Review Article

A Review on *Stereospermum colais* Mabb: Bignoniaceae

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ABSTRACT

India is known worldwide for about 45000 plant species and many have been claimed to possess medicinal properties. *Stereospermum colais* are known for their diuretic, Lithotropic, expectorant, cardio tonic and aphrodisiac, anti-inflammatory, anti bacterial, febrifuge, tonic, anti emetic, anti pyretic, rheumatalgia, malarial fever, wound, asthma and cough. This review describes the geographical distribution, morphology and taxonomical classification, phytochemical and biological properties of the plant.

Keywords: *Stereospermum colais*, geographical distribution, wound healing.

INTRODUCTION

Stereospermum colais is a large straight stemmed deciduous tree 18-30 m in height and 2.8 m in girth found throughout in moist regions of India up to an altitude of about 1200 m, chiefly in deciduous forests[1] (figure 1). In English it is known as Yellow snake tree, in Hindi it is padre and in Tamil it is Pathiri. All the parts of the tree are useful in treating many disorders. The leaves are used to treat otalgia, odantalgia, rheumatalgia, malarial fever and wounds. Decoction of the leaves is used as antipyretic and to treat chronic dyspepsia. The root is one of the important ingredients in Dasamula an Ayurvedic formulation. The roots are having bitter, astringent and acrid property. The roots are used as anodyne, appetizer, constipating, diuretic, Lithotropic, expectorant, cardio tonic, aphrodisiac, anti-inflammatory, anti bacterial, febrifuge tonic, anti emetic, anti pyretic. The decoction of root is used in the treatment of asthma and cough[2].

Figure 1: *Stereospermum colais* Tree

GEOGRAPHICAL DISTRIBUTION

It is commonly found in India, Myanmar, Sri Lanka; in the Western Ghats- South, Central and south Maharashtra Sahyadris[2].

BOTANICAL DESCRIPTION

Morphology

Leaves

Leaves compound, imparipinnate, opposite, decussate, to 60 cm long; rachis 6-16.5 cm long, canaliculate, glabrous; leaflets 3-5 pairs, opposite with odd terminal one; petiolule 0.8-1.5 cm long, canaliculate; lamina 5-15 x 2.5-7.5 cm, elliptic, apex caudate (acumen 1.5-4 cm long) base cuneate to asymmetric, margin entire, chartaceous, glabrous; midrib flat above; secondary nerves 8-10 pairs gradually curved; tertiary nerves weakly percurrent[2] (figure 2).

Figure 2: *Stereospermum colais* Mabb leaves

Inflorescence / Flower

Flowers are brownish purple in color, yellow within, Inflorescence lax terminal panicles, petals wooly[2] (figure 3).

Figure 3: *Stereospermum colais* Mabb flowers

Fruit and Seed

Capsule, 4-angled, contorted, to 40 cm long; seeds many, winged[2] (figure 4).

Figure 4: *Stereospermum colais* Mabb fruits

OTHER SPECIES OF *STEREOSPERMUM* SPECIES

Twenty four known *Stereospermum* species[3] are widely distributed in Western Ghats - South, Central and south Maharashtra Sahyadris. The genus *Stereospermum* is further organized into groups including *S. acuminatissimum* K.Schum, *S. angustifolium* Haines, *S. annamense* Dop, *S. arcuatum* H.Perrier, *S. boivini* (Baill.) H.Perrier, *S. chelonoides* (L.f.) DC., *S. cylindricum* Pierre ex Dop, *S. euphorioides* DC., *S. fimbriatum* (Wall. ex G.Don) DC, *S. harmsianum* K.Schum., *S. kunthianum* Cham, *S. leonense* Sprague, *S. longiflorum* Capuron, *S. nematocarpum* (Bojer) DC, *S. neuranthum* Kurz, *S. rhoifolium* (Baill.) H.Perrier, *S. strigillosum* C.Y. Wu & W.C. Yin, *S. strigilosum* C.Y.Wu, *S. tetragonum* DC., *S. tomentosum* H.Perrier, *S. undatum* H. Perrier, *S. variabile* H.Perrier *S. zenkeri* K.Schum. ex De Wild.

TAXONOMICAL CLASSIFICATION

The taxonomical classification of *Stereospermum colais* is summarized in table 1.

Table 1: Taxonomical Classification of *Stereospermum colais*[2]

Kingdom	Planate
Phylum	Magnoliophyta
Class	Magnoliatae
Order	Scrophulariales
Family	Bignoniaceae
Genus	Stereospermum
Botanical name	*Stereospermum colais* Mabb

ETHNOBOTANICAL USES

The ethnobotanical uses of *Stereospermum colais* are summarized in table 2.

Table 2: Ethnobotanical uses of *Stereospermum colais*[2]

Parts used	Indicators
Leaves	Otalgia, odantalgia, rheumatalgia, malarial fever, wounds, chronic dyspepsia, anti pyretic
Root	Bitter, astringent, acrid, anodyne, appetiser, constipating, diuretic, Lithotropic, expectorant, cardio tonic, aphrodisiac, anti-inflammatory, anti bacterial, febrifuge and tonic, anti emetic, anti pyretic, asthma and cough.
Flowers	Burning sensation, vitiated condition of pitta and vata, cardiopathy, hiccough and general debility
Fruits	Vitiated condition of pitta and vata
Seeds	External application in Hemicrania

PHYTOCHEMISTRY

- Two novel 1(17)-methyl anthraquinones, sterequinone-A and -D, their biogenetic precursors sterequinone-B, -C, and a new naphthoquinone sterequinone-E along with a known naphthoquinone, sterekunthal-B, have been isolated from the petroleum ether extract of stem bark of *Stereospermum personatum*[4].
- Xanthine inhibitory molecules along with new anthraquiniones were isolated from stem and stem bark of *Stereospermum personatum*[5]
- Phytochemical test of crude extract of *Stereospermum colais* L. revealed the presence of flavonoid, alkaloid, quinones, cardiac glycosides, terpenoids, tannins and triterpenoids[6].

BIOLOGICAL STUDIES

Wound healing and antioxidant

Stereospermum colais (Bignoniaceae) leaves were extracted successively with n-hexane, chloroform, ethyl acetate and ethanol by continuous hot percolation process and aqueous extract by cold maceration process.

All the ex-tracts were subjected to anti oxidant activity. Chloroform extract showed maximum antioxidant activity with an IC50 value of 36µg/ml. Chloroform, ethanol and aqueous extracts were taken for the screening of wound healing activity by excision model. Chloroform and ethanol extract showed significant activity when compared with control and standard. Percentage of wound contraction on 15th day was found to be 96.34 ± 1.64, 95.15 ± 1.54 and 16.6 ± 0.33, 17 ± 0.25. The chloroform and ethanol extracts showed significant wound healing activity. [7]

Analgesic activity

Vacuum liquid chromatography (VLC) of the *Stereospermum colais* stem bark methanol extract produced 3 fractions A, B, and C while further column chromatography (CC) analyses of the VLC fractions yielded fractions L, S and Y respectively. The fractions are evaluated for possible analgesic activity using the acetic acid and formalin pain tests. Fractions A, B and C (150, 250, and 450 mg/kg) significantly ($p< 0.0001$) inhibited abdominal writhes in mice. While fractions L and Y (150 - 450 mg/kg) significantly ($p<0.0001$) inhibited both phases of the formalin-induced pain in mice with a severe effect on the delayed phase than the premature phase. Fraction S at the same doses significantly ($p<0.0001$) inhibited both phases but with a more marked effect on the premature phase. The results indicate that the VLC and CC fractions of *Stereospermum colais* may inhibit pain responses mediated via both central and peripherally mechanisms. The present research has confirmed that *Stereospermum colais* stem bark contains pharmacologically active constituents which possess analgesic activity justifying its popular use in treatment of painful conditions. [8]

***In Vitro* Antibacterial and Antifungal**

The various successive solvent extracts *viz*., n-hexane, chloroform, ethylacetate, ethanol and water were screened for its antimicrobial activity. The test organisms used for antibacterial study includes fresh clinical strains isolated from pathologic specimens *viz.,* gram (+ve) *Coagulase negative Staphylococcus*, *Entero cocci, Staphylo coccus aureus,* and gram (-ve) *Acinetobacter, Citrobacter, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aureginosa, Salmonella typhi and Salmonella paratyphi.* The antibacterial activity was assessed by Minimum Inhibitory Concentration (MIC) and agar disc diffusion method. The antifungal activity was assessed by MIC. For antifungal activity, the fungi studied were *Aspergillus flavus, Aspergillus fumigatus, Aspergillus niger and Candida albicans.* Comparison of antibacterial activity was done with standard antibiotic ciprofloxacin (5µg/disc). The ethanol and chloroform extract showed maximum antibacterial activity followed by ethyl acetate, aqueous and n-hexane. The ethanol extract showed inhibitory effect against all fungi except *Aspergillus flavus.* Chloroform extract showed activity against *Candida albicans*. The other extracts showed significant inhibition on the growth of fungi. [9]

Antidiabetic, Antiperoxidative, and Radical Scavenging Potential

Antidiabetic, antiperoxidation, xanthine oxidase (XO) inhibition, and radical scavenging activities of acetone and methanol extracts of *Stereospermum colais* roots were investigated. Protective effects of *Stereospermum colais* root extract in stabilizing sunflower oil was also examined. The protective effect of acetone (ASC) and methanol (MSC) extracts of *Stereospermum colais* root for the potential inhibition of α-glucosidase and α-amylase enzymes were studied by *in vitro* method. Glycation inhibitory activity was also studied to inhibit the production of glycated end products. Compared with acarbose, ASC showed a strong inhibitory activity against α-glucosidase (IC_{50} 61.21 µg/mL) and a moderate inhibitory activity against α-amylase (IC_{50} 681.08 µg/mL). Glycation inhibitory activity of *Stereospermum colais* root extracts by using an *in vitro* glucose-bovine serum albumin (BSA) assay was also done and compared with standard gallic acid. ASC also shows high XO inhibition potential, free radical scavenging activities, and low *p*-anisidine value indicates the high medicinal potency of *Stereospermum colais* root. These results suggest that the extract of *Stereospermum colais* may be interesting for incorporation in pharmaceutical preparations for human health, since it can suppress hyperglycaemia, and or as food additives due to its antiradical efficiency. [10]

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