

# A Review Article on Medicinal Uses, Pharmacology & Phytochemistry of Adulsa (*Adhatoda Vasica* Nees)

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## Abstract

Plants are the major source of medicines from ancient times. Adhatodavasika (also called Adulsa, vasika) is an ayurvedic medicinal plant used for a cough, asthma, breathing trouble, Nasal congestion, bleeding disorders, allergic conditions. The Adhatodavasika belonging to the family Acanthaceae, it contains various reported Pharmacological properties like antispasmodic, sedative, expectorant, antitussive, antibacterial, anti-diabetic. Vasaka, is medicine plant widely used in traditional medicine systems like Ayurveda, Unani, and Siddha. The plant is valued for its potent pharmacological properties, particularly in treating respiratory disorders. The active constituents of A. Vasica include alkaloids such as vasicine and vasicinone, which exhibit bronchodilatory, expectorant, anti-inflammatory, and antimicrobial effects. These bioactive compounds make A. Vasica effective in managing ailments like asthma, bronchitis, cough, and other pulmonary conditions. The plant has been studied for its anti-tubercular, anti-malarial, and antioxidant properties. Modern research continues to explore the therapeutic potential of A. Vasica, confirming its role as an essential herbal remedy with broad pharmacological applications.

**Keywords: Adhatodavasica, Adulsa, Medicinal Plant, Antitussive, Medicinal Plant**

## Introduction :-

Herbal plants play a significant role in our life. Adhatodavasica. (Adulsa) is an evergreen herb belonging to the family Acanthaceae. It has been extensively used in traditional medicinal systems such as Ayurveda, Unani, and Siddha for over 2,000 years. It is indigenous to India in Sub-Himalayan tracks up to an altitude of 1000 m. In Maharashtra, it is found in Konkan, Marathwada, Vidarbha and other regions. It is large sized, evergreen, shrub growing up to height of 2.5 m. Leaves are broadly elliptic and lanceolate, entire, tapering up to 20 cm long and 7.8 cm wide. Adhatodavasica has mucolytic, expectorant and Bronchodilator action, so it is greatly used in respiratory Troubles, it relieves a cough, fights off respiratory Infections and helps in the management of asthma. It has Antitussive property so it is used as Cough Suppressants, Are Medications That Reduce Coughing. Antitussives Are Believed To Work By Blocking The Cough. The plant grows in tropical climates and can be identified by its lance-shaped leaves, small white or purple flowers, and bitter taste. The leaves are the primary part used for medicinal purposes, though the roots, flowers, and bark also have therapeutic properties. Its key bioactive compound, vasicine, is known for its medicinal effects, particularly in treating respiratory ailments.<sup>(1-5)</sup>



**Fig. Adhatoda Vasica plant**

### Literature of review:-

A REVIEW ARTICLE ON ADHATODA VASICA NEES: A POTENTIAL SOURCE OF BIOACTIVE COMPOUNDS

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ADHATODA VASICA (VASAPATRA): A REVIEW BASED UPON ITS MEDICINAL PROPERTIES

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**Objectives:-** Adhatodavasica, also known as the Malabar Nut, has many uses in traditional medicine and other applications.

1. Respiratory health: It is most commonly used to treat conditions like asthma, bronchitis, and cough. It helps clear the airways, making it easier to breathe.
2. Expectorant: The plant aids in clearing mucus from the respiratory system, offering relief from congestion.
3. Anti-inflammatory: help soothe inflamed tissues in the respiratory system.
4. Antibacterial and Antiviral: It contributes to its use in treating infections.
5. Blood purification: It is sometimes used as a blood purifier in Ayurveda<sup>(3,22)</sup>

### Plan of Work:-

- Selection of herbal plant
- Collect the information from books and other Sources
- Rearrange the all Information
- Add new Information
- Create a new Review
- Publish and Discussion

**Table 1: Vernacular names for Adhatodavasica**

Hindi	Vasaka, adalsa,
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Marathi	Vasuka
English	Malabur nut
Sanskrit	Shwetavasa, vasa, vasaka,

**Table 2: Botanical Classification of Adhatodavastica**

Properties	Remarks
<b>Taste</b>	<b>Bitter, Astringent</b>
<b>Appearance Free-</b>	<b>Flowing fine particle</b>
<b>Smell,</b>	<b>Specific,Unpleasant</b>
<b>Color</b>	<b>Green</b>
<b>Quality</b>	<b>Creates dryness, Light for digestion</b>
<b>Potency</b>	<b>Conserves energy during Digestion and metabolism</b>
<b>Digestive effect</b>	<b>Pungent</b>
<b>Action</b>	<b>Constipation</b>
<b>Effect on doshas</b>	<b>Pacifies impaired kapha and pitta doshas</b>

**Table 3: Physical properties of A. Vasica Nees :-**

Kingdom	Plantae
Common name	Adulsa (Vasaka)
Division	Angiosperms
Class	Eudicots
Order	Laminas
Family	Acanthaceae
Genus	Justicia
Species	J. Adhatoda

**Medicinal Uses:**

**The medicinal uses of Vasa are Attributed to the following:**

1. Expectorant – promotes expectoration
2. Bronchodilator – dilates bronchi
3. Anti bacterial
4. Anti-microbial
5. Antiviral

6. Anti-inflammatory – reduces inflammation of airways
7. Anti-allergic – Fights off allergies.
8. Antioxidant10.Antispasmodic – Helps in abdominal spasms and Relaxes muscles 11.Antifungal – Works against ringworm
9. .Mild Sedative – Calms the mind
10. Antitussive – relieves a cough<sup>(3,15)</sup>

**Medicinal Parts:**

- Leave – 10-20 mL
- Flower juice – 10-20 mL
- Root decoction – 40-80 mL

**Main Components:**

- Volatile oil
- Vasicine alkaloid
- Adhatodic acid
- Bromhexine

**Uses of whole plant and part of plants:****Whole plant:**

Various formulations are prepared from the Adha-Toda vasica plant by compounding with ginger and Tulsi for using them as an expectorant and antispas-Modic.

**Leaves:**

The leaves are simple, ovate to lanceolate, and have a glossy surface, arranged oppositely on the stem. Before an active Yogic practice, the tender shoots of the plant with Very little ginger is chewed. The leaf of Adhatodavasica is a dicot leaf which is Covered by the single layer of epidermis on both Sides of the leaves. They are amphistomatic and Contains trichomes on both the sides of leaves. For Clearing the respiratory passages.

### **Root:**



Various formulations such as powder, decoction and Paste were prepared from the roots of Adhatoda Vasica and used in the treatment of a broad spec-trum of diseases such as diabetes, cough and cer-Tain liver disorders, tuberculosis, diphtheria, malar-Ial fever, leucorrhoea and eye diseases.

### **Fruit:**



The fruit is a small capsule containing several seeds, and while it is not as widely used as other parts of the plant Adhatodavasica fruit extract is active against like Cold, fever, bronchitis, diarrhea, jaundice, antispas-Modic.

**Flower:**

These small, white or purple flowers contain bioactive compounds similar to those found in the rest of the plant. The Adhatodavasicia plant contains constituents like Triterpenes, flavonoids, they are apigenin, astragalinal, kaempferol, vitexin, quercetin<sup>(1-14)</sup>

**Phytochemical constituents of Adhatodavasicia :-**

There are different chemical compounds found in the plant of Adhatodavasicia. The leaves, roots, seeds, fruit, flower stem contain several chemical constituents which include essential oils, fats, sugar, gum, resins, amino acids, proteins and Vitamin C<sup>32</sup>. The analysis results showed that the leaves contain phenols, flavonoids, alkaloids, anthraquinone, saponins and reducing sugar<sup>33</sup>.<sup>(8-18)</sup>

**Leaves :**

The two major alkaloids present in this plant are Vasicine (0.85%) and vasicinone (0.027%) that are present in leaves and roots<sup>37</sup>. Leaves of the plant also contain other alkaloid constituents such as Vasicinone, Vasicinol, Adhatodine, Adhatonine, Adhavasine, Anisotine

**Flower :**

It contains triterpenes (alpha-amyryn), flavonoids (Astragalinal, Kaempferol, Quercetin, Vitexin, Apigenin), alkanes<sup>41-43</sup>.

**Root :**

The root part contains Vitamin C (5.2%), fats (2.5%), daucosterol which is a steroid, carbohydrates, alkanes and alkaloids such as Vasicine (7.5%), vasicinal, vasicinolone, vasicinone (3.5%), fiber (5.2%) and adhatonine. B-glucoside-galactose.

**Seeds :**

contain 25.8% of deep yellow oil consists of glycerides of Arachidic acid 3.1%, lignoceric acid 10.7%, oleic acid 49.9%, Cerotic 5%, linoleic acids 12.3% behenic 11.2%

**Active Compounds in Adhatodavasicia:-**

**Vasicine:** A quinazoline alkaloid with bronchodilatory, expectorant, and abortifacient properties.

**Vasicinone:** Another alkaloid derived from vasicine, with similar bronchodilatory and anti-inflammatory effects.

**Flavonoids:** These are antioxidants with anti-inflammatory and immunomodulatory properties.

**Essential Oils:** Contribute to the antimicrobial and expectorant activities of the plant<sup>(3)</sup>

**Pharmacological properties:-****1. Bronchodilator and Expectorant :**

Vasicine: One of the main active alkaloids, vasicine, acts as a bronchodilator, helping to widen the airways and improve airflow, particularly useful for treating asthma and bronchitis.

Expectorant Action: It helps in clearing mucus from the respiratory tract by thinning it, which facilitates easier coughing up of phlegm, making it valuable for treating cough and congestion.

**2. Antitussive (Cough Suppressant) :**

The plant has antitussive properties that suppress cough reflexes, offering relief from persistent coughing. This effect is particularly beneficial in managing dry and chronic coughs.

**3. Anti-inflammatory :**

Extracts from Adhatodavasica show anti-inflammatory properties due to the presence of flavonoids and vasicine, helping reduce inflammation in conditions such as asthma, bronchitis, and joint disorders.

**4. Antimicrobial Activity :**

Antibacterial and Antiviral: the extracts from the plant exhibit antibacterial and antiviral activities, particularly against respiratory pathogens, aiding in the prevention and treatment of infections.

Antifungal: The plant also demonstrates antifungal activity, helping combat fungal infections, although this is less explored than its antibacterial uses.

**5. Antioxidant Properties :**

The plant contains antioxidants that protect the body from oxidative stress by neutralizing free radicals. These antioxidants help in maintaining overall health and may play a role in preventing degenerative diseases.

**6. Antihypertensive:**

Adhatodavasica is reported to have a mild antihypertensive effect due to its ability to dilate blood vessels and lower blood pressure. This makes it useful in the management of mild hypertension.

**7. Uterotonic and Abortifacient :**

Vasicine is known to exhibit uterotonic properties, stimulating uterine contractions, which can be helpful during childbirth but also carries abortifacient risks. This property makes the plant traditionally used for managing menstrual disorders, though it must be used cautiously, particularly during pregnancy.

**8. Anti-ulcer Activity :**

Some studies have indicated that extracts from the plant have anti-ulcer properties and can reduce gastric acid secretion, providing relief from ulcers and related gastrointestinal issues.

**9. Antihypertensive :**

The plant shows cytoprotective properties, meaning it helps protect cells from damage. This, combined with its antioxidant effects, may contribute to its use in preventing cell damage in various organs.

**10. Immunomodulatory :**

Immunostimulatory effects have been observed, enhancing the body's immune responses, particularly against respiratory pathogens, making it useful in treating and preventing respiratory infections<sup>(7-19)</sup>

**Mechanism of Action:-**

- Bronchodilation:** Vasicine and vasicinone act on the smooth muscles of the bronchi, leading to relaxation and dilatation, which helps ease breathing in respiratory conditions like asthma.
- Mucolytic Activity:** These compounds also help break down thick mucus, making it easier to expel from the respiratory tract.
- Inflammation Reduction:** Through inhibition of pro-inflammatory mediators, the plant helps in reducing inflammation in both the lungs and other parts of the body.

4. **Immune Modulation:** By boosting the activity of immune cells, the plant supports the body in fighting off infections<sup>(3,5,22)</sup>

## **Clinical Studies and Findings:-**

### **1. Respiratory Diseases (Asthma and Bronchitis) :-**

**Bronchodilation and Expectorant Effects:** Several clinical studies have shown that Adhatodavasica has potent bronchodilatory and expectorant effects, which help in managing asthma and chronic bronchitis.

**Study Example:** In one randomized controlled trial (RCT), patients with chronic bronchitis who were treated with Adhatodavasica extracts experienced improved airflow and reduced mucus production. Vasicine, the plant's main alkaloid, was found to act as a bronchodilator by relaxing bronchial smooth muscle and helping to clear mucus from the respiratory tract.

The extracts were found to be as effective as conventional bronchodilators in some studies but with fewer side effects.

### **2. Cough Suppression :**

**Antitussive Properties:**

**Clinical Trials:** Studies have evaluated the antitussive (cough-suppressing) effects of Adhatodavasica in patients with chronic and acute coughs. Vasicine was found to significantly reduce cough frequency, particularly in patients with dry cough.

When combined with other herbs like Glycyrrhizaglabra (licorice) in cough syrups, Adhatodavasica has shown efficacy in reducing both dry and productive coughs.

A clinical trial demonstrated that patients using a cough syrup containing Adhatodavasica experienced faster relief compared to standard treatments.

### **3. Tuberculosis :**

**Antimycobacterial Activity:** Some studies have explored the role of Adhatodavasica in treating tuberculosis (TB), due to its antimicrobial properties.

**Preclinical Findings:** Vasicine has shown some inhibitory effects against *Mycobacterium tuberculosis* in laboratory settings, and its use in combination with standard TB treatments is being investigated. While it is not a standalone treatment for TB, its ability to reduce inflammation and support the respiratory system could serve as an adjunctive therapy.

### **4. Anti-inflammatory and Antioxidant Activity :**

**Anti-inflammatory Trials:** Clinical and preclinical studies have confirmed the plant's anti-inflammatory properties. By reducing pro-inflammatory markers like cytokines, Adhatodavasica can help manage inflammation in conditions like asthma and chronic obstructive pulmonary disease (COPD).

**Study Example:** In a study on COPD patients, Adhatodavasica extract significantly reduced inflammation markers, improved lung function, and enhanced overall respiratory health.

### **5. Antimicrobial Studies :**

**Antibacterial and Antiviral Effects:** Clinical studies have supported the traditional use of Adhatodavasica as an antimicrobial agent. Extracts of the plant have demonstrated broad-spectrum antibacterial effects, particularly against pathogens responsible for respiratory infections, such as *Streptococcus pneumoniae* and *Haemophilus influenzae*.

Some clinical trials are investigating the use of Adhatodavasica extracts in formulations for upper respiratory infections, including the common cold and flu.

**Viral Infections:** The plant has also been evaluated for its ability to inhibit the replication of certain viruses, though more research is needed to establish its full antiviral potential<sup>(2,16)</sup>



**Therapeutic Indications :-**

Adhatodavasica is helpful in following diseases

- 1.Cough (with yellow thick sputum and fever)
- 2.Chronic cough due to tuberculosis along with anti-Tubercular medicines.
3. Asthma (wheezing, breathing trouble and chest Congestion)
4. Upper respiratory infections (with a fever and Productive cough)
- 5.Common cold (with thick yellow discharge or along With secondary bacterial infections)
- 6.Chronic bronchitis
- 7.Throat pain
8. Sore throat<sup>(10-15)</sup>

**Forms of Use:**

**Juice:** Fresh leaves are crushed to extract the juice, which is consumed to relieve cough.

**Decoction:** Leaves are boiled in water to make a decoction for respiratory problems.

**Powder:** Dried leaves are powdered and mixed with other ingredients in various formulations.

**Dosage and Administration in Clinical Studies:-**

**Extracts:** In most clinical studies, standardized extracts of the plant (such as a water or alcohol extract) are used.

**Syrups and Tablets:** Syrups or tablets containing standardized doses of vasicine and vasicinone have been used in treating cough, bronchitis, and asthma.

**Inhalation Therapy:** In some cases, Adhatodavasica has been administered via steam inhalation or nebulizers to maximize its bronchodilatory effects.

**Safety and Side Effects:-**

**Safety Profile:** Generally considered safe when used in prescribed doses. Side effects are rare but can include nausea, vomiting, or gastric irritation when taken in excessive amounts.

**Contraindications:** Adhatodavasica should be avoided during pregnancy, as vasicine can induce uterine contractions and has abortifacient properties.

**Conclusion :-**

During the survey I found that Adhatodavasica has been widely studied for its pharmacological activities. It is a good source of many medicinally important chemicals such as Vasicine, Vasicinone, Vasicoline and other various useful Minor alkaloids, bromhexine. Adhatoda vasica is valued not only for its medicinal benefits but also for its role in traditional medicine systems. Ongoing research continues to explore its potential in modern pharmacology, making it a subject of interest for botanists and herbalists alike. This plant is a rich source of Vitamin C, Vasicine, Vasicinone and other alkaloids components. Adhatoda vasica is an important plant with a rich history in traditional medicine, showing strong therapeutic potential for treating respiratory and inflammatory disorders. The leaves, flowers, and roots of the plant are most commonly used for the treatment of respiratory conditions, including asthma, bronchitis, and cough.

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