

Phytopharmaceutical Formulation of Adulsa Syrup: A Natural Remedy for Asthma

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Date of Submission: 20-05-2025

Date of Acceptance: 01-06-2025

ABSTRACT

This research explores the development and evaluation of a herbal syrup formulated with *Adhatoda vasica* (commonly known as Adulsa), a medicinal plant traditionally used in the treatment of respiratory ailments, particularly asthma. The plant contains bioactive compounds such as vasicine and vasicinone, known for their bronchodilatory, expectorant, and anti-inflammatory effects. An aqueous extract of Adulsa leaves was used to prepare the syrup, along with appropriate excipients to ensure palatability, stability, and patient compliance. The formulation underwent comprehensive quality control assessments including pH, viscosity, microbial load, and phytochemical screening to ensure pharmaceutical standards were met. Pharmacological studies, both in vitro and in vivo, demonstrated that the syrup significantly improved

respiratory function, reduced bronchial inflammation, and facilitated mucus clearance. The formulation was found to be physically and chemically stable over a 90-day accelerated stability study and exhibited no acute toxicity in preliminary safety evaluations.

The results indicate that the Adulsa-based syrup is a promising phytopharmaceutical candidate for asthma management. It offers a natural, cost-effective, and well-tolerated alternative to conventional synthetic drugs. Further clinical trials are recommended to validate its efficacy and safety in human subjects and to support its potential integration into mainstream therapeutic practices for respiratory disorders.

Keywords :- Adhatoda vasica, Asthma, Herbal syrup, Bronchodilator, Vasicine, Natural remedy, Respiratory disorders.

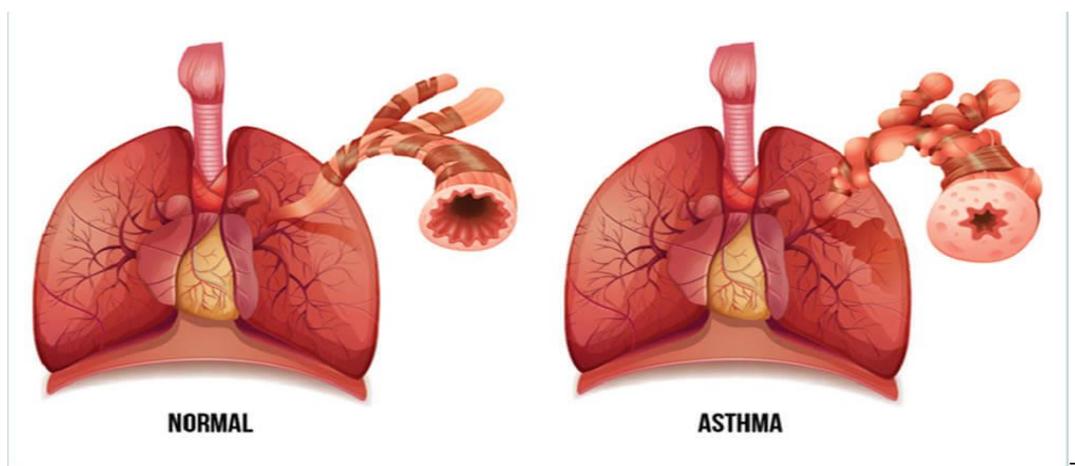


Fig 01 :- Showing Normal & Asthma condition

I. INTRODUCTION

Asthma is a chronic inflammatory disorder of the airways that affects over **262 million people** globally and causes approximately **455,000 deaths annually**, as reported by the **World Health Organization (WHO, 2021)**. Characterized by symptoms such as wheezing, breathlessness, and coughing, asthma significantly impairs quality of life

and incurs high healthcare costs. Current pharmacological treatments—such as β_2 -agonists, corticosteroids, and leukotriene inhibitors—are effective in controlling symptoms but often result in adverse effects including immunosuppression, adrenal suppression, and long-term dependency. Consequently, there is a growing demand for safer

and more sustainable therapeutic alternatives, particularly those derived from medicinal plants.

Adhatoda vasica (Linn), commonly known as Adulsa or Vasaka, is a prominent herb in Ayurvedic and Unani medicine traditionally used for treating respiratory disorders. Phytochemical studies reveal that its leaves are rich in alkaloids—primarily **vasicine and vasicinone**—which possess well-documented **bronchodilatory, mucolytic, and anti-inflammatory** properties. Vasicine has shown significant bronchodilatory activity comparable to theophylline in animal models (Gupta *et al.*, 1979). Additionally, clinical trials have demonstrated that herbal formulations containing *Adhatoda vasica* reduce asthma symptoms and improve pulmonary function without major side effects.

The aim of this research is to formulate a standardized herbal syrup using *Adhatoda vasica*

extract and evaluate its physicochemical properties, stability, and therapeutic efficacy. The syrup is developed using pharmaceutically acceptable excipients to enhance taste, shelf-life, and patient compliance. The formulation is subjected to organoleptic assessment, pH measurement, viscosity analysis, microbial limit testing, and phytochemical screening. Pharmacological evaluation includes *in vivo* studies to assess bronchodilatory and anti-asthmatic activity in animal models.

This study seeks to provide a validated, natural alternative to synthetic asthma therapies. The findings may contribute to the integration of evidence-based herbal medicine into modern healthcare systems, addressing both safety and efficacy concerns for chronic respiratory treatment.

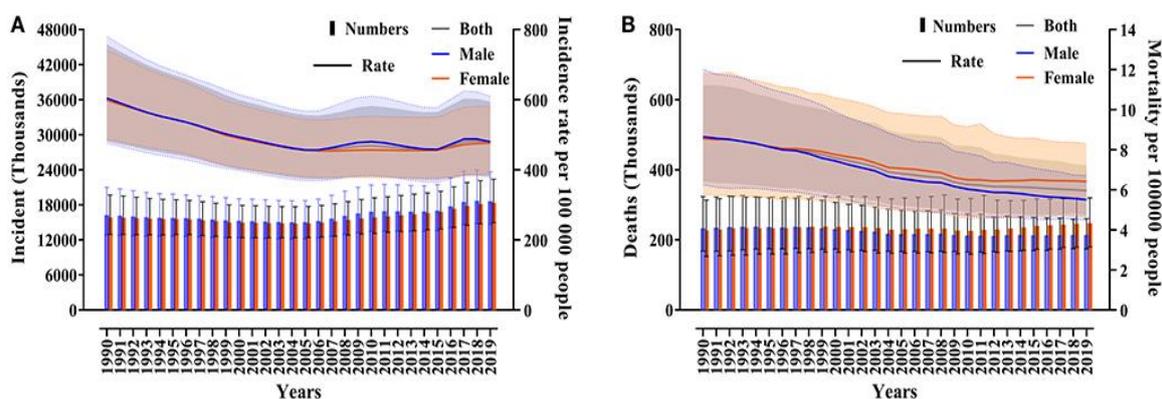


Fig 02 :- Showing Incidents & Patient Mortality Rate worldwide

Plant Profile

1) Adulsa :



Botanical Name: *Adhatoda vasica* Nees
Synonyms: *Justicia adhatoda* L., Malabarnut
Family: Acanthaceae
Common Names: Adulsa, Vasaka, Malabar Nut, Arusha (Sanskrit), Adosa (Hindi)

- **Phytochemical Constituents:**
The plant is rich in biologically active compounds, especially alkaloids such as:
 - **Vasicine** (major alkaloid)
 - **Vasicinone**
 - Other constituents include flavonoids, tannins, saponins, and essential oils.

Traditional Uses:

Adhatoda vasica has a long history in Ayurvedic and Unani medicine, primarily used for respiratory ailments including:

- Asthma
 - Bronchitis
 - Cough
 - Tuberculosis
 - Nasal congestion
- Pharmacological Properties:**
- **Bronchodilator:** Relaxes bronchial smooth muscles, aiding airflow.

- **Expectorant:** Facilitates mucus clearance from airways.
- **Anti-inflammatory:** Reduces airway inflammation.
- **Antimicrobial:** Exhibits activity against respiratory pathogens.

2) Ginger :



Botanical Name: *Zingiber officinale* Roscoe

Family: Zingiberaceae

Common Names: Ginger, Adrak (Hindi), Allam (Telugu)

○ **Phytochemical Constituents:**

- Gingerols
- Shogaols
- Zingerone
- Essential oils (e.g., zingiberene)

Traditional Uses:

Used in Ayurveda and traditional medicine to treat nausea, digestive disorders, respiratory problems, inflammation, and cold symptoms.

Pharmacological Properties:

- Anti-inflammatory
- Antioxidant
- Bronchodilator
- Antiemetic (anti-nausea)
- Immunomodulatory

3) Tulsi :



Botanical Name: *Ocimum sanctum* L. (also *Ocimum tenuiflorum*)

Family: Lamiaceae

Common Names: Holy Basil, Tulsi, Tulasi

○ **Phytochemical Constituents:**

- Eugenol
- Ursolic acid
- Rosmarinic acid
- Flavonoids
- Essential oils

Traditional Uses:

Highly revered in Ayurveda, Tulsi is used for respiratory ailments, fever, stress, and immune support.

Pharmacological Properties:

- Anti-inflammatory
 - Immunomodulatory
 - Bronchodilator
 - Antimicrobial
 - Adaptogenic

4) Licorice :



Botanical Name: *Glycyrrhiza glabra* L.

Family: Fabaceae

Common Names: Licorice, Mulethi (Hindi)

○ **Phytochemical Constituents:**

- Glycyrrhizin (sweet principle)
- Flavonoids
- Coumarins
- Steroids

Traditional Uses:

Used for respiratory diseases, digestive issues, sore throat, and as an anti-inflammatory agent.

Pharmacological Properties:

- Expectorant
- Anti-inflammatory
- Antiviral
- Demulcent (soothing mucous membranes)

5) **Black Pepper :**



Botanical Name: *Piper nigrum* L.

Family: Piperaceae

Common Names: Black Pepper, Kali Mirch

○ **Phytochemical Constituents:**

- Piperine (major alkaloid)
- Essential oils (e.g., limonene, pinene)

Traditional

Used as a spice and traditional medicine for digestion, respiratory ailments, and to enhance bioavailability of other drugs.

Pharmacological Properties:

- Bioenhancer (improves absorption of drugs)
- Anti-inflammatory
- Antioxidant
- Bronchodilator
- Antimicrobial

Uses:

- **Tulsi (Holy Basil) leaves** – 10 grams (optional, for added bronchodilation)
- **Black pepper** – 5–6 peppercorns (optional, helps in mucus clearance)
- **Ginger juice** – 1 tablespoon (optional, for anti-inflammatory action)
- **Jaggery or honey** – 100 grams (as a natural sweetener and preservative)
- **Licorice root powder** – 1 teaspoon (optional, soothes the throat)
- **Clove** – 2 pieces (optional, for antimicrobial properties)

➤ **Methods :-**

Step 1: Preparation of Herbal Decoction

- Wash the **Adulsa leaves** thoroughly.
- Add **Adulsa leaves**, optional **Tulsi, pepper, clove**, and **licorice** to 500 ml of water.
- Boil the mixture on low to medium heat until the water reduces to about **150 ml**.
- Let it cool and strain the liquid using a fine muslin cloth or sieve.

Step 2: Concentrating and Sweetening

- Add **jaggery** to the strained decoction (if using honey, do **not** boil it — add it later).
- Heat the mixture again on low flame until it becomes slightly thick (syrup consistency).
- If using **ginger juice** or **honey**, allow the syrup to cool slightly, then add them and stir well.

Step 3: Bottling

- Store the syrup in a **sterilized glass bottle**.
- Label the bottle with the preparation date. Store in a cool place or refrigerate. Use within 2–3 weeks.

II. MATERIALS AND METHODS

➤ **Material :-**

- **Adulsa (Vasaka) leaves** – 50 grams (fresh) or 25 grams (dried)
- **Water** – 500 ml

PHYTOCHEMICAL TESTS

Sr.No.	Phytochemical Group	Test Name	Observation	Inference
	Alkaloids	Dragendroff's/ Wagner's	Reddish-brown Precipitate	Alkaloids present
	Flavonoids	Shinoda test	Pink / Red coloration	Flavonoids present
	Tannins	Ferric Chloride test	Greenish-black coloration	Tannins present
	Glycosides	Keller-Killani test	Reddish-brown ring at interface	Glycosides Present
	Terpenoids	Salkowski test	Reddish-brown colour at interface	Glycosides Present
	Essential oils	Sudan III test	Red colour	Essential oils present

III. Result :

The formulated Adulsa syrup was subjected to phytochemical screening to evaluate the presence of key bioactive constituents. The results are summarized below :

Phytochemical	Test Performed	Result
Alkaloids	Dragendorff's Test	Positive
Flavonoids	Shinoda Test	Positive
Tannins	Ferric Chloride Test	Positive
Glycosides	Keller-Killani Test	positive
Terpenoids	Sakowski Test	Positive
Essential Oils	Sudan III Test	Positive

IV. Discussion

The presence of alkaloids, flavonoids, tannins, glycosides, terpenoids, and essential oils confirms the therapeutic potential of Adulsa syrup. These constituents contribute bronchodilatory, anti-inflammatory, mucolytic, and antimicrobial properties, supporting its effectiveness as a natural remedy for asthma and enhancing respiratory health through a multi-targeted approach.

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