

# Review On Anti-Asthmatic Activity Of Ficus Religiosa Leaves

Bahirat Gayatri Nitin\*, Utkarsha Lasure

RJS College Of Pharmacy Kokamthan

## ABSTRACT

Asthma is a chronic inflammatory respiratory disorder characterized by bronchial hyper-responsiveness, airway obstruction, wheezing, coughing, and shortness of breath. Despite the availability of modern anti-asthmatic drugs, long-term use is often associated with adverse effects, leading to increased interest in herbal medicines. *Ficus religiosa* Linn., commonly known as Peepal tree, is a medicinal plant widely used in traditional systems of medicine for the treatment of respiratory disorders. The leaves of *Ficus religiosa* contain various phytoconstituents such as flavonoids, phenolic compounds, tannins, saponins, kaempferol, quercetin, catechin, and alpha-amyrin which contribute to its pharmacological activities. The present review focuses on the anti-asthmatic potential of *Ficus religiosa* leaves, including their bronchodilator, anti-inflammatory, antioxidant, and mast cell stabilizing properties. Experimental studies have demonstrated that leaf extracts reduce histamine-induced bronchospasm and improve airway function. The review also summarizes phytochemical screening, formulation approaches, evaluation parameters, and in-vitro anti-asthmatic studies using goat tracheal chain models. Based on available evidence, *Ficus religiosa* may serve as a promising herbal candidate for supportive management of asthma. However, further clinical and toxicological studies are required to establish its safety, efficacy, and therapeutic application in humans.

**Keywords:** *Ficus religiosa*, Asthma, Anti-asthmatic activity, Bronchodilator, Herbal medicine, Flavonoids, Phytochemical screening, Fast disintegrating tablets, Goat tracheal chain model, Medicinal plants.

## INTRODUCTION

*Ficus religiosa* L, commonly known as the Peepal tree, is an important medicinal plant belonging to the family Moraceae. It is widely used in traditional systems of medicine such as Ayurveda for the treatment of respiratory disorders including asthma, cough, bronchitis, and other inflammatory diseases. The leaves of *Ficus religiosa* contain several bioactive constituents such as flavonoids, tannins, saponins, phenolic compounds, sterols, catechin, quercetin, kaempferol, arginine, and alpha-amyrin which are responsible for various pharmacological activities.

Asthma is a chronic inflammatory disorder of the airways characterized by bronchial hyper-responsiveness, reversible airway obstruction, excessive mucus secretion, wheezing, chest tightness, and difficulty in breathing. Medicinal plants possessing bronchodilator, anti-inflammatory, antioxidant, and expectorant activities are considered beneficial in asthma management. Extracts of *Ficus*

*religiosa* leaves have shown promising anti-asthmatic activity through relaxation of bronchial smooth muscles, reduction of airway inflammation, and protection against oxidative stress.

Traditionally, fresh leaf juice mixed with honey is used to relieve cough and breathlessness. Decoctions prepared from the leaves are also used in chronic respiratory conditions. Scientific studies on animal models have demonstrated that ethanolic extracts of *Ficus religiosa* leaves exhibit bronchodilator and anti-asthmatic effects by reducing histamine-induced bronchospasm and improving respiratory function.

Although several studies support its medicinal potential, extensive clinical studies in humans are still limited. Therefore, *Ficus religiosa* may serve as a supportive therapy along with conventional anti-asthmatic treatment. Further research is required to establish its safety, efficacy, and clinical application.

**Relevant conflicts of interest/financial disclosures:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## ASTHMA

Asthma is a chronic inflammatory disorder of the respiratory airways characterized by reversible airway obstruction, bronchial hyper-responsiveness, inflammation, and increased mucus production. Narrowing of the airways makes breathing difficult and leads to symptoms such as wheezing, coughing, chest tightness, and shortness of breath.

### TYPES OF ASTHMA

#### 1. Allergic Asthma

- Most common type of asthma
- Triggered by allergens such as dust, pollen, mold, and animal dander
- Associated with IgE-mediated immune response
- Symptoms occur after allergen exposure

#### 2. Non-Allergic Asthma

- Not associated with allergens
- Triggered by stress, infections, smoke, pollution, and cold air
- Common in adults
- More difficult to control

#### 3. Exercise-Induced Asthma

- Occurs during or after physical activity
- Caused due to heat and moisture loss from airways
- Common in athletes

#### 4. Occupational Asthma

- Caused by workplace exposure to dust, chemicals, fumes, and gases
- Symptoms improve away from workplace

#### 5. Nocturnal Asthma

- Symptoms worsen at night
- Causes sleep disturbance

- Indicates poor asthma control

#### 6. Drug-Induced Asthma

- Triggered by drugs such as aspirin, NSAIDs, and beta-blockers
- Causes bronchospasm in sensitive patients

#### 7. Cough Variant Asthma

- Main symptom is chronic dry cough
- Wheezing may be absent
- Often misdiagnosed

### CLASSIFICATION OF ANTI-ASTHMATIC DRUGS

#### 1. Bronchodilators

These drugs relax bronchial smooth muscles and provide quick relief.

##### $\beta$ 2-Adrenergic Agonists

- Short-acting: Salbutamol, Terbutaline
- Long-acting: Salmeterol, Formoterol

##### Anticholinergics

- Ipratropium bromide
- Tiotropium

##### Methylxanthines

- Theophylline
- Aminophylline

#### 2. Anti-Inflammatory Drugs

These drugs reduce airway inflammation.

##### Corticosteroids

- Inhaled: Beclomethasone, Budesonide
- Oral: Prednisolone

##### Mast Cell Stabilizers

- Cromolyn sodium
- Nedocromil

### 3. Leukotriene Modifiers

- Montelukast
- Zafirlukast
- Zileuton

### 4. Monoclonal Antibodies

- Omalizumab
- Mepolizumab

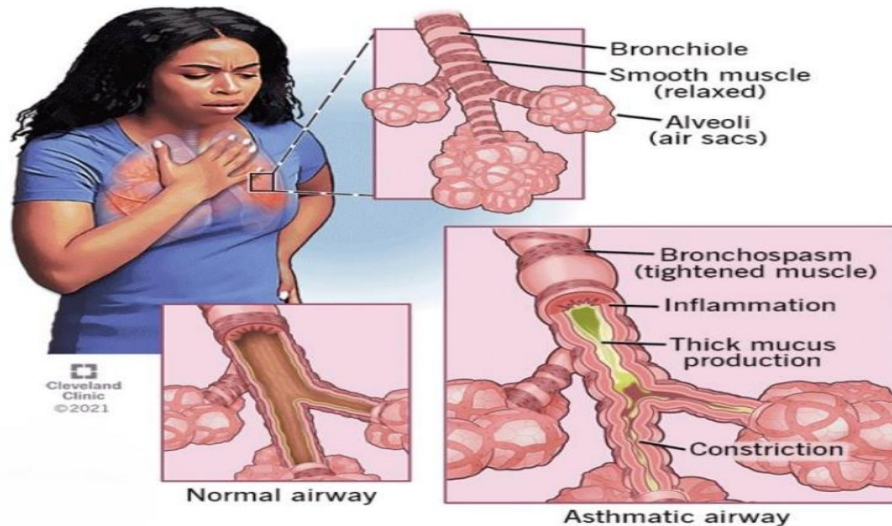


Fig no 1 : Asthma Attack

### CAUSES OF ASTHMA

#### Genetic Factors

- Family history of asthma
- Increased IgE production
- Hereditary susceptibility

#### Allergens

- Dust mites
- Pollen
- Mold spores
- Animal dander
- Cockroach allergens

#### Environmental Factors

- Air pollution
- Cigarette smoke
- Industrial fumes
- Strong odors

#### Respiratory Infections

- Viral infections
- Common cold and influenza

#### Exercise

- Heavy physical activity
- Exercise-induced bronchospasm

#### Climatic Conditions

- Cold air
- Sudden weather changes
- High humidity

#### Occupational Exposure

- Dust
- Chemicals
- Toxic gases

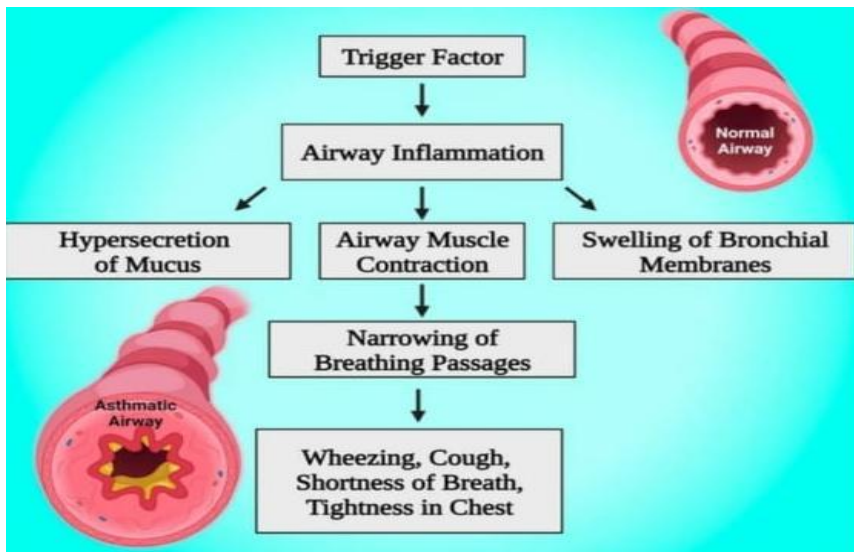
### PRECAUTIONS AND PREVENTION

- Avoid exposure to allergens and smoke

- Use prescribed medications regularly
- Carry rescue inhaler during emergencies
- Maintain proper hygiene
- Avoid cold air exposure
- Take vaccination against respiratory infections
- Perform regular moderate exercise
- Manage stress effectively

**MECHANISM OF ASTHMA**

During asthma attack, the bronchial smooth muscles constrict causing narrowing of the airways. Inflammatory mediators increase swelling of airway lining and stimulate excessive mucus production. These changes obstruct airflow and lead to breathing difficulty.



**Fig no 2 : Mechanism Of Asthma**

**OBJECTIVES**

- To collect and prepare Ficus religiosa leaf extract
- To formulate fast disintegrating tablets
- To select suitable excipients for rapid drug release
- To evaluate pre-compression parameters
- To evaluate post-compression parameters
- To perform in-vitro drug release studies
- To determine drug release using UV spectrophotometry
- To study anti-asthmatic activity using goat tracheal chain model

**PLANT PROFILE**



**Fig no 3 : Ficus religiosa L.**

❖ **Botanical Classification**

- Botanical Name: *Ficus religiosa* L.
- Family: Moraceae
- Kingdom: Plantae
- Division: Magnoliophyta
- Class: Magnoliopsida
- Order: Rosales

❖ **Description**

- Color: Green
- Shape: Heart-shaped leaves
- Size: 10–18 cm length and 8–12 cm width
- Texture: Smooth and leathery

❖ **Chemical Constituents**

- Kaempferol
- Quercetin
- Arginine
- Alpha-amyrin
- Catechin

❖ **Uses**

- Anti-inflammatory
- Antioxidant
- Anti-asthmatic
- Wound healing activity

**MATERIALS AND METHODS**

Sr. No	Ingredients	Role
1	<i>Ficus religiosa</i> extract	Anti-asthmatic agent
2	Mannitol	Diluent
3	Crospovidone	Superdisintegrant
4	Microcrystalline cellulose	Adsorbent
5	Sucrose	Sweetener
6	Magnesium stearate	Lubricant
7	Talc	Glidant

**Materials Used**

**METHOD :**

- 1. COLLECTION OF PLANT :** Fresh leaves of *Ficus religiosa* were collected from the local market and authenticated.
- 2. PREPARATION OF HERBAL POWDER :** Fresh leaves were washed and dried under shade or sunlight. The dried leaves were powdered using a grinding mixer and stored in airtight containers.

**3. PREPARATION OF PLANT EXTRACT**

- Fresh leaves were collected and shade dried
- Dried leaves were powdered coarsely
- About 30 g powder was defatted using ethanol by maceration process
- Extract was filtered using vacuum filtration
- Collected extract was stored for further use

**4. PHYTOCHEMICAL SCREENING**

**a) Test for Alkaloids**



- **Mayer's Test** : 1 ml filtrate of peepal leaf extract was treated with Mayer's reagent. Formation of white or creamy precipitate confirmed the presence of alkaloids.
- **Dragendorff's Test** : 1 ml filtrate of peepal leaf extract was treated with Dragendorff's reagent. Formation of reddish-brown precipitate confirmed the presence of alkaloids.

**b) Test for Flavonoids**

- **Lead Acetate Test** : Addition of lead acetate solution to the extract produced yellow precipitate indicating presence of flavonoids.
- **Test for Phenolic Compounds** : Ferric chloride solution was added to the extract. Formation of black coloration indicated presence of phenolic compounds.

**c) Test for Carbohydrates**

- **Molisch Test** : Molisch reagent and concentrated sulfuric acid were added to the extract. Formation of violet ring indicated presence of carbohydrates.

**d) Test for Saponins** : The extract was shaken with water. Formation of persistent foam indicated presence of saponins.

**PREPARATION OF TABLET FORMULATION**

**Step 1: Preparation of Extract** : Dry the extract in hot air oven to obtain dry powder.

**Step 2: Sieving** : Pass all ingredients through sieve no. 60 to ensure uniform particle size.

**Step 3: Mixing** : Mix extract powder, microcrystalline cellulose, and mannitol. Add crospovidone and mix thoroughly for 10–15 minutes.

**Step 4: Lubrication** : Add magnesium stearate and talc. Mix gently for 2–3 minutes.

**Step 5: Compression** : Compress the blend using single punch or rotary tablet machine using low compression force.

**Step 6: Packaging** : Store tablets in airtight containers protected from moisture.

**EVALUATION OF POWDER BLEND**

**1. Repose**

Angle of repose is the maximum angle formed between the surface of powder heap and horizontal plane. It indicates flow property of powder blend.

❖ **Procedure**

1. Funnel was fixed at a suitable height.
2. Powder blend was allowed to flow through the funnel freely onto graph paper.
3. Powder formed a cone-shaped heap.
4. Height (h) and radius (r) of heap were measured.
5. Angle of repose was calculated.

❖ **Formula**

$$\tan \theta = \frac{h}{r}$$

Where:

- $\theta$  = Angle of repose
- h = Height of powder cone
- r = Radius of cone

❖ **Interpretation**

Angle of Repose	Flow Property
<25°	Excellent
25–30°	Good
30–40°	Passable
>40°	Poor

## 2. Bulk Density

Bulk density is the ratio of mass of powder to bulk volume before tapping.

### ❖ Procedure

1. Accurately weighed powder blend was transferred into graduated cylinder.
2. Initial volume occupied by powder was noted.
3. Bulk density was calculated.

### ❖ Formula

$$\text{Bulk Density} = \frac{\text{Mass of powder}}{\text{Bulk volume}}$$

Where:

- $\rho_b$  = Bulk density
- M = Mass of powder
- V<sub>b</sub> = Bulk volume

## 3. Tapped Density

Tapped density is the ratio of mass of powder to tapped volume after mechanical tapping.

### ❖ Procedure

1. Measuring cylinder containing powder was tapped mechanically for 100 taps.
2. Final volume was recorded.
3. Tapped density was calculated.

### ❖ Formula

$$\text{Tapped Density} = \frac{\text{Mass}}{\text{Tapped volume}}$$

Where:

- $\rho_t$  = Tapped density
- M = Mass of powder

- V<sub>t</sub> = Tapped volume

## 4. Carr's Compressibility Index

Carr's index indicates compressibility and flow behavior of powder blend.

### ❖ Procedure

Calculated using bulk density and tapped density values.

### ❖ Formula

$$\text{Carr's Index} = \frac{(TD - BD)}{TD} \times 100$$

Where:

- TD = Tapped density
- BD = Bulk density

### ❖ Interpretation

Carr's Index	Flow Character
5–15%	Excellent
16–20%	Good
21–25%	Fair
>25%	Poor

## 5. Hausner's Ratio

Hausner's ratio indicates interparticle friction and flowability of powder.

### ❖ Formula

$$\text{Hausner Ratio} = \frac{TD}{BD}$$

### ❖ Interpretation

Hausner Ratio	Flow Property
1.00–1.11	Excellent
1.12–1.18	Good

1.19–1.25	Fair
>1.25	Poor

❖ **Significance**

- Indicates flow efficiency
- Predicts powder handling property

**1. Weight Variation Test**

❖ **Principle:** This test ensures uniformity of tablet weight and dose.

❖ **Procedure**

1. Twenty tablets were selected randomly.
2. Individual tablet weights were measured using digital balance.
3. Average weight was calculated.
4. Individual weights were compared with average weight.

**2. Thickness Test**

❖ **Principle:** Thickness determines uniformity in tablet size.

❖ **Procedure**

1. Thickness of tablets was measured using Vernier caliper.
2. Average value was calculated.

**3. Hardness Test**

❖ **Principle:** Hardness indicates mechanical strength of tablets

❖ **Procedure**

1. Tablets were placed between jaws of Monsanto hardness tester.
2. Pressure required to break tablet was recorded.

**4. Friability Test**

❖ **Principle:** Friability determines resistance of tablets to abrasion and shock.

❖ **Procedure**

1. Preweighed tablets were placed in Roche friabilator.
2. Apparatus rotated at 25 rpm for 4 minutes.
3. Tablets were dedusted and reweighed.

❖ **Formula**

$$\text{Percentage Friability (F)} = (Iw - Fw) / Iw \times 100$$

Where:

- F = Friability
- W1 = Initial weight
- W2 = Final weight

**5. Disintegration Test**

❖ **Principle:** Determines time required for tablet to break into small particles.

❖ **Procedure**

1. Tablets were placed in disintegration apparatus containing distilled water at  $37 \pm 0.5^\circ\text{C}$ .
2. Time required for complete disintegration was recorded.

**6. Dissolution Study**

Drug release study was performed using dissolution apparatus maintained at  $37 \pm 0.5^\circ\text{C}$  and analyzed using UV spectrophotometer.

**IN-VITRO ANTI-ASTHMATIC STUDY**

1. Fresh goat trachea was collected from slaughterhouse
2. Trachea was washed with physiological salt solution
3. Tracheal rings were prepared and mounted in organ bath
4. Tissue was stabilized for 30 minutes
5. Histamine was added to induce contraction

6. Test formulation containing *Ficus religiosa* extract was added

Reduction in histamine-induced contraction indicated bronchodilator activity.

## CONCLUSION

*Ficus religiosa* leaves possess significant anti-asthmatic potential due to the presence of flavonoids, phenolic compounds, saponins, and other phytoconstituents. The plant exhibits bronchodilator, anti-inflammatory, antioxidant, and expectorant activities which are beneficial in asthma management. Formulation of fast disintegrating tablets containing *Ficus religiosa* extract may provide rapid onset of action and improved patient compliance. Further clinical studies are necessary to establish its therapeutic efficacy and safety in humans.

## REFERENCES

1. Kapoor M, Jasani N, Acharya N, Acharya S, Kumar V. Phytopharmacological evaluation and anti-asthmatic activity of *Ficus religiosa* leaves. *Asian Pacific Journal of Tropical Medicine*. 2011;4(8):642-644.
2. Singh D, Singh B, Goel RK. Traditional uses, phytochemistry and pharmacology of *Ficus religiosa*: A review. *Journal of Ethnopharmacology*. 2011;134(3):565-583.
3. Viswanathan S, Thirugnanasambantham P, Reddy MK, Narasimhan S, Subramaniam GA. Anti-inflammatory and mast cell protective effect of *Ficus religiosa*. *Ancient Science of Life*. 1990;10(2):122-125.
4. Murugesu S, Selamat J, Perumal V. Phytochemistry, pharmacological properties, and recent applications of *Ficus benghalensis* and *Ficus religiosa*. *Plants*. 2021;10(12):2749.
5. Sultana SA, Talukder S, Shawon NJ, et al. Chemical, biological and pharmacological activities of *Ficus religiosa*: An extensive review. *Bangladesh Pharmaceutical Journal*. 2024;27(2):215-230.
6. Maheshwari R, Mehta D, Jain A, Mehta BK. A systematic review of phytochemistry and pharmacology study of *Ficus religiosa* (Pipal). *Journal of Drug Discovery and Therapeutics*. 2023;11(4):45-54.
7. Biju CR, Jyotisree G, Amita S, Sruthi R. A comparative evaluation of *Ficus religiosa* with *Ficus* species for its anti-inflammatory activity: A review. *Journal of Applied Pharmaceutical Research*. 2020;8(2):15-20.
8. Yogesh K, Ravindra P, Shilimkar V, Dhasade V. Potential of *Ficus religiosa* Linn. flavonoids in management of allergic asthma. *South Eastern European Journal of Public Health*. 2024;25(S1):1507-1521.
9. Yogesh K, Patil R, Shilimkar V, Dhasade V. Phytochemical analysis and antiasthmatic potential of *Ficus religiosa* Linn. *African Journal of Biomedical Research*. 2024;27(4S):682-691.
10. Joshi A, Bhoje M, Saatarkar A. Phytochemical investigation of the roots of *Ficus religiosa*. *Indian Journal of Pharmaceutical Sciences*. 2001;63(5):375-376.
11. Ahmed F, Urooj A. Antioxidant activity of *Ficus religiosa*. *Journal of Medicinal Plants Research*. 2010;4(4):321-326.
12. Gulecha V, Sivakumar T, Upaganlawar A, Mahajan M. Screening of anti-inflammatory and analgesic activity of *Ficus religiosa* leaves. *International Journal of Pharmaceutical Sciences Review and Research*. 2011;8(1):152-156.
13. Choudhari AS, Suryawanshi SA, Kaul-Ghanekar R. The aqueous extract of *Ficus religiosa* induces cell cycle arrest in human cervical cancer cell lines. *Journal of Ethnopharmacology*. 2013;147(1):264-274.
14. Verma RS, Bhatia KS. Medicinal uses and pharmacological properties of *Ficus religiosa*. *International Journal of Pharma and Bio Sciences*. 2012;3(4):134-138.
15. Panda SK, Das D, Tripathy NK. Evaluation of bronchodilator activity of herbal plants used in asthma. *International Journal of Research in Ayurveda and Pharmacy*. 2011;2(4):1123-1128.
16. Kumar V, Roy S, Kar M. Pharmacological potential of medicinal plants in asthma therapy. *Asian Journal of Pharmaceutical and Clinical Research*. 2012;5(3):12-16.
17. Gupta VK, Sharma SK. Plants as natural anti-asthmatic agents: A review. *International Journal of Pharmaceutical Sciences and Research*. 2014;5(3):897-904.
18. Sharma P, Bhatia V, Mishra G. Herbal medicines for treatment of asthma: A review. *Journal of*

Chemical and Pharmaceutical Research. 2010;2(1):267-273.

Pharmacognosy and Phytochemistry. 2013;2(4):55-60.

19. Chauhan A, Sharma PK, Srivastava P. Medicinal plants with anti-asthmatic potential: A current review. International Journal of Pharmaceutical Sciences and Drug Research. 2011;3(2):100-106.
20. Kumar S, Malhotra R, Kumar D. Antiasthmatic medicinal plants: A review. Journal of

**HOW TO CITE:** Bahirat Gayatri Nitin\*, Utkarsha Lasure, Review On Anti-Asthmatic Activity Of Ficus Religiosa Leaves, Int. J. Sci. R. Tech., 2026, 3 (5), 1166-1175. <https://doi.org/10.5281/zenodo.20454453>