

Rajpatha Ethno medicine of Controversial Origin

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ABSTRACT

Medicinal plants constitute an effective source of traditional and modern medicine. Adulterations and substitutions are common in raw material trade of medicinal plants. *Rajpatha* is indigenous drug having controversial origin. *Other variety, patha* is well established as *Cissampelos pareira* and sometimes *rajpatha* is used as substitute for *patha*. Recently concentration of the alkaloid, bebeerine has been suggested as criteria for identification of authentic plant. The article explores description of *Cycela peltata* and *Stephania hernandifolia*, which are usually taken as *rajpatha*.

Key words: Rajpatha, patha, *C. peltata*, *S. hernandifolia*, Ayurveda

INTRODUCTION

Many of plant drugs documented in Ayurvedic textbooks have a controversy on their accurate botanical linkages. ^[1] Since plants and plant drugs in Ayurveda were designated Sanskrit names, often based on the “doctrine of signature”, morphological appearance, properties and action, the interpretation of these names during the later period of time led to acceptance of more than one botanical species for one plant drug. ^[2]

Two varieties of *patha* have been mentioned in the Ayurvedic texts, viz. *brhat patha (rajpatha)* and *laghu patha* i.e. with large and small leaves, respectively. Both the varieties are, more or less, similar in the properties. ^[3] *Laghu patha* has been identified as *Cissampelos pareira* Linn. *Brhat patha* has been mentioned as *Kuchelika* in *Kaydeva Nighantu*. ^[4] *Charaka* has also indicated *Patha* and *Kuchela* as separate drugs in *Shakvarga*. ^[5,6]

In Ayurvedic Materia Medica, *Cycela peltata* Lam. and *Stephania hernandifolia* (Willd) Walp. are taken as *brahat patha*. *Cissampelos pareira*, *C. peltata* and *S. hernandifolia* are members of family Menispermaceae. ^[7] As per Ayurvedic herbology, *brhat patha* is bitter, astringent and beneficial in blood born diseases and polyuria. ^[8] Some authors have indicated *C. peltata* as a possible substitute for *C. pareira*. ^[9]

The roots of *C. pareira* can be distinguished from *C. peltata* and *S. hernandifolia* by presence of high concentration of pharmacologically active alkaloid bebeerine, which was found to be present in very low concentration in *Stephania japonica* and absent in roots of *Cyclea peltata*. The roots of *Cyclea peltata* were

found to contain high concentration of saponins and comparatively in low concentration in *Cissampelos pareira* where as it was found to be absent in roots of *Stephania japonica*.^[9]

Cycela peltata Auct. non (Lamk) Hook.f. & Thomson. & Thomson.

Syn: *C.barbata*: *Cycela peltata* Lam. grows throughout India and Sri Lanka, up to 800-900 metres elevation. It is commonly known as Green grass jelly. The plant is a slender twining shrub, frequently climbing up on tall trees. The leaves are simple, alternate, heart shaped, 2.5-10 cm long and 2.5-3.75 cm broad, stipule 5-10 cm long and nerves 7-11. The flowers unisexual, pale yellow, in axillary panicles. The fruits are ovoid drupes, brown or scarlet in color. The seeds are covered. The roots are tuberous, cylindrical, irregularly curved, with grayish brown surface. The plant blooms in the rainy season.^[9]

The roots of *C. peltata* are reported to contain alkaloids including *d*-tetrandrine, *dl*-tetrandrine, *d*-isochondrodendrine, fangchinoline, tetrandrine N-2'-oxide, α -cyclanoline, tetrandrine 2' β -N-oxide, (-)-2-norlimacine, (-)-curine, (-)-cycleapeltine, (-)-N-methylcoclaurine, (-)-repandine, (+)-coclaurine, (+)-cycleabarbataine, (+)-cycleanorine, coclaurine and cycleadrine.^[10-13]

In tribal medicine, jelly sediment obtained from *C. peltata* is applied to head and washed after 30 minutes in frothy stool in Kerala.^[14] The roots are used in coryza, hemorrhoids, diarrhea and burning sensation in Mangalore.^[15]

Alkaloids isolated from the petroleum ether and methanolic extracts alkaloids and their methiodides showed activity similar to *d*-tubocurarine.^[10] Bisbenzylisoquinoline alkaloids isolated from *C. peltata* have demonstrated cytotoxic and antimalarial activities.^[16]

In ethylene glycol treated animals, simultaneous administration of the powdered root of *C. peltata* resulted in decreased urinary oxalate and calcium. Likewise, serum potassium was lowered and magnesium was elevated.^[17]

In an investigatory study, 70% methanolic leaf extract of *C. peltata* significantly changed the increased malonyldyaldehyde level and decreased glutathione levels found in rats treated with cisplatin alone.^[18] Pretreatment with *C. peltata* extract provided significant protection against the peptic ulceration caused by ethanol administered individually, or in combination with indomethacin.^[19]

Stephania hernandifolia (Willd) Walp.

Syn: *S. japonica*: *S. hernandifolia* is a woody smooth vine. The leaves are oval or sub-rounded-oval in shape, 6 to 15 centimeters in length, and 4 to 12 centimeters in width, with obtuse and nearly retuse apex and rounded base, and smooth on both surfaces, with long petioles (4 to 12 centimeters long). The inflorescences are in umbels on peduncles 3 to 4 centimeters in length. The male and female flowers are small and pale yellow. The fruit is red, small, rounded but flattened, about 8 millimeters long and 6 millimeters wide.^[20]

Bancroft in a study noted that the extract of the roots was exceedingly poisonous to frogs. The physiological action of the active constituent appeared to be identical with that of *picrotoxin*, the active principle of *Cocculus*, a genus of the same order as *Stephania*. Bancroft failed to obtain *picrotoxin* from the plant, and thus suspected the poisonous effects to be due to an alkaloid.^[21] Investigative work on the plant in 1924 reported alkaloids, metastephanine, stephanine and protosetaphine along with a phenol base and base.^[22]

The plant contains alkaloids including hernandifoline and hernandiline.^[23] The roots of *S. hernandifolia* from Mangalore yielded *d*-tetrandrine, fangchinoline, *d*-tetrandrine, and *d*-isochondrodendrine.^[24] Epistephanine, (+)-3', 4'-Dihydrostephasubine and methylhernandine have been reported.^[25-27]

Chief alkaloids of *S. hernandifolia* are reported to be antispasmodic.^[28] Bulb of *S. hernandifolia*, used by the local people and traditional healers in the Eastern Himalayan belt, were studied for their effects on serum glucose levels in non-diabetic and diabetic rat models at different prandial states. *S. hernandifolia* increased the serum glucose levels of non-diabetic rats in all the series of experiments ($p < 0.05$ or $p < 0.01$). In NIDDM model rats, *S. hernandifolia* had a tendency to raise the serum glucose level.^[29]

Several studies have reported effect of *S. hernandifolia* on testicular activity in rats. In one study, adult male Wistar rats, were forcefully fed with the aqueous extract of these leaves at the dose of 2 g or 4 g of leaves/mL distilled water/100 g body weight/day for 28 days. Treatment with this leaf extract at both doses resulted in significant reduction in relative weight of the sex-organs. Further the treatment with the extract resulted in diminution in the activity plasma level of testosterone along with inhibition of spermatogenesis without any induction of hepatic and renal toxicity.^[30]

In another study, the testicular inhibitory effect of the aqueous fraction of methanol extract of *S. hernandifolia* leaf was studied in male Wistar rats. The supernatant and the precipitate part of aqueous fractions of the methanol extract of the leaf were gavaged separately to rat at a similar dose of 200 mg/mL per 100 g body weight per day for 28 days. In both treated groups, there were significant decreases in the relative weights of the sex organs, the testicular key androgenic enzymes activities, the plasma level of testosterone, the number of different germ cells at stage VII of seminiferous epithelial cell cycle and the seminiferous tubular diameter in comparison to the controls.^[31]

An ethno medicinal formulation (based on *S. hernandifolia*) at 500 and 250 mg/kg doses induced 66.7% and 33.3% post-coital pregnancy interception respectively, in Wistar rats. The higher dose exhibited significant reduction in number of litters born and also anti-implantation property. In contrast, none of the dose levels of aqueous extract of *S. hernandifolia* interfered in pregnancy but significant anti-implantation property was observed at doses of 2 and 1 g/kg, even as the higher dose produced significant reduction in number of litters born as well. HPTLC and HPLC analysis of both exhibited marked chemical differences.^[32]

The n-hexane fraction of the hydroethanolic (1:1) extracts of *S. hernandifolia* leaves and *Achyranthes aspera* roots (in a composite manner at a ratio of 1:3, respectively), exhibited maximum spermicidal activity in human and rat spermatozoa. At a concentration of 0.1 g/mL hexane fraction, all sperm of the human sample were immobilized immediately (within 20 s). In case of the rat sample, all epididymal spermatozoa were immobilized immediately (within 20 s) by treatment with hexane fraction at a concentration of 0.004 g/mL. All human sperm were found to be nonviable within 20 min.^[33]

CONCLUSION

Since plants in Ayurveda were designated Sanskrit names, often based on the “doctrine of signature”, morphological appearance, properties and action. Due to lack of correct identification, similar looking plants are collected often from the field site along with the genuine medicinal plant by mistake. Hence further studies leading to identification for Rajpatha are strictly warranted.

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