

# Vasaka (*Justicia adhatoda*): A Medicinal Plant with their Pharmacological activity

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## Abstract

*Justicia adhatoda*, commonly known as Vasaka, is a well-regarded medicinal plant in traditional and modern medicine systems. This review article aims to comprehensively summarize the pharmacological activities associated pharmacological properties of antioxidant, and immunomodulatory effects. These activities are attributed with Vasaka, highlighting its therapeutic potential. The Vasaka include anti-inflammatory, bronchodilatory, antimicrobial, antioxidant, and immunomodulatory effects. These activities are attributed compounds such as alkaloids to the presence of bioactive flavonoids, and phenolic compounds. Vasaka has been traditionally used to treat respiratory disorders, such as asthma and bronchitis, owing to its bronchodilatory and anti-inflammatory properties. Additionally, its antimicrobial activity makes it The antioxidant and effective against various infections. Immunomodulatory effects of Vasaka contribute to its potential in combating oxidative stress and enhancing the immune.

This review provides a comprehensive overview of the pharmacological activities of Vasaka, highlighting its importance as a valuable medicinal plant in healthcare and drug development. Further research and clinical studies are warranted to explore its full therapeutic potential and safety profile. Leaf of *adhatoda vasica* (Vasaka) is an important drug of ayurveda. The entire parts of the plant from roots to leaves are used to treat many ailments. The leaves of Vasaka are used to treat cough, asthma, fever, tuberculosis, piles, jaundice, bleeding gums. In this paper general medicinal uses and pharmacological activities of various parts of the plants have been reviewed.

**Keywords:-** Vasaka, *Justicia adhatoda*, Medicinal plant, phytochemistry, traditional Medicinal plant, therapeutic potential.

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## Introduction:

Vasaka is a member of Acanthaceae family and generally referred to as “Adosa” is a tiny evergreen shrub that is ubiquitous around the world and in many parts of India.

It has a wide range of applications in conventional Ayurveda.



**Fig-1 : Whole plant of Vasaka (*Adhatoda Vasica*)**

Vasica is most recognised for its capability to cure respiratory conditions. Vasica leaves have an energising impact on the respiratory system. Vasica has been successfully used for millennia to treat asthma, chronic bronchitis, a

and other respiratory problems because it possesses antispasmodic and expectorant properties. To treat ear infections and stop bleeding, herb powder is cooked with sesame oil. The discomfort from urinary tract infections & rheumatic pain are both treated with boiled leaves. Additionally, it is known to have abortifacient qualities. Some regions of India utilise it to increase uterine contractions, accelerating labour [1].

It has astringent, diuretic, purgative and antiperiodic properties. The herb has been used in homeopathy to treat asthma, whooping cough, pneumonia, fever, jaundice, and colds to serve as an expectorant and antitussive property [2]. It is utilised in the Ayurvedic medical system to treat and prevent a variety of illnesses [3]. The World Health Organisation (WHO) has included *Adhatoda vasica* (*A. vasica*) in their manual due to its historic usage in basic health care [4].

### Scientific classification

- Kingdom : Plantae
- Division : Angiosperms
- Class : Dicotyledonae
- Order : Gentianales
- Family : Acanthaceae
- Genus : *Adhatoda*
- Species : *vasica*
- Binomial name : *Adhatoda vasica* Nees.
- Synonym : Malabar nuts [5]

### General Description

It is a 2.2–3.5 metre tall evergreen shrub with long leaves and white blooms in axillary spikes. The shrub is woody, has many branches, and bears blooms that are either pink, purple, or white on opposite climbing branches.

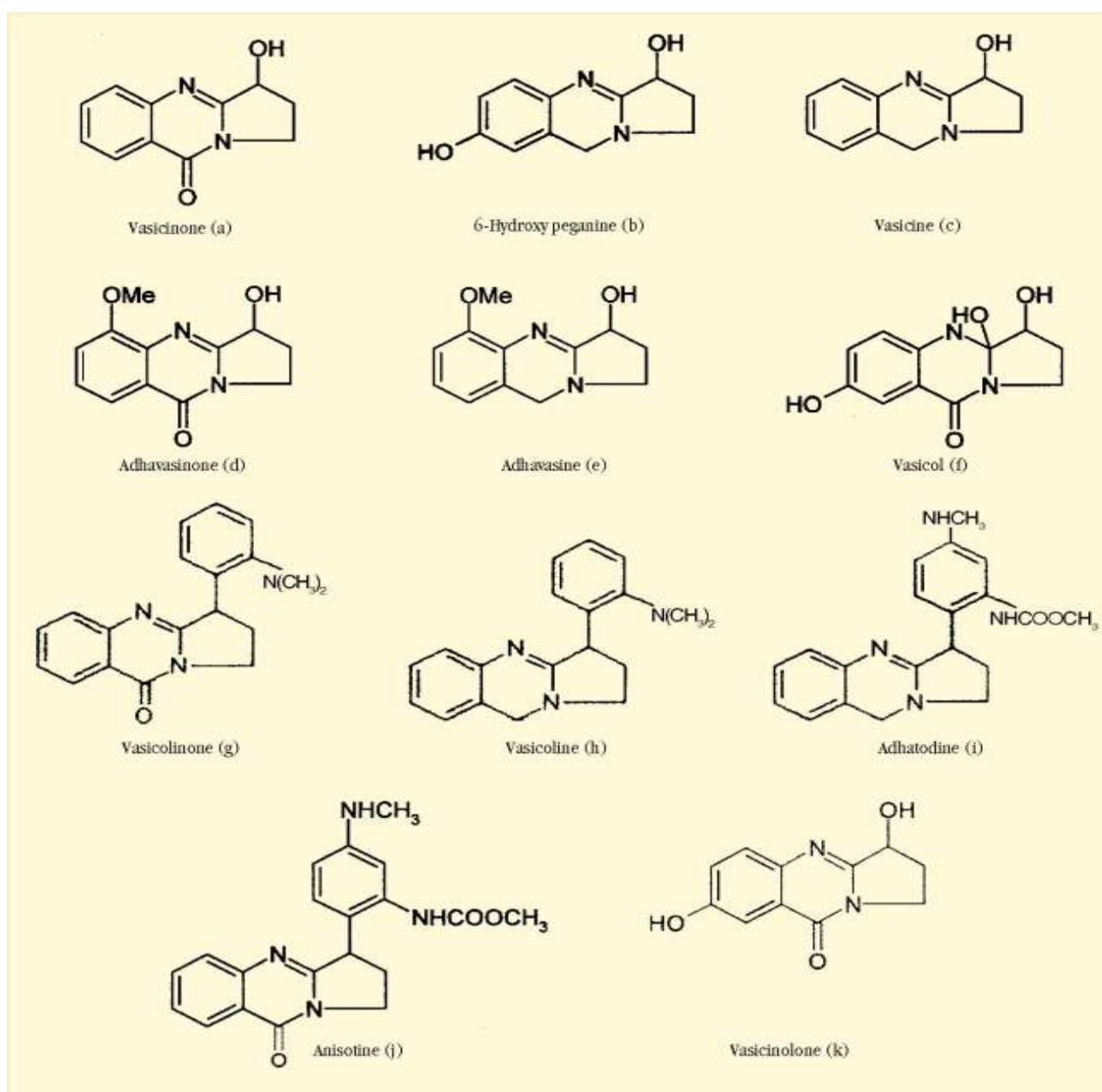


**Fig-2 : Vasaka flowers, leaves and Roots**

With secondary and tertiary rootlets, the root is typical. Large, lance-shaped leaves opposing and explicit panicles or spikes of flowers. thickly flowered inflorescences in axillary spicate cymes; short peduncles; broadly oval, foliaceous bracts. Fruit has four seeds and resembles a capsule [6].

### Phytochemistry:

*Adhatoda Zeylanica* is mostly composed of pyroquinazoline alkaloids, such as peganine, vasicine, vasicol, and vasicinone, as well as a few other smaller ingredients. One of the main bioactives is vasicine, which is 1.3% concentrated in the pyroquinazoline alkaloid of vasaka. Vasicinol, vasicinolone, and adhatonine are examples of minor alkaloids. Flowers



**Fig-3: Adhatoda zeylanica components contained in a quinazoline ring** <sup>[7]</sup>

mostly include quercetin and kaempferol. The flowers have a novel moiety called 2-4-dihydroxy chalcone-4-glucoside." The leaves include the quinazoline alkaloids vasicoline, adhatodine, vasicolinone, and anisotine, while the inflorescence contains the separated compounds vasicinone and vasicol. From the plant's roots, sitosterol, B-glucoside-galactose, and deoxyvasicine have been extracted <sup>[7]</sup>.

The metabolite of vasicine is vasicinone. X-ray study of the alkaloid hydrobromides has demonstrated the 3S configuration for the absolute stereochemistry of (-)-vasicine and (-)-vasicinone. In a similar vein, there has been an association between vasicinol and vasicinolone. possess the 3S arrangement <sup>[8]</sup>. The treatment of vasaka cells with Chloramphenicol (100-200mg/l) antibiotic doubled the production of quinazoline alkaloids <sup>[9]</sup>.

#### Medicinal Activity:

The herb *Adhatoda vasica* has been used to cure a number of illnesses. It is a main medicinal herb used to treat respiratory conditions such as bronchitis, asthma, cough, and symptoms of typical cold <sup>[10]</sup>. Plant constituents have been shown to have antistress effects, which may be partially attributed to an endocrine and partially to an method of action by immunomodulation. This plant, which contains vitamin C, is used medicinally for a variety of conditions, including muscle spasms, fever reduction, inflammation, bleeding

prevention, bronchodilation, diabetes, disinfection, jaundice prevention, and oxygen therapy<sup>[11]</sup>. In addition to liquefying phlegm, it has antiperiodic, astringent, diuretic, and purgative properties. It is also utilised as an expectorant<sup>[12]</sup>. This plant's leaves, petals, and roots were used to make herbal medications that prevented cancer and tuberculosis and had anti-helminthic qualities<sup>[13]</sup>.

European medical professionals have also employed Vasaka. The fluid extract and tincture was used as a febrifuge, expectorant, and antispasmodic in England. It was also said to be helpful in treating intermittent typhus fever and diphtheria. The expectorant and spasmolytic properties of the leaves are employed in Germany and Sweden<sup>[14]</sup>. In Sri Lanka, the herb is used to cure menorrhagia and profuse phlegm.<sup>[15]</sup> Additionally, it is used to treat sexual problems, impotence, and bleeding piles. The paste, powder, and decoction of roots found in Southeast Asia is used to treat eye conditions, leucorrhea, malaria, diphtheria, and TB<sup>[16][15]</sup>.

For gonorrhoea, the root decoction is also utilised<sup>[17]</sup>. The plant's leaves are used in India to treat postpartum haemorrhage and urinary tract issues. Pregnant women in Lucknow, Uttar Pradesh's Gora village, also use the leaves to induce abortions. Netherh gives people in Bihar, India, a decoction of the leaves to stimulate and cure both before and after childbirth<sup>[18]</sup>. People in Uttar Pradesh's Sitapur area cure acute nightfall with a paste made from roots and sugar. Additionally, *A. vasica*'s macerated roots are administered to the vagina to aid in parturition. Boiling the leaf powder in sesame oil is used to treat jaundice, earaches, bleeding, and pus in the ears .



**Fig- 4 Medicinal uses of vasaka**<sup>[19]</sup>

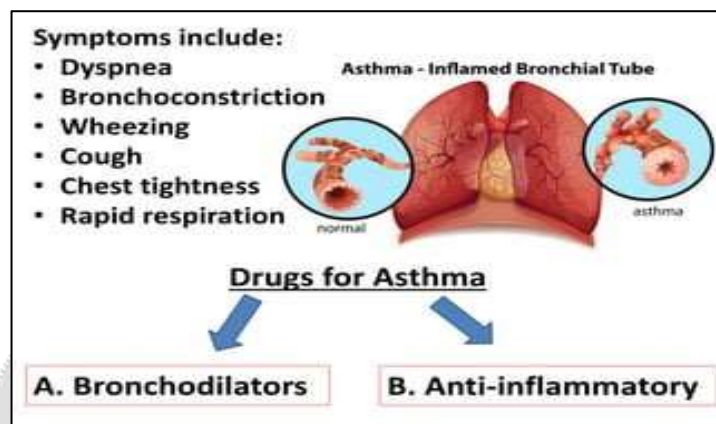
Vasaka plays a important role in traditional system of medicine in Ayurveda, like that it prevents coughing, acts as the antiviral agents also effective in curing Bronchitis, cures ulcers and vasaka also reduces the joint Pain. *Adhatoda vasica* used in treatment of Asthma it reduces the Asthma, cures sinusitis and provide relief to sore throat. Vasaka good for gut health and effective in urinary tract infection like as Uremia.

## Pharmacological Activity:

### 1. Anti- asthmatic and bronchodilator activity:

Treatment of asthmatic patients with *A. vasica* was found in clinical studies to improve lung function metrics and reduce asthmatic symptoms<sup>[20]</sup>. Important alkaloid vasicinone shown strong bronchodilator activity in both normal and histamine-induced bronchoconstriction in the lungs of guinea pigs, whereas vasicine demonstrated bronchoconstriction with detrimental inotropic effects on the heart.

During in vitro experiments, vasicinone generated tracheal relaxation that was similar to the constriction caused by histamine and theophylline incarbachol. In rat experiments conducted both in vitro and in vivo, it demonstrated anti-anaphylactic action and inhibitory effects on histamine release. Vasicine, on the other hand, showed no allergic effect and cardiac depression in addition to bronchoconstrictor properties. In contrast, vasicine had significant bronchodilatory effects in a different investigation, both in vivo and in vitro, that were similar to those of theophylline. This finding may be explained by the rapid breakdown of vasicine in the body



[21].

**Fig – 5 Asthma symptoms with their Drugs.**

## 2. Anti ulcer Activity:

In an ethanol-induced ulceration scenario, this plant's leaf powder demonstrated significant antiulcer action in experimental rats<sup>[7]</sup>. *Adhatoda vasica* was investigated for its ability to prevent ulcers brought on by aspirin, pylorus, and ethanol. Powdered *adhatoda* leaf had significant anti-ulcer efficacy in rats in the experiment as opposed to controls. The ethanol-induced ulceration model showed the highest level of activity<sup>[22]</sup>.

These findings imply that *Adhatoda vasica* has enormous potential as an anti-ulcer agent in addition to its well-known pharmacological properties. Additional study revealed that the symptoms of dyspepsia were alleviated with *Adhatoda* syrup<sup>[23]</sup>.



**Fig 6: Marketed preparations of vasaka used in Anti-ulcer Activity**

### 3. Wound Healing activity:

In order to conduct the study, buffalo calves had incisions made along their spinal columns, and powdered Adhatoda extracts made of alcohol and chloroform were administered. When compared to animals under supervision, the calves given Adhatoda Vasica demonstrated considerably better healing. Vasica enhanced the wound healing tissue's flexibility, tensile strength, breaking strength, and absorption.



**Fig- 6 Stages of wound healing**

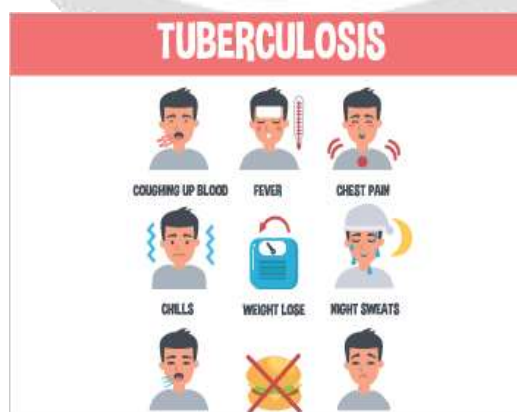
In addition, the animals treated with Adhatoda showed significantly higher levels of zinc, hydroxyproline, elastin, collagen, and hexosamine. It was discovered that the herb's alcoholic extract worked best <sup>[24]</sup>.

### 3. Anti-allergic activity:

In the plant of Vasaka active ingredients, vascinol and vasicine have anti-allergic properties by preventing ovalbumin-induced allergic responses in the guinea pig, mouse, and rat animal model Adhatoda vasica-containing patents are used to treat allergies <sup>[4]</sup>. Vasaka play a important role in the anti-allergic activity.

### 4. Anti-tubercular activity:

The Adhatoda vasica plant was shown to have anti- tubercular action based on the stated investigation. The investigation against Mycobacterium tuberculosis conducted in vitro showed that the two derivatives of vasicine, ambroxol and bromohexine, had a growth-inhibiting action on M. Tuberculosis <sup>[25]</sup>



**Fig-7 symptoms of tuberculosis**

### 6. Expectorant Activity:

According to the published research, when administered at a dosage of 50 mg/kg, the petroleum ether extract of the leaves exhibits expectorant action<sup>[25]</sup>. Vasaka gives expectorant as well as also give the antitussive activity.

Vasaka, rich in antibacterial, expectorant, and anti-inflammatory qualities, is very important for treating common cold, cough, and flu symptoms. Additionally, it clears excess sputum, eliminates nasal discharge, and lessens congestion in the chest and nasal passages.

### Conclusion:

Numerous experimental investigations have demonstrated the diverse biological actions of *Adhatoda vasica*. It is an example of a class of herbal medicine having a strong traditional or philosophical foundation.

Trial foundation for its application. Therefore, this plant has a lot of promise for development as a medication in the pharmaceutical industry. However, before recommending it for therapeutic usage in these situations, clinical trials must be conducted to demonstrate the plant's clinical value.

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