

A brief overview of the ethnomedical, pharmacological, and phytochemical uses of *Sida spinosa*

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Abstract— This overview of *Sida spinosa* Linn covers its traditional use, ethanobotanical considerations, phytochemistry, and pharmacology in great detail. There are several traditional use for the plant. It has been said that the demulcent and refrigerant characteristics of the leaves may help with gonorrhoea, gleet, and hot urine. The filtrate obtained from crushing them in water is then ingested. The root is used for mild instances of fatigue and fever as a tonic and diaphoretic. Its decoction is used as a demulcent for bladder irritation and gonorrhoea. A demulcent decoction used for bladder and genital tract irritation. The leaves may be used to scald urine or as a demulcent. Antibacterial, antifungal, antihelminthic, antifertility, antidiabetic, anti-inflammatory, antioxidant, anti-HIV, anti-arthritis, cytoprotective, hepatoprotective, anti-diarrheal, and analgesic activities are just some of the traditional and pharmacological properties attributed to *Sida spinosa*.

Keywords— *Sida spinosa* Linn., traditional medicine, antimicrobial potential, pharmacology and phytochemistry.



I. INTRODUCTION

Approximately 3,4 billion people in the developing countries rely on traditional medicines made from plants. Ayurveda, one of the world's oldest medical systems, has always relied heavily on natural remedies [1-2]. Secondary metabolites with antimicrobial activities are easily synthesised by plants and include tannins, terpenoids, alkaloids, glycosides, and phenols. It is believed that between 14 and 28 percent of all plant species are utilised for medicinal reasons, and that 74 percent of all pharmacologically active plant derived components were found via investigation of traditional ethanobotanical applications[3-5].

There are over 200 species of *Sida*, and India is said to be home to 17 of them [6]. Except for *S. rhombifolia*, all of the species in this genus are annual herbs. Throughout India's tropical and subtropical plains, *Sida* species are common weeds of abandoned lots, open scrub woodlands, and roadside ditches.

Malvaceae is the family that includes *Sida spinosa* Linn. It is a tiny, upright, perennial plant (or shrub) that is common in India's fields, wastelands, road sides, and open clearings. There are several traditional use for the plant. It has been said that the demulcent and refrigerant characteristics of the leaves may help with gonorrhoea, gleet, and hot urine. The filtrate obtained from crushing them in water is then ingested. The root is used for mild

instances of fatigue and fever as a tonic and diaphoretic. Demulcent use of its decoction is recommended for bladder irritation and gonorrhoea [7-9]. A demulcent decoction used for bladder and genital tract irritation. The leaves may be used to scald urine or as a demulcent. Khare (2007) found via his ethnobotanical research that *S. spinosa*'s ethanol extract had hypoglycaemic action [10]. The ethanol extract of *S. spinosa* has shown promising antidiabetic efficacy in recent investigations [11]. Reference: Shaikh et al., 2015 [12] The hypoglycemic, antipyretic, and diaphoretic effects of *S. spinosa* are well-documented.

Plant description

S. spinosa is a tall, hairy annual plant that may reach a height of 70 centimetres. The leaves are either elliptical or lanceolate, tapering to an obtuse or sharp tip, and measuring between 1 and 4 centimetres in length. Flowers are axillary, single or in groups of two to five, with a yellow corolla and five triangular, heavily reticulately veined, hairy seeds. October through December is peak flowering and fruiting time [13, 7].

Taxonomy

Kingdom-Plantae

Division-Tracheophyta

Class-Mangnoliopsida

Order-Malvales

Genus-*Sida*

Species-*spinosa*

Habit and habitat

It grows in the wastelands of South India and may be found at both high and low elevations. The Deccan and Karnatic regions are home to this annual plant. Near the bloom, the pedicels are joined, and the leaves are obtuse [14]. The cities of Bangalore, Belgaum, Chikmagalur, Dharwar, Hassan, Mysore, and North Kanara in the Indian state of Karnataka are all home to a sizable population of these monkeys [15].

Common name

Sida alnifolia

S. Spinosa, *S. alba*

II. TRADITIONAL USES

'Bala' is an Ayurvedic term for plants from the *Sida* genus. Bala, the most extensively used raw medication in the manufacturing of various Ayurvedic formulations, plays a significant role in the Indian traditional system of medicine. The therapeutic value of the root. Bala, a Sanskrit word meaning "medicine," is widely used in Ayurvedic medicine as an anti-rheumatic and anti-pyretic, as well as for the treatment of neurological diseases, headache, leucorrhoea, TB, diabetes, fever, and uterine problems. Anti-cancer, anti-HIV, hepatoprotective, abortifacient, antibacterial, and immune-stimulating effects have been attributed to it [6]. The roots of *S. spinosa* are used as a nervine tonic and diaphoretic in cases of debility and fevers, as described by Khare (2007) [10]. Nayopayam kashayam, often known as "Bala," is a straightforward ayurvedic preparation. In northern India, *S. cordifolia* is used to make kashayam, whereas in Kerala, *S. alnifolia* is used instead.

Root, Leaves and Bark

Asthma patients and those suffering from other chest conditions sometimes turn to *S. spinosa* for relief [16]. The *S. spinosa* ethanol extract has been shown to have hypoglycemic effects. Normal blood pressure was reduced and ileal smooth muscle activity was dampened in experimental mice [10]. *S. spinosa* is used to treat diarrhoea and dysentery [17] using both its roots and leaves.

Leaves

The demulcent and refrigerant properties of the leaves make them an effective treatment for gonorrhoea, gleet, and hot urine [18].

Root and Root Bark

S. spinosa root is used for minor instances of weakness and fever because it is a mild tonic and diaphoretic. In cases of gonorrhoea and bladder irritation, a decoction made from the root bark and root of *S. spinosa* is used as a demulcent [18].

Action and uses in Ayurveda

The fruit is astringent and cooling and may be used to treat urinary discharges, leprosy, and skin infections in addition to being tonic for wasting diseases and curing ulcers and biliousness [18].

Action and Uses in Siddha

It is used in treatment of leucorrhoea, respiratory disorder, healing of wounds, tonic and as diaphoretic [19].

III. PHARMACOLOGICAL PROPERTIES

Traditional medicine has used *S. spinosa* for the treatment of a wide variety of conditions, including diarrhoea, dysentery, skin illnesses, asthma, chest problems, snakebite, and so on. Khare (2007) performed an ethnobotanical study and found that the roots of *Sida spinosa* are used as a nervine tonic and diaphoretic in cases of debility and fevers [10]. There are several traditional use for the plant. It has been said that the demulcent and refrigerant qualities of *S. spinosa* leaves may help with gonorrhoea, gleet, and hot urine. The filtrate obtained from crushing them in water is then ingested. The root of *S. spinosa* is used in mild instances of fatigue and fever as a tonic and diaphoretic. It has been reported that a decoction of this plant may be used as a demulcent in cases of bladder irritation and gonorrhoea [7, 20, 9]. Asthma and other chest conditions may be treated with it, and it's also used as a tonic. *S. alnifolia* extracts in ethanol have been shown to have hypoglycemic effects. It has the additional effect of lowering blood pressure. It helps with urinary tract infections, leprosy, skin infections, and ulcers and biliousness. The demulcent and refrigerant characteristics of the leaves make them effective in treating gonorrhoea, gleet, and scorching urine. Roots of *S. spinosa* are utilised for their tonic diaphoretic and helpful properties in treating fever, weakness, and bladder irritation [21].

Antibacterial activity

Against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Candida albicans*, and *Aspergillus niger*, ethanol extract of the entire plant of *S. spinosa* showed antibacterial activity, as reported by Selvadurai et al., (2011) [22]. Antibacterial efficacy of *S. spinosa* leaf extract against *S. aureus*, *B. subtilis*, *E. coli*, *P. aeruginosa*, *C. albicans*, and *A. niger* was reported by Navaneethakrishnan et al., (2011) [20]. *S. spinosa* leaf extracts prepared with ethanol have shown promising antimicrobial action against the development of Gram-positive and -negative

bacteria. It showed sensitive efficacy against *Staphylococcus aureus* and inhibited the development of *Bacillus subtilis*. Significant inhibitory activity was seen against *E. coli*, *P. aeruginosa*, and *C. albicans* and *A. niger* when tested against ciprofloxacin. Against the backdrop of amphotericin The in vitro antibacterial efficacy of ethanol leaf extract against *Escherichia coli*, *Bacillus subtilis*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Proteus vulgaris* was reported by B. Karteek et al., 2011 [23]. In a 2013 study [24], Sangreskopp et al. found that an aqueous root extract of *S. spinosa* was effective against *S. aureus*, *B. subtilis*, *E. coli*, and *P. aeruginosa*.

Antifungal activity

Antifungal activity of *S. spinosa* whole plant extract against *Candida albicans* and *Aspergillus niger* was found by Selvadurai et al., (2011) [22]. *S. spinosa* leaf ethanol extract has been shown to be antifungal against *Candida albicans* and *Aspergillus niger*, according to research published by Navaneethakrishnan et al. in 2011 [20].

Antihyperglycemic and antidiabetic activity

Aqueous extract showed significant antihyperglycemic activity in streptozotocin (STZ)-induced diabetic rats. The root of *S. spinosa* helps keep blood sugar levels in check and insulin production at a healthy level, making it an effective diabetic treatment. Plant extracts stimulate insulin production from pancreatic β -cells, which contributes to their antihyperlipidemic activity [11].

Antipyretic activity

When yeast causes a rise in body temperature, the aqueous extract of *S. spinosa* root has a significant antipyretic action. Higher doses of the aqueous extract significantly reduced body temperature, with the impact being similar to that of aspirin. By blocking hypothalamic prostaglandin production, aspirin reduces body temperature. Because of this, it seems that the antipyretic activity of aqueous extracts of *S. spinosa* root may be associated to the suppression of prostaglandin production in hypothalamus, which is largely due to the presence of flavonoids and phenolics tannins in aqueous extract of *S. spinosa* root [24].

Diuretic activity

Rats were given aqueous and alcoholic extracts of *S. spinosa* leaves to see whether they had any diuretic effects.

Body weight before and after the test period, total urine volume, and urine concentration of Na⁺, K⁺, and Cl⁻ were the parameters examined for each rat. An increase in urine volume, as well as excretion of cations and anions, was seen in this research after administration of alcoholic and aqueous extracts of *S. spinosa* leaves (100mg/kg of body weight) [25].

Antioxidant activity

Ethanol extract of *S. spinosa* was tested for free radical, hydroxy radical, superoxide, and nitric oxide scavenging activities, as described by Jayasri et al., (2011) [26]. The antioxidant activity of the ethanol extract was measured and compared to that of certain industry standards, including ascorbic acid, copper sulphate, and 2, 6-di-tert-butyl-phydroxytoluene (BHT). The in vitro screening techniques showed that the ethanol extract has antioxidant properties. The data revealed that, compared to reference medications, the ethanol extract was only moderately effective.

Wound healing activity

The wound healing capability in an excision and incision model was studied by Navaneethakrishnan et al., (2011) [20], who utilised an ointment containing an ethanol leaf extract of *S. spinosa* (5% w/w and 10% w/w). Excision model wounds treated with the extract epithelialized more quickly and contracted at a greater rate than control wounds. As shown by the incision model's increased tensile strength, the extract aids in the healing process. The effects were similar to those seen with a commonly used medication containing 0.2% w/w nitrofurazone.

IV. PHYTOCHEMISTRY

The early phytochemical examination of aqueous and alcoholic leaf extracts published by Narendra et al. (2011) [25] revealed the presence of flavanoids, glycosides, saponins, carbohydrates, proteins and amino acids, tannins, terpenoids, and alkaloids.

Preliminary phytochemical analysis of the *S. spinosa* whole plant conducted by Selvadurai et al., (2011)

[22] revealed the presence of alkaloids, carbohydrates, glycosides, flavonoids, phytosterols, fixed oils and fats, saponins, phenolic compounds and tannins, lignins, proteins and free amino acids, gums and mucilage, and mucilage.

Phytosterols, amyirin, starch, and ecdysterone are found in the root, as are the alkaloids betaphenethylamine, ephedrine, si- ephedrine, vasicinol, vasicinone, vasicine, choline, hypaphorine, methyl ester, betaine [10]. In cases of weakness and fever, the roots are used as a diaphoretic and nervine tonic [15].

Alkaloids: [16].

- a) Phenethyl amine bases i) β- phenethylamine
ii) Ephedrine iii) Ψ-ephedrine
- b) Quinazoline i) Vasicine ii) Vasicinol iii) Vasicinone
- c) Choline
- d) Betaine
- e) Hypaphorine
- f) Hypaphorine methyl ester
- g) Cryptolepine
- h) Gossypol
- i) S-(+)-Nb methyl trptophan methyl ester
- j) S-(+)- Nb,Nb dimethyl tryptophan methyl ester.

V. CONCLUSION

Throughout India, Sri Lanka, and the rest of tropical Asia and Africa, *S. spinosa* has a prominent position in Ayurvedic treatment. It's fascinating to learn that the analgesic, anti-inflammatory, and hepato-protective activities of pure phytochemicals and crude extracts of leaves of *S. spinosa* Linn. have been screened for some pharmacological activities, that the anti-diabetic activity of the stem bark of the plant has been screened for, and that the hypocholesterolemic and antioxidant activities of the juices have been screened for.

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