

A REVIEW ON PHARMACOLOGICAL ACTIVITIES OF ADHATODA VASICA

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Abstract:-

Adhatoda vasica belongs to the Acanthaceae family. It is commonly known as Vasuka (Marathi), adosa (Hindi), Amalaka (Sanskrit), Basak (Bengali), Adatodai (Tamil), Adasaram (Telugu), Ata-lotakam (Malayalam), Malabar Nut (English) etc. It is found in many parts of India. Vasica is best known for its effectiveness in the treatment of respiratory diseases. It also has an expectorant effect and has been used for centuries with great success to treat asthma. Adhatoda vasica contains alkaloids vasicine, betaine, linoleic, linocerine, steroids and leaves contain quinazoline, triterpene, vitamin C, carotene, glycerides, essential oil, fat, sugar, gum, resins, amino acids, proteins, etc. The plant exhibits various biological activities such as asthma and bronchodilator, antiallergic, antiulcer, antiinflammatory, antioxidant, antituberculosis, antibacterial, antidiabetic, antitussive, anticarcinogenic and uterine. This review includes data on phytochemicals and information on biological activities of Adhatoda vasica.

Keywords:-

Adhatoda Vasica, adulsa, expectorant, antitussive, antiinflammatory,

Introduction: -

Medicinal plants play an important role in human life as we all depend on plants for our sustenance. Herbal medicine is an ancient healing practice and originated in ancient Greece in 1600 BC. Medicines derived from these medicinal plants have been used by various medical systems such as Ayurveda, homeopathy, naturopathy, Siddha, Unani to treat various types of diseases (1). Adhatoda vasica is a small

evergreen shrub growing up to about three meters in height. The plant can be found throughout the plains of India and in the lower peaks of the Himalayas, reaching an altitude of 1500 meters (3). It has opposite branches, climbing and large Exstipulate lanceolate leaves with a dark green to yellow tint (3)(4). The stemmed flowers are dense and large with large bracts and white or purple in color. This study updates the information on the phytoconstituents extracted from *A. vasica* and their potential involvement in the traditional and medical therapy of various diseases (4) (8). *Adhatoda Vasica* Nees Happiness To *Acanthus* Family, commonly called *Adosa*, is found in many parts of India and across the country with a variety of uses in the ancient Unani and Ayurvedic systems of medicine. (2) The broad and leathery leaves of *Adhatoda vasica* are useful in the treatment of bronchitis, tuberculosis and other lung and bronchiolar disorders. A decoction of *Vasaka* leaves can be used to relieve cough and other cold symptoms. The soothing action helps with throat irritation and the expectorant action will help loosen phlegm deposits in the airways (3). The plant is known to be a rich source of vitamin C, carotene and essential oil, phenols, flavonoids, sterols (1). This plant has been used for 2000 years to treat respiratory problems and was also said to be effective by the ancient Indians (1). *Adhatoda vasica* (A.

vasica) is included in the World Health Organization (WHO) manual for its traditional use in primary health care (4). All parts of *adusa* have medicinal properties, it has a characteristic odor and bitter taste (5). Its leaves, flowers, fruits, and roots are highly medicinal and are widely used to treat colds, coughs, whooping cough, chronic bronchitis, and asthma as a sedative, expectorant, and antispasmodic (6). Historically, the *Vasaka* plant has held an important place in ancient healing practices, particularly in Ayurveda, where it is valued for its therapeutic benefits. It is widely cited in classical Ayurvedic texts for its effectiveness in treating respiratory diseases, among other ailments. The leaves, roots, and flowers of the plant are especially known for their medicinal properties (7).



Popular names:

- 1) **Marathi Name** :- vasuka.
- 2) **Hindi Names**: – Arusha, Russia , Adusa.
- 3) **English Name**:- Malabar – Nut.
- 4) **Telugu Names**: – Adasaram, Adamkabu, Adampaka.
- 5) **Bengali Names** :- Adulsa.
- 6) **Sanskrit Name**:- Vasa, Vasaka.

Scientific

classification: -

Kingdom – Plantae

Subkingdom - Tracheobionta

Division – Magnoliophyta

Class – Magnoliopsida

Subclass – Asteridae

Order – Lamiales

Family – Acanthaceae

Genus – Adhatoda**Species – Vasica****Botanical description of Adhatoda vasica :-**

Adhatoda vasica is a perennial, dense, evergreen, densely branched shrub, belonging to the family Acanthaceae. The height of this plant reaches 1-3 to 6 meters (1). Adhatoda is a shrub with lanceolate leaves 10 to 15 cm long 3-10 cm wide, ovate lanceolate to lanceolate. It has a crenate margin, a conical base and a characteristic tip (11). Smooth edges and borne by short leaves (6) (9). Pedicels or panicles, small irregular zygomorphic, bisexual and hypogynous (10). The commercial name Vasaka is based on the Sanskrit name. Inflorescences in spike-shaped axillary cymes, with dense flowers; peduncles short; bracts mainly ovate, leafy (10). The stem is woody on the abaxial side and herbaceous on the adaxial side (1). When a leaf is stained with chloral hydrate and examined under a microscope, oval stomata can be seen. They are surrounded by two crescent-shaped cells at right angles to the ostioles (6). The leaves, flowers, fruits, and roots are widely used to treat colds, coughs, chronic bronchitis, and asthma, and as a sedative and expectorant (10).

Cultivation: -

Agroecological requirements Vasika will grow in a very wide range of climatic and soil conditions. Alluvial soils are best suited for optimal growth (2). Vasaka is grown by planting reform formulations or cuttings in deep, loamy, fertile, rich, acidic to slightly alkaline soils, pH 5.5 to 8.2 (9). When it comes to climate, Vasaka is relatively tolerant, but does best in warm environments. It can withstand temperatures ranging from 20°C to 30°C (12). 15-25 cm underground stem/root cuttings with 2-3 eye buds are planted directly in the field 6-8 cm deep in the soil at a spacing of 90x45 cm. In rows spaced about 4 meters apart in March, the addition of organic manure to the garden has a beneficial effect on plant growth (9). It can be grown as an associated anthombarop in coconut plantations and rubber plantations during the first 3 to 4 years. Production of carrier pegetic plants (2).

Chemical constituents: -

The wide variety of pharmacological uses of Adhatoda is believed to be the result of its rich concentration of alkaloids. The important alkaloid found in Adhatoda leaves is the quinazoline alkaloid known as vasicine (10). (hydroxypeganine), betaine, steroids, and kaempferkane. The leaves are rich in vitamin C and carotene, which make this plant a potential source of essential oil (13). The leaves, roots and young plants of adhatoda vasica contain the alkaloids quinazoline vasicine, 7-hydroxyvasicin, vasicinolone, 3deoxyvasicin, vasicol, vasicoline, vasicolinone, triterpenes, anisotineanisotine, betaine, steroids (2% darkness). Oil composed of glycerides behenic 11. 12.3 percent, oleic 49.9 percent and sitosterol (2: 6 %) (4). Major trace elements such as K, Na, Ca, Mg and minor trace elements such as analysis with atomic spectrometry³⁶ Here are various chemical compounds found in Adhatoda vasica plants. The leaves, roots, seeds, fruits, and flower stems contain many chemical components, including essential oils, fats, sugars, gums, resins, amino acids, proteins, and vitamin C(1). Research shows that these chemicals are responsible for the bronchodilator effect of Adhatoda (10).

Pharmacological Activity:- 1) Anti-asthmatic and bronchodilator activity:-

Both vasicine and vasicinone the primary alkaloid constituents of adhatoda are well established as therapeutical respiratory agents(10) (3). It Also acts as an expectorant by loosening phlegm. In guinea pigs, acetylcholine and histamine aerosol produced bronchial constriction (4). Experiment was conducted in anesthetic guinea pigs and rabbits and unaesthetic guinea pigs that showed

The antitussive property. Reported studies revealed the

Bronchodilator activity of Vasicine when experimented with both In vitro and in vivo(1).

2) Antiallergic activity: -

Research has shown that the vasicinone component of the adhatoda plant has antiallergic properties in rats, mice, and guinea pigs. In tests conducted on guinea pigs, the methanol extract of the plant demonstrated antiallergic and antiasthmatic

properties when inhaled or administered at a dose of 6 mg per animal or 2.5 g/kg, respectively (13).

3) Anti-ulcer activity: -

Adhatoda vasica has been studied for its anti-ulcer activity against ethanol, pylori and aspirin-induced ulcers. Adhatoda leaf powder showed a significant degree of anti-ulcer activity in experimental rats compared to controls (10). Vinothapooshan and Sundar examined the anti-ulcer efficacy of Adhatoda vasica leaf extracts in ulcer-induced albino Wister rats using methanolic, chloroform and diethyl ether extracts. Alcohol and aspirin were used to induce ulceration. The effects of the extracts were compared with those of the conventional drug ranitidine. The methanolic extract dose of 200 mg/kg showed significant results compared to the standard (3). **4) Anti-inflammatory activity: .**

Several bioactive components, including vasicin, vasicinone, vasicin acetate, 2-acetyl benzyl amine, and vasicinolone, are responsible for the anti-inflammatory properties of vasaca (13). When the anti-inflammatory activity of the plant extracts was measured using a modified hen egg chorioallantoic membrane assay, the methanol extract of the plant showed promise(3) .The alkaloid fraction showed potent activity at a dose of 50/pellet equivalent to that of hydrocortisone, while the MeOH extract and other fractions showed less activity. Singh and Sharma tested the anti-inflammatory activity using carrageenan and paw edema induced by the CFA model. The observed results revealed that vasicin showed the strongest anti-inflammatory effects (59 of 20.0 mg/kg)6 hours after carrageenan injection and a maximum inhibition rate was observed for vasicin (63.94%) at 10.0 mg/kg 4 days after CFA injection (6).

5) Antioxidant activity:-

The plant contains antioxidant phytochemicals such as alkaloids, tannins, saponins, phenols and flavonoids (8) Pant et al. (2015) used Soxhlet extraction to produce an ethanolic extract of Adhatoda vasica leaves, then performed several tests to measure antioxidant and anti-radical properties (3) .Antioxidant activity of methanolic extract of Adhatoda vasica . Vasica was evaluated by total antioxidant activity, 2,2 diphenyl-1-picrylhydrazyl radical scavenging activity, reducing power

potential and iron chelation activity. The extract showed high antioxidant activity in various antioxidant experiments. Extract from *A. vasica* showed the presence of high levels of polyphenolic compounds that could be the possible reason for the antioxidant activity of the plant (6). The plant has shown strong antioxidant and reducing capacity. The strong antioxidant and reducing capacity of the plant highlights its use as an antioxidant supplement against diseases such as typhoid in which the antioxidant system fails (8). It shows antioxidant and anticlastogenic efficacy against cadmium chloride (CdCl_2). The oxidative stress induced by the kidneys and genotoxicity induced by cadmium chloride (CdCl_2) in Swiss albino rats support its antimutagenic efficacy (14).

6) Anti-tuberculosis activity: -

The anti-tuberculosis activity of *Adhatoda vasica* is attributed to the formation of ambroxol and bromhexine from *vasica*, both of which have potent anti-tuberculosis activity when acting on the *Mycotuberculosis* tuberculosis strain (4). The indirect effects of

Adhatoda in tuberculosis include increased levels of lysozyme and rifampicin in bronchial secretions, lung tissue and saliva, suggesting that it may play an important role in the treatment. Extract the powdered leaves and test the extract against a strain of *Mycobacterium tuberculosis*. As a base, rifampicin (2 g/ml) and isoniazid (0.2 g/ml) were used. When comparing different concentrations of the extract, 100 g/ml had significant results (3).

7) Antibacterial activity: -

The antibacterial properties of *Adathoda vasica* were determined by extracting the leaves with different solvents and testing them in a Petri dish filled with microorganisms. After placing the extract in the Petri dishes using the disk diffusion method or the well method, they were incubated at 37°C for 24 h

(3). Conclusion: -

From several studies, it is clear that the plant *Adhatoda* plays an important role in the herbal medicinal system. The plant *Adhatoda vasica* contains phytoconstituents and exhibits pharmacological activities. *Vasaka* plant parts are used in the treatment of respiratory disorders and have various pharmacological uses such as

antibacterial, antitussive, anti-inflammatory, anti-ulcer, anti-cancer, anti-diabetic and protective for the heart, liver, lungs and. Other organs. The scientific formulation of these herbs shows beneficial activity, especially in respiratory diseases.

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