

## Traditional medicinal plants with anti-asthmatic potential - An overview

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**Abstract:** Bronchial Asthma (BA) is characterized by chronic airway inflammation and increased airway hyper-responsiveness leading to cough, wheeze, chest tightness and dyspnoea. The incidence of bronchial asthma is increasing nowadays. The drugs like Bronchodilators, Anti-inflammatory agents, Mast cell stabilizers, LT receptor antagonists are used for BA in all over the world. Current synthetic drugs used in asthma are unable to act at all stages of asthma. Many herbs are used for their, bronchodilator, mast cell stabilizer, and anti – inflammatory activity in Ayurveda System of medicine (Indian traditional medicine). Ayurveda system has better remedies for the treatment and management of Bronchial Asthma. This article analysis the anti – asthmatic properties of the most commonly employed herbs in Ayurveda medicine. It signifies the need for the development of herbal preparations containing various herbs acting at a particular site of the pathophysiological cascade of asthma for prophylaxis as well as for the treatment of asthma.

**Keywords:** Bronchial Asthma, Anti-Asthmatic herbs, Bronchodilator.

**Introduction:**

The World Health Organization recognizes asthma as a major health problem. Bronchial Asthma is one of the major respiratory disorders in clinical practice which is caused by a combination of complex and incompletely understood environmental and genetic interactions. It is characterized by chronic airway inflammation and increased hyper-responsiveness leading to cough, wheeze, chest tightness and dyspnoea. The overall Burden of asthma in India is estimated at more than 15 Million. Respiratory disorder considered in this review is asthma- bronchial asthma, occupational asthma, allergic asthma, cough-variant asthma, exercise induced asthma, nocturnal asthma and childhood asthma. The National Institute of Health defines it as a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role, in particular, mast cells, eosinophil's, T-lymphocytes, neutrophils and epithelial cells.

Asthmatic attacks may be mild, resulting from diffuse wheezes, adequate air exchange and mild dyspnoea; moderate, with respiratory distress at rest, marked wheezes but involving the use of accessory muscles or severe, when marked respiratory distress is expressed and characterized by marked wheezes and respiratory failure. When severe, respiratory distress, confusion and lethargy are experienced. Incidence of death may arise from very severe asthmatic attacks and respiratory failures. Asthma has been triggered by various other factors; viral respiratory infections, chemicals including certain medications, airborne allergens, occupational sensitizers, smoke, air pollution etc. Clinically, asthma has been described as airway obstruction that involves inflammation of the pulmonary airway and bronchial hyper responsiveness that is usually reversible.

#### **PATHOPHYSIOLOGY OF ASTHMA:**

Bronchial asthma is characterized pathologically by an infiltration of eosinophils into the airway sub mucosa. Eosinophil activation results in the secretion of an array of highly charged cytotoxic cationic proteins such as major basic protein, and is believed to play a central role in the aetiology of this disease by inducing damage to the airway epithelium. The pathophysiology of asthma involves the development of acute and chronic inflammation in airway narrowing by producing increased vascular permeability, oedema, and airway smooth muscle contraction.

The gross pathology of asthmatic airways displays lung hyperinflation, smooth muscle hypertrophy, lamina reticularis thickening, mucosal oedema, epithelial cell sloughing, cilia cell disruption, and mucus gland hyper secretion. It is observed that those patients who have died due to asthma are due to considerable increase in the thickness of the airway wall throughout the bronchial tree, partly as a result of smooth muscle hypertrophy.

Several different groupings can be applied:

- **Extrinsic Asthma:** Caused by allergic responses to house dust, animal fur, or various foods. Such causes 10-20% of adult asthma.
- **Intrinsic Asthma:** Caused by genetics, structural problems, infections, pollutants, and stress - both physiological and psychological. Such causes 30-50% of adult asthma. The symptoms of people with asthma differ greatly in frequency and degree. Some have an occasional episode that is mild and brief; otherwise, they are symptom-free. Others have mild coughing and wheezing much of the time, punctuated by severe exacerbation of symptoms following exposure to known allergies, viral infections, and exercise or nonspecific irritants. A series of stages have been characterized for describing the severity of an acute asthma attack:

**Mild:** Mild dyspnoea; diffuse wheezes; adequate air exchange.

**Moderate:** Respiratory distress at rest; hyperpnoea, use of accessory muscles; marked wheezes.

**Severe:** Marked respiratory distress; cyanosis; use of accessory muscles; marked wheezes or absent breath sounds.

**Respiratory Failure:** Severe respiratory distress; lethargy; confusion; prominent pulses paradoxes. Use of accessory muscles

**PLANTS USED IN THE MANAGEMENT OF ASTHMA:**

Asthma is a global problem. Many synthetic drugs are used to treat acute symptoms of asthma, but they are not completely safe for long term use. Hence, search has been started once again to look back to traditional medicine, which can be used to treat asthma. Most anti-asthmatic herbs act by stimulating  $\beta$ adrenergic receptors causing relaxation of the bronchial smooth muscles, thus acting as bronchodilators. Some act as mast cell stabilizers, anti-allergic, anti-anaphylactic, anti-inflammatory agents, anti-spasmodic agents, immune-modulatory agents are very useful in the treatment of asthma. The multifaceted roles these herbs will play, suggesting different modes of action within the body will assist greatly in the management of the disease. Some traditional plants with anti-asthmatic potential are discussed below in table.

**TABLE:**

| S. No. | Plant Name                   | Plant part used | Mechanism of action                      |
|--------|------------------------------|-----------------|--|
| 1      | <i>Abutilon indicum</i>      | Seed            | Anti-asthmatic                           |
| 2      | <i>Aerva lanta</i>           | Aerial parts    | Antiasthma tic                           |
| 3      | <i>Acorus alamus</i>         | Rhizome         | Mast cell stabilizer                     |
| 4      | <i>Achyranthes aspera</i>    | Fruit           | Mast cell stabilizer                     |
| 5      | <i>Adhatoda vasica</i>       | Bulb            | Mast cell stabilizer                     |
| 6      | <i>Allium cepa</i>           | Bulbs/Juice     | Mast cell stabilizer,                    |
| 7      | <i>Atropa belladonna</i>     | Seeds           | Asthma, Bronchitis, Muscular Pain        |
| 8      | <i>Benincasa hispida</i>     | Fruits          | Bronchodilator                           |
| 9      | <i>Boerhaavia diffusa</i>    | Root            | Asthma, Bronchitis                       |
| 10     | <i>Brassica campestris</i>   | Seed            | Bronchodilator                           |
| 11     | <i>Cedrus deodara</i>        | Wood            | Mast cell stabilizer                     |
| 12     | <i>Calotropis procera</i>    | Latex           | Mast cell stabilizer & Anti-inflammatory |
| 13     | <i>Cassia tora</i>           | Seeds           | Mast cell stabilizer                     |
| 14     | <i>Clerodendron serratum</i> | Stem bark       | Bronchodilator, Mast cell stabilizer     |
| 15     | <i>Cuminum cyminum</i>       | Roots           | Bronchodilator                           |
| 16     | <i>Curcuma longa</i>         | Rhizome         | Mast cell stabilizer & Anti              |

|    |                                |                     | Inflammatory                             |
|----|--------------------------------|---------------------|--|
| 17 | <i>Datura metel</i>            | Whole Plant         | Asthma                                   |
| 18 | <i>Eclipta alba</i>            | Leaves              | Anti-asthmatic                           |
| 19 | <i>Emblica officinalis</i>     | Fruits              | Asthma, Bronchitis                       |
| 20 | <i>Ficus bengalensis</i>       | Bark                | Anti-asthmatic                           |
| 21 | <i>Ficus racemosa</i>          | Latex               | Anti-asthmatic                           |
| 22 | <i>Glycyrrhiza glabra</i>      | Roots               | Antihistaminic, Antiallergic             |
| 23 | <i>Hemidesmus Indicus</i>      | Roots               | Anti-asthmatic                           |
| 24 | <i>Inula racemosa</i>          | Roots               | Mast cell stabilizer & Antiallergic      |
| 25 | <i>Leptadenia Reticulata</i>   | Leaves and<br>Roots | Cough and AsthmaS                        |
| 26 | <i>Lepidium sativum</i>        | Seeds               | Bronchodilator                           |
| 27 | <i>Moringa oleifera</i>        | Seed                | Bronchodilator                           |
| 28 | <i>Mucuna pruriens</i>         | Seed                | Anti-asthmatic                           |
| 29 | <i>Nigella sativa</i>          | Seed                | Bronchodilator                           |
| 30 | <i>Nyctanthes arbortristis</i> | Stem bark           | Mast cell stabilizer, Bronchodilator     |
| 31 | <i>Ocimum sanctum</i>          | Leaves              | Mast cell stabilizer                     |
| 32 | <i>Oxalis corniculata</i>      | Whole Plant         | Anti-asthmatic                           |
| 33 | <i>Piper betel</i>             | Leaves              | Bronchodilator                           |
| 34 | <i>Piper nigrum</i>            | Fruits              | Bronchodilator                           |
| 35 | <i>Picorrhiza kurroa</i>       | Roots               | Mast cell stabilizer, Bronchodilator     |
| 36 | <i>Rauvolfia serpentina</i>    | Whole Plant         | Bronchodilator                           |
| 37 | <i>Solanum nigrum</i>          | Roots               | Mast cell stabilizer                     |
| 38 | <i>Solanum surattense</i>      | Whole Plant         | Asthma, Bronchospasm                     |
| 39 | <i>Tephrosia purpuria</i>      | Aerial parts        | Mast cell stabilizer, Bronchodilator     |
| 40 | <i>Terminalia belerica</i>     | Leaf galls          | Asthma                                   |
| 41 | <i>Terminalia chebula</i>      | Fruits              | Mast cell stabilizer & Antiallergic      |
| 42 | <i>Tinospora cardifolia</i>    | Stem                | Mast cell stabilizer                     |
| 43 | <i>Trachyspermum ammi</i>      | Fruits              | Asthma                                   |
| 44 | <i>Tylophora asthmatica</i>    | Leaves              | Mast cell stabilizer & Anti inflammatory |
| 45 | <i>Vitex negundo</i>           | Leaves              | Bronchodilator & Antiallergic            |
| 46 | <i>Zingiber officinale</i>     | Rhizomes            | Anti-asthmatic                           |

**CONCLUSION** This is a review of some medicinal plants with anti-asthmatic properties. Medicinal plants remain the main ingredients of indigenous medicines; this review justifies the need for polyherbal formulations for use in the management of respiratory disorders.

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