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ROLE OF *TYLOPHORA INDICA* IN TREATMENT OF BRONCHIAL ASTHAMA

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ABSTRACT

Bronchial Asthma is a disease of lungs in which the patient complaining of recurrent attacks of breathlessness and wheezing due to the narrowing of the airways of the lungs. The cause of asthma may be genetic but the disease develops and persists as a result of changes in the environment, food and life style. It is believed that attacks were triggered by allergens. Tylophora indica more simply known as the asthma plant, is nature gift for the long suffering asthmatics. It is called Anantmul in Sanskrit and Verripala in *Telugu*. The leaves, stem and roots of the plant contain 0.2-0.3% alkaloid called Tylophorine. The emetic properties of the root and leaf were well established. Ayurveda acknowledges "Vamana" as useful in ejecting the afflicted Kapha (Phlegm). The method of "Vamana" is very popular in ayurveda treatment of asthma. Tylophora is very effective in drawing out the scum of kapha from the bronchial tubes resulting in the oxygenation of blood and relieving symptoms of asthma and providing solace to the patient. The mode of treatment, diet regimen was discussed.

Keywords: Bronchial Asthma , Tylophora indica , Ayurveda, *Herbal Agents.*

INTRODUCTION

It is likely that asthma attacks triggered by different factors have different mechanisms that ultimately lead to the narrowing of air passages. Three leading theories are currently discussed to explain asthma mechanisms[13].The first one, and the most popular one, is that asthma is a fundamentally allergic sequence due to a wrongful response of the immune (defense) system to a challenge, e.g. by inhaled pollutants. The second theory is the "neurogenic hypothesis" that asthma attacks are precipitated by a sudden spasm of smooth muscles in the air passages due to imbalance within the nervous system, i.e. autonomous nervous system which regulates smooth muscles via ß-receptors and α-receptors. The third theory nicknamed "myogenic hypothesis" explains that white cells migrating to walls of air passages make the smooth muscles hyperactive and prone to sudden spasms leading to an asthma attack. The other recognized factors that affect bronchial muscles and respiration are emotional and physical factors, such as altitude, temperature, and humidity of air, mostly by influencing the receptors called ß- and α-receptors dispersed in the walls of air passages. Cooling the airways may result in bronchial constriction and exercise or hyperventilation in emotional stress may trigger asthmatic attacks, because of a lowering of the airway temperature. Mast cells are pivotal in the allergic response type I or the anaphylactic type - a rapidly progressing chain-reaction that causes sudden attack of asthma. Mast cells are ubiquitous and are found around blood vessels in the connective tissue, in the lining of the gut and in the lining of the upper and lower respiratory tract. These are large mononuclear cells heavily granulated, with granules containing a host of pharmacologically active substances. The allergen (antigen) enters into the human body through the respiratory tract, skin and/or Gastro Intestinal Tract (GIT). After the exposure to antigens, antibodies directed against specific antigens. (i.e., IgE) are formed and are fixed to their respective receptors on the surface of the mast cells.

This process is called sensitization of mast cells. During the second exposure to antigens, the antigens react with these antibodies at the cell surface. This event leads to a series of biochemical reactions. These migrate to the periphery in the secretary expulsion of the mast cell granules containing active substances (vasoactive amines and chemolytic amines) causing asthma attacks. This process is called "mast cell degranulation". Currently used effective pharmacological treatments include the following groups of drugs[2]

1. Adrenoceptor stimulants (selective ß2-stimulants, selective ß2- agonists)
2. Glucocorticoids which inhibit inflammatory changes in airways.
3. Theophylline which helps open airways and also prevents bronchitis.
4. Cromones similar in action as glucocorticoids, but weaker.
5. Anticholinergics which decrease airway mucus secretion.

The drugs of significant promise in asthma that are now being tested and gradually becoming available include various inhibitors of leukotrienes biological expression. The leukotrienes are pivotal in asthma development since they are generated by virtually all inflammatory cells that are implicated in asthma, i.e. mast cells, eosinophils, basophils, macrophages, platelets and T cells. Leukotrienes exert several effects on air passages that results in syndrome of asthma. These effects include increased mucus secretion, attraction of the inflammatory cells, increased permeability of blood vessels, interference with neuronal impulse conduction, and airway smooth muscle proliferation. It seems that blocking the expression of leukotrienes in airways is particularly relevant in treatment of asthma. The following are the tested compounds currently to control leukotrienes biological expression[10] .Agents blocking receptors for leukotrienes,

1. 5-lipoxygenase inhibitors,
2. 5-lipooxygenase-activating-protein inhibitors
3. Phospholipase A2 inhibitors.

None of the existing treatments is curative and symptoms return soon after treatment is stopped. The consideration in selecting the most effective drug therapy for asthmatic patients include: efficacy of the drug, oral administration, convenience for patient, side effects, long-term outcome and costs of the treatment. Ayurveda is an example of a long-standing tradition that offers a unique insight into comprehensive approach to asthma management through proper care of the respiratory tract. This includes maintaining the nourishing functions of the lungs, in providing oxygen to the body. In Ayurveda, respiratory tract functions are interrelated with those of another organ that introduces nourishment to the body, viz., the stomach. It is believed there that phlegm humor or Kapha (which is one of the three basic humors) is produced in the stomach and then accumulates in the lungs. Correcting imbalances in the basic humors is critical to health and can be achieved through proper digestion and metabolism. Ayurvedic formulations used in the management of asthma therefore, judiciously combine herbs for breathing support with antioxidant herbs such as *Curcuma longa,* herbs to support the digestive, cardiac and nerve functions, expectorant herbs as well as soothing herbs. Ayurveda also recommends improving aeration to the lungs through Yogic breathing exercises or *Pranayama*. Ayurveda offers Materica medica which has been successfully used in the prevention and the treatment of respiratory tract conditions, some of which has been developed into synthetic compounds for the respiratory tract .*Tylophora indica* (syn: T. *asthmatica*) Sanskrit - Anthrapachaka. The therapeutic properties of this herb were particularly well documented in the treatment of bronchial asthma [20]

MATERIALS AND METHODS

Tylophora asthmatica (Order *Asclepiadaceae*) is a dark copper colored delicate creeper found growing wild in the plains of India and other sub-tropical regions of the world[4] (Chopra et.al., 1994). The medicinal properties of the plant have been known since ancient times. The roots of the plant have been employed as a substitute for Ipecacuanha in the treatment of respiratory troubles. Powder from the dried leaves, root powder, decoction of the leaves or infusion of the root bark have been used traditionally in the treatment of respiratory afflictions such as chronic bronchitis and asthma[16].Patients of asthma who came for the treatment to Dubagunta Bhaskar Rao Hospital , Kavali were subjected to careful case study and physical examination. For the present study patients in the age group of 40 years of males were selected. They have been divided in to two groups. First group was used for control group with out administering Tylophora treatment. Second group was treated with Tylophora leaf as detailed below.

In the early morning at 5 AM one fresh plucked Tylophora leaf was given for a period of 5 consecutive days. The patients were asked to chew the leaf slowly and go to bed. Even if the patient complains of the leaf taste they were not allowed take any liquid or water after an hour they were given light tea or water. It was observed there was loss of taste during the treatment.

RESULTS

In 80% of the cases the patients got relief from brachial connection how ever long and plentiful use of leaf caused slackness and weakness of the patient.

Table 1
Some Herbal Agents Used in Asthma

Plant	Common Names	Route		Mechanism of Therapeutic Effect*		
		Oral	Inhaled	Bronchospasmolytic	Mucokinetic	Antitussive
Ephedra sinica	Ma-huang	++	±	++	+	±
Atropa belladonna	Deadly nightshade	+	++	++	–	±
Datura stramonium	Jimson weed	+	++	++	–	±
Camellia sinensis	Tea	++	±	++	+	±
Coleus forskohlii	Kaffir potato	+	±	++	±	+
Ammi visnaga	Khella, khellin	–	++	++	–	±
Cannabis sativa	Marijuana	+	++	++	±	–
Gingko biloba	Gingko, maidenhair	++	–	+	±	–
Lobelia inflate	Indian tobacco	+	++	+	+	±
Glycyrrhiza glabra	Licorice	++	–	+	±	++
Mentha species	Menthol, peppermint	++	++	±	+	++
Adhatoda vasica	Vasaka, bromhexine	++	+	±	++	+
Boswellia carteri	Frankincense, olibanum	±	++	±	±	±
Commiphora myrrha	Myrrh, bdellium	±	++	–	+	±
Eucalyptus globules	Eucalyptus	±	++	–	++	±
Cephaelis acuminate	Ipecacuanha, ipecac	++	–	–	++	–
Inula helenium	Elecampane	++	±	–	++	±
Tussilago farfara	Coltsfoot	++	++	–	+	++
Marrubium vulgare	Horehound	++	++	–	+	++
Herbascum Thapsus	Mullein	++	++	–	+	++
Tylophora indica	Indian ipecac	++	±	–	+	++
Allium sativum	Garlic	++	±	–	+	–

**** = These effects are suggested, but not proven, for mosvt agents. ++ = major route or use;***
+ = minor route or use; ± = dubious route or use; – = not used, not useful.

Table 2
Effect of Tylophora indica treatment on branchial asthama patients

S.No.	Group	No.of persons treated	No.of persons got relief
1	Control	8	-
2	Treated	10	8

DISCUSSION

In recent years, the leaves have been used in the treatment of bronchial asthma, The anti-asthmatic activity of the plant is attributed to the presence of phenanthroindolizidine alkaloids. An alkaloid mixture (0.17%) has been isolated from the aerial parts of the plant[1] . Tylophorine, the major alkaloid, has been studied extensively. The presence of tylophorine in the roots of the plant was first described in 1891[11] Subsequently, two crystalline alkaloids tylophorine and tylophorinidine were isolated. The mode of action of the leaf of *Tylophora asthmatica* as well as its alkaloids tylophorine and tylophorinidine has been studied in experimental animals. water extract of the plant was administered intraperitoneally to sensitized guinea pigs challenged with egg albumin-induced anaphylaxis. The extract showed anti-anaphylactic effect, leucopenia and inhibition of Schultz-Dale's reaction in experimental animals[9] The lymphocytes and eosinophils were found to be markedly reduced. The extract also showed brief, nonspecific anti-spasmodic action in isolated tissues of guinea

pig ileum, rabbit duodenum, frog and rat stomach wherein contractions had been induced by the administration of spasmolytic agents.The utility of this plant in the treatment of bronchial asthma could be attributed to its action on cell-mediated immunity[9].Dhananjayan and his co-workers (1975)[5] conducted an extensive study on the pharmacological effects of the plant. They observed that the plant extracts produced muscle relaxant effect, antagonism of smooth muscle stimulants and immuno-suppressive effects in different species of laboratory animals.In another study, pre-treatment with the plant extracts prevented bronchospasm induced by Freund's adjuvant and bovine albumin in rats[17].The plant extracts were also found to produce significant anti-inflammatory effects in rats. The inflammatory models tested included adjuvant arthritis, hind-paw edema, granuloma pouch and cotton pellet-induced edema[6] .*Tylophora asthmatica* extract significantly inhibited edema. A comparison of the inhibitory effects of the extract with those of phenylbutazone were made by Manez, et al. 1990[15].*Tylophora asthmatica* was found to antagonize dexamethasone / hypophysectomy-induced suppression of pituitary on the activity of the adrenals. The authors of the study concluded that *Tylophora asthmatica* may act by a direct stimulation of the adrenal cortex[21]. It is therefore probable that the immunosuppressive and anti-inflammatory effects are due to increased secretion of corticosteroids by the direct effect of *Tylophora asthmatica* components on the adrenal cortex[21].

Clinical studies

Several studies confirmed the value of *Tylophora asthmatica* in the treatment of bronchial asthma and allergic rhinitis. Through an unique combination of anti-inflammatory action and immunosuppressive effects, *Tylophora asthmatica* extracts mitigate the inflammatory as well as allergenic symptoms of asthma, providing prolonged relief to the sufferers. The plant has been reported to be beneficial in preventing from asthma attacks, rather than in controlling acute attacks[5].The effect of *Tylophora asthmatica* on bronchial tolerance to inhalation challenges with specific allergens has also been investigated[18]. The scientific confirmation of its efficacy was obtained from both open and double-blind, cross-over trials[19]. One group of researchers reported that the administration of one raw leaf daily for six days or 40 mg of alcoholic extract daily, for six days, gave the patient with bronchial asthma relief which lasted for several weeks. A subsequent double-blind study using powder of the dried leaf of *Tylophora asthmatica* revealed significant effects only in patients with the perennial type of asthma[8] .

CONCLUSION

Some herbal alternatives employed in these traditions are proven to provide symptomatic relief and assist in the inhibition of disease development as well. These herbs therefore have multi-faceted roles to play in the management of asthma. They are also free from the side effects commonly encountered with conventional therapies. This is evidenced by their long history of safe use and the lack of undesirable side effects observed in clinical trials performed with therapeutically effective doses on volunteers. The Ayurvedic herbal approach thus offers safe and effective alternative remedies for managing asthma. Presently, manufacturers of nutraceuticals, such as Sabinsa Corporation, provide standardized extracts of several herbs with reported antiasthmatic activity. These include *Adhatoda vasica* (standardized for 1% vasicine), *Tylophora asthmatica* (standardized for 0.15% tylophorine).

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