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Research Article

CYCLEA PELTATA; AN ETHNOPHARMACOLOGICAL UPDATE

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A B S T R A C T

Cyclea peltata (Padakkizhangu or Padathally) belongs to the family of Menispermaceae and is one of the pharmacologically essential plants known to own medicinal values mentioned in the primitive scriptures of Ayurveda. The traditional use of Cyclea peltata is reported in different parts of India; phytochemical studies report that the plant has various constituents that add to its pharmacological properties, such as alkaloids like tetrandrine, fangchinoline, cycleanorine, cycleadrine, cycleacurine, cycleapeltine, disochondrodendrine. Traditionally, the plant reports both internal and external therapeutic applications for managing several diseases. Externally, it is used as a wound healer, for managing sinuses, snake poison, and skin disorders such as purities and erysipelas. Internally, the plant is used as an appetizer, laxative, digestive, anthelmintic agent, breast milk purifier, blood purifier, febrifuge, refrigerant, expectorant, inflammation, diuretic agent, and skin disorders. Cyclea peltata leaf has reported antioxidant, antidiuretic, antihyperlipidemic, hepatoprotective, and antibacterial properties. The peltata root has anti lithiatic, antidiabetic, and anti-ulcer properties. Hence, the present study explores the reported remedial effects of Cyclea peltata.

INTRODUCTION

Medicinal plants have been used since prehistoric periods for curative purposes in different parts of the world. India, the land of Ayurveda, has a rich source of medicinal plants. The tropical climate in India makes it easy to grow medicinal and aromatic plants. The AYUSH systems in India report more than 8,000 herbal remedies for several diseases.[1] These medicinal herbs were measured as a rich resource of information for developing natural, semi-synthetic, and synthetic medicine for the pharmacological and non-pharmacological management of diseases. As per WHO, more than 21,000 species of plants have the potential to be used as medicinal plants.[2] The need for herbal medicine is increasing day by day; WHO reports that 80% of the world population may consider herbs as a primary healthcare need for some aspect of theirs.[3] A drastic increase in world population, higher treatment costs, unavailability of synthetic agents, higher side effect profiles, and therapeutic failure due to drug resistance are the fewer factors leading to the increased emphasis on the use of herbal medicines.

Tremendous enhancement in the use of herbal medicine has been found in the past two decades; two-thirds of the population of the world depends on medicinal plants for their primary healthcare needs.[4] Broader cultural acceptability, better adaptability, and compatibility with human organ systems are the major reasons for this acceptance. This cure may sync with nature, with minimal side effects considered the major advantage. As plant-based medicines used are independent of any sex or age group, it is preferred for many conditions such as constipation, diarrhea, allergic issues, asthma, arthritis, piles, menstrual disorders, and pain management.

However, more research data is still needed in this field. Therefore, since 1999, the WHO has published three volumes of the WHO monographs on selected medicinal plants. Cyclea peltata, also known as Padakkizhangu or Padathally, is one of the medicinally significant plants that can be found in tropical and subtropical India. It is mentioned in early Ayurvedic texts such as Gulguluthikthaka ghrita, Mahatikthaka ghrita, Thikthaka ghrita, Saraswata ghrita, and Panchagavya ghrita.[5] Along with other medications, it is one of the best brain boosters used in Ayurveda. Patha is referred to as "Pata" in Vedic literature.

Cyclea peltata is a delicate twining shrub with branches that can be seen commonly ascending towering trees. The leaves of the plant are alternating, hairy, heart-shaped, 2.5-10 cm long, 2.5-3.75 cm wide, with a stipule that is 5-10 cm long and nerves that are 7-11 cm long. The flowers have one type and are light yellow. Male flowers have panicles of crowded cymes that are 20-30 cm long, delicately velvet-haired and stalked. Flowers have a stalk and are green; the calyx is bell-shaped, lobed for 1/4 of the tube into 4-6 sepals, hairy within, and finely velvet-hairy outside; the petals are cyathiform, and they lack hair. peltate, contained, 6-8-loculed synandrium; stamens 4. Female flowers are borne in panicles, 2.5-5 cm long, hairy; bracteoles ovate-lance-shaped or linear, hairy.

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Flowers are stalkless, sepal 1, round, hairy; petal 1, round, hairless; staminodes 6; carpels 3, ovoid, hairy; style short. Bracteoles are ovate-lance-shaped or linear, and female flowers are borne in panicles; they are 2.5-5 cm long and hairy. Flowers are stalkless, sepal 1, round, hairy; petal 1, round, hairless; staminodes 6; carpels 3, ovoid, hairy; style short. The fruits are spherical drupes that are white in nature. The cup-shaped calyx and corolla are unique to this plant species and can be easily distinguished from other plants. Cissampelos has the corolla alone cup-shaped.

Up on Phytochemical screening, the plant showed the presence of enormous constituents, alkaloids like fangchinoline, tetrandrine, cyclosporine, cycleacurine cycleapeltine, cycle drive, cycleahomine chloride, chondocurine, magnoflorine, is tetrandrine, per amine, cyclamen, burmannaline, isochondrodendrine so on which improves its pharmacological properties.[6] The entire part contributes to its own medicinal value. The roots of the path consume great medicinal value, so it is used for medicinal purposes, both internally as well as externally. Antidiabetic, anti-lithiatic, and anti-ulcer properties are mainly shown by the root portion of the plant.[7] The root juice is helpful in headaches as nasal drops. Also, the roots have anti-inflammatory activity and hence improve the edema.[8] Paste of its roots and leaves applied externally is extremely valuable in infected wounds, sinuses, and skin diseases like erysipelas and pruritus. In serpent bites, the external application of this paste is said to be very useful. Patha is a valuable wound healer and anti-dermatosis herb. Leafs possess activities like antidiuretic, antioxidant, antihyperlipidemic, antibacterial, and hepatoprotective activities. [9]

Table 1 Plant profile of *C. peltata*

Kingdome	Plantae
Phylum	Tracheophytes
Class	Angiosperms
Order	Ranunculales
Family	Menispermaceae (moonseed family)
Species	Cyclea peltata
Basionym	Menispermum peltatum Lam.
Common name	Pata Root, Indian Moon-Seed, buckler-leaved moon-seed
Vernacular name	Sanskrit: Bruhat patha, Raj patha Kannada: Padaavala, Paadaavali balli, Haadeballi Malayalam: Padakizhangu, Padathali, Padavalli, Pattichevian Marathi: Pakar Tamil: Pata, Pon-mucuttai
Habitat	Deciduous forest
Habit	Climber
Flower, Fruit	November-June
Distribution	India, Sri Lanka, Malesia All district of Kerala, Bellary district (Karnataka State); Alagar Hills (Madurai district), Kolli Hills (Namakkal district) (Tamil Nadu State); Araku Hills, Sunkarimetta Hills (Visakhapatnam district), Sadashivakona R.F., Tirumala Hills (Chittoor district) (Andhra Pradesh State)

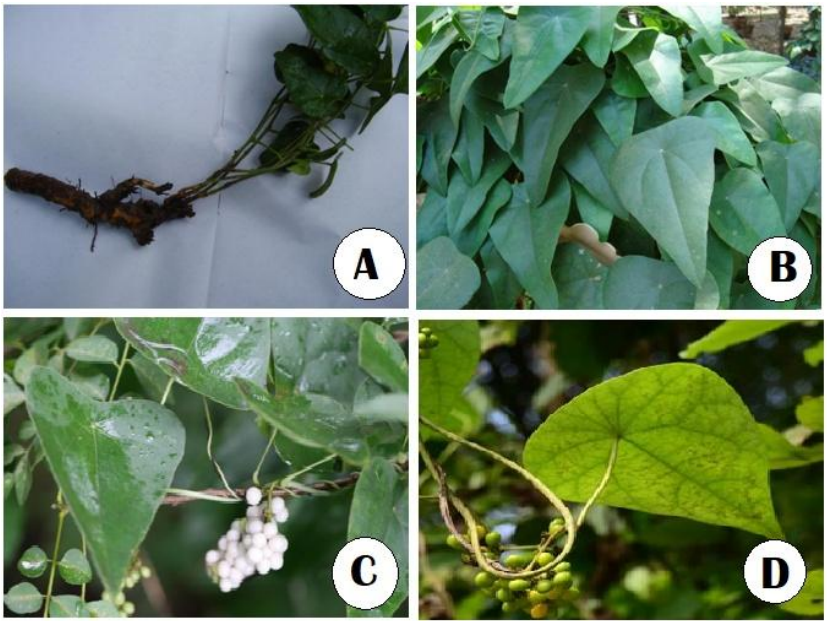

Figure 1 (A): Root of C. peltata, (B): Leaf of C. peltata, (C&D): Fruits of C. peltata

Diuretic Property

Dr. kirankumar Hullati et al.,[10] found that cyclea peltate leaves possess diuretic activity. In this study, Wistar rats of either sex were divided into six groups of six animals each. After the experimental period, Na+ and k+ estimation was carried out using flame photometry. The chlorine ion concentration was estimated by titration with 0.02 N $AgNO_3$ using 5% potassium chromate as an indicator. The volume of urine was estimated for the assessment of diuretic activity. The result of this study indicates that both the petroleum ether and ethanolic leaf extracts of cyclea peltate has shown diuretic action, which is significant with ethanolic extract compared to petroleum ether leaf extract of cyclea peltate.

The phytochemical screening of petroleum ether extract shows alkaloids and phytosterols as major phytoconstituents. The presence of flavonoids, alkaloids, tannins, saponins and diterpenes were reported from the ethanolic extracts. Several studies reports that benzyl isoquinoline type of the alkaloids were responsible for hypotensive and diuretic activity in several plants.[11] studies also report the role of flavonoids in showing diuretic activity by the action on Adenosine A1 Receptor.[12] Cyclea peltate may shows any of these possible mechanisms for their diuretic activity since it is rich in flavonoids and alkaloids.

Wound Healing Activity

Mr. Mahadeva murthy S. et al.,[13] found that cyclea peltate having wound healing activity. In this study animals are induced diabetes with steptozotocin. Methanolic and ethylacetate extract of test sample in PEG base was applied and observed for wound healing extract effect for a period of 15 days. After the competition of the study period, the excision wound area was collected and subjected to histopathological evaluation. Histopathological studies indicated moderate granulation with marked epithelial enclose and moderate hyperplasia in groups treated with high dose of methanolic extract of aerial part of cycleapeltata. The result of this study indicates that the extract of cyclea peltate favour wound healing in diabetic animals. The study suggest that, the wound healing activity may be due to the stimulation of interleukin-8, an inflammatory α-chemokine which increases intracellular communication in fibroblasts and induces maturation of granulated tissue.

Hepatoprotective

P.G Latha et al.,[14] evaluated the hepatoprotective property of alkaloid extract of cyclea peltate in paracetamol and carbon tetrachloride induced liver toxicity in wistar rats. The result of this study showed that pretreatment with alkaloid extract of cyclea peltate caused serum glutamate pyruvate transaminase, serum alkaline phosphatase, serum cholesterol, liver malondialdehyde levels reduction and decreased levels of glutathione, catalase and superoxide dismutase. Histopathological studies well corelated with biochemical results. These observations provided the basis for the conclusion that their plant possess hepatoprotective effect. The major alkaloids reported in C. peltata such as fangchinoline and tetrandrine are reported to inhibit Ca2+ transmembrane movement.[15] Tetrandrine reports several activities such as antioxidant, immunosuppressive, anti-inflammatory, free radical scavenging, anticancer and anti-fibrotic properties.[16] Coclaurine may inhibit the effect of extracellular calcium, hence they shows a potent antispasmodic activity. Thus the alkaloids present in C. peltata such as fangchinoline, tetrandrine, and coclaurine may contribute to a synergistic hepatoprotective activity.

Pillai N Rakesh et al.,[17] conducted a study entitled "Anti fibrotic effect of ethanolic extract of Cyclea peltata roots, on carbon tetrachloride induced liver fibrosis" in male Albino Wister rats. In this study, by administering 20% CCl_4 (1ml/kg of body weight), two times in a week for four weeks, mixed with an equal volume of corn oil was used for the induction of fibrosis. The depth of hepatic injury was confirmed by estimating level of hydroxyproline, bilirubin, alanine transaminase (ALT), serum level of aspartate transaminase (AST), and alkaline phosphatase (ALP), along with histopathological studies. The result showed that oral treatment with alcoholic fraction of C. peltata shows a significant level of cell repairing. A significant reduction in the hydroxyproline level, total bilirubin, various serum enzymes level (ALT, AST, and ALP) was noted, compared with that of treatment controls; which confirms the indection of fibrosis. Also the architecture of liver deranged by CCl_4 showed improvement following the administration of extract. Finelly this study concluded that, ethanolic extract of Cyclea peltata shows a significant property of reverting the fibrous tissues (Anti-fibrosis) formed in liver cells due to the repeated injury with CCL_4.

Estrogenic Activity

Sujesh Met al.,[18] evaluated the estrogenic activity of cyclea peltate root extract. In this study, they were made to characterize vaginal smear changes in relation to histological changes in the vaginal epithelium and to assess the effect of pet. Ether extract and ethyl acetate extract of the root of cyclea peltate on vaginal smear characteristics and individual phases of the estrus cycle. From this study, it was concluded that cyclea peltate root extract in pet-ether and ethyl acetate showed a significant effect on the estrus cycle of the treated rats by prolonging diestrus and metostrus phase. From this study, it is clear that cyclea peltate root extract can change the reproductive physiology of rats and act as an antifertility agent. Phytochemical screening of the plant reports the presence of alkaloids and fatty acids like heptadecanoic acid, hexadecanoic acid, propanoic acid, and steroids. The presence of alkaloids, plant steroids, and long-chain fatty acids may alter the physiological progesterone-estrogen balance and lead to morphological changes in the reproductive tract leading to prevent fertilization and implantation.

Antioxidant Activity

Cyclea peltate, which has been widely mentioned as a medicinal valuable plant in folk medicine, is used to study its potential antioxidant activity. BCV Sukanya et al., [19] conducted a study in which the antioxidant activity of the plant was studied using the DPPH method. The aqueous extract of Cyclea peltata showed antioxidant activity when compared to the standard group. The aqueous leaf extract of C. peltata showed 18.8% inhibition at 300mg/ml and it showed 33.5% inhibition at 600mg/ml, while the methanolic extracts showed 33.5% inhibition at 300mg/ml and 37.6% inhibition at 600mg/ml.

Various in-vitro antioxidant studies were conducted by Jagadeepchandra et al.,[20] on water, hexane, ethyl acetate, chloroform, and methanol extracts of Cyclea peltata. In most of the antioxidant parameters, methanol extracts, and ethyl

acetate showed potent activity and chloroform extract showed minimum antioxidant activity. Studies concluded that methanol and ethyl acetate extracts of Cyclea peltata effectively used as potent antioxidant from a natural source for the managment of complex diseases condetions caused due to excessive biological oxidative stress.

Antimicrobial Activity of Cyclea Peltata

B C V Sukanya et al.,[19] conducted a study on "Phytochemical, antimicrobial, antioxidant and immunomodulatory studies of leaf extracts of Cyclea peltata (Lam.)" and concluded that the antibacterial activity of the tested extracts of C. peltata showed a significant reduction in the growth of bacteria. The observed antimicrobial activity against the test organisms could be due to the presence of phytochemicals in the extract. The bacterial cultures showed various levels of sensitivity towards different concentrations of aqueous extracts of C. peltata. Pseudomonas aeruginosa and Streptococcus mutans showed high sensitivity against the aqueous extract of C. peltata. Staphylococcus aureus showed low sensitivity against aqueous extract. Petroleum ether, hexane, chloroform, ethyl acetate, acetone, methanol, and aqueous extracts of five concentrations were used to investigate the antibacterial activity. All the extracts showed varying degrees of inhibitory action against Staphylococcus haemolyticus, Klebsiella pneumoniae, and Proteus vulgaris. The study conducted by Uthirapathi et al.,[21] reports that the extracts from C. peltata indicated variable amounts of antimicrobial activity on the microorganisms tested, and they are more effective than traditional antibiotics. The same result was also reported by various researchers, such as Jyothi Abraham et al.,[22] Yamuna CV et al.,[23] and Raja et al.,[24] in their study on the antimicrobial activity of C. peltata.

Analgesic and Antipyretic Activities

Singh et al.,[25] tested the alcoholic extract and powder of C. peltata for their antipyretic and analgesic activities in Brewer's yeast-induced pyrexia model and radiant heat model in rats and acetic acid-induced writhing syndrome in mice. The result of the study reports that the powder has a moderate antipyretic activity. The inhibition of synthesis or the release of local PGE2 into the preoptic area of the anterior hypothalamus could be the reason for their antipyretic activity. Compared to the ethanolic extract, the powder form of the drug shows better analgesic activity in the radiant heat model in rats. However, a pronounced analgesic effect was reported in ethanolic extract compared to powder drug in acetic acid-induced writhing test. The plant extract shows an analgesic activity by their peripheral mechanism in mice through inhibition of endogenous substances that are key components in pain, such as leukotrienes and PGs. The powder form of the drug shows a better central analgesic effect in rats through opioid receptor systems.

CONCLUSION

Cyclea peltata, also called Indian moonseed, is a climbing shrub found throughout India and used in indigenous systems of medicine as a wound healer, an antidote to poisons, and various digestive, skin, and inflammatory conditions. C. peltata is one of the herbs mentioned in ancient Ayurvedic texts, the composition of which is mentioned in Vagbhata's Ashtāṅgasaṅgraha and Charaka's Charaka Samhita. Studies showed that the alkaloid fraction was the most active chemical component of the plant. Thus, Cyclea peltata significantly scavenges free radicals generated in vitro, has antioxidant and hepatoprotective effects, and has also shown significant anti-inflammatory, analgesic, antipyretic, and antimicrobial effects. Because Cyclea peltate is rich in flavonoids and alkaloids, it also has a diuretic effect. The presence of alkaloids, plant steroids, and long-chain fatty acids indicates the estrogenic activity of the plant. Nowadays, when there are alarming problems with the use of synthetic drugs, promoting the knowledge of traditional medicinal plants is necessary and unavoidable. Hence, a detailed and systematic study will be beneficial to prove the other traditional knowledge of the medicinal plant.

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