Sesbania sesban Linn: A Review on Its Ethnobotany, Phytochemical and Pharmacological Profile

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ABSTRACT

Sesbania sesban Linn (Family: Fabaceae) is well known plant widely distributed in India and other tropical countries. The World Health Organization (WHO) estimates that about 80% of people living in developing countries rely almost exclusively on traditional medicines for their primary health care needs. Different parts of the plant (Leaves, seed, and pods) are reputed for their medicinal value. The leaves of Sesbania sesban has traditionally been used as purgative, demulcent, maturant, Anthelmintic and for all pains and inflammation. Preliminary Phytochemical screening revealed the presence of several chemical compounds such as triterpenoids, carbohydrates, vitamins, amino acids, proteins, tannins, Saponins glycosides and steroids. Flowers contain cyanidin and delphinidin glucosides. Pollen and pollen tubes contain alpha-ketoglutaric, oxaloacetic and pyruvic acids. Reports suggest that, previous phytochemicals investigations of the plant led to the isolation of oleanolic acid. The present review summarizes the scientific information of various aspects of Sesbania sesban Linn plant used in traditional system of medicine for variety of purpose.

Keywords: Sesbania sesban Linn, Pharmacology, Phytochemistry, medicinal plant.

INTRODUCTION

The World Health Organization (WHO) estimates that about 80% of people living in developing countries rely almost exclusively on traditional medicines for their primary health care needs. [1] India is virtually a herbarium of the world. In India, we are using plants and herbs as the basic source of medicine because we are rich in them. Herbals which form a part of our nutrition and provide us an additional therapeutic effect are in demand and Sesbania sesban Linn is one of such plant. Sesbania sesban Linn is well known medicinal plant commonly found in India and other tropical countries it is found throughout the plains of India.

Sesbania sesban, commonly known as ‘Egyptian sesban’ is one of the six species of genus Sesbania which is commonly found to be grown in tropical region of India. The plant is widely grown for its nitrogen fixing ability and as wind shades. The plant has got good medicinal importance. According to ethno medicinal claims the poultice of leaves of S. sesban promotes suppuration of boils and abscesses and absorption of inflammatory rheumatic swellings. Juice of fresh leaves is credited with Anthelmintic properties [2].

Plant Profile [4]

Kingdom : Plantae
(unranked) : Angiosperms
(unranked) : Eudicots
(unranked) : Rosids
Order : Fabales
Family : Fabaceae
Genus : Sesbania
Species : S. sesban

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Common names
Arabic : sesaban
Bengali : jainti, jayant
Burmese : yay-tha-kyee, yethugyi
English : common sesban, Egyptian rattle pod, frother, river bean, sesban, sesbania
Hindi : jainti, jait, rawasan
Indonesian : janti, jayanti, puri
Javanese : janti
Luganda : mubimba, muzimbandeya
Sanskrit : jayanti, jayantika
Spanish : Añil francés, tamarindillo
Tamil : champai, chithagathi, karunchembai
Thai : sami, saphaolom
Vietnamese : dien-dien

Leaves
Leaves paripinnate, compound 12-18cm long made up of 6-27 pairs of leaflets. Long, narrow; leaflets in many pairs, rounded or oblong, usually asymmetric at the base, often glaucous; stipules minute or absent³.

Flowers
The raceme has 2-20 flowers which are yellow with purple or brown streaks on the corolla. Flowers attractive, yellow, red, purplish, variegated or streaked, seldom white, large or small on slender pedicels, solitary or paired in short axillary racemes, usually unpleasantly scented; all petals long clawed, standard orbicular or obovate³.

Pods
Pods pale yellow, linear, usually 10-20 cm long, cylindrical or compressed, rarely oblong; up to 40 seeds are found in a pod; seeds oblong or sub quadrate, brown or dark green mottled with black.

Two subspecies are recognized within S. sesban, namely ssp. Punctata (restricted to northern portions of sub-Saharan Africa) and ssp. sesban.

Traditional Use
Uses
*Sesban* is mostly used as fodder and for soil improvement; its wood is used only to a lesser extent⁴.

Fodder
The leaves and tender branches of *sesban* are high in protein (20-25% crude protein) and have high digestibility when consumed by ruminants, such as cattle and goats. Anti-nutritional factors are suspected to be present in *sesban* fodder. Feeding *sesban* fodders to monogastric animals (such as chickens, rabbits, and pigs) is not recommended.

Reports of feeding *sesban* to ruminant’s conflict.
Trials in Australia feeding sesban to heifers showed live weight gains, but trials with young goats in Samoa found a lack of weight gain. Until further research provides clear guidelines, caution should be used in feeding ruminants with sesban fodder at more than 10-20 percent of diet.

Soil improvement
*Sesban* establishes quickly and grows rapidly. In Africa it is often allowed to grow scattered throughout annual crop fields for the nitrogen it provides. It has been used in experimental alley cropping systems to provide mulch and green leaf manure to intercrops. *Sesban* can be somewhat shallow rooted, and may compete with adjacent crops.

Wood
*Sesban*’s wood is light in weight compared to the woods of *Calliandra* and *Leucaena*, but it is often harvested for firewood in Africa and India. It has been used in India to make charcoal. The wood is not durable and should not be considered for timber use. The branches have been used as poles in temporary structures such as sheds and mud daub huts. Because sesban grows so rapidly, it has potential for pulpwood production. Plantings at about 10,000 trees/ha have produced 15-20 tons of woody biomass (dry weight) in one year.

Food
Flowers of *sesban* are known to be added to stews and omelets in some regions, perhaps mainly as a decorative element.

Other uses
Various medicinal uses for *sesban* have been recorded in Africa and Asia⁴, ⁵. The leaves and flowers are used in medicinal poultices and teas, which are said to have the effect of astringency, or contraction of body tissues. Bark exudates from sesban produce a gum of medium commercial quality.

The leaves of *Sesbania sesban* has traditionally been used as purgative, demulcent, maturant, anthelmintic and for all pains and inflammation.
PHYTOCHEMICAL

Preliminary phytochemical screening revealed the presence of triterpenoids, carbohydrates, vitamins, amino acids, proteins, tannins, Saponins glycosides and steroids. Flowers contain cyanidin and delphinidin glucosides. Pollen and pollen tubes contain alpha-ketoglutaric, oxaloacetic and pyruvic acids. Reports suggest that, previous phytochemical investigations of the plant led to the isolation of oleanolic acid, stigmasta-5, 24(28)-diene-3-ol-3-0-β-D-galactopyranoside, fatty acids and amino acids. Various types of lignins composed of guaiacyl, syringyl and P-hydroxyphenylpropane building units and also antitumor principal kaempferol disaccharide 6,7.

PHARMACOLOGICAL PROFILE

Seed, bark and leaves of the plant are used in traditional medicine. Seeds are used in diarrhea, excessive menstrual flow, to reduce enlargement of spleen and in skin disease. Leaves are used in inflammatory rheumatic swelling and as Anthelmintic 8,9.

Antioxidant Activity

Anthocyanins were extracted with methanolic and acidified methanol from the Sesbania sesban flower petals and their antioxidant properties were investigated. Anthocyanins from Sesbania sesban flower petals exhibited a dose dependent free-radical scavenging activity against DPPH radical, superoxide anions and hydroxyl radical 10,11.

Anti inflammatory Activity

The leaves of Sesbania sesban evaluated the topical anti-inflammatory activity of the crude saponins extract by carrageenan induced rat paw edema method by preparing the gel formulation. The activity was carried on Wistar albino rats, receiving two strengths of crude saponin gel at a concentration of 1% w/w and 2%w/w respectively and Diclofenac sodium gel (1%w/w) was used as reference drug. The crude saponins extract in 2% w/w gel formulation showed significant anti-inflammatory 12.

The effects of exogenous administration of Petroleum ether, Chloroform and Methanol extracts of bark of Sesbania sesban and Sesbania grandiflora in carrageenan induced inflammation model, the result of anti-inflammatory activity of extracts of above plants showed that petroleum ether extracts of bark of Sesbania sesban and Sesbania grandiflora were having better anti-inflammatory activity as compare to other extracts in carrageenan induced paw oedema in rats. Adjuvant-induced arthritis in the rat

Oral administration of petroleum ether extracts of bark of Sesbania sesban (300mg/kg p.o. b.w.) twice each day during the 21 days of adjuvant induced arthritis showed a significant decrease in injected paw oedema from 12th day till 21st day in petroleum ether extracts of bark of Sesbania sesban and arthritis paw oedema maximum reduction was from 14th day till 21st day in all above plants extracts. In Non- injected paw all above plants extracts showed decrease in paw oedema was observed in arthritis and maximum decrease was on 12th day till 21st day. Body weight, spleen and thymus weight were observed 13.

Attenuating effect

The attenuating effects of Sesbania sesban leaves aqueous extract in streptozotocin (STZ)-induced diabetic rats at dose of 250 and 500 mg/kg per day was given to diabetic rats for 12 weeks. Cold and hot water tail immersion tests, photoactometer and Rota-rod tests were performed to assess degree of colder, thermal spontaneous motor activity and motor co-ordination changes respectively at different time intervals i.e., week 0, 4, 8 and 12. Tissue superoxide anion and total calcium levels were determined after 12 weeks to assess biochemical alterations. Histopathological evaluations of sciatic nerve were also performed. S. sesban was increased tail flick latency significantly in diabetic rats also reduced superoxide anion and total calcium levels 6.

Antidiabetic Activity

The aqueous leaves extract of Sesbania sesban was evaluated for its antidiabetic potential on normal and streptozotocin (STZ)-induced diabetic rats at the doses of 250 and 500 mg/kg body weight per day for 30 days. The fasting Blood Glucose Levels (BGL), serum insulin level and biochemical data such as glycosylated hemoglobin, Total Cholesterol (TC), Triglycerides (TG), High Density Lipoproteins (HDL) and Low Density Lipoproteins (LDL) were evaluated and all were compared to that of the known anti-diabetic drug glibenclamide (0.25 mg/kg b.w.). The statistical data indicated significant increase in the body weight, liver glycogen, serum insulin and HDL levels and decrease in blood glucose, glycosylated hemoglobin, total cholesterol and serum triglycerides when compared with glibenclamide 7.

Potential antifertility Activity

The different doses of Sesbania sesban seed powder inhibit the ovarian function, change the uterine structure and prevent the implantation, thus, control the fertility of female albino rats. The root extracts of Sesbania sesban showed oleanolic acid 3-β-Dglucuronide spermicidal activity 14, 15.

CNS Stimulant Effect

In his study Sesbania sesban was intended to evaluate the CNS stimulant activity of crude drug extract. The activity was carried out on albino mice. Caffeine was used as a reference drug. The crude extract showed significant CNS
stimulant activity in comparison to control group and result were comparable to the activity shown by reference drug.  

7. CONCLUSION
The scientific research on Sesbania sesban suggests a huge biological potential of this plant. It is strongly believed that detailed information as presented in this review on the phytochemical and various biological properties of the extracts might provide detailed evidence for the use of this plant in different medicines. The phytochemical variations and efficacy of the medicinal values of Sesbania sesban is dependent on geographical locations and seasons. There is a demand to standardize the toxic properties of Sesbania sesban and their detailed clinical trials. After proper processing, identification they may be utilized to prepare a good, Ayurvedic Formulations and Preparations. At the same time, the organic and aqueous extract of Sesbania sesban could be further exploited in the future as a source of useful phytochemical compounds for the pharmaceutical industry.

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