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REVIEW ARTICLE

Adhatoda vasica (Vasaka): A Medicinal Boon for Mankind

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ABSTRACT

Leaf of *Adhatoda vasica* (Vasaka) is an important drug of Ayurveda, prescribed as an expectorant. Quinazoline alkaloids present in the leaves are established as active principles. In Ayurveda, its leaf juice (Vasa swarasa) is incorporated in many formulations. *Adhatoda vasica* is a herb, also popularly known as Malabar nut in English, Adosa in Hindi and Vasaka in Sanskrit is used as botanicals against root knot nematodes. Parts of this plant used as medicinal value are leaves, roots, flower and stem bark. The leaves of *Adhatoda vasica* contain phytochemicals such as alkaloids, tannins, saponins, phenolics and flavonoides. Several alkaloids are present in the leaves. The most important is vasicine, a quinazoline alkaloid responsible for the medicinal activity of the plant. It has been used in preparation of herbal medicines for the past 2000 years. *Adhatoda vasica* is also used to relieve respiratory disorders and cough. The herb is often grown as a hedge and its leaves and twigs are utilized as green-manure. In spite of its use in medicinal value it has a good nematicidal properties.

1) INTRODUCTION

Adhatoda vasica (L.) Vasaka is a well-known plant drug in Ayurvedic and Unani medicine. Its first recorded mention can be traced all the way back to the Atharvaveda, the ancient Vedic text that is thought to be the root of Ayurvedic herbalism. It is readily recognized and well known in Indian society. When we travel to the Indian subcontinent, we would find that this small evergreen shrub is a common part of the landscape. It happily grows in dry climates and dry soil and it stretches across the Indian plains up to the foothills of the Himalayas. While the shrubs themselves are nothing remarkable in appearance, their flowers are their crowning glory. One of vasaka's names—vasa—translates as “perfume,” and it can be safe to bet that this name stems from the plant's flamboyant flowers. Vasaka is also known in Sanskrit botany as “lion's muzzle” and “stallion's tooth”—two undeniably powerful names that honor the strength of the plant. Vasaka is recognized as a powerful herbal aid that brings potent support to the lungs and respiratory system, with some additional benefits [17]. There is a popular Bengali saying that particularly captures the community's respect for vasaka, translating as, and “a man cannot die of disease in an area where *Vitex negundo* (bana), *Adhatoda vasica* (vasaka), and *Acorus calamus* (calamus) are found, provided that he knows how to use them. Some important bioactive compounds have been reported in various part of *Adhatoda vasica* are essential oils and quinazoline alkaloids [18].

2) TAXONOMY, MORPHOLOGY AND DISTRIBUTION

Adhatoda vasica (vasaka) is a large shrub of family Acanthaceae which grows crowded along waste land,

roadsides etc. It is distributed throughout India, especially in the lower Himalayas (up to 1300 meters above sea level), India, Sri Lanka, Burma and Malaysia. It grows to about a height of 1.5-2.0 m with leaves about 10-15cm long & 5.0cm wide & white or purple flowers & 4-seeded fruits [1]. Leaves are simple, opposite, ovate-lanceolate, acute and shiny. Flowers are white in capsule shape. All the plant parts like roots, leaves, bark and flowers are used in various herbal preparations (Figure 1).

3) PHYTOCHEMICAL ANALYSIS

Several workers isolated and identified active biomolecules in different parts of this medicinal plant. Two aliphatic hydroxyketones, isolated from the aerial parts of *Adhatoda vasica* have been characterized as 37-hydroxyhexatetracont-1-en-15-one and 37-hydroxyhentetracontan-19-one, respectively, on the basis of spectral data and chemical studies [2]. Bhartiya and Gupta [3] has been identified Dihydroxychalcone 4-glucoside in the flowers of *Adhatoda vasica*. Jain et al., [4] isolated alkaloid and a galactoside from the roots of this plant which were characterized as 9-acetamido-3, 4-dihydropyrido-(3,4-b)-indole and O-ethyl- α -D-galactoside respectively. Spectroscopic and X-ray diffraction analyses of Thappa et al., [5] indicates the presence of pyrroloquinazoline alkaloids, viz. 1,2,3,9-tetrahydropyrrol (2,1-b)-quinazolin-9-one-3R-hydroxy-3 (2'-dimethylamino phenyl (desmethoxyaniflorine) and 7-methoxy-3R-hydroxy-1,2,3,9-tetrahydropyrrolo-[2,1-b]-quinazolin-9-one (7

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methoxyvasicinone) in the the leaves of *Adhatoda vasica*.



Figure 1. *Adhatoda vasica* (Vasaka) plant

4) PHARMACOLOGICAL PROPERTIES

4.1 Antibacterial properties

Bioactive molecules present in aquatic and organic extracts of *Adhatoda vasica* are known to inhibit bacterial multiplication. Karthikeyan et al [6] tested the plant extracts against *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Bacillus subtilis*, *Enterococcus faecalis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Proteus vulgaris*, *Klebsiella pneumoniae* and *Candida albicans* and reported the antibacterial properties in vasaka plant.

4.2 Anti-inflammatory properties

Adhatoda vasica (L.) Nees is a known for the treatment of inflammatory and cardiovascular diseases. In 2013, Ahmed et al [7] screened the effect of *Adhatoda vasica* extract on platelet aggregation, adenosine diphosphate (ADP), platelet activating factor (PAF), and collagen in arachidonic acid metabolism.

4.3 Antioxidant properties

Padmaja et al [8] reported the antioxidant activities in leaf extracts of *Adhatoda vasica* Nees. The plant extract was found to contain antioxidant phytochemicals such as alkaloids, tannin, saponins, phenolics and flavonoids (Manoj Kumar et al., 2013).

4.4 Antitussive (bronchodilatory) properties

The antitussive activity of Vasicinone and Vasicine (major alkaloids) of *Adhatoda vasica* plant was evaluated in mammals by Atal [9] and Dhuley & Jayant [10]. Jahan & Siddiqui [11] studied the Antitussive Potential of *Glycyrrhiza glabra* and *Adhatoda vasica* using a cough model induced by Sulphur Dioxide gas in mice.

4.5 Abortifacient properties

Atal [9] reported uterotonic and abortifacient effects of vasicine present in vasaka plant possibly by enhancing the synthesis and release of prostaglandins. Gupta et al [12] also studied the promising abortifacient properties of Vasicine alkaloid of *Adhatoda vasica*.

4.6 Wound healing properties

Leaf extracts of *Adhatoda vasica* were found with the wound healing activity. Vinothapooshan & Sunder [13] conducted experiments to study the wound healing effect of methanolic extract *Adhatoda vasica* on albino rat.

4.7 Antifungal properties

Phytochemical constituents of *Adhatoda vasica* were found to inhibit the growth of human pathogenic fungus. Ramachandran & Sankaranarayanan [14] reported inhibition activity of *A. vasica* against *Aspergillus ruber* and *Trichophyton rubrum*.

4.8 Anthelmintic activity

Shaibani et al [15] reported anthelmintic activity of *Adhatoda vasica* (Acanthaceae) in vitro against the gastrointestinal nematodes of sheep. The aqueous and ethanolic extracts of *Adhatoda vasica* aerial parts were evaluated by egg hatching and larval development assays.

4.9. Hepatoprotective Activity

Ethyl acetate extract of *Adhatoda vasica* has been found with potent hepatoprotective effect against CCl₄ - induced liver damage [16].

5) CONCLUSION

The study of literature related to the *Adhatoda vasica* revealed that this plant has phytochemical and pharmacological activities. *Adhatoda vasica* is an important source of bioactive substances like vasicine, vasicinone, vasicolone and some other Alkaloids. These components are responsible for antibacterial, antifungal, hepatoprotective, antitussive, and antiulcer, abortifacient, thrombolytic, antioxidant properties.

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