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Review Article

THERAPEUTIC VALUE OF PILEA MICROPHYLLA: A REVIEW

Liya S Saji^{1*}, Mrs. Savitha Mol G M², Mrs. Anusha Jasmin R J³, Ms. Jyothi B N⁴, Dr. Kiran K J⁵, Dr. Prasobh G R⁶

^{1,4} Third Semester M Pharm, Department of Pharmacology, Sree Krishna College of Pharmacy and Research Centre, Parassala. ² Associate Professor, Department of Pharmacology, Sree Krishna College of Pharmacy and Research Centre, Parassala. ³ Associate Professor, Department of Pharmacology, Sree Krishna College of Pharmacy and Research Centre, Parassala. ⁵ Professor and Vice Principal, Department of Pharmacology, Sree Krishna College of Pharmacy and Research Centre, Parassala. ⁶ Principal, Sree Krishna College of Pharmacy and Research Centre, Parassala.

Abstract:

Pilea microphylla (PM) commonly known as artillery weed, rockweed or gunpowder plant is an important medicinal plant belonging to family Urticaceae. It is used in Indian folk medicine to cure allergies/wounds, diuretics, treating burn & scald, childbirth problems, infertility & bacterial infection. Pilea microphylla contains polyphenols such as Quercetin-3-O-rutinoside, 3-O-caffeoylquinic acid, Luteolin-7-O-glucoside, Apigenin-7-O-rutinoside, Apigenin-7-O-glucopyranoside, Quercetin and flavonoids such as Chlorogenic acid, Rutin, Isorhoifolin, Quercetin, Kaempferol. Due to the presence of flavonoids and polyphenols, it exhibits potent pharmacologic properties such as antidiabetic, antidepressant, antioxidant and radioprotective, antimalarial, cytoprotective and anti-inflammatory properties. This review looked at traditional uses, phytochemical composition and therapeutic actions of Pilea microphylla.

Key Words: Artillery weed, Flavonoids, Quercetin, Pilea microphylla, Urticaceae

Corresponding author:

Liya S Saji,

Third Semester M Pharm, Department of Pharmacology,
Sree Krishna College of Pharmacy and Research Centre, Parassala.

QR code



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INTRODUCTION:

Pilea microphylla (PM) commonly known as artillery weed, rockweed or gunpowder plant is an important medicinal plant belonging to family Urticaceae, is native to Mexico and tropical South America. It is used in Indian folk medicine to cure allergies/wounds, diuretics, treating burn & scald, childbirth problems, infertility & bacterial infection. It is mainly utilized in gardens and landscapes as foliage or groundcover ornamental plant, but also for many ethnobotanical uses. *P. microphylla* was found on shady surrounding wall. ^[1]

Plants are a good source of biologically active natural products. In the investigation of bioactive natural compounds, it is essential to have access to simple biological tests to locate required activities. The preservative effect of many plant species and herbs suggests the presence of antioxidative and antimicrobial constituents in their tissues. ^[2]

Pilea is the largest genus of the Urticaceae and one of the largest genera in the Urticales. It includes over 600 species, that are mostly distributed throughout the tropics, subtropics, and warm temperate regions. Most species are succulent herbs, epiphytes or small shrubs growing in heavy shade. ^[3]

Medicinal plants are the “backbone” of traditional medicine, which means more than 3.3 billion people in the less developed countries utilize medicinal plants on a regular basis. ^[4]

TAXONOMICAL CLASSIFICATION:

BOTANICAL NAME: *Pilea microphylla*

COMMON NAME: Artillery plant, Rockweed, Gunpowder plant

FAMILY: Urticaceae

KINGDOM: Plantae

ORDER: Rosales

GENUS: *Pilea*

SPECIES: *P. microphylla*

MORPHOLOGY:

Pilea microphylla is a small, soft, smooth herb, 10 centimetres or less in height. Stems are slender, angular, green with a tint of purple, and angular. Leaves occur in two rows, petioled, somewhat elliptical in shape, 2 to 5 millimeters in length. Flowers are very small and crowded in small inflorescences (cymes) which are greenish or tinged with red and less than 1 millimeter in length. Growing only 8 to 12 inches tall and quickly forming spreading clumps up to two feet wide, artillery plant makes an attractive tropical ground cover.

DESCRIPTION:

Height: 0.5 to 1.5 feet

Spread: 1 to 2 feet

Plant habit: Spreading

Plant density: Dense

Growth rate: Moderate

Texture: Fine



Fig 1: *Pilea microphylla*

Foliage:

- Leaf arrangement: opposite/subopposite
- Leaf type: Simple
- Leaf margin: Entire
- Leaf shape: Obovate
- Leaf blade length: Less than 2 inches
- Leaf color: Green

Flower:

- Flower color: Green
- Flower characteristic: Year-round flowering

Fruit:

- Fruit shape: Unknown
- Fruit length: Less than 0.5-inch
- Fruit cover: Dry or hard
- Fruit color: Brown

Trunk and Branches:

- Branches: Branched
- Stem/twig color: Green
- Stem/twig thickness: Medium

Roots:

- Fibrous roots or rarely a short taproot. ^[5]

Other:

- Invasive potential: Potentially invasive
- Pest resistance: No serious pests are normally seen on the plant. ^[6]

Distribution:

- Native of tropical America.
- Now found in most tropical countries.

PHYTOCHEMICAL CONSTITUENTS OF *Pilea microphylla*:

FLAVONOIDS	Chlorogenic acid Rutin Isorhoifolin Quercetin Kaempferol ^[7]
ESSENTIAL OILS	E-y-cadinene β -caryophyllene Thymol β -pinene 1,8-cineole P-cymen ^[8]
PHENOLIC COMPOUNDS	Quercetin-3-O-rutinoside 3-O-caffeoylquinic acid Luteolin-7-O-glucoside Apigenin-7-O-rutinoside Apigenin-7-O-glucopyranoside Quercetin ^[9]

Table 1: Phytochemical constituents of *Pilea microphylla***MANAGEMENT OF *Pilea microphylla*:**

Growing in full sun but preferring light shade, artillery plant needs well-drained yet moist soils and should only be watered when the soil dries. Plant on 18- to 24-inch centers to establish a quick cover. Plants may be pinched occasionally to encourage bushiness, but this is seldom necessary. Light applications of fertilizer are recommended.

THERAPEUTIC ACTIONS OF *Pilea microphylla*:**Folkloric:**

- Entire plant infusion is used as a diuretic.
- Used for diarrhoea and asthma.

- Crushed leaves applied to sores and bruises.
- In the Antilles, sweetened decoction of roots used as diuretic.
- In Jamaica, entire plant used for women in labour; used for infertility and inflammation.
- In Brazil, used as a diuretic.
- In Guatemala, used for urinary problems.
- In Jamaican and Chinese medicine, used for diabetes.
- In western Panama, stem decoction drunk for diarrhoea.
- In Trinidad and Tobago, leaves used for inflammation and as womb cleanser. ^[6]

Antidiabetic activity:

It was reported that due to the rich fractions of flavonoids in the PM produces significant anti-diabetic activity. The HPLC characterization revealed the presence of flavonoids in PM such as quercetin, chlorogenic acid, rutin, isorhoifolin etc. An overall antidiabetic effect could be the result of a combination of several constituents acting in concert restoring homeostasis in energy consumption and utilization. [10]

Antioxidant activity:

The antioxidant activity evaluated by using DPPH free radical scavenging method. The methanolic extract of PM shows the highest antioxidant activity. Due to the presence of phenolic compounds such as Quercetin-3-Orutinoside, 3-O-caffeoylquinic acid, Apigenin-7-Orutinoside and quercetin, PM exhibited significant antioxidant potential in scavenging free radicals such as DPPH, ABTS assays. The antioxidant activities were determined on the basis of cell-free and cell-based systems.[11]

Antimicrobial activity:

The antimicrobial activity study of PM extract was tested in vitro by using disc diffusion method and minimum inhibitory concentration. It was reported that PM extract showed the antibacterial activity against both Gram negative and positive bacteria and also it did not exhibit antifungal and antiyeast activity. The phenolic compounds which are isolated from the plant exhibited significant antimicrobial property. [12]

Cytoprotective or antigenotoxicity activity:

Study compared the cytoprotective and antigenotoxic activity of the polyphenolic fraction with its active polyphenolic constituents against γ -radiation in V79 cells. Results showed radioprotection probably from a synergistic effect of the phytochemicals present in the herbal extract rather than any single component. [13]

Antidepressant activity:

It was reported that the crude extracts of PM produced an antidepressant-like effect and significantly reduced the immobility and decreased freezing time in Forced Swim Test and Tail Suspension Test. It exerts an antidepressant effect in the two behavioural models and it suggests that effect may be due to the presence of flavonoids. The antidepressant activity was determined in the different extracts of *Pilea microphylla* and found out that it may have the activity that enhanced uptake of flavonoids groups.[14]

Improvement in sperm parameters and dna fragmentation:

Varicocele is one of the most common causes of primary male infertility. It was reported that the administration of PM, there is an improvement in certain parameters such as semen parameters, DNA fragmentation and fertility in varicocelized rats. It suggests that the improvement in the rate of fertilization in varicocelized rats may be due the reduction in reactive oxygen species (ROS) production. [15]

Antiinflammatory activity:

The anti-inflammatory effect of PM also observed in the different doses of methanolic extract of PM. It results in the greater inhibition of paw oedema when compared with the standard agent. The studies shows that the use of *Pilea microphylla* as therapeutic agents to treat inflammation as an alternative option. [16]

CONCLUSION:

Pilea microphylla commonly known as artillery weed, rockweed or gunpowder plant is an important medicinal plant belonging to family Urticaceae. It is used in Indian folk medicine to cure allergies/wounds, diuretics, treating burn & scald, childbirth problems, infertility & bacterial infection. The plant *Pilea microphylla* contains different levels of phenolic compounds, flavonoids and possess antioxidant activity, antidiabetic, antidepressant, antimicrobial and radioprotective activities in animal models. However, the application of any compounds to medicine will require safety and toxicity issues to be addressed and further studies need to be done.

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