



A REVIEW ON: PHARMACOLOGICAL ACTIVITY AND TRADITIONAL USES OF ADHATODA VASICA (JUSTICIA ADHATODA)

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ABSTRACT

Adhatoda Vasica (L.) Nees, also known as *Justicia adhatoda* L., belongs to the Acanthaceae family and is considered the most important plant in the genus world. It is commonly known as Vasaka, Vasica, Adosa or Malbur nut and is distributed in various parts of India and the world. In order-plants known in Ayurvedic and Unani healing systems. This plant has been used in the indigenous healing system of India for over 2,000 years. The plant has great medicinal importance and is used to treat various diseases and ailments, especially respiratory diseases such as coughs and cold symptoms, colds, asthma, tuberculosis and chronic bronchitis. All parts of the plant are used medicinally. The main chemical ingredient is vaciniaare contained in this plant which has various medicinal properties and is used in various Ayurvedic preparations. It also contains various reports pharmacological properties such as antispasmodic, sedative, expectorant, antitussive, oxidative, antibacterial, antidiabetic, healing, abortifacient, against asthma and abscesses.

KEYWORD: Vasapatra, Ayurveda, Rasapanchak, Pharmacological activity

INTRODUCTION

Herbaceous plants play an important role in human life, just as they do for each of us people depend on plants for their livelihood. Phytotherapy is outdated healing practice and originated in ancient Greece in 1600 BC. According to the WHO (World Health Organization) there are approximately 6000 species of higher plants in India, 40% of which are. There are species used in the traditional healthcare system. Majority plants have medicinal properties and are used to cure various diseases/conditions (1). There are about 258,650 species of higher plants reported worldwide, of which 10% of the plants are used in different cultures and societies to cure various diseases (2). Medicines from these medicinal plants were used from various healing systems such as Ayurveda, Homeopathy, Naturopathy, Siddha, Unani for various types of treatments/diseases (3). *Adhatoda Vasica* Nees (Fig. 1), also known as "Vasaka, Adosa, The Malabar walnut belongs to the Acanthaceae family. It is also, known by the synonymous name *Justicia adhatoda*. We think about it the most important medicine in Ayurvedic and Unani medicine systems (4,5). The plant is a small evergreen plant found mainly in the plains regions in India, Sri Lanka and Burma (6). This plant was used has been treating respiratory diseases for 2000 years and we have talked about that too Old Indians » "No man suffering from tuberculosis should despair. » as long as the Vasaka factory exists. The leaves of this plant give has a stimulating effect on the respiratory tract (7). In Ayurveda in the healing system of, it is considered the most important medicinal plant for treating illnesses such as cough, cold symptoms, asthma, bronchitis (8). This plant is was treated like a mother by doctors in the traditional medical system originally comes from India, which is why it is called *Vaiyamata singhee* (9) in Sanskrit. IL, the main component that would be present in A. The Vasica plant is *Vasicin*, a quinazoline alkaloid with great potency medical significance (10). The plant is known to have a rich source vitamin C, carotene and essential oil, phenols, flavonoids, sterols (11,12). It is used medicinally in the Ayurvedic system of medicine. different diseases like Shwasa (shortness of breath), Ksaya (consumption), Kasa (cough), Raktapitta (hemorrhagic disease), Kamala (jaundice) and Kushtha (skin disease) (13). Source of medicine "Vasaka" is considered to be its native system of medicine. The contains various medicinal properties including: Protection of the circulatory system, anti-tuberculosis, anti-ulcer, anti-asthmatic, hepatoprotective, antibacterial, antitussive, anthillmutagenic, antibacterial, abortifacient (14). This plant is known, among other things, as different names in states of India and other countries shown in table 1.

TABLE 1: Vernacular names for Adhatoda vasica

Hindi	Adosa, adalsa, vasaka
Sanskrit	Shwetavasa, vasa, vasaka, Vaidyamata singhee
Bengali	Basak
Tamil	Adatodai
Marathi	Vasuka
Telugu	Adasaram
Malayalam	Ata- lotakam
Gujarati	Aradusi, adusa
Punjabi	Bansa, basuti, bhekkar
English	Malabur nut
China	Ya-Zui-Hua
Manipuri	Nongmangkha-agouba
Kannada	Adusoge
Arabic	Adusha ¹⁵⁻¹⁸

TABLE 2: Botanical classification of adhatoda vasica

Taxonomical Rank	Taxon
Kingdom	Plantae
Division	Angiosperms
Class	Eudicots
Order	Lamiales
Family	<i>Acanthaceae</i>
Genus	<i>Justicia</i>
Species	<i>J. adhatoda</i>
Common name	Adulsa (Vasaka) ^{19,20}

Botanical portrayal of Adhatoda vasica

Adhatoda vasica could be a little, thick, lasting, thickly branched, evergreen bush that has a place to the family Acanthaceae. The stature of this plant comes to up to 1-3 to 6 meters⁽¹⁵⁾. It contains long inverse branches. The stem is woody from the abaxial side and herbaceous from the adaxial side. Blooms are huge, thick, terminal spikes with huge bracts, indiscriminate, zygomorphic, little, unpredictable, hypogynous, white, pink or purple in appearance with length 1.9-2.2 cm and breadth 2.2 cm - 0.8 cm^(16,17). The taste and scent of the plant are repulsive and bitter⁽¹⁸⁾. Clears out of the plant are basic, dim green, decreasing base; reticulate, inverse, brief peduncle, elliptic-lanceolate or ovate-lanceolate, bushy with breadth 4-7 cm and 7-19 cm long⁽¹⁹⁾. The natural product of this plant is little, clavate and longitudinally capsulated having four globular seed.



Figure 1: *Adhatoda vasica* (*J. adhatoda*)

PHYTOCHEMICAL COMPONENTS OF ADHATODA VASICA

Chemical compounds are present in the plant *Adhatoda Vasica*. Leaves, roots, seeds, fruits, flower stalks contains several chemical components, including essential oils, fats, sugars, gums, resins, amino acids, proteins and vitamins (21). The analysis results showed that the leaves of *J. adhatoda* contain phenols, flavonoids, alkaloids, anthraquinone, saponins and reducing sugar (22). Pharmacologically best studied The phytochemical component of the bitter quinazoline alkaloid vasicin (1,2,3,9-Tetrahydropyrrol[2,1-b]quinazolin-3-ol, $C_{11}H_{12}N_2O$) present in flowers, roots and leaves (23). Vasicin is produced by adding 2-aminobenzylamine to the environment Vasicinone tricarboxyl reagent (24). Second triterpenoid 3-Hydroxyl-D-friedoolean-5-ene with two other compounds In the above-ground parts there are also called Epitaraxerol and Peganidin *Adhatoda basica* Nees. Main trace elements such as K, Na, Ca, Mg and smaller trace elements such as Zn, Cu, Cr, Ni, Co, Cd, Pb, Mn and Fe can also be found during elemental analysis using the atomic method Absorption spectrometry (25). Structures of some fields of study In Fig. 2.

Leaves : shows secondary plant substances. The two main alkaloids of this plant are vasicin (0.85%) and vascion (0.027%), present in the leaves and roots (26). The leaves of the plant also contain other alkaloid components such as: under the names Vascionone, Vascionol, Adhatodine, Adhatonin, Adhavasine, Anisotine and Hydroxypeganine. Apart from that it also contains a small amount of essential oil and crystalline acid, betaine, steroids and alkanes (27-29).

Flower : It contains triterpenes (alpha-amyrin), flavonoids (astagaline, kaempferol, quercetin, witeksin, apigenin), 4-dihydrochalcone - Glucosides and alkanes (30-32).

Root : The root part contains vitamin C (5.2%), fats (2.5%), daucosterol, i.e. steroids, carbohydrates, alkanes and alkaloids such as Vascion (7.5%), Vascinal, Vascionolone, Vascion 3.5%, fiber (5.2%) and adatonin. β -glucoside galactose, sitosterol. The root part of the plant also contains extracts of deoxyvascin (33).

Seed : Seed contains 25.8% of a dark yellow oil consisting of glycerides: peanut acid 3.1%, lignoceric acid 10.7%, oleic acid (34).

TRADITIONAL USES OF ADHATODA VASICA:

Traditional uses In *Adhatoda Vasica*, an Ayurvedic medicinal plant, was used for various lung and respiratory infections, including whooping cough, for coughs, chronic bronchitis and asthma and was used as an expectorant sedative to treat excess phlegm (phlegm), residue and exfoliated inflammatory cells) and menorrhagia (abnormal blood clotting, change in normal hormonal balance) Regulation of menstruation or disorders of the uterine lining (uterus) in Sri Lanka. It is also used to treat bleeding Hemorrhoids, impotence and sexual dysfunction. I, antispasmodic and anthelmintic drug. Glycodin, a famous product for The medicine for bronchitis is a product obtained from the leaves *Adhatoda Vasica* [35]. In addition, it was found that the extracts very effective against tuberculosis. Various parts of the plant has been used in Indian traditional medicine for the treatment of asthma, joint pain, lumber pain, sprains, cold, cough, eczema, malaria, rheumatism, swelling and venereal diseases. Roots: In India paste of the fresh root applied on abdomen and vagina minutes before childbirth facilitates easy delivery. The extract of roots of *Adhatoda vasica* has commonly been used by rural population against diabetes, cough and certain liver disorders. Whereas its paste has been used for curing tuberculosis, diphtheria, malarial fever, leucorrhoea, eye diseases, acute nightfall [(paste mixed with sugar) in Sitapur district, Uttar Pradesh, India. Further, the root's decoction has been used for gonorrhoea and as an expectorant, antispasmodic/anthelmintic agent [36]. Various leaf preparations were used for the treatment Bleeding, bleeding, skin diseases, wounds, headaches and leprosy (chronic infection) when infused or extracted with solvent proved to be an excellent destroyer of flies and white mosquitoes. Mixed juice from fresh leaves with honey and ginger juice cures all types of acute cough, chronic bronchitis, shortness of breath and liquefies sputum and asthma. Extract obtained by decoction of leaves and fruits *Phyllanthus emblica* mixed with honey has been shown to be effective against asthma. For this purpose, chopped fresh leaves of the plant are used. deals with snake bites (India and Sri Lanka). Macerated extract from leaves/yellow leaves/smoke

from dried leaves has a cough suppressant effect and mucus congestion in colds (Bangladesh) and infusions protect against headaches (Burma and Pakistan). Leaf powder cooked in sesame oil stops bleeding, earache and pus and jaundice. The juice of the leaves was used as the best medicine to increase the platelet count in dengue fever, such as B. Viral fever, after delivery bleeding, urinary problems, hyperacidity and belching and mixtures thereof with jaggery reduces excessive menstrual bleeding and is cured. The externally heated leaves were used against rheumatic pain and sprains, joints, stomach catarrh with constipation, rheumatism, gout, fever and urinary stones. The juice of the bark and leaves is useful for vomiting. Flowers: Flowers are known to cause have expectorant, anti-asthmatic and antiseptic properties was used for ophthalmia, colds, tuberculosis, asthma, bronchitis, cough, antispasmodic effect, high fever and gonorrhea. And flowers improve blood circulation and intensify blood circulation. Fruit: fruit *Adhatoda Vasica* contains four seed pods. In Pakistan fruit plants are used for colds, antispasmodics and bronchitis. The fruits of this plant are also used against diarrhea, dysentery, fever, etc. as a laxative [37-39].

PHARMACOLOGICAL ACTIVITY :

Bronchodilator effect: Phytochemical and pharmacological research *Adhatoda zeylanica* reports that medicinal plants have medicinal properties of plant secondary metabolites due to the presence of various complex chemical substances of different compositions. It was also mentioned that *Adhatoda zeylanica* is used for treating cold, cough, whooping cough, chronic bronchitis, asthma and also used as sedative, expectorant, antispasmodic classes. Contains *Adhatoda zeylanica* numerous phytonutrients such as the alkaloid quinazoline i.e. Vascina, Vasicinone, Vasicinol, Vasicin and Vasiculin. Alkaloids vascine and vasicinone had a bronchodilating effect (40).

H1N1 Flu prevention activity: Bronchodilator effect: Phytochemical and pharmacological research *Adhatoda zeylanica* reports that medicinal plants have medicinal properties of plant secondary metabolites due to the presence of various complex chemical substances of different composition. It was also mentioned the use of *Adhatoda zeylanica* for treatment cold, cough, whooping cough, chronic bronchitis, asthma and is also used as a sedative, expectorant and antispasmodic classes. Contains *Adhatoda zeylanica* numerous phytonutrients such as the alkaloid quinazoline i.e. Vascina, Vasicinone, Vasicinol, Vasicin and Vasiculin. Alkaloids: vascine and vasicinone show measures to prevent influenza H1N1: Focus on the current disease scenario of one of the studies shows that *Adhatoda* has potential prevents swine flu. (41).

HIV protease inhibition activity: It was noted in a different study that *Adhatoda vasica* Nees. may have some role in inhibiting HIV proteases. While AIDS is among the biggest problems with public health in the health sector in the world today. An assessment of HIV prescreening program for agents from organic sources, such as different *Adhatoda* crude extracts *Vasica* in vitro was carried out. Regarding the testing Pepsin assay was used in place of for this purpose. Screening with HIV-protease blocker of the HIV protease. That it was stated that pepsin has a fairly similar similarity between HIV-1 protease and its proteolytic activity namely, one of the essential HIV-1 life cycle enzymes and both remain members of the same aspartate enzyme family. observed that *adhatoda vasica*'s aqueous extract revealed highly considerable suppression of pepsin's enzymatic activity. It's additionally, it was stated that structural and functional HIV-protease and plant resemblance to pepsin extracts with pepsin-inhibiting properties enzyme, it ought to likewise prevent HIV-protease from acting. Thus, it was said that this study requires

additional contemplation on chemical analysis and isolation of *Adhatoda vasica*, the plant extract's active ingredient (KP Singh et al., 2010) (42).

Detailing composition activity: Consider conducted on Ayurvedic arrangements, uncovered that *vasaka* clears out juice was joined in more than 20 definitions counting *Vasarishta*, *Mahatiktaka ghrita*, *Triphata ghrita*, *Vasavaleha*, *Vasakasava*, *Mahatriphata ghrita*, *Panchatikta ghrita guggulu* and *Panchatikta ghrita*. In these definitions classical strategy of extraction was utilized viz. not appropriate for large-scale generation of clears out juice. It is utilized against a few infections i.e. malarial fever, fever caused by Pitta and Kapha, unremitting fever, inborn discharge, hack, asthma, sickness, skin infections and heaps. It is additionally detailed to be an expectorant, abortifacient, antimicrobial, antitussive and anticancerous. Subsequently, in this consider diverse adjusted strategies counting conventional i.e., steaming of clears out is utilized for commercial generation (Soni S, et al 2006) (43).

Anti-inflammatory activity: In case of irritation of pyorrhoea it was found that twenty-five patients enduring from pyorrhoea treated with knead of kindled gums by *Adhatoda vasica* leaf extract appeared the decrease and alleviation in the fiery and dying conditions of gums (Doshi JJ, et al 1983) (44).

WBC expanding activity: In another case it was found that *Adhatoda vasica* plant was successful to extend add up to WBC, blood lymphocytes, splenic lymphocytes and peritoneal macrophages as well because it was essentially defensive against *Escherichia coli* that initiated stomach peritonitis (Thakur SR 2007) (45).

Throat alleviation and diabetes related sickness activity: One of the considers detailed that the complete parts of *adhatoda* plant are utilized as pharmaceutical. The clears out, blooms, natural products and roots are utilized for treating cold, hack, whooping hack, persistent bronchitis and asthma. The plant too has potential anti-diabetic movement in pale skinned person rodent after organization of extract of *Adhatoda zeylanica* (Meenakshi B, et al 2010). The examination on phytochemical screening of six restorative plants appeared positive comes about for all phytochemical constituents viz. tannins, saponins, flavonoids, carbohydrates, alkaloids, anthraquinones utilized for HIV treatment. This ponder gives a modern methodology of treatment in creating social mindfulness among the HIV patients, as compared to anti-microbial treatment (Bharathi B, et al 2011) (46).

Anti-allergy movement: The consider conducted on vasicinone movement appeared that power towards unfavorably susceptible responses on mice and guinea pigs. The movement of alkaloid vasicinone and 20%vasicine was found inhibitory at 5 mg amount up to 37% (Paliwa JK, et al 2000, Wagner H 1989) (47).

Anti bacterial movement: The antibacterial movement of Adhatoda clears out extricate was tried by paper circle and weakening strategy. It was found that alkaloids show in this plant have solid antibacterial movement against *Pseudomonas aeruginosa*. Next to, antibacterial movement against the gram-negative i.e. *E. coli* and Gram-positive microscopic organisms strains i.e. *Streptococcus faecalis*, *Staphylococcus aureus*, *Staph epidermidis* were moreover famous (Patel VK, Venkatakrishna BH 1984)(48).

Abortifacient and uterotonic activity: The in vivo and in vitro thinks about were carried out to identify the uterotonic action of *J. adhatoda* plant which is comparative to the oxytocin and methylethylergometrine. It was too detailed that the Vasicine component has abortifacient activity⁸⁰. The consider was carried out in rats, guinea pigs, hamsters and rabbits. It was found that Vasicine has abortifacient property and acts through the discharge of prostaglandin hormones⁸¹. In vitro ponders were carried out in synthesized subsidiaries of Vasicine and Vasicinone illustrated to have oxytocic movement at a measurement over 1 µg/ml⁸². When considered within the pale skinned person rodent demonstrate, it was found that the watery extricate of clears out uncovered 100% abortifacient action when given in 175 mg/kg dosage⁽⁴⁹⁾.

Antiulcer activity: Past ponders uncovered that the ethanolic extricate of leaf powder appeared antiulcer action when tried in an ethanol-induced rodent mode (50).

Antimutagenic activity: Analysts considered the antioxidant and anticlastogenic viability of *Adhatoda vasica* against cadmium chloride (CdCl_2)–induced renal oxidative push and genotoxicity in Swiss pale skinned person mice. A single intraperitoneal dosage of CdCl_2 (5 mg/kg b.wt.) brought about in critical ($p < 0.001$) increment in chromosomal distortion and micronuclei arrangement. Verbal organization of *A. vasica* at two dosages (50 and 100 mg/kg BW) for seven sequential days appeared critical ($p < 0.001$) concealment of mutagenic impacts of CdCl_2 in plant-pretreated bunches. Cadmium inebriation modified the antioxidant levels and upgraded MDA arrangement essentially ($p < 0.001$). *Adhatoda vasica* appeared noteworthy ($p < 0.001$) recuperation in antioxidant status, viz., GSH substance, its subordinate chemicals, and catalase movement. Prophylactic pretreatment of *Adhatoda vasica* extricate in cadmium-intoxicated mice appeared stamped ($p < 0.001$) hindrance of lipid peroxidation (LPO) and xanthine oxidase (XO) movement (Jahangir et al., 2006) (20).

Wound recuperating activity: From different detailed ponders it was found that the alcoholic and chloroform extricates separated from takes off of *J. adhatoda* plant appeared mending impact and act as a treatment. It was moreover detailed that the recuperating rate is higher in buffaloes as compare to pancreatic tissue extracts⁽⁵¹⁾.

Anticholinesterase activity: The test thinks about appeared that the Vasicine constituent extricated from the roots has anticholinesterase movement and delivered temporal hypotension in cats, sadness of confined heart and withdrawal of the confined digestive system in guinea pigs⁽⁵²⁾.

Expectorant activity: From the detailed ponders it was found that the petroleum ether extricate of the clears out has expectorant action when given at a dosage of 50 mg/kg (53).

Immunomodulatory activity: Different exploratory considers illustrated that diethyl ether, chloroform and Methanolic extricate confined from takes off of *Adhatoda vasica* has the immunomodulatory property. To discover out the immunomodulatory action, the ponder was carried out in male Wistar rats managed with an verbal dose of 400 mg/kg brought about in an expanding rate of neutrophil attachment to nylon strands and boost the resistance of the host⁽⁵⁴⁾.

CONCLUSION

From different detailed considers it is obvious that *Adhatoda vasica* plays a critical part within the home grown restorative framework. This plant is utilized in Ayurveda and Unani restorative frameworks from old times. The conventional and Ayurvedic view of this plant is briefly talked about within the current ponder. It is widely studied for its chemical constituents and therapeutical properties. This plant may be a wealthy source of Vitamin C, Vasicine, Vasicinone and other alkaloids components. Different logical considers uncovered that the *Vasaka* plant has distinctive pharmacological properties demonstrated by numerous exploratory ponders like antifungal, antitussive, antiulcer, abortifacient, hypoglycemic, anti-tubercular, anti-inflammatory, radio modulatory, antiviral, hepatoprotective. Logical ponders uncovered that the definitions made from this plant are useful to human utilize particularly in respiratory diseases.

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