

SIRISH (*Albizia lebbbeck* Benth.): A NATURAL ANTI-ALLERGIC DRUG

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ABSTRACT

Allergy is an immune response to a foreign antigen that results in inflammation and organ dysfunction. Allergy may range from the life-threatening to the annoying and include allergic asthma, allergic rhinitis, conjunctivitis, food allergy, hay fever, atopic dermatitis and anaphylactic symptoms viz. shortness of breath, swelling and itchy rashes. Histamine plays a major role in allergic conditions. *Sirish* (*Albizia lebbbeck* Benth, *Fabaceae*) is an excellent anti-allergic herb. It reduces the release of histamines through a stabilizing effect on Mast cells and mildly suppresses the activity of T- lymphocytes reducing the level of allergy-inducing antibodies. The plant contains alkaloids, tannins, saponins and flavonoid which have therapeutic potential for allergic conditions. It is classically indicated in *Swaasa*, *Kasa*, *Sotha*, *Sitpitta*, *Kandu*, *Kustha*, *Pama*, *Visharp*, *Worms*, *Raktadusti*, *Vishadust* and *Netrabhishyand*. Parts viz. leaves, bark, seeds and pod are frequently used in therapeutics. The paper is an attempt to review the plant for anti-allergy therapeutic potential.

Keywords: *Sirish*, Anti-allergic, Antihistaminic, Antiasthmatic.

INTRODUCTION

Allergy is a very common condition caused by hypersensitivity or overreaction of the immune system to substances that either enter or come in contact with the body such as dust, pollen, food or drugs. These immune responses vary from mild-moderate to life-threatening. *Sirish* (*Albizia lebbbeck* Benth. *Fabaceae*) is considered as an excellent anti-allergic herb in Ayurveda. In Charak Samhita it has been said to as *Sirish vishaghnaam* (CS.Su.25.40)^[1]. It means *Sirish* has been claimed as best anti-allergic and antidote drug. *Sirish* helps in balancing all three *Doshas*; even it can be safely administered in chil-

dren with asthma, respiratory allergies and recurrent respiratory infections.

Immunity and Allergens:

The immune system normally protects the body from pathogens by producing antibodies. In allergic conditions immune system mistakenly identifies the particular allergen as an invader and begins to create antibodies against them. These antibodies, called IgE (Immunoglobulin E), attach themselves to mast cells, which are abundant under the surface of the skin and in the nose, eyes, lungs and gastrointestinal tract. When the allergens are encountered, the IgE

antibodies grab them, and triggering the mast cells to release of histamine and causes the allergic reaction. A reaction often occurs within minutes or up to a few hours after contact and may lead to many severe symptoms. The common allergic diseases include allergic asthma, hay fever, atopic dermatitis, food allergies, and anaphylactic symptoms may include red eye, itchy rashes, runny nose, shortness of breathing and swelling. Histamine signaling-related histamine H1 receptor (H1R) and Histidine Decarboxylase (HDC) genes are allergy sensitive genes and their expression level affects the severity of the allergic symptoms^[2-4].

PLANT PROFILE:

Albizzia lebbeck Benth.

Family-*Fabaceae*

Subfamily-*Mimosoideae*

Classical categorization^[5]:

Charak Samhita-

-*Vishaghna* (group of anti-poisonous herbs)

-*Vednasthapna* (group of Analgesic herbs)

-*Sirovirechana* (group of herbs for cleansing and detoxify ENT)

-*Kashayaskanda* (group of astringent herbs)

Sushruta Samhita- *Salsaradi gana* (group of herbs)

Astanga Hridaya- *Asanadi gana* (group of herbs)





Vernacular names^[5]:

Sanskrit: *Bhandi, sitapuspa, sukapriya, Mridupuspa, Sukapushpa, Sukataru, Kapitan*

English: *Siris Tree, Lebbeck Tree*

Hindi: *Siris, Shiris*

Table 1: Morphological Description:

	
Fig.1 Fruit pods	Fig.2 Inflorescence
	
Fig. 3 Tree	Fig. 4 Flowers and Leaves

A deciduous tree, height of 15-30 m and a stem diameter of 50cm-1m, with grey, fissured corky bark, somewhat flaky; inner bark reddish. Compound leaves are bipinnate, glabrous or slightly hairy on the axis, pinnae in 2-4 pairs, each with 2-11 pairs of obliquely oblong to elliptic-oblong leaflets, 15-65 x 5-35 mm, shortly stalked, initially bright green and

maturing to a duller glaucous green and folding at night. The glabrous glands are raised, elliptic to circular, on the upper side of the stalk, close to the base and between most pairs of leaflets. The inflorescence consists of large clusters 5-7.5 cm wide of fragrant pedunculate, globular flower heads, 15-40, on stalks 5-10 cm long. The corolla is 5.5-9 mm long, gla-

brous, cream, white or green, with numerous pale green stamens on filaments 15-30 mm long. The entire inflorescence is fluffy in appearance, 60 mm in diameter, yellow-green with a pleasant fragrance. The pods are the pale straw to light brown at maturity, narrow-oblong 12-35 x 3-6 cm, papery-leathery, swollen over the seeds and not constricted between them, indehiscent and borne in large numbers. Seeds are brown, flat, orbicular or elliptic, 8-10 x 6-7 mm, transversely placed with 3-12 in each pod^[7-9].

Types of Sirish:

Raj nighantu described two varieties of *Sirish* viz. *Sirish* and *Kantaki Sirish*. Another variety is *Krishna* and *Sweta*. *Albizia procera* Benth. is known as *Kinihi* or *Shweta Sirish* and *A. odoratissima* Benth. or *A. amara* is known as *Krishna Sirish*^[6].

Rasa Panchak (Classical pharmacology)^[6,10]

Rasa- Madhur, Tikta, Kashay
Guna- Laghu, Ruksha, Tikshna
Vipaka- katu
Virya- Ishat ushna

Dosha karma- Tridosha shaman

Parts used: Bark, flowers, leaves, seeds.

Doses: Powder-3 to 6 gm per day, water decoction- 50 to 100 ml, fresh juice- 10 to 20 ml.

Commonly used classical preparations: *Sirisharista*, *Panch-sirish ghrit*, *Panch-sirish Agad*.

PHYTOCHEMISTRY:

Major phyto-chemicals reported in *Sirish* are^[9]

Stem bark- D-catechin, betulinic acid, lebbekinin A-C, leucocyanidin, melacacinidin, leucoanthocyanidin, lebbecacidin, friedelin, β -sitosterol^[11].

Leaves- echinocystic acid, flavonovicenin-2 and β -sitosterol, myricitin, quercetin, albigenin, albigenin, kaempferol, albizziahexoside^[12].

Flowers- Lupeol, amyirin, benzyl acetate, benzyl benzoate, crocetin, different sterols-taxerol, cycloartemol, lupeol, campesterol and lebeckannin-D,F,G and H^[13].

Pod and Seed- albigenin, albigenic acid, echinocystic acid and sitosterol in pods, seeds are rich in amino acids and fatty acids^[14-15].

CLASSICAL INDICATIONS:

Indication	Description	References ^[16-20]
<i>Swasa, Kasa</i> and <i>Hikka</i> (Hiccough and Asthma)	1. Juice of the flowers of <i>Sirish</i> should be taken with <i>Pippali</i> and honey. Efficacious in the predominance of <i>Kapha</i> and <i>Pitta</i> 2. Intake of the flower of <i>Sirish Kadli</i> and <i>Kanda</i> with <i>pippali</i> followed by rice-water alleviates all types of asthma	CS.Ci.17.114 SS.U.51.38
<i>Kustha</i> (Skin disorders)	Bark paste of of <i>Sirish</i> alleviates <i>Kustha</i>	CS.Ci.7.96; SS.Ci.9.14,54,59 AH.Ci.19.63
<i>Visarpa</i> (Erysipelas)	1. Paste of <i>Sirish</i> and <i>Bala</i> mixed with ghee used as ointment 2. Flower of <i>Sirish</i> mixed with a little ghee applied as an ointment	CS.Ci.21.85 CS.Ci.21.90
<i>Krimi</i> (Worms)	Juice of <i>Sirish</i> and <i>Kinihi</i> mixed with honey should be taken	SS.U.54.25; AH.Ci.20.26
<i>Sirahshool</i> (Headache)	In <i>Suryavartta</i> and <i>Hemicrania</i> pressed snuff of the seeds of <i>Sirish</i> and <i>Mulaka</i> is efficacious	SS.U.26.31 VM.62.38
Eruptive boils	<i>Sirish</i> , <i>Udumbara</i> , and <i>Jambu</i> are useful as sprinkling and paste.	VM.55.10
<i>Netra roga</i> (Eye disease)	The juice of <i>Sirish</i> mixed with honey should be used as collyrium (eye cleanser). It alleviates acute conjunctivitis.	GN.3.3.150 SS.U.1216,28
<i>Visha roga</i> (Poisoning)	<i>Sirish</i> has been said to be the best drug for poisoning, <i>PanchSirish Agada</i> and <i>Siddharthak Agada</i> have been used in various poisoning	CS.Su.3.28;25.40; CS.Ci.9.70;23.49,52,53,5571,78,19 3,200,202,204,209,212,218,242. SS.Ka.1.36,50;2.45;5.18,79,81,85;

		6.3;7.12-13,20,37; 8.44,52,68,108 AH.U.37.43,76;40.48
<i>Mushaka visha</i> (Rat poisoning)	1. <i>Sirish beej</i> in <i>Amrit sarpi</i> , <i>Shiris puspa</i> in <i>Mahasugandhiagad</i> used as <i>Sarva visha-nashak</i> (all poisoning). 2. <i>Sirish kalk</i> and <i>Shiris Saar</i> (heart wood)	SS.Ka.6.12,20 SS.Ka.8.12, 37
<i>Kita visha</i> (Insect bite)	Decoction of all parts of <i>Sirish</i> mixed with <i>Trikatu</i> , salt and honey should be taken in <i>Kita visa</i> (insect bite)	SS.Ka.5.81
<i>Dushivisha</i>	<i>Kshar</i> (alkali) obtained from <i>Sirish</i> and <i>Hinshra</i> applied locally	AH.U.35.46

EXPERIMENTAL STUDIES:

Anti-allergic activity:

A study was carried on H1R (histamine H1 receptor) and HDC (Histidine Decarboxylase) gene expression using Toluene-2, 4-Di-Isocyanate (TDI) in sensitized allergy model rats. *A. lebbeck* bark extract significantly suppressed TDI-induced H1R and histamine content. It also suppressed TDI-induced up-regulation of IL-4, IL-5, and IL-13 (Interleukin) mRNA [21]. Another study was carried on the antiallergic activity of ethanolic extract of *A. lebbeck* bark and found that extract at different concentrations has got potent mast cell stabilizing the property. This inhibitory potential was due to catechin in the extract, which causes modulation of two important effectors functions- histamine release and cytokine expression of antigen-antibody (IgE) activated mast cells [22]. Another study was carried on chloroform, methanol and water extracts of bark and leaves of *A. lebbeck* in vitro mast cell stabilizing effect against compound 48/80 (selective mast cell activator). Methanolic extract of leaf and methanolic and water extracts of bark exhibited maximum activity comparable to that of disodium cromoglycate (mast cell stabilizer) [23]. A pure saponin fraction of *Albizia* seeds had been studied on the mast cells in the mesentery and peritoneal fluid of rats subjected to anaphylaxis. The result shows a mast cell membrane stabilizing the effect of the test drugs [24].

Anti-asthmatic activity:

A study revealed that bark and flower decoction of the plant protects the guinea pig against histamine-induced bronchospasm and it could be due to smooth muscle relaxation [25]. The decoction of the

flower in the dose of 50mg/kg significantly protected the guinea pig against histamine-induced bronchospasm [26]. The results showed that *A. lebbeck* had a significant disodium cromoglycate (mast cell stabilizer) like action on the mast cells. In the first week of sensitization it markedly inhibited the early sensitizing processes and during the second week, it suppressed antibody production [27]. The effects of the decoction of the bark and flower of *Albizia* were also studied for its antiasthmatic and anti anaphylactic activity [28]. Another study was carried with the bark decoction in a dose of 0.25g to 1.0 g/kg significantly protected the guinea pig (300-400g of either sex) against 1% histamine-induced bronchospasm and the protection was maximum with a dose of 1g per kg ($p < 0.025$) [29].

CLINICAL STUDIES:

Pulmonary Eosinophilia:

In the preliminary screening of 35 cases of tropical pulmonary eosinophilia were treated with *Sirish* flowers for 6 weeks at the dose of 200 mg and given twice a day with water. The result indicated that 82% cases showed an excellent response, 12% showed good response whereas 6% showed poor response [30].

Bronchial Asthma:

A clinical study was carried on a decoction of stem bark of *Sirish* and given to the patient of bronchial asthma and result showed that 56% patient showed good relief, 38% fair relief and 6% poor relief [31]. Another study was carried on two types of *Sirishavaleha* (a linctus preparation of *Sirish*) prepared by *Kwatha* (decoction) of *Twak* (bark) and

Sara (heartwood) of *Sirish* to evaluate its comparative efficacy in *Tamaka Shwasa* (bronchial asthma). The results were assessed in terms of clinical recovery, symptomatic relief and pulmonary function improvement. A significant increase in Hb (hemoglobin) and a considerable decrease in total eosinophil count, AEC (absolute eosinophil count) and ESR (erythrocyte sedimentation rate) were observed. The study revealed that *Sirishavaleha* can be used as an effective drug in bronchial asthma^[32].

Allergic conjunctivitis:

In a clinical study, it was observed that the role of 29% of *ghansatva* of *A. lebbeck* bark and *Sirish churna* 500mg capsule showed a very favorable response in all kinds of allergic conjunctivitis^[33].

Anti-fungal activity:

The anti-fungal activity of lebbeckalysin was screened with an agar diffusion assay. Two hundred micrograms of lebbeckalysin were added to test its inhibitory effect on different fungi. The pathogenic fungi species used included *Mycosphaerella arachidicola*, *Fusarium oxysporum*, *Helminthosporium maydis*, *Valsa mali* and *Hizoctonia solani*. Nystatin (Sigma) was used as a positive control. The IC 50 value for the anti-fungal activity of lebbeckalysin against *Rhizoctonia solani* (pathogenic fungus) was determined^[34].

OTHER ACTIVITIES:

Antimicrobial activity:

The ethyl extract of *Albizia* leaves in doses of 1000mg/ml by dissolving in appropriate quantity, showed antibacterial activity against *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Candida albicans*, *Trichophyton rubrum*, *T. tonsurans*, *T. violacium*, *T. mentagrophytes* and *Bacillus cereus*^[35-36]. The alcoholic extract of bark revealed moderate anthelmintic activity against in vitro human *Ascaris lumbricoides*^[37]

Anti-inflammatory activity:

An experimental study on petroleum ether, ethyl acetate, the methanol extract of *Albizia* bark was

carried on carrageenan-induced paw edema in mice. The extract at the dose of 400mg/kg/BW was given and 36-68% inhibition of edema volume at the end of 4hr was observed. The extract at the 200 and 400 mg/kg dose level in the acetic acid-induced writhing test, showed 39.9% and 52.4 % inhibition of writhing, respectively^[38].

Immunomodulatory activity:

In an experimental study, immuno-modulatory effect of the bark of *Sirish* was evaluated by studying humoral and cell mediated immune responses in mice. The study animal was immunised previously with sheep red blood cells (SRBC). The hot aqueous extract and its butanolic fraction were administered once daily in the dose levels (6.25, 12.5 and 25 mg/kg, p.o.) for one week. *A. lebbeck* treated mice developed higher serum antibody titers compared to the vehicle treated group and the effect was comparable to the standard drug muramyl dipeptide (MDP). Delayed type hypersensitivity response was suppressed in SRBC immunized mice. The macrophage migration index remained unaltered in both mice and rats. The result showed immunomodulatory potential of *A. lebbeck*^[9,39]. Immuno-modulating activity of ethanolic and aqueous extracts of leaves and bark of *A. lebbeck* were investigated in Swiss albino mice by using swim endurance test and acetic acid induced writhing test model. The ethanolic extract of *A. lebbeck* leaves had shown strong immuno-modulator effect by increasing the swimming or survival time ($P < 0.001$) and also decreased the writhing produced by glacial acetic acid ($P < 0.001$). The maximum increased swimming or survival time was noted in test and standard drugs^[40].

CONCLUSION

Allergic disorders among the population are one of the major health problems of most modern societies. Recently it is also spreading towards rural area due to deforestation and increasing agricultural pollution. Mast cells play a major role in allergic disease and inflammation. Numerous medicinal plants have been

screened for the prevention and management of allergic disorders. Treatment strategies adopted for the management of allergic conditions are mast cell stabilizing activity. Herbal drugs are the preferred against modern medicine for lesser side-effects at low cost. Toxicity in the body produces by antigen-antibody reaction and classically it is considered as best *Visaghana* (anti-toxicity drugs). Many pharmacological studies revealed that *Sirish* reduces the release of histamines through a stabilizing effect on Mast cells and mildly suppresses the activity of T-Lymphocytes reducing the level of allergy-inducing antibodies. Judicious use of *A. lebbeck* may be a solution to all types of allergic manifestations.

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