

**AYURVEDIC MEDICINAL PLANT - SHALA (*SHOREA ROBUSTA*)
(A BIRD'S EYE VIEW)**

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ABSTRACT

Since the time immemorial the society always rely on plants not only for the diet resources but also for medicinal purposes along with ecological balance, so that all the creatures of god starting from birth to death spend their life in a manner of dignity or we may say healthy and disease free life. From Vedic era there is a lot of descriptions regarding plants along with their therapeutic properties were available and gradually the same were added as the time progress till the date. As per Ancient Indian Literatures Shorea robusta is considered as a Holy Tree said to be the favourite of Lord Maha vishnu which is commonly known as Indian Dammer. Shorea robusta finds its use in Ayurveda, Unani and tribal systems of medicine. It has many medicinal properties, but the tree is valued mostly for its ability to stop bleeding piles and provide relief to the patient. The bark, leaves, fruit and resin of the Shorea are used in medicinal preparations. The resin is burnt as incense and the fumes thus obtained are said to have good medicinal value. Shorea ointments for skin troubles, breast enhancement and for bleeding piles are available at herbal stores. Some herbal doctors consider the Shorea a natural remedy for diabetes, nerve pain, arthritis, burns, ulcers, jaundice and skin infections. It has anti-bacterial properties too. Plant Shala is a contribution in the area of medicinal plants covering various aspects particularly relating to botanical phytochemical, pharmacological & pharmacognostical studies are very relevant & important in the national context. Shala has been reviewed from different aspect, starting from Vedic era up to recent books on medicinal plants and entire procured information regarding its therapeutic values, synonyms, vernacular name, classification according to Ayurvedic texts, types, purification, Rasa panchaka, karma and adverse drug reaction and treatment was compiled.

Keywords: Shala, Antimicrobial, Resin, Pharmacognosy etc.

INTRODUCTION

India has a long tradition of the use of drug derived from plants in the Ayurvedic system of medicine. It has been stated that over 2000 Plants grow in India which have medicinal properties in which maximum species are found in wild state and some are cultivated.

The Sal tree is widely distributed in India, covering approx. 13.3% of the total forest area in the country from the plains upto 900-1700 m altitude covering part of North, East and Central India. In the North it extends from Punjab, Himachal Pradesh to Haryana states through the sub Himalayan tracts, outer Himalayas to Assam and Tripura states covering Garo, Khasi and Jaintia hills. In the East it is distributed from western Bengal. Orissa upto Vishakhapatnam in South and through greater part of South eastern Madhya Pradesh up to Chindawara and Hoshangabad districts in the west. Also distributed in Nepal and Bhutan[1]

Shala is one of the most gregarious of Indian trees and under favourable conditions tends to regenerate in masses and grow up in more or less even-aged crops of varying extent in which it is either pure or forms the bulk of the stock in mixture with other species.

Shala belongs to the taxonomic group Magnoliopsida and family *Dipterocarpaceae*. In Latin it is called as *Shorea robusta Roxb ex Gaertn.f.*[2]

Ayurveda has declared that The drug Shala having Kashaya rasa, Ruksha guna, Sheeta virya, Katu vipaka and it pacifies Pitta and Kapha, So prevent the formation and growth of Krimis.[3] It is used in the treatment of excessive perspiration, wounds, ulcers, neuralgia, burns, pruritus, fractures, fever diarrhoea, dysentery, hiccough, asthma, haemorrhoids, gonorrhoea. Menorrhagia, splenomegaly, obesity, cephalalgia. Odontalgia, burning sensation of the eyes. [4]

Botanical Description

Shorea robusta is a large, deciduous tree up to 50 m tall and with a dbh of 5 m; these are exceptional sizes, and under normal conditions *S. robusta* trees attain a height of about 18-32 m and girths of 1.5-2 m; bole is clean, straight and cylindrical, but often bearing epicormic branches; crown is spreading and spherical.

Bark dark brown and 2.5 cm. thick, with deep vertical furrows, bark of old or matured trees thicker and quite rough with having deeper furrows and grayish, reddish brown to dark brown, provides effective protection against fire. The tree develops a long taproot at a very young age. On tapping the trees exudes a white liquid an **oleo-resin** which turns brown on drying. **Heartwood** Coarse, cross grained, **pale** brown to dark reddish brown. **Leaves** simple, shiny, glabrous, about 10-25 cm long and broadly, stout, leathery, shining, alternate, entire, oval at the base, with the apex tapering into a long point; new leaves reddish, soon becoming delicate green. **Flowers** pale yellow or cream coloured, in lax, terminal or axillary panicles, velvety pubescent. **Fruit** 1-1.5 cm long, ovoid, reddish to pale yellowish green slightly fleshy, indehiscent, with wing like persistent sepals, 5-7 cm long, wings linear, 10-nerved, obtuse. **Seed** one, ovoid. Plant bears young foliage and flower in March-April fruiting begins during summer season. Generally flowers in March and fruits in June.[5]

PHARMACOGNOSY-BOTANICAL EVALUATIONS [6]

Macroscopic evaluations - i.e. Resin

- Name of the drug - Resin of Shala

- Shape - Irregular and cylindrical pieces
- Size - Differs
- Color - Varying from dark brown to pale amber or yellow and red
- Taste - Generally tasteless but sometimes the taste resembles nearly that of turpene.

Microscopic Analysis

Microscopic structure of Transverse Section of Midrib of lamina

Transversely elongated parenchymatous cells externally covered by thick cuticle. Vascular strand having xylem tissue above the phloem. Bundle sheath between palisade and spongy parenchyma. Some cells possess microspheoidal crystal of calcium oxalate as sandy masses.

Microscopic structure of Transverse Section of Young Stem

Epidermal cells elongated to form covering trichome of stellate type. Chlorenchyma followed by collenchyma's cells. Tracheids, and parenchyma; rays less prominent. Xylem having vassels,

Microscopic structure of Transverse Section of Root

Cork cambium is seen to arise on the outer most layer of the cortex. Phloem and xylem transverse by uniseriate medullary rays. Phloem fibers present; xylem consists of large vassels. Tracheids and lignified parenchyma and pith also present.

PHYTOCHEMISTRY[7]

Seed - corilagin, ellagic, chebulinic, gallic, phenolic, shorbic acids, **Essential oil** - p-cymene, tetrahydro-gamma-cadinene, cadalene, **Resin** - Nor-triterpine 3 β -acetoxy-28-nor-urs-12-ene. **In whole plant** leucoanthocyanidin, hopeaphenol, triterpenoids and a terpene alcohol, furfural, monomethylether, dimethylether of homocatechol, alkybenzene derivatives, pentosans, lignan, tannin, amino acids, fatty acids, triterpenoids.

Pharmacological properties

Analgesic activity

A 70% ethanol extract of the dried powder resin of *Shorea robusta* was investigated for analgesic activity. The extract (30, 100 and 300 mg/kg, i.p.) produced significant central and peripheral analgesic effect, as is evidenced from increase in reaction time in hot plate and tail flick tests. These results demonstrated that the extracts of *S. robusta* possess significant analgesic properties [8]. The methanolic and aqueous leaf extract of *S. robusta* shows analgesic activity with acetic-acid induced writhing and tail flick tests. The dose of both extracts such as methanol and aqueous extract (200 and 400mg/kg i.p.) caused significant reduction of writhing and tail flick method in rats and mice by different ways [9]

Antipyretic activity

The ethanolic extract (70%) of *S. robusta* resin (SRE) was investigated for its antipyretic activities. The antipyretic activity of SRE was studied using Brewer's yeast-induced pyrexia in rats. The rats were divided into five groups with five animals in each group. Group I was treated with vehicle i.e. 1% v/v Tween-80 and served as control. Groups II to IV were treated with three different doses of SRE (30, 100 and 300 mg/kg orally). Group V was treated with standard drug etoricoxib (10 mg/kg orally). The results of this study demonstrated antipyretic activities of *S. robusta* resin and supported its traditional therapeutic use in fever [10].

Anti-inflammatory activity

The aqueous extract of leaves of *Shorea robusta* with a dose of 100, 200 & 500 μ g/ml, was taken for the activity & compared with the standard Diclofenac doses of 20 & 40 μ g/ml, in HRBC membrane stabilization model and same dose of extract was taken for activity & compared with Aspirin 200 μ g/ml, using Heat Induced Haemolytic method. The extract of 500 μ g/ml showed good result in both

models [11]. The methanolic and aqueous leaf extract of *S. robusta* shows anti-inflammatory activity in carrageenan and dextran induced paw method and cotton-pellet-induced granuloma model. The dose of both extracts such as methanol and aqueous extract (200 and 400mg/kg i.p and p.o.) caused significant effect in rats and mice by different ways [12,13].

Antinociceptive activity

A methanol extract of the dried leaves of *Shorea robusta* was investigated for antinociceptive activity. The extract (200 and 400 mg/kg, p.o) produced a dose dependent antinociceptive effect was also observed with hotplate device maintained at 550C, Acetic acid induced writhing, formaline induced paw licking, Tail clip and Tail flick models in mice. Two different dose levels exhibited a significant anti-nociceptive activity in different animal models of pain. In hot plate test, antinociceptive reaction towards thermal stimuli in mice is a well validated model for detection of opiate like analgesic drugs wherein pain response is from spinal origin [14].

Antibacterial activity

The aqueous extract of floral parts of *Shorea robusta* was prepared with cold water maceration. Well diffusion method was employed to determine the effect of antibacterial potential against Gram positive bacteria viz. *Staphylococcus aureus* and *Bacillus subtilis* and Gram negative bacteria viz. *Klebsiella pneumoniae* and *Serratia marcescens*. Aqueous extract of the plant has showed significant inhibitory activity on different bacterial species tested against penicillin as standard antibacterial agent. Furthermore, the preliminary phytochemical analysis revealed that the aqueous extract possesses tannins, flavanoids, cardiac glycosides and steroids, which are involved in antibacterial activity[15].

Anti-Obesity activity

Anti-obesity effect of hydro-alcoholic extract of *Shorea robusta* (HASR) leaves on monosodium glutamate induced obesity in albino rats. Monosodium glutamate is used to induce obesity for 7 days along with normal diet and obtained obese rats were treated with *Shorea robusta* in a dose of 200, 400 and 600mg/kg p.o for next 41days. Physical parameters such as body weight, various organs and adipose tissue weight and various biochemical parameters like serum glucose, triglyceride, cholesterol, LDL-C, HDL-C, VLDL-C, atherogenic index, SGPT and SGOT were evaluated and compared with both normal control and obesity control groups. From result, it was concluded that hydro-alcoholic *Shorea robusta* leaves extract is a potential drug which can be used for treatment of obesity and favours the correction of disturbed lipid profile [16].

Antiulcer activity

Gastroprotective potential of *S. robusta* resin (dissolved in water) at two different doses (150 and 300 mg/kg bw p.o.) was studied on ethanol and pyloric ligation (PL) induced gastric ulcer models in rats. Pretreatment with the resin (SRR) produced 62.69% inhibition of gastric mucosal damage in ethanol induced model and 64.55% inhibition in PL-induced model which was comparable to the reference drug omeprazole. The protective effect was associated with normalization of antioxidant markers (superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx), glutathione-S-transferase (GST) and lipid peroxidation (LPO)) in ethanol induced model. In PL rats, SRR showed significant (P<0.001) decrease in gastric juice volume (65.44%), free acidity (33.06%), total acidity (26.98%) pepsin (44.39%) and protein (23.82%) with subsequent increase in carbohydrate (22.67%) and mucin (41.46%) in gastric juice. Further, the pH of the gastric juice increased from 1.23 to 4.54. This study clearly suggested that *S. robusta* resin possess significant gastroprotective activity, supporting the folk use of resin preparations and contributing for its pharmacological validation [17].

Antimicrobial activity

The aqueous, methanol, petroleum and benzene extract of oleoresin of *Shorea robusta* were tested. Different extracts inhibited the growth of used microorganisms. Aqueous extracts of *Shorea robusta*

exhibits significant activity against *Bacillus coagulans*, *Escherichia coli*, *Bacillus cereus* and moderate inhibition on *Salmonella typhi* and *Bacillus subtilis* and less activity against *Proteus vulgaris* and *Pseudomonas fluorescens*. However, ethanolic extracts also exhibited significant activity against *Staphylococcus aureus*, *S. epidermidis* and *Escherichia coli*, moderate inhibition on *Candida albicans* and *Bacillus coagulans*. The results revealed methanol extract showed more significant activity. The petroleum ether and benzene extracts showed less inhibitory activity when compared with the above two extracts. The Petroleum ether showed activity against *Escherichia coli*, *Aspergillus flavus* and *Candida albicans* and whereas benzene extracts worked against *Bacillus licheniformis*, *Bacillus cereus* and *Aspergillus flavus*. It may be concluded that *Shorea robusta* resin have a stronger and broader spectrum of antimicrobial activity against a number of pathogenic microorganisms [18].

Immunomodulatory activity

The ethanolic extract of *Shorea robusta* bark was administered p.o. (orally) to mice at a dose of 100mg and 300mg/kg body weight per day for 14 days. In this study, *Shorea robusta* bark extract administrated rat models at 300mg/kg per day, i.p showed significant effect in stimulating immunomodulatory response, thus *Shorea robusta* bark is an effective natural health product for modulating immune system [19].

Kairomonal activity

The attractant (kairomonal) property of some compounds isolated from bark of sal (*Shorea robusta*) against its dreaded pest sal borer, *Hoplocerambyx spinicornis*, in laboratory. Extract of the bark and its various isolates were prepared by standard procedure and subjected to bioassay. Behaviour exhibited by the beetles, viz., orientations, walking movement, antennal activity, visits to the test compound treated surface, biting and feeding attempts to the particular compound and number of beetles attracted has been recorded. They showed positive behaviour with regard to the parameters discussed above against the bark extract as well as other isolated compounds. The chemical analysis of the compounds exhibiting the kairomonal property has also been performed [20].

Free radical scavenging and antioxidant activities

Antioxidants are one of the key players in tumorigenesis, several natural and synthetic antioxidants were shown to have anticancer effects. The aim of the present study is to divulge the preventive nature of *Shorea robusta* bark extract (SRBE) during diethylnitrosamine (DEN)-induced liver cancer in male Wistar albino rats. Administration of DEN to rats resulted in increased serum marker enzymes aspartate transaminase (AST), alanine transaminase (ALT), lactate dehydrogenase (LDH), and gamma glutamyl transpeptidase (GGT). The levels of lipid peroxides elevated with subsequent decrease in the tissue antioxidants like superoxide dismutase (SOD), catalase (CAT), reduced glutathione (GSH), glutathione peroxidase (GPx), and glutathione reductase (GR). SRBE supplementation (500mg/kg body weight) significantly attenuated these alterations, thereby showing potent anticancer effect in liver cancer. These findings suggest that SRBE prevents lipid peroxidation, hepatic cell damage, and protects the antioxidant system in DEN-induced hepatocellular carcinogenesis [21].

Woundhealing activity

The ethanolic extract of *S. robusta* (10 and 30 % w/w) applied locally in excised and incised wounds produced a dose-dependent acceleration in wound contraction and increased hydroxyproline content and tensile strength of wound in rats. The result demonstrate wound healing activity of ethanolic

Medicinal Uses

The resin is used in the indigenous systems of medicine as an astringent and detergent and is given in diarrhea and dysentery. It is also used as an ingredient of ointments for skin diseases and in ear troubles. Plant pacifies vitiated kapha, vata, nervine pain, arthritis, infection, wounds, ulcers, burns, pruritus, fracture, fever,

hemorrhoid, menorrhagia, jaundice, splenomegaly, obesity, headache, and skin diseases. [22]

CONCLUSION

The available scientific research on *S. robusta* has shown that it is an important medicinal plant used in a wide range of medical treatments. The plant has been in use for a long period of time without any documented serious adverse effects. The detailed information presented in this review provides evidence for its phytochemical, pharmacological & traditional uses. The outcomes of such future studies will provide promising sources of phytochemicals that will have huge potential for the pharmaceutical industry. Shala is still not well known for its antimicrobial properties as mentioned in classics. Extraction of drug in different solvent in different concentration or direct administration of drug proved antibacterial action.

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