

Medicinal Plants Utilized for Treatment of Corona

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ABSTRACT

In the present review special emphasis is placed on Indian medicinal plants reported for antiviral, immunomodulatory and anti-allergic/anti-inflammatory activities and they are categorized for prioritization in research on the basis of earlier reports. The formulation is made of four herbs *Ocimum sanctum* L. leaves, *Cinnamomum verum* J. Presl. stem barks, *Zingiber officinale* Roscoe rhizomes and *Piper nigrum* L. fruits. These herbs are reported to boost immunity and are active remedies to various viral diseases. Samshamani vati is made of aqueous extract of *Tinospora cordifolia* (Willd.) Miers (family Menispermaceae), and reported to be an immunomodulator. Ethanolic extracts of *N. sativa* seeds demonstrated antiviral properties by decreasing viral load, alpha fetoprotein, and improved liver function parameters. The leaves of neem (*A. indica*), a popular Indian plant, is traditionally boiled and consumed for treatment of fever. As post COVID-19 complications remains a new field of study at present, investigation on long-term safety profile and pharmacokinetics of potential medicinal plants can be beneficial. Crude extract or pure compounds isolated from medicinal plants and/or herbs such as *Artemisia annua*, *Agastache rugosa*, *Astragalus membranaceus*, *Cassia alata*, *Ecklonia cava*, *Gymnema sylvestre*, *Glycyrrhizae uralensis*,

Houttuynia cordata, *Lindera aggregata*, *Lycoris radiata*, *Mollugo cerviana*, *Polygonum multiflorum*, *Pyrrhosia lingua*, *Saposhnikoviae divaricate*, *Tinospora cordifolia* etc. have shown promising inhibitory effect against coronavirus. Medicinal plants and natural products are still considered promising alternatives to prevent or treat several diseases. Since the outbreak of the COVID-19 pandemic in December 2019, various traditional herbal medicines have been used and resulted in positive health effects among COVID-19 patients. A total of 60 species of medicinal plants from 36 families and 54 genera were documented as being perceived. Among them, the most common families were Apiaceae (6 species), Zingiberaceae (4 species), Amaryllidaceae (4 species) and Lamiaceae (4species). And most common genus were Allium (3 species), Terminalia (2 species), Mentha (2 species), Cinnamomum (2 species), and Syzygium. Likewise, the most perceived species was *Zingiber officinale* (39.79%) followed by *Curcuma angustifolia* (34.11%). The habit analysis showed that the medicinal plants belonging to herb, shrub, climber, and tree species were 56.67%, 11.67 %, 6.67%, and 25% respectively. Leaves (33.68%) were the most predominantly used parts,

followed by seeds (23.33%), fruits (21.67%), roots (13.33%), rhizomes (11.67%), whole plant (8.33%), bark (6.67%) stem (1.67%), and bulb (1.67%). The most commonly used method of preparations was to grind the parts, boil with hot water or milk, and drink.

INTRODUCTION

Medicinal plants have not only guarded human health against infectious diseases over millennia but also played an important role in the modernization and globalization of human society in recent centuries. A recent trend in the community is the consumption of herbal medicines containing certain active compounds, which have antimicrobial or antiviral, anti-inflammatory, and immunostimulatory activities, such as echinacea, quinine, and curcumin. These herbal compounds are assumed to have the capacity to modulate the immune response and, therefore, they are believed to have beneficial effects on preventing or treating COVID-19. *Echinacea purpurea* (*E. purpurea*) is one of the most popular herbal medicines in Europe and North America because it shows promising effects against viral infections. Its common name is *Purple coneflower*. The preparation of *E. purpurea* can be made in the form of extracts,

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tinctures, teas, and sprays. Many Native Americans use this kind of herb for respiratory infections. It contains several bioactive compounds like chicoric acid and caffeic acids, alkylamides, and polysaccharides. [1]

Phyto-compounds like terpenoids, flavonoids, polyphenols, quinones, tannins, coumarins, terpenes, lectins, polypeptides and saponins are herbal constituents. They play an important role in signal transduction, mitosis (cell division) and apoptosis (cell death) too. Various medicinal plants impart crucial immunomodulatory / antioxidant response. [2] These include:

- *Amla* or Indian gooseberry (*Emblica officinalis*)
- *Pippali* or Indian long pepper (*Piper longum*)
- Garlic (*Allium sativum*)
- Turmeric (*Curcuma longa*)
- Ginger (*Zingiber officinalis*)
- Giloy
- *Guduchi* (*Tinospora cordifolia*)
- *Tulsi* (*Ocimum sanctum*)
- Clove
- *Laung* (*Syzygium aromaticum*)
- *Ashwagandha* (*Withania somnifera*)
- Ginseng (*Planax quinquefolius*)
- *Kalonji* (*Nigella sativa*)
- Pomegranate (*Punica granatum*)
- *Ghritkumari* (*Aloe vera*)
- *Kalmegh* (*Andrographis paniculate*)
- *Yashtimadhu* (*Glycyrrhiza glabra*)
- *Neem* (*Azadirachta indica*)

The herbal drugs with potent antioxidant and antiviral activity might help in alleviating the anxiety and other upper respiratory related symptoms associated with COVID-19. [3] Secondary plant metabolites could act at one or multiple stages of virus replication. *Aloe vera* plant has been considered as a source of highly potential candidate. Its extract as well as its bioactive constituents anthraquinones to possess excellent broad spectrum virucidal activities. [4] *Aloe vera* extract rich in zinc and its secondary bioactive metabolites could be used in the management of COVID-19 owing to their ability to attenuate expression of pro-inflammatory factors that induce acute respiratory distress and by strengthening the immune system. [5]

DISCUSSION

Piper nigrum L. (Black Pepper, Kaali Mirch): *Piper nigrum* L. is also referred as king of spices due to the extensive use of its dried unripe fruit in almost all cooking worldwide. Moreover, this plant is enriched with more than 600 different phytochemicals including lignans, alkaloids/amides, terpenes, neolignans etc. having different beneficial biological activities and medicinal properties. Antiviral, antibacterial, anti-inflammatory, anti-pyretic, anti-oxidative, anti-thyroid, antitumor, immune and vaccine bioavailability enhancing properties are among the few in huge list of beneficial biological functions of peppercorn and various secondary metabolites of *Piper nigrum*. [6] *Tulsi*, also called as holy basil, is an indigenous plant to India and is highly renowned for its medicinal properties in Ayurvedic and Siddha medicinal system. Many in-vitro and in-vivo reports on animals and humans have proven its therapeutic potential as antibacterial, antidiabetic, anti-carcinogenic, anti-viral, anti-inflammatory, cardio-protective, immune system booster etc.. In Ayurveda, *Tulsi* is denoted as “Elixir of life” for its healing capability and promising potential in curing different health ailments including bronchitis, pyrexia, rheumatism, asthma, skin diseases, parasitic and microbial infections, gastric and hepatic disorders etc. Regarding the role of *Ocimum sanctum* in controlling COVID-19, [7] *Tulsi* is already being used for curing pain, diarrhoea, cough and fever, which are common symptoms related to COVID-19. India’s Ministry of AYUSH issued a statement on “Ayurveda’s immunity boosting measures for self-care during COVID 19 crisis”, [13] which includes the recommendation to take Chyavanprash formula (containing a range of wild plant ingredients) daily. *Withania somnifera* comprises a host of phytoconstituents such as Withanolide A & B, Withaferin A, Withanone, Withanosides. *Withania somnifera* root tubers showed antimicrobial activity (protease inhibitor) against a few bacterial and phytopathogenic viruses. *Withania somnifera*, through regulation of host Th-1/ Th-2 immunity, will be an important agent in controlling COVID-19. WS can be helpful for the activation of anti-viral immunity. [8]

By now, among the most used herbal species are *Astragalus mongholicus* Bunge, *Glycyrrhiza glabra* L., *Saposhnikovia divaricata* (Turcz. ex Ledeb.) Schischk., *Atractylodes lancea* (Thunb.) DC., *Atractylodes macrocephala* Koidz., *Lonicera japonica* Thunb., [9] and *Forsythia suspensa* (Thunb.) Vahl. Saikosaponins, a group of oleanane derivatives, isolated from medicinal plants such as *Bupleurum* spp., *Heteromorpha* spp.

and *Scrophularia scorodonia* have been reported to possess various biological activities. Saikosaponin B2 has potent anticoronaviral activity and that its mode of action possibly involves interference in the early stage of viral replication, such as absorption and penetration of the virus.[10]

RESULTS

Consuming healthy food produced from plants, fruits and vegetables, could enhance the immune system and protect the body against COVID-19, as well as other viruses and diseases, and more broadly improve the general wellbeing of people. Thus, dietary therapy and medicinal plants should not be ruled out as a complementary preventive therapy, especially among at-risk populations with limited vaccine access during the COVID-19 pandemic. Far from being a pseudoscience, these therapies could exist side by side with modern/western medicine, and even enhance the effectiveness of western medical procedures. These edible medicinal plants contain a host of biologically-active compounds.[11] Their physiological effects requires more research in future to improve our understanding of human nutritional and medicinal requirements, especially with reference to flu symptoms, diseases of the respiratory system, as well as COVID-19. Mixtures of these natural products after enhanced assessment and validation, might be made with several combinations might become validated as an anti-COVID-19 drug and in future might be constituted as assessment of alternative as preventive and therapeutic approaches. Now vaccines are available against corona. But still the corona wave is continuing. In the meantime, maintain social distance, wash hands, wear a mask, keep safe and follow all Government directives.[12]

CONCLUSIONS

Medicinal and aromatic plants are effective antiviral, antibacterial, antifungal and antioxidants, in part thanks to their compounds, such as eucalyptol, quinine and other alkaloids, menthol...etc. These compounds may be effective in decreasing and preventing the contamination risk as well as treating some symptoms of Covid 19. Further research is needed to identify the different active components of medicinal and aromatic plants, to separate them and to study their effect and also their probable synergistic effect, to fight against this scourge. Many countries have taken precautionary measures against the virus, and Government officials in all countries continue to make efforts to minimize human contact by facilitating countrywide shutdowns of public places, as well as various steps have been initiated to ensure the safety of the people, like social distancing and self-quarantine which limits our social

interactions.[13] This will reduce the risk of spreading the COVID-19 to people by breaking the transmission chain and the influx of new COVID-19 cases in a given time period. National Institutes of Health (NIH), has mentioned that SARS-CoV-2 could survive for up to three hours maximum as aerosols to a maximum of three days on surfaces. Slowing the spread of the COVID-19 cases will significantly reduce the strain on the healthcare system of the country by limiting the number of people who are severely sick by COVID-19 and need hospital care.[14] It will also give researchers more time to develop more vaccines, medicines of oral usage viz. tablets, syrups and capsules against COVID-19. So, it's time for all the citizens to join hands together to fight against coronavirus by practicing self-hygiene and social distancing. Let us all wait for the light at the end of the tunnel, in solitude.[15]

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