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## **Herbal Remedies for Asthma: An Overview**

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### **Abstract**

Asthma affects 7% population of the United States, 6.5% of British population and a total of 300 million people worldwide. It affects over 5-10% of the population in industrialized countries. Asthma is characterized by a predisposition to chronic inflammation of the lungs in which the airways (bronchi) are reversibly narrowed resulting in difficulty in breathing. The agents responsible for the early reaction (immediate bronchoconstriction) include- histamine, tryptase, and other neutral proteases, leukotrienes C4 & D4 and prostaglandins. Synthetic drugs may give instant relief from symptoms of asthma, but have lot of undesirable effects (like those of steroids). Herbal drugs (Tylophora, Coleus, Ephedra, Boswelia and Ginkgo etc.) as reported in ancient literature and screened for pharmacological activity are an excellent option for the treatment of various ailments including asthma.

**Key words:** Bronchodilators, leukotrienes, anti-inflammatory, antiallergic and antispasmodic.

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### **Introduction**

Asthma affects over 20 million individuals in the US and over 60 million individuals worldwide. It affects over 5-10% of the population in industrialized countries. It is a condition in which the bronchial tubes becomes swollen and clogged resulting in difficulty in breathing.

It is a disease mediated by reaginic antibodies bound to mast cells. The agents responsible for the early reaction (immediate bronchoconstriction) include- histamine, tryptase, and other neutral proteases, leukotrienes C4 & D4 and prostaglandins. Other mediators like cytokines are responsible for the more sustained bronchoconstriction, cellular infiltration of the airway

mucosa and mucous hyper-secretion of the late asthmatic reaction that occurs 2 to 8 hours later. Other causes or factors that may induce or aggravate asthma are – Viral respiratory infections, exposure to known allergens (e. g. cockroaches, pollens, moulds), exercise, animals with fur or feathers, house- dust mites (in mattresses, pillows, carpets, curtains etc.), smoke (tobacco, wood, agarbattis), changes in weather (exposure to cold air, humidity etc.), foods (especially nuts) and food additives (coloring matters etc.) and drugs (e.g. aspirin,  $\beta$ -blockers etc.).

Common asthma symptoms are a scratchy throat, coughing, shortness of breath, wheezing and a tight feeling in the chest. Synthetic drugs may give instant relief from symptoms of asthma, but have lot of undesirable effects (like those of steroids). Synthetic drugs used for conventional medical treatment of asthma include-

Bronchodilators (Sympathomimetics: Albuterol, Formoterol, Terbutaline; Methylxanthines: Aminophylline, Dyphylline; Antimuscarinics: Ipratropium, Tiotropium) Mast cell stabilizers (Cromolyn sodium, Nedocromil sodium) Corticosteroids (Aerosols: Beclomethasone, Budesonide, Triamcinolone; Systemic: Betamethasone, Prednisolone) Leukotriene inhibitors (Montelukast, Zafirlukast, Zileuton). [1-2, 33]

### Herbal Drugs used for Asthma

Herbal drugs are an excellent option for the treatment of various ailments including asthma. Phytochemical and pharmacological screening of various plant sources, on the basis of their traditional use, is in progress. Herbal drugs having established anti asthmatic activity include the following:

Source and part used	Active chemical constituent	Biological activity
<b>Tylophora</b> (Hindi & Ben.-Antamul: Hindi-Jangli Pikvan). The leaves and roots of a perennial climbing herb: <i>Tylophora indica</i> syn. <i>T. asthmatica</i> .(Family- Asclepiadaceae)	Tylophorine	Tylophorine appears to be effective in asthma, where it may have anti-inflammatory, antiallergic and antispasmodic actions. [3-4]
<b>Boswellia</b> (Hindi & Ben. – Luban; Salai guggal in Ayurveda) Boswellia or Salai guggal extract is a standardized powder extract of the gum of the <i>Boswellia serrata</i> (Family-Burseraceae)	Boswellic acid	Boswellic acids have been reported to inhibit the 5-lipoxygenase and prevent formation of leukotrienes from arachidonic acid and thus, are of value in the treatment of asthma. [5-6]
<b>Coleus</b> (English- Coleus; Hindi- Mayamul, Garmar) The root stocks of <i>Coleus forskohlii</i> , a member of the mint family (Family-Labiatae)	Forskolin	Forskolin is a direct activator of adenylyl cyclase and elevates intracellular c-AMP levels, thereby causes relaxation of muscles around the bronchial tubes. [7]
<b>Ginkgo</b> (English- Maidenhair Tree; Hindi-Balkuwari) The leaves of <i>Ginkgo biloba</i> (Family- Ginkgoaceae)	Ginkgolide-B	The extracts block the action of platelet activating factor (PAF), which causes asthma symptoms.[8]

Tab. Cont'd

<b>Ephedra</b> (English- Ephedra; Indian Languages: Khanda, Janusar) The aerial stems of various species of Ephedra (Family- Ephedraceae).	(-) Ephedrine	Ephedrine has bronchodilator activity and is used to relieve the attacks of asthma.[9-10]
<b>Vasaka</b> (English-Malabarnut;Hindi-Adotodai)The leaves and flowers of <i>Justicia adhatoda</i> syn. <i>Adhatoda vasica</i> (Family- Acanthaceae).	Vasicine, Vasicinon, Vasicinol	The leaves and flowers possess expectorant and antiasthmatic properties.[11-12]
<b>Acorus</b> (English- Sweetflag; Hindi & Ben- Bach, Gorabach). The rhizomes of <i>Acorus calamus</i> (Family- Araceae).	Asarone	The volatile oil obtained from rhizomes is used in bronchitis. $\alpha$ Asarone exhibited spasmolytic action by antagonizing action of histamine, acetylcholine and serotonin.[13-14]
<b>Fagopyrum</b> (English- Buck-wheat; Hindi – Kaspel). The leaves of <i>Fagopyrum esculantum</i> (Family- Polygonaceae) are used.	Quercetin, Fagomine	Quercetin reduced concentrations of prostaglandin-E2 (PGE2) and leukotrienes B4 (LTB4). It also reduced LTB4 in cells.[10,15]
<b>Hordeum</b> (English- Barley; and – Hindi- Jave, Jan). The leaves of <i>Hordeum vulgare</i> (Family- Poaceae) are used.	Hordenine	Hordenine is the main constituent. Hordenine and its methyl ether were effective bronchodilators in cats. [6, 16]
<b>Nigella</b> (English- Small fennel, Blackcumin; and Hindi- Kala jira, Kulangi). The seeds of <i>Nigella sativa</i> (Family- Ranunculaceae) are used.	Nigellone, Nigellicin, Nigellimine-N-oxide.	These alkaloids were isolated from essential oil of the seeds. Nigellone protected guinea – pig trachea against histamine-induced bronchospasms. [14, 17]
<b>Tagetes</b> (English- Stinking roger, Wild Marigold Tagetes Minuta) Aerial parts of <i>Tagetes minuta</i> L. syn. <i>T. glandulifera</i> Schrank (Family- Asteraceae) are used.	$\alpha$ -Terthienyl, Quercetagetrin and Patuletrin	The essential oil exhibited bronchodi - latory, spasmolytic, tranquillizing, hypotensive and anti-inflammatory activities. [18-19]
<b>Thalictrum</b> (English- Gold thread; Hindi- Pilijari). The aerial parts and roots of <i>Thalictrum foetidum</i> syn <i>T. minus</i> var. <i>foetidum</i> (Family- Ranunculaceae).	Phetidine, Thalsoetidine, Thalpin, Thalphinin	Administration of alkaloidal fraction to rats reduced histamine content of lungs. [6, 20]
<b>Achyranthes</b> (English- Rough chaff tree; Prickly chaff- flower; Hindi- Latjira, Chirchira). The unripe fruits of <i>Achyranthes aspera</i> (Family-Amaranthaceae)	Saponin C, Saponin D	The fruits were used in the treatment of respiratory diseases. [14, 21]
<b>Semecarpus</b> (English- Marking-nut tree; Hindi- Bhela, Bhilawa). Plant extract obtained from <i>Semecarpus anacardium</i> . (Family- Anacardiaceae)	Bhilawanol	The plant extracts antagonized spasmogenic effects of histamine, carbachol, barium chloride and pitocin. [19, 22]

Tab. Cont'd

<b>Carum</b> (English- Caraway; Hindi- Shia Jira). The fruits of <i>Carum anethifolium</i> (Family Apiaceae)	Carveol	Carveol showed antiasthmatic and anti anaphylactic effects in guinea – pigs. [10, 23]
<b>Rhus</b> (Hindi- Tatri). The plant parts of <i>Rhus semialata</i> & <i>Rhus succedanea</i> . (Family – Anacardiaceae)	Rhusflavone	The plant is used for the treatment of bronchitis and heart diseases. [4, 24]
<b>Crocus</b> (English- Saffron; Hindi – Kesar) The flowering buds of <i>Crocus sativus.L</i> (Family – Iridaceae).	Crocin-1, 2, 3 & 4	Carotenoid glycosides were shown to have antiasthmatic activity. [6, 25]
<b>Hyoscyamus</b> (English – Henbane; Hindi- Khurasani ajvayan). The leaves of <i>Hyoscyamus multicus L. and H. niger L.</i> (Family- Solanaceae)	Scopolamine	Scopolamine, a tropane alkaloid, on intraperitoneal administration protected guinea pig against bronchospasms produced by inhalation of histamine spray. [19]
<b>Olanum</b> (Hindi- Bhutkatya; Kateli) Plant parts of <i>Solanum surattense</i> syn. <i>S. xanthocarpum</i> . (Family- Solanaceae)	Carpesterol	Plants powder is anti-tussive. Its beneficial effects in patients of bronchial asthma and non – specific cough have been explained as due to depletion of histamine from lung and its expectorant action as due to inorganic nitrate content. [26]
<b>Prangos</b> (English- Silphium Parsley; Hindi- Komal). The roots, umbels and seeds of <i>Prangos pabularia Lindl.</i> (Family- Umbelliferae)	Osthol	Osthol is shown antagonism to histamine and acetylcholine, and also antagonized to some extent action of respiratory depressants, such as phenobarbitone and morphine. [19, 27]
<b>Allium</b> (English- Onion; Hindi – Piyaz) The plant extract obtained from <i>Allium cepa</i> . (Family- Liliaceae)	Quercetin	Quercetin showed antiasthmatic activity. Plant extract also showed bronchodilatory activity. [19, 28]
<b>Descurainia</b> (Hindi- Khubkalm) The seeds of <i>Descurainia sophia L. syn. Sisymbrium sophia</i> . (Family- Brassicaceae).	Erysimoside	Seeds are expectorant, restorative and tonic and useful in fevers, bronchitis and dysentery. [19, 29]
<b>Cyclea</b> (English-Cyclea barbata)The roots of <i>Cyclea barbata</i> (Family-Menispermaceae)	Tetandrine	Tetrandrine inhibited contraction of human bronchial and lung strips induced by slow – reacting substance of anaphylaxis (SRS-A). [10, 14, 30]
<b>Acalypha</b> (English- Indian acalypha. Hindi – Kuppu, Khokali). The leaves and young twigs of <i>Acalypha indica</i> . (Family- Euphorbiaceae).	$\beta$ - Sitosterol Acalyphol Acalphin	The plants were found to be useful against asthma and pneumonia. [6, 31-32]
<b>Glycyrrhiza</b> (English – Sweet wood, Liquorice; Hindi- Mulathee). The plant parts of <i>Glycyrrhiza glabra</i> . (Family – Leguminosae).	Glycyrrhizinic acid	Glyerrhizin inhibited contraction of guinea pig trachea induced by histamine or acetylcholine and antiallergic action might be due to its inhibitory effect on Platelet activating factor production.[10-11]

## Conclusion

Though synthetic drugs give instant relief from symptoms of asthma, but they cause lot of undesirable effects (like those of steroids). Moreover, their efficacy goes on decreasing with their continuous use. Herbal drugs like- Tylophora, Coleus, Ephedra, Boswellia and Ginkgo etc., on the other hand, provide prolonged effects and have less side effects. In addition, dietary modifications (like pure vegetarian diet schedule) and avoidance of excess of coffee, sugar, salt and chlorinated tap water; and inclusion of vitamin C may help the patient. Alternative therapy like- acupuncture may also be useful for asthmatic along with herbal drugs.

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