REVIEW ARTICLE

Siris (Albizzia lebbeck (L.) Benth.) in view of Unani and contemporary pharmacology

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Abstract

Siris, a well-known Unani drug is credited to possess a number of medicinal properties by Unani scholars. Furthermore, a lot of preclinical and clinical work has been conducted on *Albizzia* which has further added to its scope of use by corroborating the earlier therapeutic actions of this drug as well as added some new pharmacological actions to the already existing list. A detailed literature review has been conducted on *Albizzia lebbeck* to validate the classical therapeutic assertions through latest evidence-based pharmacological findings established through modern scientific means. A comprehensive search of Unani literature in Urdu, Persian and Arabic languages for classical literature was conducted at Central Library, Jamia Hamdard (Hamdard University), New Delhi, as well as Library of CCRUM headquarters, Ministry of AYUSH at Janakpuri, New Delhi. For up-to-date research work on *Albizzia* search was conducted on articles published in English language using PubMed, Medline, Science direct, and the Google scholar with search term including *Siris*, shirisha, *Albizzia*, and *A. lebbeck*, since 1977–2017. The search included authentic classical Unani literature and 26 research articles published between 1977 and 2017, which further substantiated various pharmacological actions attributed to the drug classically including anti-inflammatory, antidiarrheal, antihelminthic, anticonvulsant, nootropic, ulcer healing, and wound healing properties of A. lebbeck. Largely the pharmacological attributes and therapeutic application of *Siris* which have been mentioned in classical Unani literature are in accordance with latest research findings. However, still there are many indications mentioned in classical literature for which this drug has not been evaluated contemporarily so far. Hence, it is suggested that Siris be further explored for all the classical indication as it will give better insight with regard to its use as a drug and may decrease the multidrug therapy by the concerned practitioners.

Key words: *Albizzia lebbeck*, herb, *Siris*, Unani

INTRODUCTION

Albizzia lebbeck tree is often found in deciduous and semi-deciduous forests of India, eastern Pakistan, Sri-Lanka, and Burma. It is also planted as ornamental tree in America, Columbia, and Brazil. The tree is unarmed and reaches height up to 20–30 m. The leaves of *Albizzia* are bipinnate; there are 3–11 pairs of leaflets which are oblique to elliptical in shape with dimension of 15–65 × 5–35 mm, the rachis are 70–90 mm long, and rachilae are 1–5 in pair. The inflorescence is axillary cluster of 15–40 pedicellate flowers. The approximate length of peduncle is 100mm and of pedicle is 1.5- 5 mm. The corolla are numerous, inconspicuous, with free filaments and 15-30 mm long. Entire inflorescence is fluffy and 60 mm in diameter, yellow-green with distinctive pleasant fragrance. The pod is flat, oblong 120–350 mm × 30–60 mm, stiff-papery when ripe, swollen over seeds, and dehiscent. The seeds are 3–12 per pod, brown, and flattened, 7 × 1.5 mm.[1,2]

Botanical Classification[3]

Kingdom: Plantae
Sub-kingdom: Tracheobionta
Super-division: Spermatophyta
Division: *Magnoliophyta*
Class: M*agnoliopsida*
Subclass: Rosidae

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Order: *Fabales*
Family: *Fabaceae*
Genus: *Albizia*
Species: *A. lebbeck* (L.) Benth.

Vernacular Names[4]

Arabic: Sultan al Ashjaar
Persian: Darakht-e-Zakariya
Bengali: *Siris*
English: Indian walnut tree, *Siris* tree
Hindi: *Siris*
Sanskrit: *Siris*ha
Telugu: Dirisana
Tamil: Vagei
Urdu: Siras.

TEMPERAMENT AND ACTION

The temperament of bark and seeds of *Siris* is described as cold and dry in the second degree[5,6] while some scholars said that it is hot and dry in first degree[6] whereas flowers are described as cold and dry in first degree.[7]

PARTS USED

- Bark
- Seed
- Leaf
- Flower.

PHARMACOLOGICAL ACTION

Common Action

According to Unani Scholars *Siris* is known to have Musaffi Khoon (Blood purifier), Musakkin Hiddat-e-Khoon (Anti-Allergic), Mohallil-e-Waram (Anti-inflammatory), Muqawwi (General tonic) and Mudir (Diruretic) properties.

Topically

Bark

The bark of *Albizzia* possesses Jali (Detergent), Mohallil (Anti-inflammatory), Mujaffif (Disiccant/Siccative),[5] Mudammil Qurooh (Wound Healing), and Muqawwi-e-Dandan-wa-Lissa (teeth and gum strengtheners) properties locally.

Leaves extract

It consists of Jali (Detergent) and Muqawwi-e-Basar (eye-sight enhancer).

Seeds

It consists of Jali (Detergent) and Mudammil Qurooh (wound healer).

Orally

Bark

The bark of *A. lebbeck* is Mudir (Diuretic), Musaffi Khoon (blood purifier).

Leaves

Siris leaves are mentioned to possess Musaffi Khoon (blood purifier) and Daf-e-Tadiya (Antiseptic) activities.

Seeds

The seeds of the *Siris* possess Muqawwi-e-Bah (Aphrodisiac), Mugallize-e-Mani (inspisant of semen), and Muqawwi-e-Asab (Nervine Tonic) actions.

Flowers

A. lebbeck flowers are Qatil-e-Kirm-e-Shikam (anti-helminthic) and Mussakin-e-Alam (analgesic) in nature.[4,6-8]

THERAPEUTIC APPLICATION

Leaves

In Unani system of medicine leaves of *Siris* is used for night blindness in powdered form and decoction of leaves for management of toothache. The extract of leaves is used to cure stomach-ache. The juice of fresh leaves along with milk is used in oligospermia, low viscosity of semen, anaphrodisiac, and for healing ulcers of ureters.[4,6]

Bark

The paste of bark is applied locally for healing wound, acne vulgaris, non-healing ulcers, boils, and abscess. It is also used to treat Pruritis, Scabies, and Dermatophytosis[8] locally whereas internally it is used in powder form in blood dyscrasias and Jaundice. It is also used orally in the management of dementia, psychosis, epilepsy, mania, and paralysis.[5,6,8]

Flower

The fragrance of flowers is used to treat headache and migraine. The juice of flowers and leaves is used to kill

intestinal worms.[5,6,8]

Seeds

The seeds of *A. lebbeck* are widely used in Unani medicine. Its powder is used locally in the diseases of eyes such as corneal opacity and grittiness of eyes along with other medications while internally it has been used in the management of premature ejaculation, anaphrodisiac, scrofula, syphilis, epilepsy, mania, cold and cough, sinusitis, constipation, hemorrhoids, and dysentery. The seed oil of *Siris* is used in the treatment of vitiligo.[5,6]

Unwarranted Effects and Correctives

It is harmful (*Muzir*) for dry temperament people and with drug badyan (*Foeniculum vulgare* Mill.) and Tabasheer (*Bambusa bambos* Druce). The correctives (Musleh) for *Siris* are sarphooka (*Tephrosia purpurea* (L.)) and Roghan-e-Zard (clarified butter).[6,8,9]

Dosage

The dose of bark is 5–7 g, the dose of seed is 1–2 g or 10 g and the dose of leaves is 12 g.[4,5,7]

Formulations

The well-known formulation of bark of *Siris* are Zimad-e-Muhasa[10] and Tila Muhasa[11,12] for acne vulgaris whereas formulations of seeds of *A. lebbeck* are Surma Noorani for Shabkori (night-blindness), Nakhona (Pteregium), Jala (Nibula), Nuzool-ul-Ma (Cataract), Zof-e-Basarat (impaired vision), Surma Zahiri for Nuzool-ul-Ma (Cataract), Sozish-e-Chashm (Trachoma, Inteshar-e-Shar-e-Palak (ectropion),[13] Kohal-e-Zufra for zufra (Pteregium), Shiyaf-e-Dahna-e-Farang for Nuzol-ul-Ma (Cataract), Sabal (keratitis), and Zufra (Pteregium).[14]

CHEMICAL COMPOSITION

The phyto-chemical screening survey has revealed that different part of Albizzia lebbeck possess variety of chemical constituents which are enumirated in detail in the below mentioned table

Whole plant	Saponin, macrocyclic alkaloids, phenolic glycosides, coumarins, and flavonols[15-17]]
Specific components	
Leaves	Two tri-*O*-glycoside flavonols (kaempferol and quercetin) and Pipecolic and derivatives Albiziahexoside (a new hexaglycosylated saponin) different sterols (Taxerol, cycloartenol, lupeol, campesterol, and sitosterol)[16,18,19]
Bark	Saponins (named albiziasaponins A, B, and C)[16,17]
Root	Echinocystic acid (saponin)[15]
Pod	3',5 dihydroxy4', 7 dimethoxy flavone and N-benzoyl L Phenyl alaninol
Flower	different sterols (taxerol, cycloartemol, lupeol, campesterol, and sitosterol)[15]

CONTEMPORARY RESEARCH

Antibacterial Activity

Rahul *et al*. had performed *in vitro* antibacterial activity on leaves successive ethyl acetate extract in which he has proven minimum inhibitory concentration (MIC) and zone of inhibition of pathogens including *Staphylococcus aureus, Escherichia coli, Bacillus cereus, and Pseudomonas aeruginosa*. The study has proven maximum inhibitory effect against *P. aeruginosa* and minimum against *E. coli* and was sensitive for both Gram-negative and Gram-positive bacteria.[20]

Bobby *et al*. have conducted an *in vitro* antibacterial activity on *A. lebbeck* extracts, namely petroleum ether, ethyl acetate, and methanol in which he found out that methanolic extract has wide-spectrum activity. The methanolic extract has the highest zone of inhibition against the pathogens *Salmonella typhii* (23 mm), *P. aeruginosa* (22 mm), *E. coli* (22 mm), *Proteus vulgaris* (18 mm), *S. aureus* (17 mm), *Bacillus subtilis* (16 mm), and *Klebsiella pneumonia* (11 mm). The ethyl acetate extract has confirmed maximum zone of inhibition against *E. coli* (26 mm), *P. aeruginosa* (22 mm), and *K. pneumonia* (16 mm) whereas petroleum ether extract was least sensitive and exhibited a zone of inhibition against *P. aeruginosa* (15 mm).[21]

Padamanabhan *et al*. have performed antibacterial screening on hydroalcoholic extracts of *A. lebbeck* pods out of five bacterial strains 4 were Gram-negative, namely *Shigella sonnei K. pneumoniae* and *Klebsiella aerogenes* and *S. typhi,* and one among them was Gram-positive *E. coli.* The study revealed that the hydroalcoholic extract was active against Gram-positive strains mentioned above and has insignificant activity against Gram-negative strain *E. coli*.[22]

In contrast to above studies, Miranda *et al.* have shown that ethanolic extract of A. lebbeck leaf powder has no inhibitory activity on the growth of Gram-negative (*Salmonella typhymurium, E. coli* and *Salmonella choleraeseus*) and Gram-positive (*B. cereus*, *S. aureus*, *and Micrococcus luteus*).[16]

Lam and Ng isolated lebbeckalysin from seeds of *A. lebbeck* which suppressed the growth of *E. coli* with an IC_{50} of 0.52 M.[23]

Antifungal Activity

Gupta *et al* (2012) have screened aqueous, acetone, and benzene extract of *A. lebbeck* for anti-candida activity against *Candida albicans* results revealed 7, 13, and 6 zone of inhibition in millimetre, 0.60, 0.41, and 0.50 MIC for 50% inhibition and 0.70, 0.55, and 0.65 minimum fungicidal concentration for 50% sensitivity, respectively.[24]

Lam and Ng in the study mentioned above also assess the antifungal effect of lebbeckalysin isolated from seeds of *A. lebbeck* which impeded mycelial growth in the fungi *Rhizoctonia solani* with an IC_{50} of 39 M, but there was no effect on a variety of other filamentous fungi, including *Fusarium oxysporum, Helminthosporium maydis, Valsa mali,* and *Mycosphaerella arachidicola*.[23]

Antimicrobial Activity

A study shows that glycosides obtained from stem bark *A. lebbeck,* namely cardenolide glycosides and anthraquinone glycosides obtained have an antimicrobial action against the pathogen, namely *P. aeruginosa*, *S. aureus*, *C. albicans*, *Trichophyton rubrum*, *Trichophyton violacium, Trichophyton tonsurans,* and *Trichophyton mentagrophytes*.[15]

Anti-allergic

Nurul *et al*. investigated the effect of *A. lebbeck* bark extract on histamine signaling-related H1R gene and histidine decarboxylase HDC gene expression on toluene-2,4-diisocyanate (TDI) sensitized allergy model rats and HeLa cells which expressed endogenous H1R. *A. lebbeck* extract administration has significantly reduced the numbers of sneezing and nasal rubbing. The study concluded that *A. lebbeck* is very promising anti-allergic drug as it contains antiallergic compound(s) and alleviates TDI-induced nasal symptoms. The probable mechanism of action might be through suppression of histamine signaling by inhibition of H1R and HDC gene transcriptions.[25]

Mast-cell Stabilizing Activity

Barua has shown mast cell stabilizing activity of crude extract as well as of active fraction of *A. lebbeck* in rats after treating them with 10 mg/kg for 5 days. *In vitro* Mast cells degranulation was done by egg albumin (1 mg/ml) and comp. 48/80 (1 mg/ml). The results of electron microscopic study have proven that mast cells from control group were degranulated with their cell contents released, whereas in treated as well as in standard group, the mast cells were protected from degranulation 66% and 62%, respectively, in DO81 and FO82 treated group.[26]

Anti-inflammatory Activity

Babu *et al*. performed anti-inflammatory activity of *A. lebbeck* extracts, namely petroleum ether, chloroform, and ethanol using cotton pellet carrageenan, dextran, and Freund's complete adjuvant-induced rat models. The extracts were administered at the concentrations of 100, 200, and 400 mg/kg body weight. The ethanol and petroleum ether extracts at concentration 400 mg/kg showed maximum inhibition of inflammation, i.e. ethanol having 59.57% and petroleum ether 48.6% induced by carrageenan. The results for dextran-induced inflammation were petroleum ether 45.99% and ethanol 52.93%, cotton pellet induced inflammation was petroleum ether 34.46% and ethanol-53.57%, and Freund's adjuvant-induced inflammation was petroleum ether 64.97% and ethanol 68.57%. This proves that *A. lebbeck* possesses significant anti-inflammatory activity.[27]

Saha and Ahmed has shown anti-inflammatory activity of extract of the bark of *A. lebbeck* which is obtained by cold extraction of mixture of equal proportions of ethyl acetate, petroleum ether, and methanol. Inflammation was induced by carrageenan in rat paw causing edema, the extract at a dose of 400 mg/kg have showed 36.68% inhibition of edema volume at the end of 4 h whereas in writhing test induced by acetic acid extract at dose of 200 mg/kg showed 39.9% and at 400 mg/kg showed 52.4% inhibition of writing.[28]

Kajariya *et al*. have investigated *in vivo* anti-inflammatory and analgesic effect of hydroalcoholic extract of a formulation comprising *A. lebbeck*, cyperus rotundus and Solanum xanthocarpum induced by carrageenan in rat paw edema at a dose of 200mg, 500mg, and 500 mg/kg body weight which led to 79%, 77%, and 81% reduction in edema whereas in writing test-induced by acetic acid extract has showed a reduction of 65.6% at dose of 200 mg/kg and 70.9% reduction at 500 mg/kg body weight dose.[29]

Analgesic

Saha and Ahmed along with the anti-inflammatory activity mentioned above has screened analgesic effect by radiant

heat tail-flick method in which crude extract of *A. lebbeck* has produced elongation of tail flicking time 30 min 40.74% ($P < 0.001$) at 200 mg/kg oral dose and 61.48% ($P < 0.001$) at 400 mg/kg oral dose.[28]

In the the study mentioned above Kajariya *et al*. have also revealed analgesic effect of hydroalcoholic extract of formulation by radiant heat tail-flick test the crude extract of the drug resulted in 58.1% and 61.1% elongation of tail flicking time in 30 min at 200 and 500 mg/kg body weight doses, respectively, and after 60 min elongation was 56.3% at 200 mg/kg body weight and 59% at 500 mg/kg body weight dose.[29]

Wound Healing Activity

An *in vivo* study was conducted for evaluation of wound healing property of ethanolic extract of root of *A. lebbeck* through incision and excision models. Histopathology of wound, degranulation tissues from excision and dead space wound model were performed for confirmation. The extract has considerably increased wound healing strength with ceiling effect at 500 mg/kg p.o. and shown optimum wound contraction on the 18th day while complete wound contraction on day 22. Normal epithelisation and fibrosis were noted histopathologically evidenced by collagen density. Thus, they validated wound healing activity of ethanolic extract along with potential antibacterial property attributed to potential antioxidant activity and collagen synthesis.[30]

Shobana *et al.* have conducted *in vivo* study on polyherbal ointment containing leaves of *A. lebbeck*, *Desmodium gendeticum,* and *Anisomeles malabarica*s to investigate its wound healing potential on excision wounds in albino rats. The study comprises three groups Group I was excision wounded control whereas Groups II and III were excision wounded rats treated with two different doses 5% and 10% of polyherbal ointment applied topically for 14 days, and the past Group IV was excision wounded animals which were treated with reference ointment Soframycin. The mechanism of healing of wound was assessed by the rate of wound contraction, hexosamine, estimation of hydroxyl proline, tissue protein, DNA, RNA enumeration of white blood cell (WBC), and platelet count. The topical application of polyherbal ointment treated groups showed a significant decrease in wound contraction, WBC count and platelet count and increase in hydroxyl proline, hexosamine, tissue protein, DNA, and RNA. Thus, the results suggested that the drug contain wound healing property.[31]

Anti-malarial Activity

Kalia *et al*. studied antimalarial activity of ethanolic bark extract of *A. lebbeck*. He maintained continuous *in vitro* culture of *Plasmodium falciparum* to check the efficacy of different concentrations 5–100 µg/ml of extract. *In vitro* antimalarial screening exhibited IC_{50} = 8.2 µg/ml and 5.1 µg/ml against MRC2 and RKL9 strains of the parasite, respectively. Therefore, the extract was classified as active exhibiting selectivity indices of >121.9 and >196.07, respectively, which confirms it's *in vitro* antiplasmodial efficacy against *P. falciparum* as evident by high SI values.[32]

Acute Toxicity (lethal dose [LD_{50}])

Kalia *et al*. while investigating antimalarial activity mentioned above also performed acute toxicity test by limit test of lorke on ethanolic bark extract of *A. lebbeck*. He has used four female BALB/c mice and administered 5/kg concentration of bark extract orally by dissolving dried extract residue in the standard suspending vehicle. Mice were fasted for 4 h. After administration of EBEAL, mice were examined for mortality and side effects. If the mice died, lower concentrations of extracts were administered to mice, till LD_{50} was determined. The median LD for ethanolic bark extract of *A. lebbeck* was determined to be >5 g/kg. No mortality was observed with this concentration during the study period. These observations revealed the safety of *A. lebbeck* as a medicinal plant without severe side effects.[32]

Anticonvulsant and Anxiolytic Activity

Kasture *et al.* investigated ethanolic extracts of leaves of *A. lebbeck* for anticonvulsant activity. He has performed bioassay-guided fractionation which revealed that the anticonvulsant activity in an ethanolic extract of the leaves of *A. lebbeck* lies in the methanolic fraction of chloroform soluble part. The fraction of the extract does protect animals from electrical kindling, maximum electroshock, and pentylenetetrazole-induced convulsions in mice. Lithium–pilocarpine-induced convulsion and electrical kindling were also inhibited by this fraction of ethanolic extract. However, it failed to protect mice from convulsions induced by strychnine. This fraction has raised brain contents of gamma-aminobutyric acid (GABA) and serotonin and antagonized the behavioral effects of D-amphetamine and potentiated the pentobarbitone-induced sleep.[33]

Nootropic Activity of *A. lebbeck* in Mice

Chintawar *et al*. studied Nootropic activity of *A. lebbeck*. They obtained saponin containing n-butanolic fraction (BF) from dried leaves of *A. lebbeck* and studied for memory and learning ability in albino mice using elevated plus maze and the passive shock avoidance paradigm. They also studied its effect on the behavior influenced by noradrenaline, serotonin (5-HT), and dopamine, levels of serotonin, GABA, and dopamine in brain were also estimated and correlated with the behavior through neurotransmitter levels. The brain concentrations of 5-HT level were increased, while GABA and dopamine were decreased which point toward monoamine neurotransmitters involvement in the nootropic action of BF of *A. lebbeck*. The results proved its significant nootropic activity.[34]

Antispermatogenic Effect

Gupta *et al*. studied spermatogenic effect of saponins isolated from *A. lebbeck* bark in male rats at the dose 50 mg/kg/bw per day orally for 60 days showed a significant reduction in the weights of testes, seminal vesicle, epididymides, and ventral prostate. The production of round spermatid was reduced by 73.04%, the population of preleptotene spermatogonia by 47.48%, spermatocytes by 65.07%, and secondary spermatocytes by 73.41%, the density and motility of sperm were also reduced. The administration of the saponins reduced the fertility of male rats by 100%. Gupta did not observe any changes in hemoglobin, red blood cell and WBC count, hematocrit and glucose in the blood and cholesterol, protein, triglyceride, and phospholipid in the serum. The seminiferous tubular diameter was extremely reduced and intertubular space increased compared to controls. Another study showed also the antifertility activity of the methanolic pod extract of *A. lebbeck* in male albino rats.[35]

Antidiarrheal Efficacy

Antidiarrheal activity of the seed extract was performed by Besra *et al.* on albino rats and mice. *A. lebbeck* watery methanol extract of seeds results in a significant dose-dependence delay in transit. The antidiarrheal dose of the extract was at least 10–30 times less than the LD_{50} dose. He has concluded that the antidiarrheal activity of extract at a dose of 2.5–5 mg/kg i.p similar to loperamide at1 mg/kg i.p. and when loperamide and extract were administered together has synergistic effect.[36]

Balekar *et al*. have also evaluated antidiarrheal effect of ethanolic extract of *A. lebbeck* stem bark on castor oil-induced diarrhea, at doses of 250, 500, and 1000 mg/kg p.o. The bark extract has significantly inhibited intestinal fluid secretions in castor oil as well as magnesium sulfate induced enteropooling and peristaltic movements in charcoal meal test at a dose 500 mg/kg with $P < 0.05$.[37]

Anthelminthic Activity

A. lebbeck bark aqueous extract was screened by Galal *et al*., for anti-helmintic activity had moderate effect at a dose of 10–100 g/kg orally.[38] While El-Garhy and Mahmoud 2002 investigated *A. lebbeck* ascaricidal efficacy *in vitro* against eggs and larvae of *Ascaris lumbricoides* and it was effective in killing both the infective eggs in 20 days and larvae in fewer than 40 days.[39]

Antidiabetic Activity

Syiem *et al*. found that various doses of aqueous-methanol extract of *A. lebbeck* bark have reduced the level of blood glucose in normal as well as alloxan-induced diabetic mice which were dose-dependent. The extract enhanced glucose tolerance in both the groups. The reference drugs used by researchers were metformin, glibenclamide, and Insulin.[40]

Antipyretic

Farag *et al*. have shown antipyretic effect of five different extracts of *A. lebbeck* flowers, namely *n* hexane, ethyl acetate, dichloromethane, *n*-butanol, as well as the 70% total alcohol on albino Wistar rats. The study revealed that the di-chloromethane has dropped down temperature by 8°C and ethyl acetate by 5°C. In addition, other fractions were slightly less effective compared to above fractions, total alcohol has lowered temperature by 2.3°C, *n*-butanol by 4.7°C, aqueous by 2.7°C, and *n*-hexane extracts by 1.7°C.[41]

Antiasthmatic and Antianaphylactic Activity

Tripathi *et al*. (1977) investigated antiasthmatic and anti-anaphylactic activity of decoction of the bark and flower of *A. lebbeck*. The study revealed that the decoctions suppress histamine as well as acetylcholine-induced bronchospasm in guinea pigs. However, the extract did not show any notable effect on mesenteric mast cell count of the rat. The perturbation rate in sensitized albino rats was inhibited of mast cells stimulated by antigen. It showed no effect on the adrenal, thymus, and spleen weight as well as adrenal ascorbic acid, excluding the cholesterol content which decreased considerably. Although the researcher did not observe any difference between the normally disrupted mast cells counts in the control and the bark decoction treated group, when the control sensitized animals were challenged with the antigen, 69.6+9.5% of the mast cells were disrupted (compared to the bark treated sensitized animals which 27.4+11.4% of the mast cells were disrupted). Disrupting the mast cells with antigen was notably lower in rats which were pretreated with bark decoction ($P < 0.025$). It has been proved in guinea pig sensitized with horse serum that the bark decoction considerably protected anaphylactic shock ($P < 0.025$), but it is neither intervened through the stabilization of the mast cell nor through the adrenal gland.[42] They mentioned also that hot water extract of bark had no anti-allergic activity in experiment model of cutaneous anaphylaxis and mast cell stabilization activity. Hot water extract of stem bark did not show any bronchodilatory effect. According to Tripathi decoction of the bark shows a notable cromoglycate-like effect on the mast cells of albino rats, and reduced the early procedure of sensitization and synthesis of reaginic type of humoral antibodies. The studies indicated that the anti-anaphylactic activity of the plant is not only because of cromoglycate action on the mast cells but also caused by synthesis antibodies inhibition and of T-lymphocytes suppression activity.[43]

Antiulcer Activity

Shirode *et al*. investigated gastroprotective ability of 70% ethanolic extract of leaves in ethanol, pylorus ligation, and

indomethacin-induced models in rat. Swiss albino mice weighing 18–25 g and Albino Wister rats weighing 150–200 g of either sex were used for the study. In pylorus ligation induced ulcer model gastric volume, free acidity, total acidity, pH, and ulcer index were studied. The gastroprotective efficacy of test extracts reported to be 45.59% at 100 mg/kg and 62.00% at 200 mg/kg doses, which were compared to that of standard lansoprazole 8 mg/kg. The total acidity was 104.22 ± 5.95 and free acidity of the gastric secretions was 97.2 ± 6.24. The gastric secretion was reduced and increment in the pH was up to 5.15. It was noted that at 100 mg/kg dose the gastric volume was not reduced, but with 200 mg/kg dose gastric volume reduced significantly. The pyloric ligation that has caused gastric ulcerations was reduced by the administration of extracts dose-dependently. Thus, they suggested that the extract can suppress gastric damage induced by aggressive factors.[44]

Antitumor Activity

Lam and Ng in the study mentioned above isolated lebbeckalysin from seeds of *A. lebbeck*. It reduced viability of murine splenocytes with IC_{50} of 0.21. It halted proliferation of MCF-7 breast cancer cells with an IC_{50} of 0.97and HepG2 hepatoma cells with an IC_{50} of 1.37 M, respectively.[23].

Nutritional Value of *Siris*

The nutrition analysis of *A. lebbeck* revealed high level of protein content ranging from 7.49 to 25.48%. The seed leaf pericarp and stem *Albizzia* showed higher percentage of essential amino acids from 42.19 to 50.16% and non-essential amino acids 57.81 and 49.80%. The sodium and potassium were relatively higher amounting 745 mg and 287 mg/100g in seeds and in leaf amounted to 660 mg and 253 mg/100 g followed by calcium, magnesium, and zinc. The vitamin analysis revealed higher amount of Vitamin C in leaf and seed 37.04 mg and 56.80mg mg/100g, respectively, followed by Vitamin A (β-carotene) in seeds and leaf 210.50 and 209.80 µg/100g, respectively. The lipoidal matter of *A. lebbeck* showed presence of fatty acids (46.40–52.30%), MUFA (15.46–30%), and PUFA (21.48–40.65%).[45]

DISCUSSION

The present review was carried out with an aim to elucidate the relation between the indications mentioned in classical Unani literature for *Siris* with the findings of contemporary research studies conducted on it. Both were in Synchrony with each other. Furthermore, the contemporary research also gives us the insight into the most probable reasons behind the therapeutic indications mentioned classically. The Musaffi khoon (blood purifier) and Daf-e-tadiya (Anti-septic) effect of *Siris* can be attributed to antibacterial, antifungal, and antimicrobial activities as reported above by Rahul *et al*., Bobby *et al*., Gupta *et a*l., Gupta *et al*., Padamanabhan *et al*., and Lam and Ng, on various strains of microorganism by evaluating MIC and zone of inhibition of ethyl-acetate, petroleum ether, methanolic, and hydroalcoholic and ethanolic extracts of *A. lebbeck*. Due to Mohallil-waram (anti-inflammatory) and Daf-e-tadiya (Anti-septic) nature it has been used by Unani physicians to treat boil, swelling, and abscess, this is also in cohesion with the findings of contemporary research as its anti-inflammatory activity has been proved by various researchers such as Babu *et al*., Kajariya *et al*., and Saha and Ahmed although preclinical studies. The antiallergic (Nurul *et al*.), antifungal (Gupta *et al*.) (Lam and Ng), anti-anaphylactic (Tripathi *et al*.), and mast-cell stabilizing (Barua *et al*.) activities can be very well ascribed to Mussakkin hiddat-e-khoon (soothing blood heat) action and explains its application in Hikka (Pruritis), Jarb (Scabies), and Qooba (dermatophytosis) in traditional medicine. The use of *Siris* in management of headache and migraine signifies its analgesic effect as ascribed to it traditionally, has also been proven by Saha and Ahmed and Kajariya *et al*., along with anti-inflammatory activities in rat model. Joshi *et al*. and Shobana *et al*. have elucidated wound healing activity of *A. lebbeck* adequately to explain its application in non-healing ulcers. The use of *Siris* in acne vulgaris may be attributed to antibacterial, anti-inflammatory and wound healing properties of *A. lebbeck* thus, targeting the pathogenisis of disease. The traditional use of *Albizzia* in epilepsy and mania is in consonance with its anticonvulsant and anxiolytic activities recently explored by Kasture *et al*., who stated that extract does protect animals from electrical kindling, maximum electro shock, and pentylenetetrazole-induced convulsions in mice. The nootropic action of *Siris* investigated by Chintawar *et al*., in an *in vivo* study validates its use in dementia and psychosis as it has significantly enhanced memory and learning ability in albino mice. The use of leaves extract for management of stomach ache could be attributed to gastroprotective effect and antiulcer property of *A. lebbeck* as reported by Shirode *et al*. The therapeutic application of *Siris* in productive cough, sinusitis, and cold is somehow in correlation with antiasthmatic activities shown by Tripathi *et al*. who has proved that the drug possess bronchodilator effect and mast-cell stabilizing properties. El-Garhy and Mahmoud and Galal *et al*. have evaluated anti-helminthic activity of *Siris* and Unani literature has also claimed it to be anti-helminthic in nature. Both Classical literature and contemporary research attribute *Siris* to be antidiarrheal in nature and it has been proved by Besra *et al*. and Balekar *et al*., in animal studies. The nutrition analysis performed by El-Hawary *et al*. has revealed that *Albizzia* contain sufficient amount protein, essential and non-essential amino acids, sodium, potassium, calcium, magnesium, zinc, Vitamin A, Vitamin C, Fatty acids, MUFA and PUFA, which is sufficient to explain the use of *Siris* as Muqaww-e-Aam (general tonic) as attributed by Unani Scholars. The therapeutic application of leave extract of *Albizzia* in night blindness may be due to the presence of Vitamin A and the teeth and gum strengthening effect of *Albizzia* is probably due to high amount of Vitamin C as investigated by El-Hawary

et al. The antidiabetic, antipyretic, and antimalarial effects of *A. lebbeck* were not mentioned in classical literature and are recent addition to the list of pharmacological actions of Siris. The only action of the *A. lebbeck* which does not go with the flow is *in vivo* antispermatogenic effect of *Albizzia.* As classically it has been used to enhance aphrodisia, to treat oligospermia, and to enhance viscosity of semen. Hence, for complete denial of this therapeutic application of *Siris* clinical studies on *A. lebbeck* is required. Apart from researches conducted on *Albizzia* there are more indications of *Siris* which include vitiligo, paralysis, constipation, hemorrhoid, toothache, jaundice, sinusitis, and cataract. In Unani text *Albizzia* is mentioned as potent diuretic, so the drug *Siris* be further explored for all the indication mentioned classically, as it will give better insight with regard to its use as a drug and may decrease the multidrug therapy by the concerned practitioners.

CONCLUSION

The action and therapeutic application of *Siris* including in diarrhea, dysentery, anti-helminthic anti-inflammatory, analgesic, wound healing, anticonvulsant, nootropic, anxiolytic, and antiulcer, which has been mentioned in Unani literature is all in concordance with latest research except antispermatogenic action. Apart from the explored actions of the *A. lebbeck* still there are many time tested indications mentioned in classical literature for which this drug can be further explored and proved on scientific parameters.

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