

A Review on medicinal significance of Justicia Adhatoda

¹Amar Satish Wangujare, ²Kanifnath Asaram Gaikwad, ³Umesh Appasaheb Misal,
⁴Vishal Ramprasad Raykar, ⁵Ajinkya Ganesh Padol

Research Scholars
Raosaheb Patil Danve College of Pharmacy
Badnapur.

Abstract- It has been determined that up to 25% or of the prescriptions are related to natural products directly derived from plants. Therefore, over the last few years, people have become interested in learning about herbs and their long-term applications in many countries. Today, however, scientific evidence must be presented to justify the use of herbs or their active ingredients. In the case of modern drugs, they should be further characterized after clinical trials by examining toxicity as well as pharmacokinetic and pharmacodynamic properties. Therefore, this communication includes a review of the medicinal properties, ethnomedicinal uses, phytochemistry, pharmacological activity, pharmacokinetics, and toxicity of the Indian medicinal herb Justicia adhatoda. Various phytochemical components are isolated from J. Adhatoda; Among them, have important functions such as anti-inflammatory, abortifacient, antibacterial, anti-cardiovascular, anticholinesterase and anti-inflammatory. Although the medicinal value of this plant is due to the presence of small doses of active compounds that stimulate the body in humans and animals. Some important bioactive compounds have been demonstrated in many plants. Therefore, J. Adhatoda extract may be one of the best options for the development of new natural medicines.

Keywords- Justicia Adhatoda, Acanthaceae, Inhibition zone, Proteus vulgaris, pharmacological activities, Pharmacokinetic, phytochemistry, toxicity

INTRODUCTION:

For thousands of years, plants have played an important role in maintaining human health and the quality of life of human civilization. The use of medicinal plants is as old as human civilization itself, and of the approximately 258,650 higher plant species reported in the world; More than 10% of are used to treat patient. [1] Many existing medicines such as Ayurveda, Unani, Homeopathy, Naturopathy, Siddha, and other medicine systems have used herbs as effective medicine to treat various ailments. The World Health Organization (WHO) estimates that 80% of the world's population rely on drugs for their primary medical needs and most of these treatments. It includes the use of plant extracts or their products. Justicia adhatoda (L.) Nees (Acanthaceae) is a plant distributed in tropical countries in Southeast Asia. [2] J. adhatoda (L.) Horse and Adhatoda zeylanica Medic are synonyms. It is commonly known as Vasaka or An old Indian example is "As long as it's the Vasaka plant, TB patients should not despair". Therefore, the frequent use of J.adhatoda allows it to be included in WHO handbook "The Use of Medicines in Medicine" for use by healthcare professionals in Southeast Asia to teach the benefit of flora. around them in clinical practice (WHO, 1990). Vasicin and vasininone, the major alkaloids of plants, were found to be biologically active and have been the subject of many compounds and pharmacological studies have been discussed. Malabar fruit. It is a perennial, evergreen, and highly branched tree (1.0 m to 2.5 mm high) with a strong odour and bitter taste. [3] It has branches growing with white, pink, or purple flowers. It is a very important Ayurvedic medicinal herb used to treat colds, coughs, asthma, and tuberculosis. Its main functions are expectorant and antispasmodic (bronchodilator in addition, the importance of the Vasaka plant in the treatment of respiratory diseases can. [5]

MEDICINAL PROPERTIES:

J. adhatoda is a well-known botanical remedy in Ayurveda and Unani medicine. It is used by Ayurvedic doctors and has some medicinal properties. has been used in the treatment of many diseases and ailments, especially respiratory diseases. It is therefore an important herb of the Ayurvedic system for the treatment of cough, bronchitis, asthma, and cold symptoms. The root of the drug "Vasaka" is well known in the medical community, especially with its good results in bronchitis. Similar to bisolvent, a brand-name drug containing Vasaka, is used to clear the channel by reducing mucus and opening the channe. [6] Various herbs are available for the treatment of various respiratory disorders. For example, Kanjang, an oral solution containing a combination of extracts of Echinacea purpurea, J. adhatoda, and extracts of Eleutherococcus senticosus, has been used to reduce symptoms associated with the common cold (wear and throat). With established drug use, including the daily drug use of 50 million people. The main strength of this drug is usually, depending on the Vasaka, cancer) and antibodies. The juice of leaves is said to treat diarrhoea, stomach pain and cancer. In addition, plants are used for therapeutic purposes in homeopathy. [7]

ETHNOMEDICINAL USES OF JUSTICIA ADHATODA

1. Whole plant

All herbs are used as ingredients in many popular formulations, including Zingiber officinale (Zingiber officinale) and Tulsi (white basil), which exerts the expectorant and antispasmodic power of along with cough syrup for [5] plant is used in Sri Lanka for the

treatment of phlegm and menorrhagia. It is also used in the treatment of bleeding haemorrhoids, impotence, and sexual dysfunction^[8]

2. Leaves

One yoga practice is to chew the leaves alone or with a pinch of ginger root to clear gas as you prepare for deep breathing.^[9] Various preparations of the leaves are used in Southeast Asia to treat haemorrhages, skin diseases, injuries, headaches, and leprosy.^[10] Fresh rotten leaves are used to treat snake bites in India and Sri Lanka. Generally, the yellow leaves are used in the treatment of cough, and the smoke of the leaves is used in the treatment of asthma. The leaves of the plant are used to control postpartum blood and urinary tract infections. 1995^[11] It was found that 70% of pregnant women in Gora village in Lucknow (Uttar Pradesh, India) used *J. adhatoda* leaves for abortion. Additionally, it has been found that the Nethat people of Bihar (India) use a decoction of leaves for stimulation and treatment before and after birth. Bean flour boiled in sesame oil is used to reduce bleeding, earache, and ear discharge. and pale. The decoction of its leaves and its ash are used as antipyretic and acidity reducer in bronchial diseases such as asthma and tuberculosis.^[15] The leaves are poisonous to "all lower life" and are an insecticide. It is also used for gastric mucositis, constipation, gout, urinary tract stones. The heated leaves are used topically for rheumatism and dislocated joints. In addition, the preparation of ling leaves is used in Burma to treat wealthy people suffering from certain types of water in the body^[2]

3. Root

The root extract of *J. adhatoda* is mostly used by rural residents to treat diabetes, cough, and some liver diseases. Pastes, powders, and decoctions of the roots are used in Southeast Asia to treat tuberculosis, diphtheria, malaria, leukorrhea, and eye infections.^[12] In the Sitapur district of the Indian state of Uttar Pradesh, a paste made from roots mixed with sugar is used to treat night pains.^[21] Also, softened roots of *J. Adhatoda* is used on the abdomen and genitals to aid in childbirth and facilitate fetal expulsion. Root decoction is also used for gonorrhoea.^[25]

4. Flower

The flowers are used in eye medicine, and various flower preparations are used in Southeast Asia to treat colds, tuberculosis, asthma, bronchitis, cough, antispasmodics, fever, and gonorrhoea. The flower is also used as an antiseptic to improve blood circulation and blood temperature.^[22]

5. Fruit

The fruit of *J. adhatoda* are used for curing cold, antispasmodic, bronchitis, Diarrhoea, Dysentery, Fever and as laxative.^[11]

PHYTOCHEMISTRY

Chemicals found in *J. adhatoda* plants include essential oils, fats, resins, sugars, gums, amino acids, proteins, and vitamin "C", among others. Phytochemical analysis showed that the leaves of *J. adhatoda* contain phenols, tannins, alkaloids, anthraquinones, saponins, flavonoids and reducing sugars.^[14] But *J.* The most studied drugs are in the field of pharmacology.^[25] A bitter quinazoline alkaloid found in *adhatoda*, leaves, roots, and flowers are vaccine (1, 2, 3, 9 tetrahydropyrrole [2, 1-b]quinazolin-3-ol, C₁₁H₁₂N₂O) (Fig. 1). It can be coupled by adding 2-aminobenzylamine to an ortho-tricarbonyl reagent, resulting in a short synthesis of Vasisin. In addition to cassava, the leaves contain many alkaloids (Vasicinone, Vasicinol, Adhatodine, Adhatonin, Adhanom, Anisotine and Hydroxypeganine), betaines, steroids, and alkanes. Vasicin is metabolized to Vasicinone, and analysis of *J. adhatoda* leaf extracts showed that it contains 0.85% guardian and 0.027% vassinon. The exact stereochemistry of (-)-Vasisin and (-)-Vasicinon is shown as 3S^[23] configuration on the basis of X-ray analysis of the alkaloid hydrobromides. Similarly, Vasicinol and Vasicinolone which have been interrelated should also have the 3S configuration. The novel alkaloid isolated leaves and characterized as 1, 2, 3, 9-tetrahydro5-methoxypyrrol [2, 1-b] quinazolin-3-ol.^[26] The roots also contain alkaloids (vasicinal, vasicinolone, vasicinone and adhatonine), a steroid (daucosterol), carbohydrates and alkanes. In the flowers triterpenes (α -amyryn), flavonoids (Apigenin, Astragaln, Kaempferol, Quercetin, Vitexin) and alkanes have been found.^[23]

PHARMACOLOGICAL ACTIVITY OF JUSTICIA ADHATODA

Anti-inflammatory Activity

The methanolic extract of *J. adhatoda* was evaluated for anti-inflammatory activity by the modified egg allantoic membrane assay.^[28] The alkaloid fraction was found to be active at a dose of 50 μ g/particle.

Antimicrobial Activity

The aqueous extract has been shown to be effective against microbial flora isolated from patients with gingivitis. Alcoholic extracts of leaves and roots showed antibacterial activity against *Staphylococcus aureus* and *Escherichia coli*, while the liquid extract showed activity only against *Staphylococcus aureus*.^[27] The crude ethanol extract of the leaves has antibacterial activity against *Staphylococcus epidermidis*, *Bacillus subtilis*, *Proteus vulgaris* and *Candida albicans*. Also, *J.*'s methanol extract. *adhatoda* has been shown to have good antibacterial activity against *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Bacillus subtilis*, while *Escherichia coli* is not well inhibited by the extract of the plant tested.^[28] The sap showed little growth affecting fungi, *Microsporum gypsum*, *Chrysosporium tropicalis* and *Trichophyton terrestris*. The growth of *Mycobacterium tuberculosis* has been shown to be inhibited by the mucolytic action of benzylamine, ambroxol, and bromhexine (a semi-synthetic derivative of vasicin). Because these compounds are concentrated in macrophages, they may be effective against *M. tuberculosis* by increasing lysozyme levels in bronchial secretions and rifampicin levels in lung and mucus. Therefore, these compounds are frequently used as adjuvant drugs in the treatment of tuberculosis.^[26]

Abortifacient Activity

Vasicine has been shown to have uterotonic activity in many species, including humans. It turns out that this effect depends on how much estrogen prepares the uterus. Vasicine induces contraction of human myometrial bands from pregnant and lactating women with effects comparable to oxytocin and maserin. In a study on rats, rabbits,^[26] hamsters, and guinea pigs; has been shown to have

uterotonic and abortive effects by promoting the synthesis and release of prostaglandins. In this study, a dose-dependent effect was observed with 2 effective doses.^[24] 5 to 10 mg/kg. However, administration of estradiol dipropionate improved abortion in guinea pigs, whereas aspirin therapy prevented abortion due to inhibition of prostaglandin release.^[28]

Antitussive

Extracts of *J. adhatoda* showed good antitussive activity in anesthetized rabbits and guinea pigs and in unanaesthetised guinea pigs.^[15] Because Vasicine shows bronchodilation both in vitro and in vivo. Vasicinone, the main metabolite of vassin, although also found in *J. adhatoda* extract, exhibits bronchoconstriction in vivo.^[27] The combination of the two alkaloids showed bronchodilation activity both in vitro and in vivo. This may be due to the presence of specific sites of action for Vasicinone and Vasicin (the main alkaloids), which cause coughing by the action of nerves in the medulla. When administered intravenously, it was as effective as codeine (1/20 - 1/40) against mucus and radiation in rabbits and guinea pigs.^[23]

Cardioprotective

The combination of Vasicine and Vasicinone has been shown to reduce the effects of the intervention. Vasicinone (DL-form) showed no effect; however, the L-form has been shown to have a weak effect in supporting the myocardium.^[22]

Anticholinesterase

Vasicinone extracted from the roots causes transient hypotension in cats, isolated intestinal obstruction and isolated cardiac inhibition in guinea pigs and shows good anticholinesterase activity.^[17]

TOXICITY

In the anti-fertility activity analysis of *J. adhatoda*, no effects on pregnancy were noted after administration of the leaf extract in rats or mice.^[26] However, animals treated with approximately 100 mg/kg of *J. adhatoda* extract did not show any growth. *J. adhatoda* power The effect of *Adhatoda spissum* leaf extract in the first trimester of pregnancy was investigated.^[18] No effects on maternal body weight or other parameters were noted as significant differences between treated and control animals. Analysis of the leaf extract of *J. adhatoda* showed that it contained 0.0541 to 1 varicin. 105% Therefore, the toxicology study of his guardian was also done. No significant effects of any type were noted.^[29] The systemic toxicity of vice versa after repeated oral administration for 6 months was studied in rats and monkeys.^[21] Clinical examination, chemical examination and histopathological examination of major organs were performed for both species.^[14] In addition, no abnormality was found in the autopsy and histopathological examination of the body mass. In mice, ten animals were administered intraperitoneally (5 and 10 mg/kg body weight) at different times.^[19] It has no effect on implantation from the 1st to the 7th day of pregnancy and has an effect on abortion after the 7th day of pregnancy.^[16] Teratogenicity studies have been conducted with Vasicinone in rats and rabbits. Just some pregnant moments from series.^[13] 5 mg/Kg, but partially depleted at higher doses of guardian, did not show any teratogenic effects or other adverse effects in children exposed to the first or second dose.^[12] Vasicinone was tested in human studies before it was designed to inhibit second trimester pregnancies by intra-amniotic infusion of the drug.^[11] 12 people took doses of 60 mg or more and all were withdrawn after about 48 hours. It has also been found in other studies to be an excellent human oxytocic agent for preventing postpartum haemorrhage.^[21]

CONCLUSION

A research article has shown that *J. adhatoda* is widely studied for its medicinal properties, considered a panacea in Ayurvedic medicine, and its status as a versatile herb with diverse actions today. It can be concluded that *J. adhatoda* is an important source of many pharmacologically and medically important substances such as Vasicine, Vasicinone, Vasicolin and other beneficial minor alkaloids. There is no scientific evidence that it is *J. adhatoda* extract can cause problems for humans. As the global situation shifts towards the use of non-toxic plant products, emphasis should be placed on the development of modern medicine from *vasaka*. It is also clear that there is much more to see when it comes to active ingredients and their biological effects. In addition, the documents recorded here are designed as a tool for researchers in the field of ethnopharmacology in *J. adhatoda*.

REFERENCES:

1. Nature's Pharmacy, Our Treasure Chest: Why We Must Conserve Our Natural Heritage, By Emily Roberson, Native Plant Conservation Campaign Director March 2008.
2. Utilization of alternative systems of medicine as health care services in India: Evidence on AYUSH care from NSS 2014 Shalini Rudra¹, Aakshi Kalra², Abhishek Kumar², William Joe^{2*}
3. Adnan M, Hussain J, Shah MT, Ullah F, Shinwari JK, Bahadar A, Khan AL (2010). Proximate and nutrient Composition of Medicinal Plants of Humid and Sub-humid regions in Northwest Pakistan. *J. Med. Plant Res.*, 4: 339-345.
4. Agrawal S, Chauhan S, Mathur R (1986). Antifertility effects of Embelin in male rats. *Andrologia*, 18: 125-131.
5. Chandhoke N (1982). Vasicine, the alkaloid of *Adhatoda vasica*. *Indian Drugs*, 24: 425-426.
6. George M, Venkatraman PR, Pandalai KM (1947). Investigation on plant antibiotics: A search for antibiotic substances in some Indian medicinal plants. *J. Sci. Ind. Res.*, 2: 6B.
7. Pushpangadan P, Nyman U, George V (1995). Glimpses of Indian Ethnopharmacology. Tropical Botanic Garden and Research Institute, Kerala, pp. 309-383.
8. Reddy MB, Reddy KR, Reddy MN (1989). A survey of plant crude drugs of Anantpur district Andhra Pradesh, India. *Ind. Int. J. Crude Drug Res.*, 27: 145-155.
9. Shete AB (1993). Fermiforte, indigenous herbomineral formulation in the management of non specific leucorrhoea. *Doctor's News*, 5: 13-14.
10. Shinwari ZK (2010). Medicinal Plants Research in Pakistan. *J. Med. Plant Res.*, 4(3): 161-176.
11. Shinwari ZK, Khan I, Naz S, Hussain A (2009). Assessment of antibacterial activity of three plants used in Pakistan to cure respiratory diseases. *Afr. J. Biotechnol.*, 8: 7082-7086.

12. Zama MMS, Singh HP, Kumar A (1991). Comparative studies on *Adhatoda vasica* and pancreatic tissue extract on wound healings in buffaloes. *Ind. Vet. J.*, 68: 864-866.
13. Zutschi U, Rao PG, Soni A, Gupta OP, Atal CK (1980). Absorption and distribution of vasicine, a novel uterotonic. *Planta Medica*, 40: 373- 377
14. Siddiqui MB, Hussain W (1993). Traditional treatment of gonorrhoea through herbal drugs in the province of central Uttar Pradesh, India. *Fitoterapia*, 64: 399-403.
15. Wakhloo RL, Wakhloo OP, Gupta OP, Atal CK (1979). Vasicine hydrochloride - A new drug for interruption of Pregnancy. *J. Obst. Gyn. Ind.*, 29: 939-940.
16. Shrivastava N, Shrivastava A, Banarjee A, Nivsarkar M (2006). Antiulcer activity of *Adhatoda vasica* Nees. *J. Herb Pharmacother.*, 2: 43-49
17. Nath D, Sethi N, Srivastava S, Jain AK, Srivastava R (1997). Survey on indigenous medicinal plants used for abortion in some districts of Uttar Pradesh. *Fitoterapia*, 68: 223-225.
18. Narimaniyan M, Badalyan B, Panosyan V, Gabrielyan E, Panosian A, Wikman G, Wagner H (2005). Randomized trial of a fixed combination (KanJangs) of herbal extract containing *Adhatoda vasica*, *Echinacea purpurea* & *Eleutherococcus senticosus* in Patients with upper respiratory tract infections. *Phytomedicine*, 12: 539-547.
19. John M, Snell JC (1996). Activity of bromhexine and ambroxol, semi synthetic derivatives of vasicine from the Indian shrub *Adhatoda vasica*, against *Mycobacterium tuberculosis* in vitro. *J. Ethnopharmacol.*, 50: 49-53.
20. Jahangir T, Khan TH, Prasad L, Sultana S (2006). Reversal of cadmium chloride –induced oxidative stress and genotoxicity by *Adhatoda vasica* extract in Swiss albino mice. *Biol. Trace Elem. Res.*, 1-3: 217- 228.
21. Jain SK (1991). *Dictionary of Indian Folk medicine and Ethnobotany*. Deep Publications, New Delhi, pp. 256-262.
22. Jain SP, Puri HS (1984). *Ethnobotanical plants of Jaunsar-Bawar Hills, Uttar Pradesh, India*. India. *J. Ethnopharmacol.*, 12: 213-222
23. Atal CK (1980). Chemistry and Pharmacology of vasicine: A new oxytocin and abortifacient. *Indian Drugs*, 15: 15-18.
24. Ayyanar M, Ignacimuthu S (2008). Medicinal uses and pharmacological Actions of five commonly used Indian Medicinal plants: A mini-review. *Iranian J. Pharm. Therapeut.*, 7: 107-114.
25. Bhat VS, Nasavatil DD, Mardikar BR (1978). *Adhatoda vasica*-an Ayurvedic plant. *Indian Drugs*, 15: 62-66.
26. Amin AH, Metha DR (1959). A bronchodilator alkaloid (vasicinone) from *Adhatoda vasica* Nees. *Nature*, 184: 1317.
27. Asolkar LV, Kakkar KK, Chakra OJ (1992). Second Supplement to Glossary of Indian Medicinal Plants with active principles, Part I Publication and information Directorate (CSIR), New Delhi, India, pp. 78-84.
28. Ayyanar M, Ignacimuthu S (2008). Medicinal uses and pharmacological Actions of five commonly used Indian Medicinal plants: A mini-review. *Iranian J. Pharm. Therapeut.*, 7: 107-114.
29. Chowdhury BK, Bhattacharyya P (1987). Adhavasinsonone: A new quinazolone alkaloid from *Adhatoda vasica* Nees. *Chem. Ind.*, (London), 1: 35-36