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Review Article

REVIEW ON *ALBIZIA LEBBECK* A POTENT HERBAL DRUG

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ABSTRACT
Herbs and herbal drugs have created interest among the people by the clinically proven effects like immunomodulatios, adaptogenic and antimutagenic. Also the overuse of synthetic drug, which results in higher incidence of adverse drug reaction, has motivated humans to return to nature for safer remidies. In this review we have taken *Albizia lebbeck* which is important herbal drug in various aspect like, chemical constituent, pharmacologically active and being used traditionally for longer time.
Keywords: *Albizia lebbeck* , Pharmacognosy, chemical constituents, and Pharmacology.

INTRODUCTION

Herbal Medicine, sometimes referred to as Herbalism or Botanical Medicine, is the use of herbs for their therapeutic or medicinal value. An herb is a plant or plant part valued for its medicinal, aromatic or savoury qualities. Herb plants produce and contain a variety of chemical substances that act upon the body.

Herbalists use the leaves, flowers, stems, berries, and roots of plants to prevent, relieve, and treat illness. From a "scientific" perspective, many herbal treatments are considered experimental. The reality is, however, that herbal medicine has a long and respected history. Many familiar medications of the twentieth century were developed from ancient healing traditions that treated health problems with specific plants. Today, science has isolated the medicinal properties of a large number of botanicals, and their healing components have been extracted and analyzed. Many plant components are now synthesized in large laboratories for use in pharmaceutical preparations.[1]

Plant morphology

The genus *Albizia* comprises approximately 150 species, mostly trees and shrubs native to tropical and subtropical regions of Asia and Africa. *Albizia lebbeck* is native to deciduous and semideciduous forests in Asia from eastern Pakistan through India and Sri Lanka to Burma. The tree has been introduced as an ornamental and plantation tree throughout the tropics and northern subtropics, including the Greater and Lesser Antilles, Central America, Colombia, Venezuela, and Brazil. *Albizia lebbeck* is a fast-growing, medium-sized deciduous tree with a spreading umbrella-shaped crown of thin foliage and smoothes, finely fissured, greyish-brown bark. Depending on site conditions, annual height growth ranges from 0.5 to 2.0 m; on good sites, individual trees attain an average maximum height of 18 to 25 m and 50 to 80 cm d.b.h. The species grows well from sea level to 1500 m on sites receiving between 500 and 2500 mm annual rainfall and tolerates both light frosts and drought. While it grows poorly on heavy clay soils, it tolerates saline, sodic, and lateritic sites. The tree grows best on moist, well-drained soils. Its leaves, seeds, bark, and roots are all used in traditional Indian medicine. Flowers usually appear with new leaves over an extended period beginning at the end of the dry season; in the Caribbean region this season occurs between April and September. Flowering can occur on trees as young as 10 months. The fragrant, cream-colored flowers develop on lateral stalks in rounded clusters 5 to 7.5 cm across the many threadlike, spreading, whitish-to-yellow stamens tipped with light green, borne at the ends of lateral stalks 4 to 10 cm long. The fruits, flattened pods 10 to 20 cm long and 2.5 to 3.8 cm broad, are produced in large numbers and each contains several seeds. Immature pods are green, turning straw-colored on maturity, usually 6 to 8 months after flowering. The mature pods may be collected by hand from the ground or low branches or clipped with pruning poles. Seeds are easily extracted from the pods by hand or by crushing the pods and winnowing. *Albizia lebbeck* seeds are small, oblong, approximately 9 by 7 mm long and broad, compressed, and light brown in color with a smooth, hard testa.[2]

Taxonomy

***Albizia lebbeck* Linn.**
Family - *Mimosaceae*.
Habitat - All over India, from the plains up to 900m in theHimalayas; also in the Andamans.
English - Siris tree, East Indian walnut.
Ayurvedic- Shirisha, Bhandi, Bhandila, Shitapushpa, Mridupushpa, Kapitana (bark-dusty black).
Unani - Siras.
Siddha/Tamil- Vaagei.
Action - Antiseptic, antibacterial, antiallergic, antidermatosis, antidysenteric.
Bark-used in bronchitis; bark and seeds in piles
Root- in hemicrania
Flowers- in cough, bronchitis, tropical pulmonary eosinophilia, and asthma.
Pod-antiprotozoal.
Dosage- Stembark 3-6 g powder; 20-50 g for decoction.[3]

Pharmacognosy

Pharmaconostic study of *Albizia lebbeck* is performed such as Standardization parameters, Microscopic parameters, Macro-morphological Evaluations, and results are showed in the table no. 1, 2, and 3.

Phyto-Chemical Study

Leaves-Two new tri-O-glycoside flavonols kaempferol and quercetin were identified from the leaves of *Albizia lebbeck.*

Albizziahexoside a new hexaglycosylated saponin was isolated from leaves of *Albizia lebbeck*.[4,5]

Pods- Lupeol, oleanolic acid, docosanoic acid and beta-sitosterol were isolated and characterized from the hexane extract of *Albizzia lebbeck* pods. Oral administration of triterpenes isolated from *Albizia lebbeck* pods and observed that Oral administration of triterpenes did not cause any significant change in the body weights but a significant reduction in the weight of reproductive organs i.e. testis, epididymides, seminal vesicle and ventral prostate were observed. Testicular sperm count, epididymal sperm count and motility were significantly reduced.[6]

Flower- The flowers on steam distillation gave colorless, sweet-smelling oil [4.3%] and on fractionation, it yielded p-nitro benzoate, Benzyl alcohol and Benzoic acid.[7]

Bark- The photochemical studies show the presence of condensed tannins 7-11%, catechin, Isomer of leucocyanidin, Melacacidin, Leuco-anthracyanidin, Lebbecacidin, Friedelin, Beta- Sitoste-rol, Betulinic acid and its glycosides in bark of *Albizia lebbeck*.[8] Three main saponins named albizia saponins A, B and C were isolated from the bark of *Albizia lebbeck*.[9] Phenolic gly-coside, albizinin and four known flavon were isolated form the acetone extract of bark of *Albizia lebbeck*.[10] The hot aqueous Stem Bark decoction and its butanolic fraction was found effective in the antiallergenic activity in various models like anti-PCA or mast cell stabilizing activity.

Seeds- From methanolic extract of seeds of *Albizia lebbeck* macro-cyclic alkaloids named as budmunchiamine were separated. Fatty acid composition of seed oil exclusively collected from the arid zone of Rajasthan have been investigated using GC / MS technique. *Albizia lebbeck* showed saponin content in the seeds.[11]The seeds of Albizia *lebbeck* were studied for their fat and protine contents and fatty acids and minerals compositions. The seeds oil (5.3%) was rich in oleic and linoleic acid as the sum of 18:1 and 18:2 was found to be 78.5% whereas, the protein content was 29.5%.[12]

Phytochemical screening and Physio-Chemical Composition of *Albizia lebbeck* is given in table no. 4 and5.

Traditional use of *Albizia lebbeck*

Albizia lebbeck is traditionally important medicinal plant. Many Ayurvedic preparations containing *Albizia lebbeck* like Aller-7, Antiasthma kada, Sirisa twak kvatha, Vasadikwath are available. *Albizia lebbeck* leaves have alkaloids, flavanoids, tannins and saponins which have therapeutic value.[13]Some therapeutic use of Albizia Libbeck given in API vol- III are as follows. Pama, Kushtha, Kandu, Visarpa, Kasa, Vrana, sotha, savasa, Musaka Visa, sita Pitta, Raktadusti, Pinasa, Vismajvara, Pratisyaya, Sarpdansa, (Casake), Visadusti, Suryavarta, Ardhavabhedaka, Karmi Roga, Netrabhiasanda.[14]

Pharmacological Activity

Anti asthmatic activity

Asthma is now recognized to be a primarily inflammatory condition; inflammation underlying hyperactivity. *Albizia lebbeck* has been shown to posses anti-asthmatic activity Clinical trials with the bark have showed significant relief in case of bronchial asthma. In an experiment, the bark decoction in dose of .25g to 1.0 g/kg significantly protected the guinea pig (300-400g of either sex) against 1% histamine induced bronchospasm. The action started within 1 hr of drug administration and the protection was maximum with a dose of 1g per kg ($p<0.025$). The decoction of the flower in the dose of 50mg/kg significantly protected the guinea pig against histamine induced bronchospasm. Now it has been established that both the bark and flower decoction of the plant protect the guinea pig against Histamine induced bronchospasm and it could be due to smooth muscle relaxation. In another experiment on rat mesenteric mast cells, 12 albino rat of either sex (100-150g) were treated with 0.5g/kg of bark orally for one week, 8 control animal were treated with equal volume of distilled water. On the seventh day the animals of both the groups were sacrificed, intestine removed and kept in ringer-lactose solution. Mesenteric mast cells per high power microscopic field were counted. Ten such fields were counted with each rat. In the other group of similar study mesentery was incubated with 2.5 micro g/ml of compound 48/80 for ten minutes at37º C and percentage of mast cell disrupted was recorded. The mean mesenteric mast cell count in the control albino rat was9.3+0.84 per field while in the bark treated group it was 11.1+0.42 per field. It appeared that the numbers of mast cells following the drug treatment was more than normal but the difference was statistically insignificant .The drug significantly reduced the rate of the disruption of the mast cells by antigen in sensitized rats. It thus appears that the drug inhibits the phenomenon of sensitization.

There was no difference in the normally disrupted mast cells counts in the control (5.0+1.1) and the bark decoction treated group(5.3+2.2).But when the mesentery of the control sensitized animals was challenged with the antigen (horse serum), 69.6+9.5% of the mast cells were disrupted. Similarly when the mesentery of the bark treated sensitized animals was challenged with the antigen, 27.4+11.4% of the mast cells were disrupted. The disruption of the mast cells with antigen was significantly lower in rats which were pretreated with bark decoction ($p<0.025$).

Effect on anaphylactic shock-It has been proved in guinea pig sensitized with horse serum that the bark decoction significantly protected anaphylactic shock ($p<0.025$) but it is neither mediated through the stability of the mast cell nor through the adrenal gland. Studies on sensitized Albino rat suggest that the antianaphylactic activity could be due to the inhibition of phenomenon of sensitization. Hot aqueous extract of AL bark was not found to posses anti allergic properties in experiment model of cutaneous anaphylaxis and mast cell stabilization activity. Hot aqueous extract of stem bark did not posses any bronchodilatory effect *per se* in non sensitized animals. The decoction of the bark had a significant cromoglycate like action on the mast cells of albino rats and appeared to also inhibit the early

process of sensitization and synthesis of reaginic type of humoral antibodies. The studies indicated that the antianaphylactic activity of the plant besides being due to cromoglycate action on the mast cells, is also due to inhibition of the synthesis antibodies and suppression of T-lymphocytes activity. The crude extract of the seeds and a pure saponin fraction at a dose of 0.5 mg/ml had a stabilizing effect on the mast cells in the mesentery and peritoneal fluid of rats subjected to anaphylaxis.

Effect on adrenal gland thymus and spleen of albino rats:

The effect of 7days treatment with the bark decoction produced insignificant reduction in the weight of adrenal, thymus and spleen ($p>0.05$). Consequently it was established that the anti-asthamatic and the anti- anaphylactic action of the drug are not mediated through adrenal gland. The drug

however, significantly reduced the cholesterol content ($p<0.05$) but the ascorbic acid content of the adrenal gland were hardly changed ($p>0.05$).

Pulmonary eosinophilia: In a preliminary screening 35 cases of tropical pulmonary eosinophilia were treated with shirish flower for 6 week. The dose 200mg twice a day with water. The result indicated that 82% cases showed excellent response, 12% showed good response whereas 6% showed poor response. No side effects were observed.

Allergic conjunctivitis: In a clinical study the role of 29% of ghansatva of AL bark and 500 mg capsule of AL showed very favorable response in all kinds of allergic conjunctivitis.

Diuretic effect: The saponin isolated from the seeds at a dose of 200mg/kg orally did not exhibit diuretic activity in albino rats.

Anti-diarrheal activity: *Albizia lebbeck* posses anti bacterial activity against infectious diarrhoea. Aqueous, methanol and chloroform extracts of AL exhibited activity against *E. coli* and *Salmonella species*. Petroleum ether and hexane extracts did not exhibit any activity. None of extracts showed activity against Shigella and Candida. It has also been shown that *Albizia lebbeck* has moderate activity against *V. cholerae, A.hydrophilis* and *B. subutilis*.

Nootropic and Anxiolytic Activity: The effect of saponin containing n-butanolic fraction (BF) extracted from dried leaves of *Albizia lebbeck* was studied on cognitive behavior and anxiety in albino mice. The studies showed that BF possesses anxiolytic activity and nootropic activity.[20] BF inhibited baclofen-induced hypothermia and passivity. Thus the study suggests that saponins act by modifying GABA ergic mechanism.

The effect of saponin containing *n*-butanolic fraction (BF) extracted from dried leaves of *Albizia lebbeck* on learning and memory was studied in albino mice using passive shock avoidance paradigm and the elevated plus maze. Significant improvement was observed in the retention ability of the normal and amnesic mice as compared to their respective controls. The effects of BF on the behavior influenced by serotonin (5-HT), noradrenaline and dopamine have been studied. The brain levels of serotonin, gamma-aminobutyric acid (GABA) and dopamine were also estimated to correlate the behaviour with neurotransmitter levels. The brain concentrations of GABA and dopamine were decreased, whereas the 5-HT level was increased. The data indicate the involvement of monoamine neurotransmitters in the nootropic action of BF of *Albizia lebbeck*.[15]

Effect on the reproductive system: Male rats of proven fertility were divided into two groups of 10 each. One group was treated with saponins of *Albizia lebbeck* bark (50 mg/kg b.w. per day, oral) for 60 days. The control group received vehicle (distilled water 0.5 ml/day, oral) for 60 days. On day 61, animals were sacrificed under ether anaesthesia; testes, epididymides, seminal vesicle, ventral prostate, liver and adrenal glands were removed, cleared off fat and connective tissue and weighed.

Fertility test*:* The mating tests were performed from day 55 to day 60 (6 days) and also before commencement of the treatment. The male rats were cohabited with proestrous females at a ratio of 1:3. The presence of vaginal plug and sperm in the vaginal smear in the next morning were considered the indices for positives mating. The mated females were separated to note the implantation site on day 16 of pregnancy through laparotomy.

Saponins of *Albizia lebbeck* bark feeding to rats significantly reduced sperm concentration of testes and epididymides ($P < 0.001$). The motility of the cauda epididymal sperm was also reduced significantly ($P < 0.001$). The saponins reduced the fertility of male rats by 100%.[16]

Antiproliferative activity toward tumor cells: The antiproliferative activity of lebbeckalysin was carried out by testing its inhibitory effect on the growth of human hepatoma HepG2 cells and human breast cancer MCF-7 cells are reported.[17] The cells were cultured in RPMI-1640 medium supplemented with 10% fetal calf serum and 1% penicillin–streptomycin, in a humidified atmosphere of 5% CO_2 at 37ºC. The cells (10,000 cells/100_l/well) were seeded in a 96-well culture plate and serial dilutions of a solution of the lebbeckalysin, or doxorubicin (as positive control) in 100_l medium were added. Medium only was added as negative control. The cells were harvested after incubation for 24 h. Standard MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) assay was performed to determine the level of its inhibitory activity. All reported values are the means of triplicate samples.

Hemolytic activity: Rabbit erythrocytes were washed with phosphate-buffered saline (PBS, pH 7.5) and adjusted to a final concentration of 2% (v/v) in PBS. A sample solution (0.2 ml) was mixed with rabbit erythrocytes (0.2 ml) and incubated at 37ºC for 30 min before centrifugation at 14,000×g for 30s. The amount of haemoglobin released from disrupted erythrocytes was determined spectrophotometrically. One hundred percent hemolysis was defined as OD540 of hemoglobin released from erythrocytes treated with 0.1% Triton X-100. One hemolysin unit (HU) was defined as the reciprocal of amount of hemolysin (in mg) eliciting 50% hemoglobin release.[18]

Yeast survival assay: The survival of Candida albicans after treatment with different concentrations of lebbeckalysin for 24 h at 37ºC was monitored by counting viable yeast. This was done by counting the number of colony forming units (CFUs) after appropriate dilution on LB medium and calculating their number per milliliter. Nystatin (Sigma) was used as a positive control.[19]

Assay of 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 *Rhizoctonia solani*. Nystatin (Sigma) was used as a positive control. The IC_{50} value for the anti-fungal activity of lebbeckalysin against R. solani was determined.[20]

Assay of anti-bacterial activity: Escherichia coli was collected in the exponential phase of growth and re-suspended at a density of 1×108 cells/ml with PBS (pH 7.5). Different concentrations of lebbeckalysin in 200:l of 0.2% (w/v) bovine serum albumin were then incubated in 10:l with bacterial suspension with 190:l of Luria–Bertani medium. The mixture was incubated with shaking at 37ºC for 3 h. OD600 was measured. *Rachycentron canadum* ovary lectin was used as a positive control.[21]

Anti-oxidant Activity: Animals were divided into 3 groups of 6 rats each as follows. Group I animals consisted of normal rats supplied with pellet diet and water *ad libitum.* They also received saline at the dose of 10 ml/kg body weight, Group II animals were the alloxan-diabetic rats

supplied with pellet diet and water *ad libitum*. Group III animals constituted alloxan–diabetic rats co-administered *Albizia lebbeck* at the dose of 75 mg/kg body weight, twice a week, po (orally) in 2 ml of distilled water for a period of four weeks. (A pilot study revealed that *Albizia lebbeck* caused anti-diabetic effect at doses ranging 25–125 mg/kg body weight. 75 mg was found to be the effective dose). The animals were reared in laboratory conditions for a period of four weeks. After that, the animals were fasted overnight and then sacrificed under light anaesthesia (ether inhalation). Blood was collected from jugular vein in two separate tubes. Blood collected in the tube containing potassium oxalate and sodium fluoride was used for estimating blood glucose. The blood contained in the second tube was allowed to clot at room temperature and serum separated after centrifugation. Tissues like liver and kidneys were dissected out, blotted off blood, rinsed in ice cold saline and weighed. Fat was freed from the tissues[22] and then homogenized in buffer containing 50 mM Mannitol, 2 mM Tris HCl pH 7 (10%) in a Potter Elvehjem homogenizer fitted with a polyteflon plunger at high speed. The homogenate thus obtained was centrifuged at 25000 rpm at 4°C. The supernatant fraction was used for various biochemical estimations.

It can be concluded that *Albizia lebbeck* seems to be a promising plant in respect to its antioxidant potential to alleviate diabetes, and it necessitates further studies.[23]

Effect of *Albizia lebbeck* on contents of blood glucose, liver glycogen and antioxidant status of liver and kidneys is given in table no. 6 and 7.

Anti- Ulcer Activity

Indomethacin induced ulcer: The albino rats of either sex weighing between 180 –200 gm were divided into 4 groups of 6 animals each and fasted for 24 hrs with water ad libitum prior to experiment. The animals of group 1 were pretreated with vehicle and the animals of group 2 were treated with standard i.e. lansoprazole 8mg/kg. Similarly the animals of group 3 and 4 were pre-treated with ethanolic extract 100 mg/kg and 200mg/kg respectively. Indomethacin (30mg/kg p o) was administered to the animals of group 2 – 4, 60 minutes after the respective treatments. The animals were then sacrificed by cervical dislocation after 4 hrs. The stomach was taken out and cut open along the greater curvature of stomach.[24] The number of ulcers per stomach were noted and severity of the ulcers were observed microscopically and scoring was done as described before (16): 0 for normal coloured stomach, 0.5 for red colouration, 1 for spot ulcer, 1.5 for hemorrhagic streaks, 2 for ulcer between > 3 but < 5mm and 3 for ulcer > 5mm. Mean ulcer score for each animal is expressed as ulcer index. The percentage protection was calculated.

Ethanol induced (EtOH) induced ulcer: The albino rats of either sex weighing between 180 –200 gm were divided into 4 groups of 6 animals each and fasted for 24 hrs with water ad libitum prior to experiment. The animals of group 1 were pretreated with vehicle and the animals of group 2 were treated with standard i.e. lansoprazole 8mg/kg. Similarly the animals of group 3 and 4 were pre-treated with ethanolic extract 100 mg/kg and 200mg/kg respectively. Ethanol (100% 1ml/200 g, po) was administered to all the animals of group 2 – 4, 60 minutes after the respective treatments. The animals were sacrificed by cervical dislocation after one hour of EtOH administration and stomach was incised along the greater curvature and examined for ulcers.[25]

Pylorus – ligated (PL) rats: Albino rats of either sex weighing between 180 – 220 g were divided into 4 groups of 6 animals each and fasted for 18 hrs and care was taken to avoid coprophagy. Control vehicle (group-1) or standard drug (group-2) or extracts (group - 3 and 4) were administered 60 minutes prior to pyloric ligation under light ether anesthesia. The abdomen was opened and pyloric ligation was done without causing any damage to its blood supply. The stomach was replaced carefully and the abdomen wall was closed in two layers with interrupted sutures. The animals were deprived of water during the post operative period. After 6 hrs, stomach was dissected out; contents were collected into tubes for estimation of biochemical parameters. The stomach was taken out and cut open along the greater curvature and ulcers were scored and % protection was reported as mentioned in the above explained models.

Gastric Secretion -The gastric juice was collected 6 hrs after pylorus ligation and centrifuged for 5 minutes at 2000 rpm and the volume of supernatant was noted. The pH of the gastric juice was recorded by the pH meter. Then the contents were subjected to analysis for free and total acidity. Free acidity and total acidity were determined using 0.01N NaOH and Topfer's reagent containing phenolphthalein as indicator.[26]

Free radical scavenging and anti-arthiritic activity: Rheumatoid arthritis (RA) is a prevalent and debilitating disease that affects the joints. Infiltration of blood-derived cells in the affected joints upon activation generates reactive oxygen/nitrogen species, resulting in an oxidative stress. One approach to counteract this oxidative stress is the use of antioxidants as therapeutic agents. The methanolic extract of *Albizia lebbeck* which exhibited significant anti-inflammatory activity, was evaluated for the possible mode of action by studying its antioxidant potential in adjuvant-induced arthritic rats. The biological defense system constituting the superoxide dismutase, catalase level showed a significant increase while the lipid peroxide content was found to decrease to a large extent on *Albizia lebbeck* treatment thereby indicating the extracts has free radical scavenging property. Arthritis was induced in rats by injecting 0.1ml of Freund's complete adjuvant containing 6 mg of heat killed mycobacterium tuberculosis in 1ml paraffin oil into the left hind paw of the rat subplanterly. *Albizia lebbeck* Methanolic extract (200 mg/kg, 400 mg/kg, and 600 mg/kg body weight/day) was administered orally for 12 days. On 21st day of experiment; the biological estimation and radiological observation were carried out along with rheumatoid factor and arthritic index. It can be conclude that *Albizia lebbeck* methanolic extract possesses strong anti-arthtritic and anti-oxidant property.[27]

Anti-allergic Activity: Histamine plays major roles in allergic diseases and its action is mediated mainly by histamine H1 receptor (H1R). We have demonstrated that histamine signaling-related H1R and histidine decarboxylase (HDC) genes are allergic diseases sensitive genes and their expression level affects severity of the allergic symptoms. Therefore, compounds that suppress histamine signaling should be promising candidates as anti-allergic drugs. Here, we investigated the effect of the extract from the bark of *Albizia lebbeck*, one of the ingredients of Ayruvedic medicines, on H1R and HDC gene expression using toluene-2,4-diisocyanate (TDI) sensitized allergy model rats and HeLa cells expressing endogenous H1R. Administration of

the *Albizia lebbeck* extract significantly decreased the numbers of sneezing and nasal rubbing. Pre-treatment with the *Albizia lebbeck* extract suppressed TDI-induced H1R and HDC mRNA elevations as well as [3H] mepyramine binding, HDC activity, and histamine content in the nasal mucosa. *Albizia lebbeck* extract also suppressed TDI-induced up-regulation of IL-4, IL-5, and IL-13 mRNA. In HeLa cells, *Albizia lebbeck* extract suppressed phorbol-12-myristate-13-acetate- or histamine-induced up-regulation of H1R mRNA. Our data suggest that *Albizia lebbeck* alleviated nasal symptoms by inhibiting histamine signaling in TDI-sensitized rats through suppression of H1R and HDC gene transcriptions. Suppression of Th2-cytokine signalling by *Albizia lebbeck* also suggests that it could affect the histamine–cytokine network.[28]

CONCLUSION

Albizia lebbeck is very important medicinal plant traditionally. Many ayurvedic preparation containing *Albizia lebbeck* like, Anti-asthma kada, sirisa twak kvatha, vasadikwath etc. are available. *Albizia lebbeck* contains alkaloids, flavonoids, tannins, saponins which have therapeutic value. It can be concluded that *Albizia lebbeck* seems to be promising plant in various activities. So this plant can be further explored pharmacologically on various isolated pure compounds.

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Table 1 Showing Standardization Parameters:

PARAMETERS	RESULTS
Total ash	7.06%
Acid insoluble ash	1.43%
Water soluble ash	1.33%
Alcohol soluble extractives	9.6%
Water soluble extractives	20.8%
Loss on drying	6.53%
Crude fibre	27%
Foaming index	Less than100

Table 2 Showing Microscopic Parameters:

PARAMETERS	RESULTS
Vein islet no.	14-16-18 (per mm2)
Vein termination no.	12-19.6-24 (per mm2)
Stomatal no.	12 (per mm2)

Table 3 Showing Macro-morphological Evaluations

CHARACTERS	OBSERVATIONS
Surface appearance	Glabrous
Shape	Oblonge
Margin	Entire
Lamina	Compound paripinnate
Base	Asymmetrical , pulvinus present
Venation	Reticulate pinnate

Table 4 Showing phytochemical screening of *Albizia lebbeck* leaves maceration Extracts

Solvent→ Phytochemical↓	Ethyl Acetate	Ethanol	Water
Glycoside	-	-	-
Tannin	+	+	+
Saponin	-	-	+
Steroid	-	-	-
Flavanoids	+	+	+
Carbohydrates	-	+	+
Amino acids	+	+	+
Proteins	+	+	+
Alkaloids	-	+	+

Table 5 Physio-Chemical Composition of *Albizia lebbeck* (g/100g of dry material)

Component	Percent
Protein (N x 6.25)	36.50
Fat	4.12
Fibre	10.91
Moisture	7.00
Unsaponifiable matter	1.60
Iodine value	114
Refractive index	1.4683
Total carbohydrate	37.58
Calcium	0.1280
Potassium	1.1750
Sodium	0.5010
Iron	0.0580
Magnesium	0.0610
Manganese	0.0085
Zinc	0.0035
Copper	0.0081

Table 6 Effect of *Albizia lebbeck* on contents of blood glucose and liver glycogen

Parameters	*Group-I*	*Group-II*	*Group-III*
Blood glucose (mg/100 ml)	110.4±2.1	297.8±3.9*	133.2±2.8^
Liver glycogen (mg/100 g)	1093±2.6	807±2.8*	1064±2.3^

Values are mean±SEM of 6 animals in each group.
*P<0.01 as compared to Group-I.
^P<0.01 as compared to Group-II.

Table 7 Effect of *Albizia lebbeck* on antioxidant status of liver and kidneys

Parameters		*Group-I*	*Group-II*	*Group-III*
TBARS (µmol/100 g tissue)	In liver	0.7±0.02	1.1±0.03	0.8±0.02^
	In kidney	0.8±0.02^	1.4±0.04*	1.0±0.03^
CD (µmol/100 g tissue)	In liver	0.3±0.03	0.7±0.05*	0.4±0.05^
	In kidney	0.5±0.02	0.9±0.03*	0.5±0.02^
GSH (µmol/100 g tissue)	In liver	482.1±2.5	404.6±4.2*	499.2±3.5^
	In kidney	380.6±2.1	319.6±1.6*	371.7±1.9^
SOD (units/mg protein)	In liver	6.4±0.16	2.8±0.16*	6.0±0.15^
	In kidney	6.0±0.15	1.9±0.14*	5.7±0.09^
CAT H2O2/min/ mg protein)	In liver	211.7±5.27	135.3±2.07*	202.8±1.09^
	In kidney	73.1±0.8	31.8±1.1*	71.6±0.9^
GPX (units/mg protein)	In liver	166.4±1.5	97.7±1.4*	155.3±2.3^
	In kidney	123.1±2.1	59.6±1.5*	116.6±1.9^
GST (units/mg protein)	In liver	0.87±0.06	0.25±0.03*	0.79±0.4
	In kidney	0.80±0.07	0.41±0.01*	0.73±0.02^

Values are mean±SEM of 6 animals in each group.
*P<0.01 as compared to Group-I.
^P<0.01 as compared to Group-II.