
Review Article

***Justicia adhatoda* L.: an important medicinal plant for respiratory health**

Sumit Chouhan¹, Sohan Lal², Rajesh Kumar Verma³, Avtar Singh⁴, Debangshu Agrahari⁵
Rajkumari Supriya Devi⁶ and Smitaa Basole^{7*}

¹Regional Research Institute of Unani Medicine, Bhadrak (Central Council Research of Unani Medicine, New Delhi), Odisha, India

²School of Studies in Botany, Shaheed Mahendra Karma Vishwavidyalaya, Bastar, Jagdalpur, Chhattisgarh, India

³Department of Dravyaguna, Naiminath Ayurvedic Medical College and Research Centre, Agra, Uttar Pradesh, India

⁴Department of Dravyaguna, Guru Nanak Ayurvedic Medical College and Hospital, Barkandi Road, Sri Muktsar Sahib, Punjab, India

⁵Department of Dravyaguna Vijnana, Jeevak Ayurved Medical College and Hospital Research Centre, Chandauli, Uttar Pradesh, India

⁶Biodiversity and Conservation Lab., Ambika Prasad Research Foundation, Odisha, India

⁷Department of Botany, Balbhim College, Beed, Maharashtra, India

*Email-Id: sgbasole@gmail.com; ORCID: <https://orcid.org/0009-0007-7892-5264>

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Abstract: Respiratory diseases, including cough, asthma, chronic bronchitis, tuberculosis and upper respiratory tract infections, are among the leading causes of morbidity and mortality in India. *Justicia adhatoda* has been extensively used in many traditional folk medicines for the treatment of respiratory ailments. The present review compiles available information on the ethnomedicinal uses, morphology, habitat, phytochemical constituents and pharmacological significance of *J. adhatoda* with special emphasis on respiratory healthcare. Relevant information was collected through an extensive review of published literature and supported by ethnobotanical observations. The findings revealed that the leaves are the most frequently used as fresh juice or decoction for the treatment of cough, common cold, bronchial asthma, chronic bronchitis, whooping cough and other respiratory disorders. The therapeutic efficacy of the plant is primarily attributed to the quinazoline alkaloids vasicine and vasicinone, along with flavonoids, phenolics and saponins, which exhibit bronchodilatory, expectorant, mucolytic, antitussive, anti-inflammatory, antioxidant and antimicrobial activities. The strong correlation between traditional knowledge and modern pharmacological evidence demonstrates the potential of *J. adhatoda* as an important herbal resource for

respiratory disease management. Further clinical and pharmacological studies are needed to validate its therapeutic efficacy and standardize its use.

Key words: Respiratory diseases, plant decoction, phytochemicals, vasicine, vasicinone

Introduction

Respiratory diseases are a major public health concern in India, contributing substantially to morbidity, mortality, and healthcare expenditure. The most common respiratory disorders include chronic obstructive pulmonary disease (COPD), asthma, tuberculosis, respiratory tract infections, allergic rhinitis, bronchiectasis, interstitial lung diseases and lung cancer (Singh and Sharma, 2018). Their rising prevalence is associated with air pollution, tobacco smoking, biomass fuel combustion, occupational exposure, rapid urbanization and climate change (Pillai, 2025). The Indian Chest Society SWORD survey further reported that respiratory diseases account for a significant proportion of outpatient consultations, with higher incidence during winter and periods of increased air pollution. Airborne particulate matter, industrial emissions, vehicular exhaust and indoor smoke are among the major environmental factors contributing to the onset and exacerbation of these diseases. *Justicia adhatoda* L. (Acanthaceae) is one of the most important medicinal plants traditionally used in India for the treatment of respiratory ailments. In Ayurveda, Siddha, Unani and various folk healthcare systems, its leaves are widely used to treat cough, cold, bronchitis, asthma, whooping cough, sore throat and other respiratory tract infections (Kumar et al., 2010; Singh, 2024; Marndi et al., 2024). Tribal and rural communities commonly prepare leaf decoctions, fresh leaf juice, herbal teas, or syrups, often combined with honey or ginger, to relieve persistent cough, promote expectoration and improve breathing (Dhankhar et al., 2011). The medicinal properties of the plant are primarily attributed to the alkaloids vasicine and vasicinone, which exhibit bronchodilatory, expectorant, mucolytic, antitussive, and anti-inflammatory activities (Barth et al., 2015). Experimental and clinical studies have demonstrated its effectiveness in reducing cough frequency, enhancing mucus clearance, and alleviating symptoms of chronic bronchitis, bronchial asthma and upper respiratory tract infections (Soudagar and Anupama, 2025; Kute et al., 2025; Kumbhar et al., 2025). Considering the increasing burden of respiratory diseases and the therapeutic significance of *J. adhatoda*, the present study aims to document its ethnomedicinal uses, phytochemical constituents and habitat, thereby revealing its potential as an important medicinal resource for respiratory healthcare.

Methodology

The study was conducted using both literature survey and field survey approaches. A literature review was undertaken to collect information on the taxonomy, distribution, habitat, ethnomedicinal uses, phytochemical constituents, pharmacological activities and clinical significance of *Justicia adhatoda* (Kumar, 2025). Relevant data were compiled from peer-reviewed research articles, books, book chapters, review papers and authentic online databases. Field surveys were carried out in selected rural and tribal areas of Athagarh, Odisha to document the traditional uses of *J. adhatoda* for the

treatment of respiratory ailments. Information was gathered through semi-structured interviews and informal discussions with traditional healers, herbal practitioners, elderly villagers and local inhabitants near Mahanadi River areas during 2024-2025 (Devi et al., 2024). Data on local names, plant parts used, methods of preparation, dosage, mode of administration and ailments treated were recorded. The collected information was verified by comparing field observations with published literature to ensure accuracy and authenticity.



Figure 1: *Justicia adhatoda* near village area of Athagarh

Results and discussion

Morphology & Habitat: *J. adhatoda* is an evergreen, perennial medicinal shrub that typically grows to a height of 1–3 m. The stem is woody, much-branched and covered with smooth greyish-brown bark. Leaves are simple, opposite, lanceolate to elliptic-lanceolate, 10-20 cm long, dark green, with entire margins and a characteristic bitter taste. The flowers are white with purple or violet streaks, arranged

in dense, short axillary or terminal spikes (Figure 1). It is most often observed in the village areas of forest edges where people cultivate it for common therapeutic uses mostly related to respiratory problems.

Ethnomedicinal uses and phytochemical constituents: The ethnobotanical survey and literature review revealed that *J. adhatoda* is one of the most widely used medicinal plants in India for the management of respiratory disorders (Table 1). The survey revealed the used of leaves predominantly as a decoction or taken in addition to other herbs to get rid of whooping cough, bronchial asthma and in treatment of tuberculosis.



Figure 2: Local inhabitant (village) informing about its medicinal uses

The study coincides also with some of the literature procured data where the leaves are the principal medicinal part, most commonly administered as fresh leaf juice, decoction or syrup, either alone or in combination with other herbal ingredients. These preparations are traditionally used for treating cough, common cold, bronchial asthma, chronic bronchitis, whooping cough, tuberculosis and general respiratory ailments. The review showed a strong correlation between the traditional uses of *J. adhatoda* and its phytochemical composition. The quinazoline alkaloids vasicine and vasicinone were consistently reported as the major bioactive constituents responsible for its therapeutic efficacy (Gupta and Yadav 2026; Kumbhar et al., 2025). These compounds possess bronchodilatory, expectorant, mucolytic, antitussive and anti-inflammatory properties. Fresh leaf juice and decoction were the most frequently reported formulations for relieving cough and facilitating mucus expulsion, whereas decoctions and polyherbal formulations were preferred for chronic respiratory conditions such as asthma and bronchitis. Besides alkaloids, flavonoids, phenolic compounds and saponins also contribute to the medicinal potential of *J. adhatoda* (Swarnabala et al., 2023). These phytochemicals exhibit antioxidant, antimicrobial, anti-inflammatory and immunomodulatory activities, which may help alleviate respiratory infections, reduce airway inflammation and enhance host immune responses (Narasimhaji et al., 2023). The use of leaf decoctions for common cold and as a supportive remedy in tuberculosis may therefore be attributed to the synergistic action of these secondary metabolites.

Table 1: Traditional uses of *J. adhatoda* and associated phytochemical compounds

Ethnomedicinal uses	Phytochemical compounds	Source(s)
Fresh leaf juice or decoction is taken in cough	Vasicine, vasicinone	Kumar et al., (2010); Dhankhar et al., (2011); Barth et al., (2015); Shoaib (2021); Gupta and Yadav (2026)
Leaf decoction taken as to get rid of common cold	Vasicine, flavonoids, phenolics	Kumar et al., (2010); Marndi et al., (2024); Kumbhar et al., (2025)
Leaf decoction or fresh juice or with mix herbal formulations in Bronchial asthma	Vasicine, vasicinone, quinazoline alkaloids	Soudagar & Anupama (2025); Narasimhaji et al., (2023); Kute et al., (2025); Gupta and Yadav (2026); Present study
Leaves decoction taken in chronic bronchitis	Vasicine, vasicinone	Soudagar and Anupama (2025); Singh (2024); Swarnabala et al., (2023)
Leaves syrup or decoction taken in whooping cough	Vasicine, vasicinone	Kumar et al., (2010); Dhankhar et al., (2011); Singh (2024); Present study

Leaves decoction in traditional supportive therapy of Tuberculosis	Alkaloids, flavonoids	Kumar et al., (2010); Shoaib (2021); Kumbhar et al., (2025); Present study
Leaves decoction	Vasicine, vasicinone, flavonoids, saponins	Singh (2024); Swarnabala et al., (2023); Gupta and Yadav (2026)

Conclusion

Justicia adhatoda is an important medicinal shrub with a long history of use in traditional healthcare systems for the management of respiratory disorders. The present review demonstrates a strong correlation between its ethnomedicinal applications and the presence of bioactive phytochemicals, particularly vasicine and vasicinone, which exhibit bronchodilatory, expectorant, mucolytic, antitussive and anti-inflammatory activities. In addition, flavonoids, phenolics, and saponins contribute antioxidant, antimicrobial and immunomodulatory properties that further support its therapeutic potential. The convergence of traditional knowledge with experimental and clinical evidence validates the use of *J. adhatoda* in the treatment of cough, bronchial asthma, chronic bronchitis, common cold and other respiratory ailments. Further phytochemical investigations, pharmacological studies, and well-designed clinical trials are needed to standardize its formulations, establish dosage and safety profiles and facilitate the development of evidence-based herbal medicines for respiratory healthcare.

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