



A REVIEW ARTICLE ON *PATALA* (*Stereospermum suaveolens*, Roxb.DC) WITH IT'S PHARMACOLOGICAL EFFECTS

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Abstract : *Patala* is one of the most important drug of *Dashmoola* and widely use in Ayurvedic preparations. It is included in Bignoniaceae family. It is distributed in marshy places of Bihar, Bengal, Himalayan tarai, Tamilnadu and Kerala. *Patala* is traditionally use in *Aruchi*, *Shwas*, *Shotha*, *Chhardi*, *Hikka*, *Trushna*, etc diseases. It contain many biological active chemical constituents like flavonoids, tannins, glycosides, etc. This plant is used as anti-inflammatory, hepatoprotective, immunomodulatory, antiulcer, analgesic and antipyretic. In present study we explore investigation related to taxonomy, monographs, Present review article throws light on distribution, morphology, different types of *patala*, phytochemistry, traditional uses and pharmacological uses of the plant.

Index Terms - *Patala*, morphology, types of *Patala*, pharmacological effects of *Patala*.

I.INTRODUCTION

Dashmoola is a famous Ayurvedic combination of roots of ten medicinal herbs, which used together. It contains *Brihat Panchmool* i.e. roots of five big trees and *Laghu Panchmool* i.e. roots of five small herbs. This is the most common polyherbal combination used in the production of many Ayurvedic formulations that are indicated in the treatment variety of ailments especially in *Vata Roga*. *Patala* is one of the most important drug of *Dashmoola* and widely use in Ayurvedic preparations. Any kind of negligence regarding its preparation knowingly or unknowingly affects its efficacy. Nowadays the proper Identification of Ayurvedic herbs is one of the major challenges. Many times due to improper knowledge a wrong drug or a drug of low potency is mistakenly chosen for production which leads to mismanagement of the disease, so there is need of proper identification of plant. In this review article controversy about *Patala* and types of *Patala* are explained in detail, which helps in identification. This plant is widely used in lots of ayurvedic medicines for its anti-inflammatory & analgesic properties. In this study its other pharmacological effects are described so that we can explore wide use of *Patala* in various diseases.

- **External Morphology of *Patala* (*Stereospermum suaveolens*, Roxb.DC)[1,2]**

Habit- A large deciduous tree often up to 20m in height with thick spreading branches and 1.8m in girth with clear bole of about 9m.

Stem-Branched, grey, exfoliating in flat scales; Wood hard, yellowish brown.

Leaves- Opposite, decussate; Lamina uni-pinnate about 20-40 cm long.

Leaflets-mostly 3-5 pairs, individual and terminal leaflets quite large about 10-12 × 2-5 cm elliptic, acuminate, caudate at the base slightly unequal sided.



Fig: Tree of Patala



Figure : Leaves of Patala

Inflorescence - terminal, lax drooping panicles. It has dull crimson flowers which are complete, regular, zygomorphic, hypogynous and fragrant.

Calyx - Sepals are 5, inconspicuous, campanulate, 3-5 toothed, purplish.

Corolla- Petals are 5, united, bi-lipped about 2 cm long, yellowish, tinged with reddish purple, woolly at the base, bearded inside of the lower tip.

Androecium- Stamens 4, didynamous, epipetalous, filament with short tuft of woolly hairs at the base.

Gynoecium- Carpels 2, ovary superior, syncarpous, bi-locular with many ovules on axile placenta; seated on cushion like disc; style long; stigma bi-lobed.

Fruits- like capsule, more or less spirally twisted, dotted with white specks, dissepiments brownish with notches carrying seeds.

Seeds - flat, about 3-3.5 cm long, readily splitting along with transverse furrow.

Figure: Fruits of *Patala*

Habitat: Marshy places of Bihar, Bengal, Himalayan tarai, Tamilnadu and Kerala.

Plant Profile:[2]

Kingdom- plantae

Phylum- Mangoliophyta

Class- Mangoliatae

Order- Scrophulariales

Family- Bignoniaceae

Genus- Stereospermum

Species- suaveolens

Scientific name- *Stereospermum suaveolens*

- Vernacular Names- [1]

Sr. No.	Language	Synonyms
1	Sanskrit	Patala, Patali, Madhuduti, Amogha, Kaldutika, Kachsthali, Vasantduti, Vasantkusuma, Tamrapushpi, Tamrakusuma, Raktpushpika, Kumbhipushpi, Kumbhika, Krushnavrunta, Krushnavruntika, Krushnavruntakusuma, Kalvruntika, Vitvallabha, Vallabha, Tuwara, Sthali, Kaysthali, Phaleruha, Anushna, Sthirgandha, Tikta, Dubhuhavaya, Kuberakshi, Kamdutika, Kharachchhada
2	Assamee	Parul
3	Bengali	Parul
4	English	Rose Flower Fragrant
5	Hindi	Padal
6	Marathi	Padal
7	Gujrati	Podal
8	Kannada	Padramora
9	Malayalam	Padiri
10	Orissa	Boro, Patulee
11	Tamil	Padari
12	Telgu	Kaligottu, Kokkesa, Podira
13	Punjab	Padal

- Properties and action as per API [1]

Ras	Katu, Tikta , Kashaya
Guna	Guru, snigdha
Veerya	Anushna
Vipak	Madhur

- Chemical Constituents:

Root:

p-coumaric acid, Triacantanol[3], 3-cetyl alcohol, Lapachol, 1,4 naphthoquinone[4]; Morphinane, Sinocorculine alkaloids [5] Root heartwood:-Dehydroalpha-lapachone and Dehydrotectol[6] Root bark:-B-sitosterol and n-triacocatanol[6]

Bark:

Quinones- Sterechenols A & B, Stetekunthal, Sterequinone C.[7]
Crystalline bitter substances.

Leaves:

Dinatin-7-glucuronide[8], 6-O-glucosylscutellarein[9]

Flowers:

Sterols, Glycosides, Glyco-Alkaloides, Glucose, albumin and mucilage.

Fruits:

Stearic acid, Palmitic acid, Oleic acid

- **Contraversy about Patala (*Stereospermum suaveolens*, Roxb.DC)^[10,11]**
 - *Patali* word is used for *Patala* by Charaka, Sushruta and Vagbhata.
 - Krushna Patala- It is mentioned by Ashtanga Hridaya; that means there are 2 types of Patala Shweta and Krushna.
 - Kuberakshi word is mentioned in Sushruta, which is used for Kashtapatala.
 - Dhanvantari Nighatu, Raj Nighantu, Kaiyadev Nighantu and Bhavprakash Nighantu described Shweta and Rakt Patala according to its flowers.
 - *Patala* - The word Patala is usually taken for Krushna Patala, having purple coloured flowers. It is found all over India.
- Synonyms - Patali, tamrapushpi.
Latin name - *Stereospermum suaveolens*, Roxb. DC.
Family - Bignoniaceae

- *Sita Patala* - It is bearing white flowers, Phala kashtavat and beej Kuberakshvat. Its bark is used as substitute in place of patala.

Synonyms - Kashtapatla, kuberakshi, Sitapatala, Garudpha

Latin name - *Randermachera xylocarpa*, Roxb

Family - Bignoniaceae



Fig 4: *Stereospermum suaveolens*, Roxb. DC.



Fig 5: *Randermachera xylocarpa*, Roxb

- *Mushak*- It is mentioned by Sushruta, also called as Ghantapatala.

Two types of *Mushak* are explained—*Shweta* & *Krushna*

- *Shweta Mushak* – It has yellow flowers

Synonyms - *Morawa*, *Ratanagarur*

Latin name - *Elaeodendron glaucum* Pers.

Family - *Celastraceae*



Fig 6: *Elaeodendron glaucum*, Pers



Fig 7: *Schrebera swietenoides*, Roxb

- *Krushna Mushak*- It has white flowers with grey dots.

Synonyms - *Ghant*, *Eksira*, *Mocha*, *Ksharvruksha*, *Kshashreshtha*

Latin name- *Schrebera swietenoides* Roxb.

Family-*Celastraceae*

- **Pharmacological activities**

1) **Anti-inflammatory**: [12, 18]:

Shothahara property of *Patala* is explained in *Samhitas* and *nighantus*. The anti-inflammatory effect of the ethanol extract of *Stereospermum suaveolens* (Roxb.) DC (*Bignoniaceae*) bark given orally at the dose of 200 and 400 mg/kg body weight was studied in rats using the carrageenan-, dextran-, and histamine-induced hind paw edema, and cotton pellet-induced granuloma formation models. Indomethcin at the dose of 10 mg/kg body weight was used as a standard drug. The extract (400 mg/kg body weight per os) showed maximum inhibition of edema 64.6, 53.48, and 50.06% at the end of 3 h with carrageenan-, dextran-, and histamine-induced rat paw edema, respectively. The extract (400 mg/kg) exhibited significant reduction (34.77%) in granuloma weight in the cotton pellet-induced granuloma model. From these results it could be concluded that, the ethanol extract of *Stereospermum suaveolens* possesses maximum anti-inflammatory activity in a dose-dependent manner, in various experimental models.

2) **Hepatoprotective** [13]:

The present study aims to evaluate the hepatoprotective activity of *Stereospermum suaveolens* DC (*Bignoniaceae*). Hepatoprotective activity is studied by carbon tetrachloride (CC14)-induced liver damage in albino rats. The degree of protection in this activity has been measured by using biochemical parameters such as serum glutamate oxaloacetate transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT), alkaline phosphatase (ALP), total bilirubin, LDL-cholesterol and SOD, CAT, GSH, total thiols, NO, and lipid peroxidation in liver tissue homogenate. The results suggest that the methanol stem bark extract of *Stereospermum suaveolens* at the doses 125, 250, and 500 mg/kg and reference standard Liv-52 treated group produced significant ($p < 0.001$) hepatoprotection against CC14 induced liver damage by decreasing the activities of serum enzymes, bilirubin and lipid peroxidation. The extract significantly ($p < 0.001$) increased levels of SOD, CAT, GSH and total thiols, as compared to control group. Histopathological studies further substantiate the protective effect of the extract. It was concluded that methanol stem bark extract of *Stereospermum suaveolens* showed effective hepatoprotective activity.

3) **Immunomodulatory activity** [14]:

Stereospermum suaveolens (Roxb.) DC. is used in various Ayurvedic formulations to treat variety of disorders including inflammations, asthma, blood disorders, fevers, liver disorders etc. Quantification of the bioactive compound in *S. suaveolens* root extract (SSRE) was determined through RP HPLC, in order to standardize the plant material with optimal concentration of known active constituents present there in. The immunomodulatory potential of SSRE was determined for its effects on non-specific immune functions against sheep red blood cells antigenic challenge using in-vivo models. The assay included total and differential leukocyte counts, nitroblue-tetrazolium reduction test, neutrophil adhesion test, phagocytic activity and delayed type

hypersensitivity (DTH) reaction. In RP-HPLC analysis, the contents of dehydro-a-lapachone and lapachol in SSRE was found to be 0.043 ± 0.003 and 0.16 ± 0.002 % (w/w), respectively. Standardized SSRE (100-300 mg/kg) increased the total leukocyte count and the population of monocyte and neutrophil in rats. Further, treatment with SSRE increased the neutrophil adhesion to nylon fibres, DTH response, phagocytic activity and intracellular killing potential of phagocytes in a dose dependent manner. The immunostimulatory potential of SSRE at 300 mg/kg was found to be very significant ($p < 0.001$) in compared to the control. These findings suggest that SSRE can able to stimulate the innate defence mechanisms of an individual and it can be considered as an alternative therapy to boost the innate immune functions during the impaired immunological conditions.

4) Antiulcer and gastroprotective[15]:

Journal of Pharmacology and Pharmacotherapeutics| April-June 2011| Vol 21 Issue 2 experimental animal models on various groups of rats. The rats of group I were not ligated, serving as normal control; rats of group II were ligated but were not treated, serving as experimental control; group III received ranitidine 20 mg/kg and served as standard. The groups IV, V and VI received 125, 250 and 500 mg/kg of methanolic extract by the oral route 2 h prior to the induction of ulcers. Rats were fasted for 36 h prior to the surgical procedure. Under light ether anesthesia, the abdomen was opened by a small midline incision below the xiphoid process. The pylorus portion of the stomach was identified, slightly lifted out and ligated, avoiding traction to the pylorus or damage to the blood supply. The stomach was then replaced carefully and the abdominal wall closed by interrupted sutures. Animals were sacrificed after 6 h of pylorus ligation.

5) Analgesic and Antipyretic Activities[16]:

Ethanol extract from the stem bark of *Stereospermum suaveolens* (Roxb.) DC (Bignoniaceae), given orally at the doses of 200 and 400 mg/kg body weight, was assessed for analgesic and antipyretic properties on different experimental animal models. Administration of ethanol extract of *Stereospermum suaveolens* (EESS) produced significant ($p < .05$, $p < .001$) dose-dependent analgesic effect in the tail flick, hot plate, and tail clip (central) as well as in acetic acid induced writhing (peripheral) nociceptive tests in mice, suggesting the involvement of both central and peripheral mechanisms in alleviating the pain response. In the current study, indomethacin, aspirin, and morphine were used as the standard analgesic drugs. In addition, EESS also exhibited a significant ($p < .05$, $p < .001$) dose-dependent antipyretic response in Brewer's yeast-induced pyrexia in rats and the results were comparable with that of paracetamol, a standard antipyretic agent. These results showed that the EESS possesses potent analgesic and antipyretic activity by dose-dependent manner, in various experimental animal models.

6) Antihyperglycemic and antioxidant[17]:

To evaluate the antihyperglycemic effect of ethyl acetate fraction of ethanol extract of *Stereospermum suaveolens* in streptozotocin (STZ-) induced diabetic rats by acute and subacute models. In this paper, various fractions of ethanol extract of *Stereospermum suaveolens* were prepared and their effects on blood glucose levels in STZ-induced diabetic rats were studied after a single oral administration (200 mg/kg). Administration of the ethyl acetate fraction at 200 mg/kg once daily for 14 days to STZ-induced diabetic rats was also carried out. The parameters such as the fasting blood glucose, hepatic glycogen content, and pancreatic antioxidant levels were monitored. In the acute study, the ethyl acetate fraction is the most potent in reducing the fasting serum glucose levels of the STZ-induced diabetic rats. The 14-day repeated oral administration of the ethyl acetate fraction significantly reduced the fasting blood glucose and pancreatic TBARS level and significantly increased the liver glycogen, pancreatic superoxide dismutase, and catalase activities as well as reduced glutathione levels. The histopathological studies during the subacute treatment have been shown to ameliorate the STZ-induced histological damage of pancreas. This paper concludes that the ethyl acetate fraction from ethanol extract of *Stereospermum suaveolens* possesses potent antihyperglycemic and antioxidant properties, thereby substantiating the use of plant in the indigenous system of medicine.

● Conclusion:

Patala is a popular herb among practitioners of traditional herb medicine. It has long been used as powder and kashaya form for the treatment of various ailments particularly anti-inflammatory, antipyretic antienetic and analgesic. Thus, bioassay-guided isolation and identification of the bioactive components must be developed to reveal the structure-activity relationship of these active components. Plant extracts of root of this plant have interesting Hepatoprotective, immunomodulatory, antiulcer, Antihyperglycemic and Antioxidant properties.

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