PHYTO-PHARMACOLOGICAL PROFILE OF *ALBIZZIA LEBBECK*

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Summary

The plant Albizzia lebbeck Benth. [Mimosaceae] is reported to possess anti-asthmatic, anti-inflammatory, antifertility and anti-diarrhoeal properties. Albizzia lebbeck is an important source of chemicals of melacacidin, D- catechin, b-Sitosterol, Albiziahexoside, betulnic acids which are effective as antiseptic, anti-dysenteric, anti-tubercular and used in bronchitis, leprosy, paralysis, helmenth infection etc. Hence in view of immense medicinal importance of the plant this review is therefore an effort to compile all the information reported on its phytochemical and pharmacological activities. This information will be helpful to create interest towards the plant and may be useful in developing new formulations, which are more effective and have more therapeutic value.

Key Words - Albizzia lebbeck, Mimosaceae, Albiziahexoside, anti-asthmatic.

Introduction

Albizzia lebbeck is a tree well known in the Indian subcontinent for its range of uses. *Albizzia lebbeck* Benth. (Mimosaceae) is a large, erect, unarmed, deciduous spreading tree. *Albizzia lebbeck* is native to deciduous and semi deciduous forests in Asia from eastern Pakistan through India and Sri Lanka to Burma. In India it is known by various names in different regions viz. Sirish in Bengal, Begemara in Karnataka and Pilo-sarasio in Gujarat[1, 2, 3].

Stem is large, erect and branched. The wood is light (sp. gr., 0.61; 624.78 kg / cu m) course-textured and has broadly and shallowly interlocked grain. The sapwood is white or yellowish white and the heartwood is dark brown streaked with. Leaves bipinnate, rachis 70-90 mm, rachillae 1-5 pairs, leaflets 3-11 pairs, oblong to elliptic-oblong, asymmetrical, glabrous, entire, initially bright green and folding at night, maturing to a duller glaucous green and fixed rachis. Inflorescence is globose heads.

Flowers greenish-yellow to white, fragrant. Flowering is occurs in May to August. Fruits pod flat oblong, stiff-papery when ripe, swollen over seeds, dehiscent. Seeds 3-12 per pod, brown, flattened. Pod ripen during December to February.

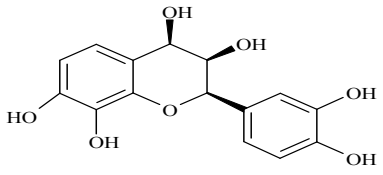
It is reported to have many important medicinal properties. In the indigenous system of medicine *Albizzia lebbeck* has been claimed to be useful in respiratory problem (Asthma), snake bite, scorpion sting and malaria/intermittent fever[4]. The plant is reported to have antiseptic, anti-dysenteric and antitubercular properties. The bark has acrid taste. It is recommended for bronchitis, leprosy, paralysis and helminth infections.

Leaves have been claimed to have anticonvulsant activity[4] and nootropic effect[5] which may be due to presence of certain important compound like alkaloids and flavanoids. Bark has immunomodulatory effect[6] and antimicrobial activity[7] while seed have anti-fertility effect[8] and antidiarhoeal activity[9]. The main constituents of *Albizzia lebbeck* are alkaloids, flavanoids, tannins, proteins and saponins.

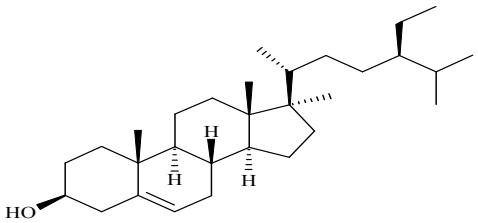
Figure: Albizzia lebbeck

PHYTOCHEMICAL STUDIES

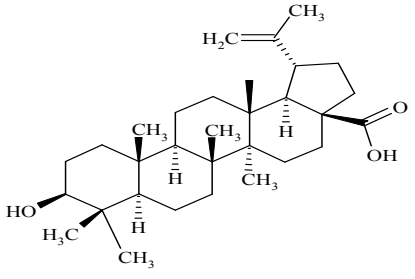
Work is done by many scientists in the field of phytochemical investigation of the plant. The phytochemical studies show the presence of the bark yields tannins 7-11 % of condensed type, viz. D-catechin, Isomer of leucocyanidin [5,7,3',4'-tetrahydroxy flavon-3,4-diol], Melacacidin, Leuco-anthracyanidin, Lebbecacidin [8,3',4'-trihydroxyl flavon -3,4-diol], Friedelin, β-Sitosterol, Betulinic acid and its glycosides. Leaves are reported to contain – Caffeic acid, alkaloids,flavanoids [kaempferol and quercetin], Albiziahexoside A (1) & A (2). The flowers on steam distillation gave colorless, sweet-smelling oil [4.3%]. On fractionation, it yielded p-nitrobenzoate, Benzyl alcohol and Benzoic acid and seeds contains Saponins, Budmunchiamine (1-3), N-dimethyl budmunchiamine (1). Acyclic ester heneicos–7(z) enyl-24-hydroxytetracos–10(z) enoate, in addition to lupeol, oleanolic acid, docosanoic acid and β–sitosterol were isolated and characterized from the hexane extract of *Albizzia lebbeck* pods[10]. Three main saponins named albizia saponins A, B and C were isolated from the bark of *Albizzia lebbeck*. Their structures were established through spectral analysis as acacic acid lactone 3-0-β–D–xylopyranosyl (1 to 2) α-L-arabinopyranosyl-(1 to 6) β–D–glucopyraonoside, 3-0-β–D–glucopyranosyl (1 to 2) – 0 –[α–L–arabinopyranosyl] (1 to 6) β-D-glucopyranoside and 3-0-β–D–xylopyranosyl (1 to 2) α-L-arabinopyranosyl– (1 to 6) β–D–glucopyronoside, 3-0-β-D-glucopyranosyl-(1 to 2)–0–[α-L-arabinopyranosyl – (1 to 6) –β–D– glucopyranoside and 3–0–β–D–xylopyranosyl (1 to 2) –α-L–arabinopyranosyl–(1 to 6)–0-[β–D–glucopyranosyl]–(1 to 2)-β-d-glucopyranoside[11]. Methanolic extract of seed of *Albizzia lebbeck* yielded three macrocyclic spermien alkaloids budmunchiamines 1-3[12]. From methanolic extract of seeds of *Albizzia lebbeck* macrocyclic alkaloids named as budmunchiamine L4, L5, L6 were separated and structure was determined by Dixit and Misra[13]. Phenolic glycoside, albizinin and four known flavon–30-ols, (-) epicatechin, procyanidin B-2, procyanidin B-5, procyanidin C-1, were isolated form the acetone extract of bark of *Albizzia lebbeck*[14]. Two new tri-o-glycoside flavonols, kaempferol and quercetin 3-0-alpha-rhamnopyranosyl [1 to 6] –β–glucopyranosyl [1 to 6] –β–galactopyranosides, were identified from the leaves of *Albizzia lebbeck*[15]. Albizziahexoside (1) a new hexaglycosylated saponin was isolated from leaves of *Albizzia lebbeck*[16]. Fatty acid composition of seed oil exclusively collected from the arid zone of Rajasthan have been investigated using GC / MS technique by M.M. Azam and M.R.K. Sherwani[17].



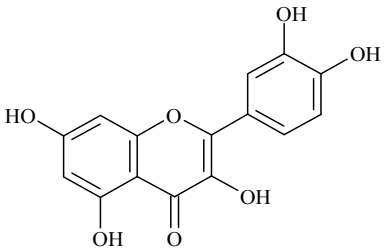
Melacacidin



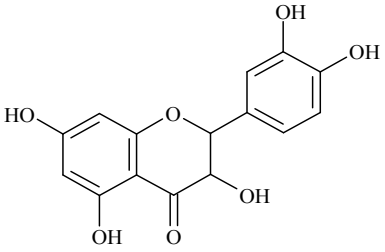
b-Sitosterol



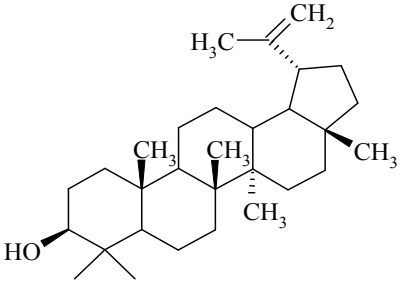
Betulinic acid



Quercetin



Kaempferol



Lupeol

PHARMACOLOGICAL STUDIES

In indigenous system of medicine, *Albizzia lebbeck* has been claimed to be useful in respiratory problem [Asthma], snakebite, scorpion sting and malaria/intermittent fever. Anti-inflammatory activity of the *Albizzia lebbeck* were assayed at a dose of 1000 mg / kg body weight of male albino rats using carrageenan induced rat paw edema and it was found highly effective[18]. Electrophoretic changes were observed on the protein profiles of somniferous tubules fluid and epididymal fluid from caput and caudo regions after the administration of alcoholic extract of dry seed of *Albizzia lebbeck*[19]. The chloroform fraction of methanolic extract of *Albizzia lebbeck* leaves protected mice against maximal electroshocks[20]. *Albizzia lebbeck* fractions inhibited the passive cutaneous anaphylaxis, mast cell degranulation in rat dose dependently and could protect the sensitized guinea pig from antigen induced anoxic convulsion[21]. The pharmacological study on antiasthma kada, which is a proprietary herbal combination, was carried out by V.S. Kasture et al. Results showed that composite drug was quite safe even in the dose of 1600 mg / kg body weight both in acute and subacute toxicity studies. In isolated frog heart, it produced dose dependent depression. In lower doses the drug behaved like acetylcholine but in higher doses direct action is predominant. Isolated rabbit heart also showed the same effect[22]. The decoction of *Albizzia lebbeck* stem bark was found to be effective against bronchospasm induced by histaminic acid phosphate and shown to exert di-sodium cromoglycate like action on mast cells. Results of clinical trials conducted with Sirisa Twak Kvatha on 19 Tamaka Shwasa patients were reported by C.C. Baruah[23].

Anti-diarrhoeal activity of the aqueous methanolic extract of seeds of *Albizzia Lebbeck* was investigated employing five rodent diarrhoeal models. The aqueous extract [1-10 mg/kg] was found to possess significant antidiarrhoeal activity[24].

The hot aqueous extract of the bark of *Albizzia lebbeck* and its butanolic fraction were administered once daily for one week in mice at the dose level tested [6.25, 12.5 and 25 mg / kg]. *Albizzia lebbeck* treated mice developed higher serum antibody and delayed type hypersensitivity response was suppressed[25]. Hot aqueous extracts and butanolic fractions of *Albizzia lebbeck* were examined for the anti- PCA activity in mice and rats using guinea pig and rat anti-sera. At a dose rate of 50 mg / kg p.o., there was 74 and 66 percent activity respectively[26].

Anti-tumour activity of the ethanolic extracts of 12 medicinal plants of Bangladesh was studied using the potato disc bioassay technique. Among these 10 plants including *Albizzia lebbeck* extract of 25.0 µg / disc exhibited significant inhibition of crown gall tumours caused by *Agrobacterium tumefaciens*[27]. The effect of saponin containing n-butanolic fraction [BF] extracted from dried bark of *Albizzia lebbeck* was studied on cognitive behavior and anxiety in albino mice. An elevated plus maze was used for assessment of both nootropic and anxiolytic activity. BF inhibited baclofen induced hypothermia and passivity[28]. Oral administration of saponin isolated from *Albizzia lebbeck* bark at the dose level of 50 mg/kg per day to male rats, a significant decrease in the weight of testes, epededymides seminal vesicle and ventral prostate[29]. S.D. Chintawar, V.S. Kasture and S.D. Kasture studied effect of saponin containing n-butanolic fraction extracted from dried leaves of *Albizzia lebbeck* on learning and memory albino mice using passive shock avoidance paradigm and elevated plus maze. Significant improvement was observed. The mice treated with 100 mg / kg of BF showed 50 percent mortality[30]. *Albizzia lebbeck* bark extract show the antimicrobial activity. The active constitute of bark extract is anthraquinone glycosides. The main constituent from bark is active against aerobes and mechanism of action is that glycosides cause the leakage of the cytoplasmic constituents[31].

Clinical Study

Clinical study of herbal and ayurvedic preparations of *Albizzia lebbeck* is carried out individually by B. Mukhopadhyay, M.A.Iyenger, Mahesh Chandra[32] and results show that these preparations are safe and effective. Treatment of allergic conjunctivitis by oral and local application of *Albizzia lebbeck* has been studied. This clinical study was done on 60 cases of various types of allergic conjunctivitis to assess the role of *Albizzia lebbeck* in the form of eye drop and capsule for a period of 60 days for treatment and further 90 days for follow up. Significant results were observed[32]. The decoction of composite drug was administered to 14 patients of asthma in a dose of 30 ml t.i.d. or b.i.d and significant improvement in peak expiratory flow rate and eosinophil count were observed after 28 days of treatment. All patients showed clinical improvement in their symptoms of breathlessness, cough and wheezing. The combination is effective in the prophylaxis of asthma[33].Svasakuthararasa [ayurvedic formulation] is given to asthma patients and on comparison the effect of shirishadi kashaya (25 ml twice daily for 45 days) was found to be better than Svasakuthararasa (250 mg) with one cup of water twice daily for 45 days[34].

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