

ANTIASTHMATIC AYURVEDIC HERBS - A REVIEW

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Abstract

Asthma is amongst the most common chronic diseases worldwide. Asthma is a public health problem and approximately 300 million people worldwide currently suffer from Asthma, with estimates suggesting that Asthma prevalence increases globally every decade. Bronchial asthma is chronic debilitating disease of diverse aetiology which is characterized by recurrent attacks of breathlessness and wheezing, which vary in severity and frequency from person to person. Tamaka Shvasa is analogous to bronchial asthma due to similarity in symptoms, onset, causes, precipitating factors and pathogenesis. Although asthma cannot be cured, appropriate management can control the disease. Many synthetic drugs are used to treat acute symptoms of bronchial asthma, but they are not completely safe for long term use because they have various adverse effect. Many Ayurvedic herbs are used as antiasthmatics which have been described in this review paper, such as *Adhatoda vasica*, *Inula racemosa*, *Ocimum sanctum*, *Solanum xanthocarpum* etc.

Keywords: Asthma; Tamaka Shvasa; Ayurveda; Herbs.

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INTRODUCTION

Asthma is one of the most common chronic diseases worldwide. Bronchial Asthma is one of the distressing diseases which are relatively widespread in all the socio-economic groups of all the age groups and approximately all over the world. Ayurveda refers to bronchial asthma as Tamaka Shvasa. Asthma is the most common chronic disease of childhood and the leading cause of childhood school/day care absences, emergency department visits, and hospitalizations. The prevalence of asthma has increased considerably over the past 20 years, especially in children. Asthma is a public health problem and approximately 300 million people worldwide currently have Asthma, with estimates suggesting that Asthma prevalence increases globally every decade and its prevalence increases by 50% every decade. In North America, 10% of the population have asthma.^[1]

Bronchial asthma is chronic debilitating disease of diverse aetiology which is characterized by recurrent attacks of breathlessness and wheezing, which vary in severity and frequency from person to person. Tamaka Shvasa is analogous to bronchial asthma due to similarity in symptoms, onset, causes, precipitating factors and pathogenesis. In Ayurvedic, five types of Shvasa Roga have been described by various acharyas.^{[2][3][4]} Acharya Charaka discussed the various causative factors (nidana) which directly or indirectly act as triggers for tamaka Shvasa as exposure to various allergens and irritant gases (dust, smoke), excessive physical exertion, undue exposure to cold air and water, non-congenial diet, certain drugs and distressing emotional circumstances etc.² The WHO recognizes asthma as a major public health problem caused by a combination of genetic and environmental factors. Various trigger factors such as dust, fumes and pollen grains along with genetic factors have been studied and investigated which have immensely helped in managing the disease. It

is thus apparent that Tamaka Shvasa is aetiologically quite similar to bronchial asthma. The pathogenic mechanisms of asthma include the infiltration of leukocytes and release of cytokines in the respiratory tract resulting ultimately into a transient obstructive pulmonary disorder. Acharya Charaka while describing the pathogenesis of Shvasa roga propounds that etiologic factors (nidana) vitiating the Vata dosha on entering the Pranavaha Srotasa deranges the inherent Kapha in Urah-pradesha (thoracic region). This Kapha produces obstruction of Pranayu in the aforesaid srotasa thus resulting in an obstructive pulmonary disorder i.e. Shvasa roga. This redention of svasa-roga pathology is also suggestive of an obstructive pulmonary disorder. Although asthma cannot be cured, appropriate management can control the disease. In Ayurveda, the prognosis of Tamaka Shvasa, a disease of pranavaha srotas is said to be sadhya (curable) in its initial stage of onset if diagnosed and treated promptly. Otherwise as time elapses it becomes yanya (a disease controlled only by regular use of medicine). Further, its Ayurvedic line of treatment includes Vamana and Virecana (Sodhana Chikitsha) followed by Pathya, Dhumaapaana of medicated drugs, Leha and other Shamana Chikitsha.^[2] Acharya Charaka described ten important drugs for treatment of Asthma (Shvasahara) as Shati (*Hedychium spicatum*), Puskaramoola (*Inula racemosa*), Amlavatsha (*Garcinia pedunculata*), Ela (*Elettaria cardamomum*), Hingu (*Ferula narthex*), Agara (*Aquilaria agallocha*), Sursha (*Ocimum sanctum*), Tamalaki (*Phyllanthus urinaria*), Jivanti (*Leptadenia reticulata*), Chanda (*Angelica glauca*).^[5] Acharya Sushruta also mentioned Surasadi gana for treatment of Shvasa.^[6]

Modern management of Asthma includes prevention by avoiding exposure to the triggering factors and pharmacologic intervention. Asthma being a chronic inflammatory disease of airways with unheralded acute attacks requires specific

medications classified into fast-acting and long-acting categories. The most commonly used antiasthmatic drugs are - Salbutamol, terbutaline, theophylline, tiotropium bromide, montelukast, corticosteroids etc. These synthetic drugs are used to treat acute symptoms of bronchial asthma as well as for long term control to prevent exacerbations. Yet these have safety issues especially when employed for long term use due to their various adverse effects. In this scenario, use of herbal medications as documented in Ayurveda for Svasa-roga can prove helpful in form of adjuvant or maybe even as primary therapy for asthma. Many related research works has been carried out in this direction using traditional medicine with encouraging results. It is an endeavour on the part of this review paper to highlight such documented herbs which show anti-asthmatic properties.

1. *Abrus precatorius* (Gunga): The ethanol extract of *A. precatorius* leaves significantly decreased milk induced leukocytosis and eosinophilia in mice in a dose dependent manner.^[7]
2. *Abutilon indicum* (Atibala): The methanolic extract of aerial parts of *A. indicum* revealed mast cell stabilizing effect against compound 48/80 and egg albumin induced rat peritoneal mast cell degranulation. *A. indicum* also showed anti-inflammatory activity when evaluated using carageenan induced rat paw edema model. So, the results of the study indicate that possible mechanism of action of *A. indicum* in the treatment of bronchial asthma is its mast cell stabilizing and anti-inflammatory activity.^[8]
3. *Achyranthes aspera* (Apamarga): The ethanolic extract of *A. aspera* reported protective role in toluene diisocyanate (TDI) induced occupational asthma in experimental wistar rats. There was significantly decreased in the neutrophils and eosinophils in blood and particular eosinophils in BAL fluid in

treatment groups as compared to TDI sensitized rats.^[9]

4. *Adhatoda vasica* (Vasa): *Adhatoda vasica* have been used for the treatment of Shvasa roga in the traditional system and its antiasthmatic property also revealed by various studies in recent years. Polyherbal formulation (containing mainly the ethanolic extract of *Adhatoda vasica*, *Clerodendrum serratum*, *Curcuma longa*, *Solanum xanthocarpum* and *Piper longum*) was evaluated against compound 48/80-induced mast cell degranulation as well as triple antigen-induced anaphylaxis in rats and results suggest anti-anaphylactic and mast cell stabilizing property.^[10] *Adhatoda vasica* showed improvement in clinical features of Tamaka shvasa during clinical trials.^{[11][12]}
5. *Aerva lanata* (Goraksaganja): The ethanolic extract of aerial parts of *Aerva lanata* exhibits significant dose dependent antiasthmatic activity as revealed by its mast cell stabilization and inhibited the clonidine induced catalepsy when evaluated in the isolated goat tracheal chain preparation model and in-vivo model using clonidine-induced catalepsy, mast cell degranulation in mice.^[13]
6. *Ailanthus excelsa* (Aralu): Methanolic extract of stem barks of *Ailanthus excelsa* Roxb. was evaluated in-vivo and in-vitro screening models in Guinea pigs and revealed dose-dependent antiasthmatic activity.^[14]
7. *Albizia lebbeck* (Shirisha): The decoction of the bark and flower of *Albizia lebbeck* showed protection of the guinea pig against histamine as well as acetylcholine induced bronchospasm.^[15] Similarly hydroalcoholic extract of polyherbal drug Shirishadi (containing *A.lebbeck*, *Cyprus rotundus* and *Solanum xanthocarpum*) showed antimicrobial activity (e.g. against *Staphylococcus aureus*, *Escherichia coli* *Pseudomonas*

- aeruginosa* and antifungal activity) and bronchodilator effect.^[16]
8. *Anacardium occidentale* (Cashew): The ethanol extract of *Anacardium occidentale* when used in various animal models revealed inhibition of catalepsy and milk induced total leukocytosis count.^[17]
 9. *Balanites roxburghii* (Ingudi): The ethanolic extract of stem bark of *Balanites roxburghii* showed antiasthmatic effect as having significant antihistaminic (H₁ receptor antagonist) activity on experimental models.^[18]
 10. *Calotropis gigantea* (Swetaarka): the ethanolic extract of roots *Calotropis gigantea* showed antiasthmatic activity when evaluated in vivo and in vitro animal models.^[19]
 11. *Clerodendron phlomidis* (Tekara): The extract of *Clerodendron phlomidis* showed antiasthmatic activity as evident by having antihistaminic effect, mast cell stabilising effect, decreased blood eosinophilia and decreased capillary permeability in mice.^[20]
 12. *Clitoria ternatea* (Aparajita): The ethanol extract of *Clitoria ternatea* roots studied on the histamine aerosol induced bronchospasm in wister rats and results showed bronchodilating activity.^[21]
 13. *Curculigo orchioides* (Talamuli): The ethanol extract of *Curculigo orchioides* exhibited antiasthmatic activity by showing relaxant effect against histamine in guinea pigs as well as decrease in eosinophils.^[22]
 14. *Dichrostachys cinerea* (Virataruu): The methanolic extract of *D.cinerea* showed relaxant effect in the guinea-pig trachea preparations by activation of β-adrenergic or histaminergic receptor.^[23]
 15. *Elettaria cardamomum* (Ela): Crude extract of *Elettaria cardamomum* exhibits bronchodilatory effect, mediated through Ca⁺⁺ antagonist mechanism when tested against carbachol-mediated bronchoconstriction in rats.^[24]
 16. *Ferula assa-foetida* (Hingu): Asafoetida (*Ferula assa-foetida*) showed a potent relaxant effect on tracheal smooth muscle of guinea pig which seems due to muscarinic receptor blockade.^[25]
 17. *Ficus religiosa* (Asawatha): The aqueous extract of *F. religiosa* leaves found effective on histamine and acetylcholine induced bronchospasm in guinea pigs.^[26]
 18. *Ficus benghalensis* (Vata): The extract of *Ficus benghalensis* showed antibacterial activity (e.g. against *Klebsiella pneumoniae* and *Micrococcus luteus* etc.).^[27]
 19. *Hemidesmus indicus* (Sariva): The alcohol extract of roots of *Hemidesmus indicus* exhibited significant antiasthmatic activity in the isolated goat tracheal chain preparation, passive paw anaphylaxis in rat.^[28]
 20. *Inula racemosa* (Puskaramoola): Extract of air dried roots of *Inula racemosa* revealed antiasthmatic activity as noticed by antagonistic effect on histamine induced contraction, milk-induced eosinophilia and leukocytosis, and protection against mast cell degranulation.^[29] Similarly Puskaramooladi choorna (a polyherbal drug consists *Hedichium spicatum*, *Inula racemosa*, *Emblica officinalis* powder) showed significant increase in pulmonary function tests during a clinical trial.^[30]
 21. *Lagenaria siceraria* (Ikshwaku): Antiasthmatic activity noticed when the aqueous extract of *Lagenaria siceraria* leaf used in various animal models like histamine and acetylcholine induced bronchoconstriction in Guinea pigs.^[31]
 22. *Leucas aspera* (Thumbai): Methanolic extract of dried whole plant of *Leucas aspera* reported antiasthmatic activity *in-vivo* models like histamine induced bronchospasm in guinea pigs, passive paw anaphylaxis in rats and milk induced eosinophilia mice and *in vitro* bronchoconstriction in rats.^[32]

- model like mesentric mast cell degranulation by egg albumin etc.^[32]
23. *Mangifera indica* (Aamra): The aqueous extract of *M.indica* trail suggests antiasthmatic effect as they block histaminic and muscarinic receptors on rat trachea.^[33]
 24. *Mimosa pudica* (Lajalu): The extract of *Mimosa pudica* showed antiasthmatic activity as it blocked the release of monocyte chemotactic protein-1, interleukin-6 and suppress leukocytosis, eosinophilia and mucus hypersecretion in asthmatic lung.^[34]
 25. *Momordica dioica* (Karvelaka): The extracts of *M.dioica* revealed antiallergic activity in mice which was supposed to be presence of flavonoids.^[35]
 26. *Moringa oleifera* (Shigru): *Moringa oleifera* showed antiasthmatic activity which may be due to its bronchodilator, anti-inflammatory, mast cell stabilization and antimicrobial activity.^[36]
 27. *Murraya koenigii* (Mitha nimba): *M.koenigii* was found useful in asthmatic models (adult wistar albino rats) because of mast cell stabilizing and anti-inflammatory actions.^[37]
 28. *Nyctanthes arbortristis* (Parijata): Petroleum ether extract of *N. arbortristis* bark reported bronchodilation and mast cell stabilizing property while trailed in mice and guinea pig ileum (in vitro).^[38]
 29. *Ocimum sanctum* (Tulsi): Ethanolic extract and flavonoid fraction of *O. sanctum* showed mast cell stabilizing activity in albino rats.^[39]
 30. *Ocimum basilicum* (Berbari): The extract of *O. basilicum* revealed relaxant effect on tracheal chains of guinea pigs.^[40]
 31. *Onosma bracteatum* (Gojivha): Aerial parts of *O. bracteatum* showed antiasthmatic potential by decreasing the infiltration of inflammatory mediators, inhibiting histamine release and decreasing airway inflammation in vivo and in vitro experimental models.^[41]
 32. *Phyllanthus emblica* (Amalaki): Methanolic extract of *P. emblica* fruits was evaluated in guinea pigs and rats and reported bronchodilating activity as well as mast cell stabilizing activity, antianaphylatic activity and anti-inflammatory activity.^[42]
 33. *Piper nigrum* (Pippali): The aqueous extract of *Piper nigrum* fruits significantly inhibited acetylcholine induced bronchoconstriction of isolated goat trachea which revealed anti-asthmatic potential.^[43]
 34. *Pluchea lanceolata* (Rasna): Ethyl acetate fraction of *P.lanceolata* showed relaxant action against histamine induced contraction in vitro animal model in isolated guinea pig tracheal chain preparation which demonstrate its use in asthma.^[44]
 35. *Pterocarpus marsupium* (Vijaysara): The ethanolic extract of heartwood of *Pterocarpus marsupium* noticed antiallergic and mast cell stabilizing activity on milk induced leukocytosis and eosinophilia in mice.^[45]
 36. *Ricinus communis* (Eranda): The ethanol extract of *R. communis* shows antiasthmatic activity which may be due to presence of its flavonoids and/or saponins in experimental models.^[46]
 37. *Sapindus mukorossi* (Arishtaka): The aqueous extract of fruit of *Sapindus mukorossi* showed significant anti-asthmatic potential as it inhibited acetylcholine induced bronchoconstriction of isolated goat trachea.^{[47][48]}
 38. *Solanum xanthocarpum* (Kantakari): The extract of *S.xanthocarpum* trails revealed antiasthmatic, anti-inflammatory and mast cell stabilizing activities.^{[49][50][51]}
 39. *Syzygium cumini* (Jambu): The aqueous leaf extract of *Syzygium cumini* prevented mast cell degranulation and histamine release in wistar rat which demonstrate its anti-allergic effect.^[52]

40. *Tectona grandis* (Shaka): The extracts of *Tectona grandis* bark showed significant antiasthmatic activity in vivo animal models e.g. clonidine induced catalepsy, haloperidol induced catalepsy, milk induced leucocytosis and eosinophilia.^[53]
41. *Vitex negundo* (Nirgundi): Ethanolic extract and various fractions of leaves of *Vitex negundo* are found to be effective in experimental models of asthma.^{[54][55]}
42. *Woodfordia fruticosa* (Dhataki): Ethanolic extract of *Woodfordia fruticosa* dried flower reported bronchoprotective, bronchodilatory and anti-inflammatory activity against experimental asthma induced by the combination of histamine and acetylcholine aerosol in guinea pigs.^[56]

CONCLUSION

Bronchial asthma is a chronic inflammatory disorder of the airways affecting a large percentage of people all over the world. Although wide ranges of drugs are available, the relief is mainly symptomatic and short lived. The available treatment options have major limitations owing to adverse effects. Herbs/Plants are always an ideal source of drugs. In the ancient times, traditional drugs of plant origin were used for the treatment of various diseases. As from various experimental and clinical studies, a number of Ayurvedic herbs have been reported that help in preventing asthmatic attacks without any side effects and gradually helps in recovering from asthma. So in this review paper, various such herbs with significant antiasthmatic activity are described.

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