Critical review of Albizia lebbeck- A multi potent drug

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ABSTRACT

Introduction: Agadatantra is the sixth branch of Ayurveda which deals with management of animate & inanimate poisoning. Due to enhancement in technology the environment is polluted & hence we come across more toxic substances which interfere with the living creature of the world. The present study is an attempt to focus on different therapeutic uses of Shirisha (Albizialebbeck). It is considered as best antitoxic drug in Ayurveda. Aim: To study the detail about Shirisha in overall perspective of its therapeutic uses. Materials and methods: All related texts were reviewed. Relevant data was also collected from the internet. Discussion: On detail study, it was found that Shirisha is useful in 24 modalities of treatment of poisoning. It is best among all the antipoisonous drugs described in the great Trio of Ayurveda. It is a large tree. Its habitation covers almost all the parts of India. It can be effective in the cases of environmental poisoning. Its plantation should be recommended in the greenbelt scheme around the industrial areas. Sushruta had explained in air pollution Agadas should be released in air in Dumubhiswaniya chapter of Kalpsthanaṃ. Conclusion: Shirish is not only used as Vishagna (antipoisonous) drug but it has multiple therapeutic values, which are discussed in the article.

Keywords: Shirisha, Ayurveda, Vishagna, Multiple therapeutic uses.

INTRODUCTION

The Human being is the end product of a long process of evolution. There are elements of birds and beasts, and even plants and other living organisms, in a human being. There is a close relationship of Human with his natural environment. So, whenever a person falls sick, there is some imbalance between his own nature. Plants in one’s own habitat are more beneficial for treatment than the medicines. But the physician should be well learned about the identification and therapeutic use of any drug. So here is a brief account of Shirish is presented.

Acharya Charakaaalso quotes about the importance of knowledge of drugs as “Aushadham …….Visham” (Ch. Su. 1/126) i.e. the drug is worthless without appropriate knowledge of its name, morphological identification and specific qualitiesand if the above criteria have been fulfilled, the knowledge about proper formulationof the same is an indispensable fact for a physician.

SHIRISHA [1]

Botanical name : Albizialebbeck
Family : Fabaceae (Mimosoideae)
Authority : Benth

Synonyms: Visha hanta, Madhupushpa, Kapitana, Shyamala, Shukataru, Uddanaka, Barhapatsha, Bhandi, Bhandika, Shirisha etc.

The importance of synonyms in prescription writing is to use the appropriate synonym name of the drug. This selection depends on the exact action he wanted from the drug, specific to the signs of patient. This practice also helps the physician to recall, for what purpose he had used that drug for treatment. For example, if doctor wants to use Shirish in the case of insect bite, then he should write, ‘Vishahanta’in the prescription. Synonyms are indicators of its variety, color, mode of action, habitat etc.
Vernacular names:

Hindi : Garsa, Kalshish, Shirish, Siras, Sirin
English : Parrot tree, Acacia amarilla, EastIndian walnut.
Bengali : Siris, Sirisha
Punjabi : Sirish, Sareehn
Gujarati : Kalosadasado, Kaliosaras, Pilosarashio
Marathi : Chichola, Kalashiras, Mohathisaras
Kannada : Bagey, Bage mara, Hombage
Malayala : Kuttuvaka, Nenmani
Tamil : Vakai
Telugu : Dirisena
Nepal : Harrasisris

Varieties:

2 types : Shweta: Albizzia odoratissima
Krishna: Albizzia procera

Classification:

- Charaka Samhita:
  Shiro virechana : Ch.Su. 2 / 3 - 6
  Vishaghna: Ch.Su. 4/11, Ch.Su. 25/40
  Vedanasthapana: Ch.Su. 4/18
  Sarayoni: Ch.Su.25/49

- Sushruta Samhita:
  Avasadaka: S.Su. 36/33
  ShiroVirecana: S. Su. 39/5

- Pitta - Nashana: S. Chi. 7/9-13

Vishahara: S. K. 5/84-85

- Ashtanga Hridaya: Kashyagana (A.H. Su. 10/31-32)
- KashyapaSamhita: Shirovirechana (K.Si. 4)
- Bhela Samhita: Shiro virechana (B.Si. 2)
- Bhaishajya Ratnavali: Nyagrodhadi gana (Bh.R. 86/77)
- Bhavaprakasa: Vatadivarga (13-14)
- Madanapala Nighantu:Vatadi Varga, Panchamavarga, p132, (14)
- Dhanwantari Nighantu: Amrady Panchamavarga, p179, (102-103)
- Dravyaguna Samgraha: Anuapaana Varga (D.G.S.14/11)
- Madhava Dravyaguna : Lavanavarga, Anuapaavarga
- Raj Nighantu : Prabhadradiavarga (9/58-60)
- Raj Vallabha Nighantu : Aushadhashraya Parichchheda (6/50)
- Shabda Chandrika : Vrukshadi Varga (Chap.1), Triphaladi Varga
  (Chap. 9)
- Saraswati Nighantu : Mahavruksh Varga (1/34)
- Siddha Mantra: Kaphavaatgnavarga
- Sodhal Nighantu : Amradi Varga
- Sausruta Nighantu: Saalsaaradi Gana, Arkadi Gana.
- Hridaya Dipaka Nighantu: Ekapaada Varga (94)
- Abhidhana Manjari : Velladi Varga (4/84)
- Abhidhan Ratna mala : Kashaya Sakandha (6/2)
- Amarakosha: Vanausadhati Varga (1/63)
- Ashtanga Nighantu: AsanadiVarga (10/84)

Citations from Sanskrit literature: The delicacy, nicety and the sensitivity of the Shirisha flowers are compared with Sita. Similarly in Kumarasambhava of Kalidas, soukumartyaad Goddess Parvati is exemplified by the Shirisha flowers. Its flowers are so delicate and are having pleasant smell. As Gandha is the property of Pruthvi Mahabhuta, Shirisha can purify the polluted air by its fragrance. Further study is needed in this context. Shirisha was also used for beautification in lieu of ear ornaments. Shirisha flowers were also extensively used in Astrological practices to predict the good crop of Priyangu and Kanguni.

Distribution and habitat: Fairly common through-out India from sea level to about 4000 feet. It is recorded as occurring in “Tropical Himalayas” the Central Provinces, Bombay, Konkan, South-Karnatic and drier parts of Travancore-Cochin. All soils seem to suit its growth. In South India it is very common cultivated as a shade tree, along road sides, by the side of irrigation wells, and tanks [2].

Habit and general features: Moderate size to large, unarmed tree, deciduous during cold season growing to about 60 feet in height, with a dense shade-producing crown. Trunk is comparatively short, about two to three feet in diameter. The stem and branches are covered with deeply irregularly cracked dark grey to brownish bark and bear evenly bipinate leaves having fairly large obliquely oblong leaflets, globose heads of whitish or yellowish- white sessile flowers and characteristic straw- colored strap- shaped pendulous pods. The plant blooms in hot season, usually March, April and May and fruits from September onwards but usually persist on tree even up to next March [3].

Bark: Appreciably thick and rough, dark brown to grayish black with vertical & transverse deep fissures. The rind or outer bark comprises nearly a third or more of the thickness of the entire bark. On the trunks and older branches, the bark has a composite structure composed of discontinuous alternating strata of ‘woody’ and sub serous layers. Excluding the corky layer, the middle and inner barks which comprises the official tissue is nearly two thirds the thickness of the entire bark. Its outer part has a characteristic reddish-brown tinge.
Leaf: about 9" long, alternate, stipulate, evenly bipinnate, grooves on upper side, tapering.

Leaflets: 4 – 8 pairs, opposite, short stalked, 1-2" long, ¼ -3/4" broad, entire, oblong and pale.

Flower: Sessile or short pedicelled, all bisexual, regular, whitish or yellowish white, fragrant, calyx-0.125" long, petal-5, connate below the middle to form funnel shaped corolla, stamens-indefinite.

Fruit: 6'-1", straight or slightly curved, ¼ - 1 ½" broad, thin but firm, straw to yellowish brown.

Seeds: Non endospermic, yellowish brown, ¾ - ¾" long, ovate, horse shaped compression near margin. The name of genus is derived from Filippo del Albizzi, a scholar.

Indigenous origin, growth, or production: seen in India, Myanmar, Nepal, Thailand, Malaysia, Indonesia, Australia [9].

Reproductive Biology: Reproductive organs of both sexes are present in Shireesh. In its natural habitat, September to October is the period of flowering; mature florescent pods remain on the tree for long periods and are available upto May-July. Flowers possesses both sexual [9]. Hence, it is considered as symbol of Ardhnaharineshwar (Combination of shiva and shakti according to Indian Mythology) possessing supernatural qualities, one of it is its antitoxic effect by Prabhava.

Folk Medicine: Folk remedial claims of Shirish according to Hartwell (1967-1971) is the tree is used for boils, cough, eye ailments, flu, and lung ailments; for abdominal tumors, in bowel enemas, gree or powders. It is reported as an astringent, pectoral, rejuvenant, and tonic. The seed oil is effective in leprosy. Seed powder is useful in scrofulous swellings. Indians use the flowers in the condition of abnormally frequent and involuntary no orgasmic emission of semen [10].

Properties:

**Rasa Pancaka:**
- **Rasa:** Madhura, Tikta, Kasaya,
- **Guna:** Grahi
- **Veerya:** Anushna
- **Vipaka:** Katu
- **Bija:** Shukra Stambhaka
- **Doshaghnata:** Tridosha
- **Rogaghnata:** Twakroga, Shwasa, Shotha,
- **Agrya (Foremost- best)** Aushadha for Visha Chikitsa

**Official parts:** Stem-bark, flowers, seeds and Panchanga (whole plant).

### Chemical constituents:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Part of the plant</th>
<th>Chemical constituents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leaf</td>
<td>Saponins tannis and Two new tri-O-glycoside flavonols, kaempferol and quercetin3-0-α-rhamnopyranosyl (1’6)-α-glucopyranosyl (1’6)-α-galactopyranosides [11, 12]</td>
</tr>
<tr>
<td>2</td>
<td>Pod</td>
<td>7 dimethoxy flavone, 3’,5 dihydroxy and N-benzoyl L Phenyl alaninol [13]</td>
</tr>
<tr>
<td>3</td>
<td>Beejo (The beans)</td>
<td>Albigic acid – Its a triterpenoid sapogenin [14]</td>
</tr>
<tr>
<td>4</td>
<td>Chaal (Plant bark)</td>
<td>Two saponin known as libbekenin A&amp;B, Three Saponin albiziasaponins A, B and C [15-17] Condensed tannins (7-11%) &amp; d-catechin, libbecacidin, isomers of leucocyanidin, friedellin-3-one, acacic acid; Echinocystic acid and β - sitosterol, a saponin - libbekenin C - on acid hydrolysis yielded echinocystic acid, Sglucose and rhamnose. friedelan -3-one (friedelain) and y-sitosterol from bark [18-20]</td>
</tr>
<tr>
<td>5</td>
<td>Sora (Heart wood)</td>
<td>MeTriloxetin, d-pinotol, okanin &amp; leucopelangonidin, a stereoisomer (–) melacacidin (7,8,3’,4’-tetrahydroxyflavan-3,4-diol), and lebbecacidin in addition to melacacidin and melanoxin, two new compounds – (–)-2,3-cis-3,4-cis-3,0-methylmelacacidin as its methyl ether and 3‘-O-methylmeloxetin-isolated from heartwood [21]</td>
</tr>
<tr>
<td>6</td>
<td>Moolu (Tap Root)</td>
<td>Saponin are characterized as echinocystic acid-3-0-L-rhamnopyranosyl (1→5)-β- D-xylouraninol (1→4)-β-D-glucopyranoside [11, 13]</td>
</tr>
<tr>
<td>7</td>
<td>Inflorescence</td>
<td>Triterpene, Saponin glycosides, Saponin lebbeckanin, benzyl benzoate ,benzyl acetate, and crocetin lebbeckanin-D,F,G &amp; H. Flowers on stem distillation yield a sweet odoured oil having no colour-4.3%, the residue gave lupiol [24]</td>
</tr>
<tr>
<td>8</td>
<td>Pharmaceutical chemistry (as a whole plant)</td>
<td>the presence of triterpinoids, flavonoids, saponin [25,26]. Macrocyclic alkaloids, [27, 28], and Phenolic glycosides [29].</td>
</tr>
</tbody>
</table>
PHARMACOLOGICAL CONTRIBUTION:

Anti-asthmatic activity: A significant decrease in WBC, eosinophilic count, ESR, and 56% marked improvement is reported in the Clinical studies of stem bark decoction [30]. Shrisharta is used for one month in the dose of 40 ml per day in cases of bronchial asthma provided percentage of 36.59%, 43.9%, 7.32% mild, moderate and marked improvement [31]. Shrishadi Ghana Vati at a dose of 1000 mg four times a day in water for 30 days provided marked improvement in 40% patients are improved markedly, mild improvement in 20% patients [32]. Decoction of the Inflorescence significantly protected the guinea pig from bronchospasm induced by histamine. The activity could be due to smooth muscle relaxation [33]. Aqueous extract of Albizialebebeck Benth. may prove protective in bronchial asthma as it has been proven to decrease histamine-induced bronchospasm in guinea pigs [34].

Effect on anaphylactic shock: Bark decoction reported to possess cromoglicate like action on mast cells of albino rats. Studies indicate the anti-anaphylactic activity is due to inhibition of the synthesis antibodies and suppression of T-lymphocytes [39]. Extract of Crude seeds and a dose of 0.5 mg/ml of a pure saponin fraction had displayed stabilizing action on the mast cells in the mesentery and peritoneal fluid of rats undergone anaphylaxis [38].

Pulmonary eosinophilia: Preliminary screening in 35 tropical pulmonary eosinophilia cases treated with extracts of Shirishapushpa 200 mg dose with water twice a day indicated 82%, 12%, 6% marked response, good response and poor response respectively. Zero (AE) Adverse Effects were reported in the study [37].

Anti-tussive activity: Shrishavaleha exhibits anti-tussive property. It shows significant decreased in cough episodes in comparison to control group was observed in experimental animals of sulphur dioxide induced cough [38].

Allergic conjunctivitis: In a comparative clinical study, Ghana satva of Shirisha bark and capsules of Shrish Churna had showed significant results in all types of allergic conjunctivitis [39].

Anti- spermagenetic activity: Methanolic extract of pod of Shrishia exhibited anti-spermatic activity by decreasing spermagomata count & spermaticocyte, reduction in sperm motility & density and lessened the size of testes, seminal vesicle, epididymis, and prostrate in male rats [40]. The dose of 50 mg/kg body weight in male rats isolated saponin from bark of Shrishia administered Orally, resulted in a considerable decrease in weight of testes, seminal vesicle, epididymis & ventral prostate. No substantial changes could be observed in biochemical and hematological parameters as well [41]. Saponins extracted from seeds in the dose of 200 mg/kg shows inhibition of copper-induced ovulation in 60% of rabbits. There was also significant reduction in average number of bleeding points in the ovaries [42]. The 2% concentration of ethanolic extract of pods and root, saponins, lebkekanin-E exhibited spermicidal activity in human and rat’s semen [43-45].

Anti-diarrheal activity: Aqueous and methanolic extracts of Shirisha is able to act against E. coli & Salmonella species, but Petroleum ether & hexane extracts had not exhibited such activity. All of the extracts had shown neutral activity against Shigella and Candida sp [46]. In the cases of V. cholerae, A. hydrophilis and B. subtilis, it has also been shown moderate activity against it [47].

Antimicrobial activity: The glycosides extracted from the stem bark presented anti-microbial activity against S aureus, P aeruginosa, Trichophyton rubrum [48].

Anti-inflammatory activity: At the end of 4 hr, Methanol extract of bark in the dose of 400 mg/kg inhibited 36.68% (p<0.001) oedema [49].

Shrishavaleha exhibited significant Anti-inflammatory activity at the end of 6 hours (60.14%, p<0.05) in compared to control group (35.55%) [50]. Aller-7, an Ayurvedic formulation of Albizia lebbeck Benth. exhibited potent anti-inflammatory activity as various inflammatory responses because of lipoxxygenase inhibition, mast cell stabilization, hyaluronidase inhibition in different in- vitro models tested [51].

Analgusic activity: The acetic acid induced writhing test had been used to measure the peripheral analgesic activity of Shrissha. It is observed that the bark extract at the dose of 400 mg/kg had showed significant (p<0.001) decrease in the number of writhes with 52.4% of inhibition [52]. By measuring the drug induced changes in the sensitivity of the prescreened (Reaction time 2-4 sec) mice to heat stress applied to their tails by using a medicraft Analgesiometer-N (D’Amour and Smith 1941), the central analgesic activity of the plant material was studied. The crude extract produced 61.48 % (p<0.001) delaying of tail flicking time 30 min after oral dose of 400 mg/kg. The plant extract showed longer stress tolerance capacity in the mice, indicating the possible involvement of higher centres [53]. Bark given in a dose of 250 mg/kg i.p. showed analgesic activity lesser than novalgin [54].

Cognitive behavior and Anti-anxiety Study: Saponins extracted from dried leaves contains n-butanolic fraction which is potent enough to inhibit baclofen-induced hyperthermia and passivity in amnesic mice. The studies concluded that anxiolytic activity and nootropic activity was possessed by n-butanolic fraction [44].

Immunomodulatory activity: Immunomodulatory activity is more significant in Shrishavaleha prepared from Sara (Heartwood) than in prepared from Twak (Bark) [54].

Hypoglycemic activity: - Ethanol extract of Shrishadi poly herbal compound demonstrates good α-glucosidase and α-amylose inhibitory activity Extract of Shrishia compound in ethanol exhibits 76.40% + 0.88% decrease in alpha amylase activity and 63.85% + 0.36% in alpha glucosidase activity with IC₅₀ 0.68 mg/ml and 2.89 mg/ml, consecutively. Shrishadi extracts have the dual advantage of having α-glucosidase and pancreatic α-amylase inhibitor action; hence, it may prove to be best drug for the management of bronchial asthma associated with diabetes mellitus. This study suggests that the ethanolic extract of Shrishadi polyherbal compound effectively corresponds as alpha amylase and glucosidase inhibitor. It also leads to a decrease in starch hydrolysis and thus acts as hypoglycemic as well as anti-asthmatic drug [54].

DISCUSSION

From all the above facts given above, it is a wonder drug useful in various ailments. Its ethnomedicinal claims are easily applicable and used by folk medicinal practitioners. It can be easily cultivated in arid land with optimum requirement of water. Its large tree give shade to the walkers and its flowers and smell enhances the beauty of the path. In Metrocities, its plantation is beneficial to cope with the diseases caused by polluted air. Pharmacological contribution of Shrishia is discussed under various headings as Anti-asthmatic activity, Effect on anaphylactic shock, Pulmonary eosinophilia: anti-tussive activity, Allergic conjunctivitis, anti-fertility activity, Anti-diarrheal activity, antimicrobial, Anti-inflammatory activity, analgesic, Cognitive behavior and Anti-anxiety Study, Immunomodulatory activity, Hypoglycemic activity. All this function is proved in laboratories but antitoxic effect of Shirish is time tested. Still there is a huge scope to explore this drug on different parameters. Its availability and easy plantation methods is the next economical point for research on this drug for cheap and effective formulations for the masses. Naturalization of these tree throughout India may help GOI to fight against toxic air pollutants which are spreading in air day by day, as it is chief among antipoisonous drugs described in Agryasamgraha [53].
CONCLUSION

A single drug is useful in thirteen different diseased condition with evidences are presented here. It is proved that Shirish is multipotent drug and can be promoted as a future drug. It’s Utility can be explored in the field of environmental poisoning.

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