

Role of Adulsa in Respiratory Disorders

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ABSTRACT

In Ayurvedic and Unani medicine, *Adhatoda vasica* (L.) Nees is a well-known plant medication. It has been used to treat a variety of diseases and disorders, notably those affecting the respiratory system. Several scientific publications on the oxytocic and abortifacient effects of vasicine and alkaloid produced from the plant have arisen in the last 20 years. As a result, there are concerns about the safety of *A. vasica* as a herbal medicine. The major data on traditional applications, ethnopharmacological and toxicological research, both published and unpublished, are reviewed and commented on in this article. The data were assessed for correctness, reliability, relevance, and importance in the context of the overall assessment of *A. vasica* safety.

Key word : (*vasica* ,Respiratory Disorders , COVID-19 , Combination Drug Therapy

I. INTRODUCTION

Adhatoda vasica is a tiny, evergreen perennial shrub that grows to about three metres in height. It has opposing and ascending branches. The broad, leathery leaves, which are sometimes employed as an insecticide, have a length of 10 to 15 centimetres and a breadth of 4 cm. They're pubescent, with a light green top and a darker green underside. The leaves are completely lanceolate and briefly petiolate, tapering towards both apex and base, and grow in an opposing arrangement. When the leaves are dry, they turn brownishgreen and have a bitter flavour and scent comparable to strong tea. It has a soft stem that creates nice charcoal. Huge, dense terminal spikes with large, appealing white petals tinged with purple on the lower lip. The fruit is a small, clavate, longitudinally channelled capsule, containing four globular seeds. *Adhatoda vasica* is useful in treating bronchitis, tuberculosis and other lung and bronchiole disorders. A decoction of the leaves of *Vasaka* may be used to help with cough and other symptoms of colds. The soothing action helps irritation in the throat and the expectorant will help

loosen phlegm deposits in the airway. A poultice of the leaves of *Vasaka* may be applied to wounds for their antibacterial and antiinflammatory properties. The poultice is also helpful in relieving rheumatic symptoms when applied to joints. *Vasaka* has been used to control both internal and external bleeding such as peptic ulcers, piles and bleeding gums. *Vasaka* exhibits antispasmodic, expectorant and blood purifying qualities.

The fruit is a four-globular seeded clavate capsule with a longitudinally channelled opening. Bronchitis, TB, and other lung and bronchiole illnesses can all be helped by *Adhatoda vasica*. A decoction of *Vasaka* leaves can be used to treat coughs and other cold symptoms. The expectorant will assist release phlegm deposits in the airway and the calming action will help soothe discomfort in the throat. Wounds can be treated with a poultice made from *Vasaka* leaves, which has antibacterial and antiinflammatory qualities. When applied to joints, the poultice can help relieve rheumatic symptoms. *Vasaka* has been used to treat peptic ulcers, piles, and bleeding gums on both an internal and external level. *Vasaka* has antispasmodic, expectorant, and blood purification properties.

Modern medical practitioners have also embraced it. The bark, flowers, roots, and leaves of this shrub grow in all parts of the world and are used in medicine. The leaves have a reputation for being effective in the treatment of coughs and bronchitis. The flavour of the herb is spicy and

astringent. In action, it's icy. It improves the voice and balances kapha and pitta. It can be used to treat coughing and asthma in patients, and it can also be used to treat any disease that has these symptoms. It is advantageous to tuberculosis patients. *Vasaka*'s distinctive attribute is that it can reduce bleeding caused by pitta aggravation in the mouth, nose, genitals, or urinary systems.

One teaspoon of the juice obtained by dampening and pounding the leaves is beneficial in the treatment of chronic bronchitis, asthma, and tuberculosis. This isn't to say it always heals all of these ailments, but it does provide rapid relief. It is

an excellent expectorant, drawing out all kapha (phlegm) that has accumulated in the lungs. The juice of Vasaka is blended with the juice of ginger and honey and administered early in the morning on an empty stomach in many cases where bronchitis is caused by a lack of appetite and poor digestion. The juice of Vasaka, taken three times a day in the early stages of tuberculosis, aids a patient who is prone to persistent coughing.

Vasaka has been utilised as a basis or a component in a variety of cough syrups. The leaves, when boiled and applied to the bladder region, have a diuretic effect, reduce kidney edema, and promote clean urine. People suffering from bleeding piles or diarrhoea with bleeding, as well as ladies suffering from menorrhagia, can benefit greatly from drinking Vasaka juice 2 to 3

times a day. Bronchitis can be treated with dried and powdered leaves in a quantity of 40 grains twice a day. The dose in liquid form is around half to one teaspoon. Excessive doses of 1 to 2 ozs produce an emetic effect, causing vomiting in which all of the kapha is expelled. The juice of 1 seer of Vasaka leaves is boiled with 14 seer of white sugar, 4 tolas long peppers, and 4 tolas pure

ghee until the combination is reduced to a jelly form in the event of asthma and bronchial congestion. After cooling, 14 seer of honey is added, and the mixture is thoroughly combined. Doses of 12 ounces of the combination are given. Vasasav, a liquid Vasaka concoction administered in half-ounce doses after the main meals, decreases kapha (phlegm) production and soothes excessive coughing. Vasaka leaves' juice softens the bronchial tube. It can also help to relieve pitta aggravation and jaundice discomfort. The roots and bark have a reputation for having expectorant characteristics.

Morphological character

Synonyms - Vasaka ,adulsa, Malabarnut

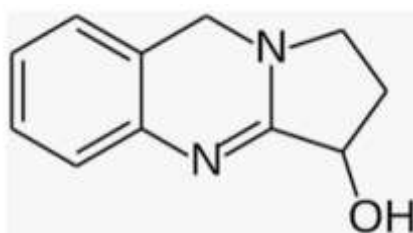
Biological source - It consist of the fresh or dried leaves of Adhatoda vasica Nees. **Family** - Acanthaceae

Geographical source - The plant may be found all over India's plains and in the lower Himalayan peaks, reaching a height of 1,500 metres.

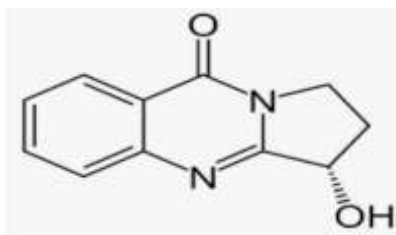
Colour - Dried leaves are dull brown on top and light greyish brown on the bottom; fragrance is distinctive, tastes bitter

Structure -

1) Vasicine



2) Vasicinone



Uses

It's a classic home cure for treating all types of liver problems, including jaundice. Hair loss, eye problems, TB, oral infections, and a persistent cold. Alose is a drug that is used to treat scorpion stings, lack of appetite, and anemia. It's good for inflammation, bronchitis, and itching. Sedative, antispasmodic, and anthelmintic properties. Vasicine has an oxytocic and abortion-inducing effect.

Plant description

Vasica Adhatoda is a member of the Acanthaceae family of medicinal plants. It's a 1-3 foot tall evergreen shrub with many long opposed branches. The leaves are lance-shaped and big.

Above the stem is herbaceous, and below it is woody. Leaves are ex-stipulated and opposite. Small irregular zygomorphic, bisexual, and hypogynous flower spikes or panicles (Shinwari et al., 1995). It bears four seeded capsular fruits. The blooms come in two colours: white and purple. Vasaka is a commercial name derived from a Sanskrit name (Kumar et al., 2010). Inflorescences in densely flowered axillary spicate cymes; peduncles short; bracts broadly oval, foliaceous. The leaves, flowers, fruit, and roots are widely used as sedatives, expectorants, and antispasmodics in the treatment of cold cough, whooping cough, chronic bronchitis, and asthma.



Vernacular names

Hindi : Adosa, adalsa, vasaka

Sanskrit : Amalaka, bashika,

Bengali : Basak

Tamil : Adatodai

Marathi : Adulsa

Telugu : Adasaram

Malayalam : Ata-lotakam

Classification of Adulsa

Kingdom : Plantae

Order : Lamiales

Family : Acanthaceae

Genus : Justicia

Species : *J. adhatoda*

Common name : Adulsa (Vasaka)

Properties of adulsa

Anti-asthmatic & bronchodilator activity

10 Vasicine and vasicinone, two alkaloids found in *Adhatoda vasica*, are used as strong respiratory agents in medicine. The leaf and root extracts of *Adhatoda vasica* have the ability to treat a wide range of lung problems, including bronchial disorders, bronchitis, cough, and cold. *Adhatoda* leaf decoction has a calming effect that helps to alleviate throat discomfort and can also be used as an expectorant (Dhuley, 1999). have investigated the anti-asthmatic activity of *Adhatoda vasica* by extracting the powdered leaves with ethanol and their effects on guinea pigs provoked by bronchospasm using acetylcholine and histamine, as well as in-vitro investigations on isolated guinea-pigileum. The extract has shown promise in suppressing bronchial construction in a dose-dependent manner.

Anti-bacterial activity

Adathoda vasica's antibacterial properties were determined by extracting the leaves using various solvents and testing them on a microorganism-strewn Petri dish. After depositing the extract in the Petri dishes using either the disc diffusion method or the well method, they were incubated at 37 ° c for 24 hours. Some gram-positive and gram-negative bacterial strains are shown to be susceptible to the extract. Wound Healing is a type of activity that involves the healing of wounds. The entire plant was discovered to have wound-healing properties. After generating wounds on the vertebral columns, the animals were given an alcoholic extract of the whole plant and compared to a control group that received no therapy. When compared to the control group, the *Adathosa vasica*-treated groups had significantly higher wound healing activity (Bhargava et al., 1988). The wound healing benefits of the *Adhatoda vasica* plant in Wistar albino rats were researched by Gv and Sundar (2010a). Methanol, diethyl ether, and chloroform were extracted from the plant in order and made into an ointment. The animals were given an incision and the ointment was put to the incision. The methanolic extract was shown to have the most powerful wound healing activity of all the extracts.

Anti-tussive activity

Srivastava and Choudhary (2016) produced ethyl acetate and methanol extracts of *Adhatoda vasica* leaves and compared them to the

standard for causing cough with Sulphur dioxide and ammonium hydroxide (Codeine phosphate and dextromethorphan). At a dose of 500mg/kg, both ethyl acetate and methanol extracts showed considerable suppression in cough revluxes, however the results of ethyl acetate are slightly better than those of methanol.

Anti-tubercular activity

The *Adhatoda vasica*'s anti-tubercular activity is attributed to the formation of ambroxol and bromhexine from vasicine, both of which have powerful anti-tubercular activity when acting on the Mycotuberculosis tuberculosis strain (Narimanian et al., 2005). Ignacimuthu and Shanmugam (2010) used hexane, ethyl acetate, and methanol to extract powdered leaves and tested the extract against a *Mycobacterium tuberculosis* strain. As a baseline, rifampicin (2 gm/ml) and isoniazid (0.2 gm/ml) are used. When compared to different concentrations of the extract, 100gm/ml had significant outcomes.

Antimicrobial activity

Prasad et al. (2011) produced n-hexane, methanol, and water extracts of *Adhatoda vasica* leaves and examined the extracts for antibacterial and antifungal activity in bacterial and fungal strains. Ciprofloxacin and Fluconazole were used as reference drugs for antibacterial and antifungal activity in the research. All of the extracts produced satisfactory results, however the methanolic extracts were more promising than the other two extracts (Pradhan and Pradhan, 2015; Dymock et al., 1890). Sheebab and Mohan (2012) synthesised *Adhatoda vasica* extracts in methanol, ethanol, acetone, chloroform, diethyl ether, and water and tested them against *Staphylococcus aureus*, *Streptococcus pyogenes*, *Proteus vulgaris*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Klebsiella pneumonia* bacterial strains. Despite the fact that Eventhough all extracts have shown better results diethyl extract has shown even more promising results

Antioxidant & Radical Scavenging Activity

Pant et al. (2015) used soxhlet extraction to make an ethanolic extract of *Adhatoda vasica* leaves and then performed several assays to measure antioxidant and radical scavenging properties. The extract was evaluated for DPPH scavenging activity, ABTS scavenging activity, Superoxide anion scavenging activity, Hydroxyl

radical scavenging activity, NO scavenging activity, reducing power assay, lipid peroxidation assay, and TBA technique. All of the experiments yielded dose-dependent outcomes.

Anti-ulcer activity

Shrivastava et al. (2006) developed an *Adhatoda vasica* leaf extract and tested its anti-ulcer properties in Sprague-Dawley rats. Two strategies were used to cause the ulcer: ethanol-induced ulcer and pylorus ligation plus aspirin dosage. The extract's effects are compared to a commercially available formulation as a baseline. When compared to the reference chemical, the extracts showed substantial results (Shrivastava et al., 2006). Vinothapooshan and Sundar (2011) examined the anti-ulcer effectiveness of *Adhatoda vasica* leaf extracts in ulcer-induced Wistar albino rats using methanolic, chloroform, and diethyl ether extracts. Alcohol and aspirin were used to cause the ulcer. The effects of the extracts were compared to the conventional drug ranitidine. The methanolic extract dose of 200 mg/kg has shown considerable results when compared with the standard.

Anti-inflammatory activity

Vasicine, one of the chemical compounds identified in *Adhatoda vasica*, has anti-inflammatory properties. When the anti-inflammatory activity of the plant's extracts is measured using a modified hen's egg chorioallantoic membrane assay, the methanolic extract of the plant shows promise.

Antidiabetic activity

Sathyamurthy (2017) used the Soxhlet apparatus to prepare methanol extracts of *Adhatoda vasica* leaves for 4 days, after which the extract was filtered and dried to yield the dry residue. The residue was used to investigate *Adhatoda vasica*'s anti-diabetic properties. The research was carried out on the Adipocyte 3T3 – L1 cell lines, which were generated from a 19-day-old Murine Swiss mouse embryo. The antidiabetic efficacy of *Adhatoda vasica* is determined using a deoxyribose test and compared to the reference substance quercetin. When compared to the reference drug, the extract has demonstrated encouraging outcomes.

Biochemical properties

Alkaloids, phyosterols, polyphenolics, and glycosides were discovered as a major class of chemicals in phytochemical studies of various portions of *Adhatoda vasica*. Its main ingredients are quinazoline alkaloids, the most prominent of which being vasicine. Vitamin C and carotene are

abundant in the leaves, which also provide an essential oil. Essential oils, lipids, resins, sugar, gum, amino acids, proteins, and vitamin C are among the chemical substances found in the leaves and roots of this plant (Dymock, 1972). A little amount of essential oil and crystalline acid are also present in the leaves. The seeds contained 25.8% of deep yellow oil, which was formed of glycerides of arachidic 3.1 percent, behenic 11.2 percent, lignoceric 10.7%, cerotic 5%, oleic 49.9%, and linoleic acids 12.3 percent, and -sitosterol (2:6%) according to a study published in India in 1956. (Dweck, 1995). In *Adhatoda vasica*, atomic absorption spectrophotometry confirmed the presence of main (K, Na, Ca, and Mg) and trace elements (Zn, Cu, Cr, Ni, Co, Cd, Pb, Mn, and Fe) (Jabeen et al., 2010). Gulfranz et al. conducted a chemical investigation of several bioactive substances extracted from *Adhatoda vasica* leaves and roots (Gulfranz et al., 2005). Protein (8.5 percent), vasicine (7.5 percent), vitamin C (5.2 percent), and lipids (2.5 percent) were detected in root samples of *vasica*, according to the findings. Except for sugar (16.4%), fibre (5.2%), vasicinone (3.5%), Zn (0.6%), S (1.3%), and Fe (1.3%), the levels of such compounds were low in leaves (1.2 percent).

Respiratory disorder

The *Adhatoda vasica* plant is mostly used to treat respiratory conditions such as chronic bronchitis, asthma, colds, and cough. Intestinal parasites can be treated with the entire plant. In the acute phases of bronchitis, *Adhatoda Vasica* provides unfailing relief from thick, sticky sputum. Heart problems, bronchitis, blood disorders, leucoderma, fever, jaundice, vomiting, and leprosy, loss of memory, leucoderma, tumours, sore-eye, mouth problems, and gonorrhoea were all treated with the Malabar nut. Because of its anti-inflammatory and anti-bacterial properties, the leaves of *Vasica* can be used as a cataplasm on wounds and as an external treatment to ease rheumatic pain and inflammation. It also aids in the reduction of internal and external bleeding caused by peptic ulcers, bleeding gums, and piles

Pharmacokinetics

The results of research on vasicine absorption and distribution in mice following intravenous, intramuscular, and subcutaneous treatment are identical to those reported in rats. Vasicine (20 mg/kg) was well absorbed, reaching a maximum concentration of around 56 g/ml in both pregnant and non-pregnant rats' blood and about 10 g/ml in amniotic fluid (Atal, 1980). In rats and

mice, high concentrations of vasicine were identified in the uterus within 5 minutes of intravenous injection, and the highest level was reached after 10 minutes. After intravenous treatment, the half-life was 5 to 7 minutes, 1.5 and 2 hours for intramuscular and subcutaneous administration, respectively. Vasicine and its metabolites are mostly eliminated in the urine, according to reports. After intravenous and intramuscular treatment, vasicine accounted for about 55 percent of the excretory product in the first 18 and 22 hours, respectively, but after oral administration, vasicine accounted for around 18 percent of the excretory product in the first 24 hours. The uterus had a very low concentration after oral treatment. Vasicine is converted in the liver to produce vasicinone and other metabolites, which contribute to the first-pass effects and are a significant method of vasicine removal.

Treatment

Anticholinesterase

Vasicinone derived from the roots caused transitory hypotension in cats, intestinal contraction, and cardiac depression in guinea pigs, indicating excellent anticholinesterase activity.

Wound healing

When plant extracts were used to treat buffalo wounds, the rate of healing was shown to be higher than when pancreas tissue extracts were used.

Hypoglycaemic

In rats, an ethanolic extract of the leaves has hypoglycemic action. Non-lowered the blood sugar level of rabbits for a brief period of time, it was discovered.

Abortifacient/Oxytocic

Vasicine has uterine stimulating and oxytocic properties, and the release of prostaglandins under the influence of oestrogens creates an abortifacient effect. The activity was found to be almost identical to that of oxytocin. Vasicine has uterotonic and abortifacient effects in rats, rabbits, hamsters, and guinea pigs, according to a study. This is thought to be due to increased prostaglandin synthesis and release. The dose-dependent impact was reported in this investigation, with effective dosages ranging from 2.5 to 10 mg/kg. In Natural Product

Radiance552 in guinea pigs, however, administration of estradiol dipropionate potentiated the abortifacient action, whereas treatment with aspirin inhibited the abortifacient activity due to suppression of prostaglandin release.

Role of Adulsa in covid

The Corona Virus Disease 19 (COVID-19) outbreak is a current pandemic that produces acute respiratory syndrome and has a high fatality rate all across the world. COVID-19 is characterised by the occurrence of respiratory symptoms, as well as significant cardiovascular and renal consequences in certain patients. The potential of Vasaka (*Adhatoda vasica* Nees) in the prevention and management of COVID-19 symptoms is investigated in this study. Vasaka is a well-known natural shrub in the Ayurvedic medicine system that has medicinal properties, especially in respiratory problems. The search for natural viral inhibitors has a long history. In the creation of new medicinal drugs, looking for natural antiviral chemicals from plants is a potential method. Several research attempts have been made throughout the last century to identify phytochemicals that can inhibit cancer.

Several research attempts have been made over the last century to develop phytochemicals that can prevent viral replication. Ethnopharmacology can lead to the identification and development of new bioactive plant chemicals for therapeutic research and development. *Justicia adhatoda* alkaloids have been shown to have strong antibacterial efficacy against the most resistant bacteria like *Staphylococcus aureus* and *Pseudomonas aeruginosa*, as well as highly pathogenic pathogens like *Salmonella typhi*.

Therapeutic action

Action as a treatment According to one animal investigation, *Adhatoda vasica* aqueous and methanol extracts have significant antiviral properties against herpes simplex viruses. According to another study, aqueous and methanolic extracts of *Justicia adhatoda* show potent anti-influenza virus action, inhibiting viral attachment and multiplication. Blocking viral attachment through inhibition of viral HA protein, blocking viral absorption to cells, synergistically binding to free virus particles, blocking sialic acid receptors to prevent virus entry into the cells, and inhibiting influenza virus replication or virus budding from infected Madin-Darby Canine Kidney (MDCK) cells were all possibilities. Vasaka is an antibacterial agent that is effective against both Gram positive and Gram negative microorganisms. Different clinical pathogens such as *Klebsiella pneumoniae*, *Proteus vulgaris*, *Staphylococcus aureus*, *Streptococcus Pyogens*, and *Pseudomonas aeruginosa* showed increased activity against Vasaka extract. *Adhatoda Vasica* and *Vitex negundo* leaf extract (methanolic) were

efficient against *Salmonella typhi* in one investigation. Methanolic, diethyl ether, and chloroform extracts of *Adhatoda vasica* leaves were shown to have immunomodulatory characteristics, according to the study. Another animal investigation found that *Adhatoda vasica* Ethyl acetate extract had a strong hepatoprotective effect against CCl₄-induced liver injury. In vitro and in vivo studies, vasicine, the major chemical ingredient of *Adhatoda vasica*, demonstrated bronchodilatory activity.

Vasaka extract's antitussive action was further tested in anaesthetized guinea pigs, rabbits, and unanesthetized guinea pigs, and it was discovered to have good antitussive activity. Another investigation found that ethanol extracts of *Glycyrrhiza glabra* and *Adhatoda vasica* significantly reduced SO₂ gas-induced cough. The plant *Adhatoda vasica* semi-synthetic derivatives of vasicine show a pH-dependent growth-inhibitory impact on *Mycobacterium TB*. The chemical constituents vasicine and vasicinone were found to have a substantial cardiac depressive impact in another study.

combination of Drugs with Adulsa

1. Glycyrrhiza & vasaka

Inflammation of the bronchi tubules responds well to *Glycyrrhiza glabra* as an expectorant and demulcent. Mucopolysaccharide synthesis is hampered by glycyrrhetic acid. *Adhatoda vasica* enhances bronchial secretion or decreases its viscosity, making coughing easier. These cough medicines have also been the subject of a few isolated experimental and clinical studies. Preliminary research indicates that these herbs have antitussive and expectorant activity. This aspect is being investigated further so that these herbs can be established as a standard antitussive and expectorant drug.

2. Tulsi & Vasaka

Ocimum sanctum and *Adhatoda vasica* have both been extensively studied for their phytochemical and pharmacological properties, according to the literature review. They belong to a category of herbal drugs with a strong philosophical or traditional foundation. The results of this study show that *O. sanctum* and *A. vasica* are both high in phytochemical constituents. The antimicrobial efficacy of *O. sanctum* and *A. vasica* suggests that both plants have potent antimicrobial properties, and both are widely distributed in India. Instead of synthetic chemicals, they might be recommended as a readily available and renewable source of antibacterial agent. Infectious diseases are responsible for the deaths of millions of people around the world, owing to the mutagenic nature of the bacteria' genomes. As a result, it is both desired and necessary. Developing an effective, safe, and natural solution to combat the multiple drug resistance (MDR) pathogen is both desirable and necessary. More research is needed on the conservation of these plant species in order to keep them in our lives and to find the active bio-compounds. Clinical trials are needed to determine the synergistic effect of their significant therapeutic characteristics, as well as the level of toxicity and activity of secondary metabolites.

Marketed products & Ayurvedic Formulation of Adulsa

- Adulsa syrup, adulsa tablets, adulsa powder
- Vasavaleha, Vasakarisht, Vasaka tail, vasakasav, Vasakakanak





Toxicity

Adhatoda vasica has anti-fertility activities, but no effects on pregnancy have been observed after administration of leaf extract to mice or rats (Bhaduri et al., 1968). However, rats given 100 mg/kg of several Adhatoda vasica extracts showed no signs of implantation (Prakash et al., 1985). Early gestation was explored using Adhatoda vasica spissum leaf extract. There were no statistically significant changes between the treated and control animals in terms of mother

body weight or any other parameter. The amount of vasicine found in Adhatoda vasica leaf extract ranged from 0.0541 to 1.105 percent (Bhaduri et al., 1968). For six months, rats and monkeys were submitted to chronic toxicity experiments with vasicine hydrochloride. The treated animals' mortality and body weight were found to be equivalent to control animals. The patient's haematological and biochemical markers were within normal physiological limits. During postmortem and histological analysis of the major

organs, no abnormalities were discovered, showing that vasicine hydrochloride is reasonably harmless.

II. CONCLUSION

Due to Vasaka multimodal therapeutic effects, we hypothesize that Vasaka could be effective in the prevention and Management of respiratory disorders and also COVID-19 symptoms. Existing literature and the findings from the survey based research indicate the potentiality of Vasaka plant parts in the management of COVID-19 symptoms and several other respiratory disorders. In this context, translational research is done in order to provide scientific evidence for the efficacy and to establish the standard formulation of Vasaka in the management of Respiratory disorders and COVID-19 systems.

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