systemic benefits. That's the way a lot of herbs and foods support the immune system.

Coconut oil

Two researchers have highlighted preliminary research on the anti-viral effects of lauric acid, found in coconut oil, and the metabolite of lauric acid monolaurin. They have proposed a clinical trial using virgin coconut oil (3 tablespoons daily), monolaurin (800 mg daily), and/or monocaprin (800 mg daily) in patients with COVID-19. Their suggestion was published on the Integrated Chemists of the Philippines website. They note that coconut oil, lauric acid, and monolaurin have been used to help prevent viruses in farm animals, and two small trials in people with the human immunodeficiency virus (HIV) given coconut oil showed some improvements in immune system blood cell counts. However, no evidence to date consuming coconut oil can prevent or treat coronavirus infections in people.

Garlic

Garlic is a popular natural remedy for a wide array of conditions, including viral infections. Antiviral activity against the human papillomavirus has been shown by components of garlic (*Allium sativum*) (Orhan, et al., 2012). In placebo-controlled trial conducted by (Dehghani, and co-workers, 2005), the application of garlic chloroform extracts has been documented to result in full skin wart resolution with no recurrence after 3-4 months. (Lipke, 2006). A few studies

have shown that garlic extract has demonstrated in vitro activity against influenza A and B viruses. (Fenwick and Hanley, 1985), cytomegalovirus, (Meng et al., 1993; Nai-Lan et al., 1993), rhinovirus, HIV, strain 1 of herpes simplex (Tsai et al., 1985), herpes simplex virus 2 (Weber et al., 1992), viral pneumonia, and rotavirus. It has been shown that allicin, diallyl trisulfide, and ajoene are all active. In the case of HIV, it is thought that ajoene acts by inhibiting the integrin-dependent processes. Allyl alcohol and diallyl disulfide have also proven effective against HIV-infected cells (Shoji et al., 1993). There are insufficient clinical trials regarding the effects of garlic in preventing or treating the common cold.

Giloy

This can offer protection from a range of diseases like dengue and diabetes. It contains antioxidants that protect and lower the temperature of the body. It helps fight free radicals in your body and keeps your cells safe. A protective shield against bacterial and viral infections is provided by Giloy. If you have this regularly, you will be able to eliminate toxins from your bloodstream, purify your blood, and improve the wellbeing of your heart.

Ashwagandha

This herb is known to increase strength and vitality. It has amazing anti-inflammatory and antioxidant properties that make our immune system strong so that it can fight off invading pathogens. Many studies on animals have shown that ashwagandha can produce immunoglobulin and enhance our body's immune response. It also boosts our body's defense mechanism by suppressing pro-inflammatory elements like cytokines. That's why many inflammatory disorders are also used to treat it. All these make ashwagandha a potential candidate for the COVID-19 trial by the Ministry of AYUSH. Moreover, this herb is also a rich source of flavonoids and antioxidants and contains alkaloids, amino acids (including tryptophan), neurotransmitters, and many other nutrients. Other than boosting our immunity, this herb also helps us prevent diabetes, stress, and thyroid disorders. It boosts cognitive ability and helps in lose weight too.

Oregano

Oregano is an herb in the mint family that is known for its impressive medicinal qualities. Its plant compounds, which include carvacrol, offer antiviral properties (Kubala et al., 2019). (Gilling, et al., 2014) was investigated the antiviral efficacy of oregano oil and its main active ingredient, carvacrol, against human norovirus surrogate non-enveloped murine norovirus (MNV). MNV is extremely infectious and is the principal cause of human stomach flu. (Pilau and co-workers, 2011) investigated the antiviral efficacy of Mexican oregano (*Lippia graveolens*) and found that Mexican oregano oil had antiviral effects on ACVR-HHV-1 (acyclovir-resistant human herpesvirus type 1) and HRSV (human respiratory syncytial virus), and carvacrol on RV (human rotavirus), but more detailed studies are needed (Pilau et al., 2011).

Sage

Salvia officinalis (Sage) is a plant in the family of *Labiatae/Lamiaceae*. Pharmacological findings for sage include anticancer, anti-inflammatory, antinociceptive, antioxidant, antimicrobial, antimutagenic, antidementia, hypoglycemic, and hypolipidemic effects. (Ghorbani, et al., 2017). The antiviral properties of sage are mostly attributed to compounds called saffinoline and sage one, which is found in the leaves and stem of the plant. (Geuenich and co-workers, 2008) conducted the study in which they tested extracts from lemon balm (*Melissa officinalis* L.), peppermint (*Mentha × piperita* L.), and sage (*Salvia officinalis* L.), which exhibited high and concentration-dependent activity against the infection of HIV-1 (human immunodeficiency virus type 1) in T-cell lines, aqueous extracts from *Lamiaceae* can drastically and rapidly reduce the infectivity of HIV-1 virions at non-cytotoxic concentrations.

The antiviral properties of supercritical CO₂ extracts obtained from oregano and sage were evaluated against the type-1 herpes simplex virus at different stages during virus infection in the study conducted by (Santoyo and co-workers, 2014). Carvacrol and thymol could be pointed out as the compounds responsible for the antiviral activity found in oregano supercritical extracts; meanwhile, borneol, camphor, and 1, 8-cineole could be proposed as antiviral compounds in supercritical sage extracts. Results demonstrated that supercritical extraction was an appropriate technique to obtain antiviral extracts from oregano and sage (Santoyo, 2014).

Basil/tulsi

Many types of basil, including sweet and holy varieties, can combat some viral infections. (Chiang et al., 2005) investigated in the study antiviral properties of *Ocimum basilicum* (OB). In the study, extracts and purified components of OB were used to identify possible antiviral activities against DNA viruses: herpes viruses (HSV), adenoviruses (ADV), and hepatitis B virus; and RNA viruses: coxsackievirus B1 (CVB1) and enterovirus 71 (EV71). The results show that coarse aqueous and crude aqueous and ethanolic extracts of OB and selected purified components, namely apigenin, linalool, and ursolic acid, exhibit a broad spectrum of antiviral activity. Of these compounds, ursolic acid showed the strongest activity against HSV-1, ADV-8, CVB1, and EV71, Apigenin, however, showed the highest activity against, HSV-2, ADV-3, hepatitis B surface antigen, and hepatitis B e antigen. Linalool showed the strongest activity against ADV-2. No activity was noted for carvone, cineole, beta-caryophyllene, farnesol, fenchone, geraniol, beta-myrcene, and alpha-thujone. The action of ursolic acid against CVB1 and EV71 during the process of infection and the replication phase was found to occur. The authors concluded that the potential use of ursolic acid for treating the infection with CVB1 and EV71 merits further investigation (Chiang et al., 2012).

Fennel

Fennel is a licorice-flavored plant that can battle certain viruses. Phytochemical experiments have shown that a variety of useful compounds are present. In *Foeniculum vulgare* (fennel), such as volatile compounds, flavonoids, phenolic compounds, fatty acids, and amino acids. Compiled data indicate their efficacy in several *in vitro* and *in vivo* pharmacological properties such as antimicrobial, antiviral, anti-inflammatory, antimutagenic, antinociceptive, antipyretic, antispasmodic, antithrombotic, apoptotic, cardiovascular, chemomodulatory, antitumor, hepatoprotective, hypoglycemic, hypolipidemic, and memory-enhancing property (Badgujar, 2014).

Lemon balm

Lemon balm is a lemon plant that is widely used in teas and seasonings. It is also known for its healing qualities. The results of the study conducted by (Pourghanbari et al., 2016) showed that essential oil from lemon balm could inhibit replication of avian influenza A virus H9N2 via various replication cycle steps, particularly during the direct interaction with the particles of the virus (Pourghanbari et al., 2016). Results of the study conducted by (Schnitzler et al., 2008) show that Melissa oil affected Type 1 and Type 2 herpes simplex viruses before adsorption, but not after penetration into the host cell, so that lemon balm oil may have a direct antiviral effect on herpes viruses. Considering the lipophilic nature of lemon balm essential oil, which enables it to penetrate the skin, and high selectivity.

Peppermint

Peppermint is considered to have strong antiviral properties and is widely applied to teas, extracts, and tinctures intended to naturally treat viral infections. One of the most commonly consumed single-ingredient herbal teas, or tisanes, is peppermint (*Mentha piperita* L.) Rosmarinic acid and other flavonoids, especially eriocitrin, luteolin, and hesperidin, are the phenolic constituents of the leaves. The essential oil's main volatile components are menthol and menthone. Major antimicrobial and antiviral activities, good antioxidant and antitumor actions, and some antiallergenic potential are found in peppermint *in vitro* (McKay and Blumberg 2006). (Li et al., 2017) investigated in the study the antiviral, anti-inflammatory, and antioxidant effects of the ethanol extract of *Mentha piperita* L. Leaves (MPE) and found that high phenolic acid and flavonoid levels were present in MPE.

Rosemary

Rosmarinus officinalis L. (rosemary) is a medicinal plant native to the mediterranean region and cultivated around the world. *R. officinalis* L. is constituted by bioactive molecules, the phytochemicals, responsible for implement several pharmacological activities, such as anti-inflammatory, antioxidant, antimicrobial, antiproliferative, antitumor and protective, inhibitory, and attenuating activities.

Several rosemary chemical compounds, such as oleanolic acid, rosmarinic acid, and eucalyptol have antiviral properties. (de Oliveira, 2019). Previous reports on triterpenoids showed that oleanolic acid (OA) and its analogues have antiviral, anti-inflammatory, antitumor promotion, and anticancer properties. OA is relatively non-toxic. The modification of the functional groups of hydroxyl and carboxylic acid on OA resulted in the antiviral activity of potent compounds. The anti-HIV activity of the synthesized compounds is via the inhibition of HIV-1 replication. The synthesized compounds have prevented the entry of the influenza virus by inhibiting the binding of the hemagglutinin protein influenza virus to the host cells. Some reports also showed the potential effect of OA analogues against hepatitis B virus, and HSV-1 and HSV-2 (Khawaza, 2018). Antiviral activity of essential oils against hepatitis A virus was investigated in soft fruits and found that rosemary cineole, followed by grapefruit essential oil, was the most effective essential oil in reducing viral titer on berries (Battistini, 2019).

Echinacea

Echinacea is one of the most widely used plants, ingredients in herbal medicine due to its remarkable health-promoting properties. Many parts of the plant, including its flowers, leaves, and roots, are used as natural remedies. Echinacea purpurea (purple coneflower) extracts have historically been used for the treatment of different types of infections and wounds in North America, and have become very popular herbal medicines globally. Recent studies have shown that potent and selective antiviral and antimicrobial activities include some standardized preparations. They also show numerous immune-modulatory behaviors, including activation of certain immune functions, such as macrophage phagocytic activity and suppression of epithelial cell proinflammatory responses to viruses and bacteria, which are expressed as alterations in the secretion of different cytokines and chemokines. The upregulation or downregulation of the related genes and their transcription factors are the results of these immune modulations. All these bioactivities can be demonstrated at non-cytotoxic extract concentrations and tend to be attributable not to individual chemical compounds characterizing Echinacea extracts, but to multiple components. Echinacea extract showed activity against respiratory viral infections (rhinoviruses, influenza viruses, respiratory syncytial virus, coronavirus, calicivirus, herpes viruses (Hudson, 2012)

Sambucus

Sambucus is a plant genus, sometimes referred to as the Elders. Elderberries are made from a variety of items that are used naturally to treat respiratory disorders such as flu and common colds, such as elixirs and tablets. Traditionally, elderberry (*Sambucus nigra* L.) has been used for influenza and cold care. In the research (Kinoshita et al., 2012), the antiviral impact of concentrated elderberry juice (CJ-E) on the human influenza A virus was evaluated (IFV). CJ-E had a relatively strong effect on IFV-infected mice, although its anti-IFV activity was weak in a cell culture system. A study in

mice found that concentrated elderberry juice suppressed the replication of the influenza virus and stimulated the immune system response. Furthermore, in a study of 4 studies in 180 people, elderberry supplements have been found to substantially reduce the upper respiratory symptoms caused by viral infections (Cinatl, 2003).

Ginger

Ginger products are traditional natural remedies for good purposes, such as elixirs, teas, and pastries. Due to its high concentration of active plant compounds, ginger has been shown to have remarkable antiviral efficacy. In the study, acyclovir-resistant clinical isolates of herpes simplex virus type 1 (HSV-1) were analyzed in vitro for their susceptibility to ginger, thyme, hyssop, and sandalwood essential oils (Schnitzler et al., 2007). Both essential oils displayed high levels of virucidal activity against clinical isolates of acyclovir-sensitive strains KOS and acyclovir-resistant HSV-1 and significantly reduced plaque formation (Schnitzler, 2007). (Rasool et al., 2017) found in the study that ginger may have anti-Avian influenza virus H₉N₂ activity, but further investigations and needed. Results of the study conducted by (Aboubakr et al., 2016) revealed that clove and ginger aqueous extracts hold promise for foodborne viral contamination prevention. (Chang et al., 2013) concluded in the study that fresh, but not dried, ginger is effective against plaque formation on airway epithelium induced by blocking viral attachment and internalization against HRSV (human respiratory syncytial virus).

Boswellia Serrata

A very underestimated herb is *Boswellia serrata*, or Indian frankincense. Technically speaking, in the dry mountainous regions of India, it is not a herb but a resin from a large branching tree of the Burseraceae family that grows. Its two main active ingredients are 11-keto-beta-boswellic acid (KBA) and acetyl-11-keto-beta-boswellic acid, and it has been used traditionally in supporting healthy immune and inflammatory action, mainly as a 5-lipoxygenase (5-LOX) inhibitor. (Gerbeth, Kathleen, et al., 2013). But *Boswellia serrata* is more than just an anti-inflammatory. As part of the adaptive immune response, at lower doses, it seems to enhance antibody production as part of humoral immunity and also increase B and T lymphocyte production as part of cellular immunity. (Ammon, 2010). As an immunomodulator, this is how *Boswellia serrata* can increase the immune response when it is most needed, as well as help prevent your inflammatory responses from getting out of control. *Boswellia serrata* is pretty unpleasant to take as a liquid, and it will feel like it is stuck on your palate due to its high resin content, definitely much better in a capsule form.

Ursolic Acid

Technically, ursolic acid in apple peel and other fruit peels, rosemary, thyme, elderflower, and other herbs and plants is not a herb but an active compound. Ursolic acid has been shown to improve the development of interferon-gamma

(IFN-g), which features adaptive immunity in the cellular immune response (Jang et al., 2009). IFN-g is an essential immune factor that turns on many other genes and proteins that operate at maximum capacity to help the immune system function. Ursolic acid appears to have a powerful inflammatory response control system, which can help the body respond properly to stress and vigorous exercise (Chekcer et al., 2012). You would probably have to consume a lot of the above-mentioned foods to get the amount of ursolic acid used in these studies, but still, it is food and food is good.

Astragalus

Astragalus polysaccharide (APS) is the most immunoreactive substance in Astragalus. In several immune-related diseases, APS can control the immunity of the body and is commonly used. The study conducted by (Lihong et al., 2014) was undertaken to elucidate the protective effect of APS on herpes simplex virus (HSV-1) infected astrocytes and the underlying mechanisms. The results (Khan et al., 2019) concluded in the study that aqueous and methanol roots extracts of *Astragalus membranaceus* have antiviral activity and concentrations, Secure, which may be used to treat infections with the Avian influenza H9 virus.

A bottom line on the use of coronavirus herbs and wild plants

Herbs have been used as natural remedies since ancient times. As well as lesser-known herbs such as astragalus and sambucus, common kitchen herbs such as basil, sage, and oregano have significant antiviral effects on many viruses that cause infections in humans. These powerful herbs can easily be added to our diet by using them in favorite recipes or making teas. However, much of the work has been performed in test tubes and animals using concentrated extracts. It is therefore not clear that small doses of such herbs will have the same effects. When someone wants to add extracts, tinctures, or other herbal products, contact the health care provider to ensure healthy use. Health officials are promoting traditional herbal remedies for COVID-19 in India and many other countries, but many experts warn that we do not have enough COVID-19 data to understand how particular herbs can influence the health of people. While herbal remedies can seem harmless, they can increase a person's risk of COVID-19 if misused. Some herbs may be found to be beneficial in some individuals in preventing and treating COVID-19, but there is currently insufficient evidence on the use of herbal remedies.

Future Prospects

The production of antiviral chemotherapeutics, which are cost-effective and have limited side effects and can also be used in conjunction with other medications to enhance the therapy of subjects infected with coronavirus, must be continued. As protective vaccines and active antiviral drugs are not available for the treatment of several viruses, eliminating these viral infections seems hard and problematic. However, natural products serve as a tremendous source of

biodiversity for developing innovative antivirals, with new structure-activity relationships, and potent medical and therapeutic approaches against viral infections. The main problem surrounding antiviral drugs targeting specific viral proteins or genes is the capacity of a virus to rapidly mutate during replication, as observed for HIV and HSV (McMahon et al., 2006), oseltamivir-resistant influenza viruses (Collins et al., 2008), and acyclovir- and nucleoside/nucleotide analog-resistant hepatitis B viruses (Delaney et al., 2008). There are several considerations that should be taken into consideration when determining the antiviral activity of medicinal herb preparations, such as the extraction methods used, because acetone extracts or methanol fractions achieve the highest degree of antiviral activity (Asres et al., 2009). It is, therefore, necessary to specify the correct technique for the preparation of the extracts, the parts of the plants to be used, the appropriate season(s) for the selection of the materials, and the specifics of the application modality at the outset of a prospective study on aromatic herbal medicines (Hudson et al., 1990).

Although most research studies in this area are in their initial stages, additional research on the identification of active substances, the description of underlying mechanisms, as well as the analysis of efficiency and probable in vivo applications are recommended to assist the exploration of potent antiviral chemotherapeutics. Additional research should also investigate the possibility of combining these treatments with other natural ingredients or with standard medicines, as a multiple-target solution may help diminish the infection potential of drug-resistant virus strains. We are optimistic that natural remedies, such as aromatic plants, medicinal herbal essential oils, and pure oil compounds, will continue to play an important role in the production and advancement of anti-coronavirus medicines.

Conclusion

Phytochemicals are an important source of possible medical products. In the case of phytochemicals, whose medical properties are scientifically proven, that kind of treatment should be considered as a complementary treatment that can be used safely together with classical medical treatments. Many viral infections are still lethal and/or are not yet treatable, even though some can be kept under control with life-prolonging agents, which, however, are expensive and outside the reach of most people. Thus, the discovery and development of safe, effective, and low-cost antiviral molecules are among the top universal urgencies of drug research. Therefore, scientists and researchers from divergent medical fields are studying aromatic herbs and ethnomedicinal plants, with an eye to their applicability as antiviral drugs. Widespread research on ethnopharmacology and phytomedicine for the last 50 years resulted in the discovery of antivirals from natural products. It has been identified as having powerful and potent antiviral properties for various traditional aromatic herbs and medicinal plants. As a general rule, volatile oils, aqueous and herbal extracts have shown similar successful properties. It would seem fair to believe that these products contain various forms of antiviral compounds,

considering the large number of conventional medicinal plants that have shown good results. Further health advantages can be disclosed by the characterization of secondary metabolites. The widespread use of many conventional medicines to prevent viral infections is also warranted. Finally, it is important to discover and produce new antiviral agents from medicinal plants and herbs to control the threats posed by certain pathogenic viruses, such as the 2019-nCoV.

Authors' contributions

Gunjan Garg , Sharmistha Bhati and Sanjay Kataria have contributed significantly to the conception and design of the study, the interpretation of data, and the drafting and revision of the manuscript. All authors read and approved the final manuscript.

Conflict of Interest

The authors hereby declare no conflict of interest.

Consent for publication

The authors declare that the work has consent for publication.

Funding support

The authors declare that they have no funding support for this study.

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How to cite this article:

Garg, G., Bhati, S. and Kataria, S. (2020). The role of wild plants and herbs in restoring holistic health and fighting the infections borne by the epidemic Covid-19. *Science Archives*, 1 (3), 177-185. <http://dx.doi.org/10.47587/SA.2020.1317>