



Pharmacognostical and Preliminary Phytochemical Evaluation of Leaf of *Blepharis Maderaspatensis* Linn

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ABSTRACT: *Blepharis maderaspatensis* Linn. (Family: Acanthaceae) is a perennial herb traditionally used in the treatment of wounds, ulcers, boils, and eye diseases¹. Despite its wide ethnomedicinal relevance, detailed pharmacognostical and phytochemical documentation remains scarce. The present study was undertaken to establish diagnostic features and preliminary phytochemical standards for this plant. Although *Blepharis maderaspatensis* is widely used in traditional medicine, comprehensive scientific validation is lacking, and so far, no major research has been carried out on its efficacy from an Ayurvedic perspective. The leaves were collected from their natural habitat, authenticated, shade-dried, powdered, and subjected to macroscopic, microscopic, and powder microscopy investigations. Preliminary phytochemical screening was also performed using standard protocols. Macroscopic evaluation revealed simple, ellipticovate leaves arranged in whorls of four, with entire to slightly toothed margins, dark green upper surface, pale green lower surface, and an astringent taste. Microscopic studies showed dorsiventral differentiation^{2,3} Diacytic stomata, single-layered epidermis with cuticle, parenchymatous ground tissue, xylem, phloem, and abundant calcium oxalate crystals. Powder microscopy confirmed the presence of epidermal cells, fibres, trichomes, tracheid's, and pitted vessels. Phytochemical analysis indicated the presence of alkaloids, phenolic compounds, flavonoids, tannins, saponins, steroids, carbohydrates, and terpenoids, with ethanolic extract showing the highest extractive value (6%). These findings provide baseline data for proper identification, authentication, and future standardization of *Blepharis maderaspatensis* Linn. for pharmacological and therapeutic applications.

KEYWORDS: *Blepharis maderaspatensis* Linn., Acanthaceae, Pharmacognosy, Powder microscopy, Preliminary phytochemical analysis.

INTRODUCTION

Medicinal plants have played a vital role in human health since ancient times. They are considered the foundation of many traditional systems of medicine practiced across the world. Even today, a large portion of the global population depends on plants for their healthcare needs. Among the different systems of medicine, Ayurveda is one of the oldest and most widely recognized. It focuses on natural ways of healing and

maintaining balance in life. Today, because of high demand and low supply, genuine medicines are not always easy to find. That's why it is important to use plants that are common, easy to get, and very effective.

Dravyaguna Vigyana, a branch of Ayurveda, is the study of the properties (Guna) and actions (Karma) of medicinal substances. Often considered as the Ayurvedic equivalent of clinical pharmacology, it provides the foundation of rational therapy by offering detailed knowledge of both theoretical and practical aspects. Effective and precise use of any medicine requires a clear understanding of Ayurvedic pharmacology. Ancient scholars like Raja Narahari mentioned in Rajanigantu that forest dwellers were the primary source of knowledge about medicinal plants and their healing properties. Observations from the field were later tested through clinical evaluations, which helped establish the therapeutic value of various herbs.

Blepharis is a genus of plants belonging to the family *Acanthaceae*⁴, comprising around 126 species. The leaves of these plants have traditionally been used in the treatment of wounds, boils, ulcers, eye diseases, and related ailments. The plant is known by several synonyms, including *Blepharis boerhaavifolia* and *Acanthus maderaspatanus* Vahl ex Nees. However, although a comprehensive scientific review of the plant is still lacking, it is widely recognized in traditional medicine. Tribal claims highlight its medicinal potential.

The present review focuses on one of the lesser-known species of this genus, *Blepharis maderaspatensis* (L.) B. Heyne ex Roth. It provides an overview of the pharmaco-gnostical characteristics and preliminary phytochemical evaluation of the species to substantiate its traditional use. Pharmacognostical studies, including organoleptic evaluation and microscopic examination of the transverse section of the leaves, were performed. In addition, preliminary phytochemical analysis of an authenticated sample of *Blepharis maderaspatensis* Linn. was carried out and documented following standard procedures.

MATERIALS AND METHODS

MATERIALS

Collection and Authentication of the plant

Blepharis maderaspatensis Linn. is commonly distributed throughout Kerala and in Western Ghats. The sample were collected from their natural habitat and the plant material was authenticated by Dr. Silambarasan, Taxonomist, Pankajakasthuri Ayurveda Medical College and PG Centre, Killy, Kattakkada, Trivandrum.

Preparation of study drug.

The leaves were thoroughly cleaned, shade dried and powdered for stored in air tight container and used for powder microscopy and preliminary phytochemical analysis. For the pharmacognostical evaluation, it was decided to find out the macroscopic (organoleptic) and microscopic features of the leaves of *Blepharis maderaspatensis* Linn.

STUDY SETTINGS

Drug Standardisation Unit, Government Ayurveda College, Thiruvananthapuram, Kerala.

METHODS

Macroscopic study, Microscopic study and powder microscopy was conducted.

Macroscopic evaluation

Macroscopic evaluation is the method of qualitative evaluation established on the study of morphological and sensory profiles of leaf. Fresh, full-grown and healthy leaves were collected and washed in pure water to remove all the impurities. The samples were subjected to macroscopic evaluation by observation with naked eyes and by tactile and other sensory inspection. A magnifying lens was used for a better evaluation of surface characters.

Microscopic evaluation

The microscopic evaluation is used for studying the histological features of transverse section of leaf *Blepharis maderaspatensis* Linn. Enough number of sections was taken. Thin sections that floated in water were selected were carefully transferred to a petri dish containing water. Two drops of glycerine were put on the section using a dropper, a clean cover slip was placed gently over the section. The excess glycerine was removed and the slide was placed gently over the digital microscope (Olympus digital- CS41, Japan, with CCD camera with analysis software digital image- Pro) for histological examination and direct images were taken at 4x, 10x and 40x magnification.

Powder Microscopy:

Initially, one or two drops of glycerine was placed on a clean glass slide. The tip of a needle was moistened with water and dipped into the powder to collect a small quantity of the material. This was then transferred into the glycerine drop on the slide. The mixture was stirred gently but thoroughly, and a cover slip was carefully placed over it. Light pressure was applied to the cover slip using the handle of the needle to ensure even spreading, and any excess fluid around the edges was removed. The prepared slide was then examined under a trinocular microscope, and images were captured at 4x, 10x, and 40x magnification.

Preliminary physical and phytochemical analysis

Preliminary phytochemical analysis of genuine sample of the study drug *Blepharis maeraspatensis* Linn. was conducted as a part of the study. These tests are simple and easy to carry out and give valuable information about the identity, genuineness and purity of the drug.

Preliminary phytochemical analysis was done as per standard protocol^{5,6,7}.

RESULT

Sample collection.

The genuine sample of *Blepharis maderaspatensis* Linn. was collected from its natural habitat, thoroughly washed with water and dried in shade. The powdered dry drug was kept in air tight containers and used for powder microscopy and preliminary phytochemistry. Fresh samples were taken for pharmaco-gnostical study.

Table 1: Weight of leaves of the Drug in Different Stages of Collection.

Sample	Weight
Fresh sample	1kg
After shade dry	250gm
Powdered	250gm

Macroscopic evaluation

The leaves of *Blepharis maderaspatensis* Linn. were subjected to organoleptic evaluation and microscopic examination, after that observations were recorded, the data analysed, and the results interpreted accordingly.



Fig. 1: Showing Different dimensions of *Blepharis maderaspatensis* Linn. Leaf

Table 2: Showing Organoleptic characters of leaves of *Blepharis maderaspatensis* Linn.

Type	Simple, whorl of Four
Shape	Elliptic-ovate, rhomboid
Size	4.6 x 1.9 cm
Margin	Entire, toothed in the upper half
Surface	Smooth, Glabrous
Apex	Acutely apiculate apex
Base	Acute-cuneate
Texture	Glabrous
Color	Upper surface - Dark green in color. Lower surface – Pale green
Odor	Characteristic odor
Taste	Astringent

Blepharis maderaspatensis Linn. is a perennial herb, with whorled four leaves at each node, elliptic-ovate-rhomboid in shape, upper half of leaf margin is slightly dentate or serrate, leaves surface is slightly hairy. Acute apex, and cuneate base. Upper surface of leaf is Dark green in colour and lower surface is Pale green. Leaf texture is slightly rough and glabrous.

Microscopic evaluation of leaves of *Blepharis maderaspatensis* Linn.

The microscopic evaluation of the transverse section of the leaf of *Blepharis maderaspatensis* Linn. was performed, and the details are presented below.

The leaf of *Blepharis maderaspatensis* Linn. is dorsi-ventrally differentiated, exhibiting a well-organized structure with distinct laminar regions. It comprises an upper and lower epidermis, mesophyll, and a prominent midrib. Both epidermises are single-layered and lined with thick layer of cuticle. The upper epidermal layer consists of rectangular cells, while the lower epidermis features thick-walled, rectangular cells. Stomata are Diacytic, present on both surfaces, though more abundant on the lower epidermis. The midrib contains a single, semicircular vascular strand, with xylem forming a robust arc of circular, thick-walled vessels, and phloem delicately arranged beneath the xylem. The surrounding ground tissue is parenchymatous, extending from the vascular bundle to the upper epidermis. The mesophyll is differentiated into a single row of narrow, loosely arranged palisade cells, while the spongy mesophyll comprises three to four lobed aerenchyma cells. Scattered throughout the leaf are abundant calcium oxalate crystals, elegantly arranged in rosette-like patterns. Cystolith present throughout the ground tissue.



Fig.2: Genuine sample of *Blepharis*



Fig. 3: Fresh sample collected *maderaspatensis* Linn. from its natural habita



Fig.4: Dried sample



Fig.5: Powdered sample



Fig.6: Macroscopy of the leaf of *Blepharis maderaspatensis* Linn.

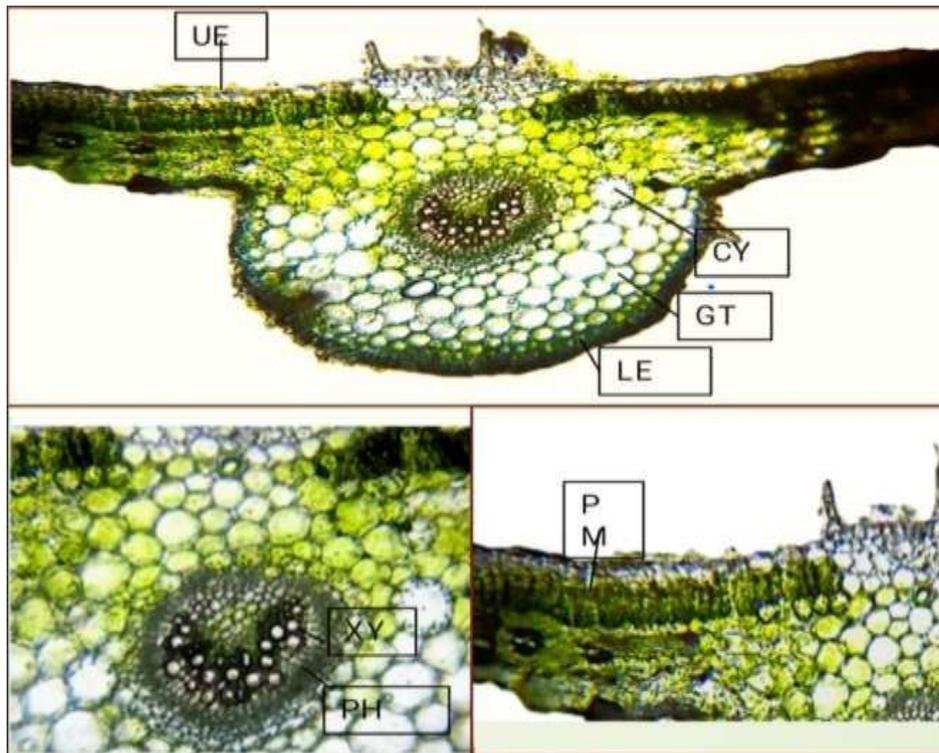


Fig.7: Transverse section of leaf U.E-Upper epidermis, L.E-Lower epidermis, CYCystolith, GT-Ground tissue, XY-Xylem, PH-Phloem, PM-Parenchyma

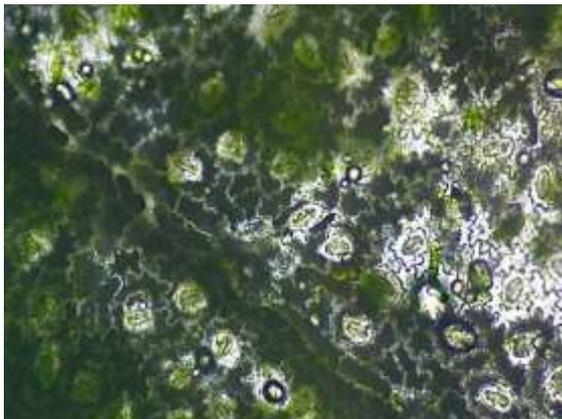
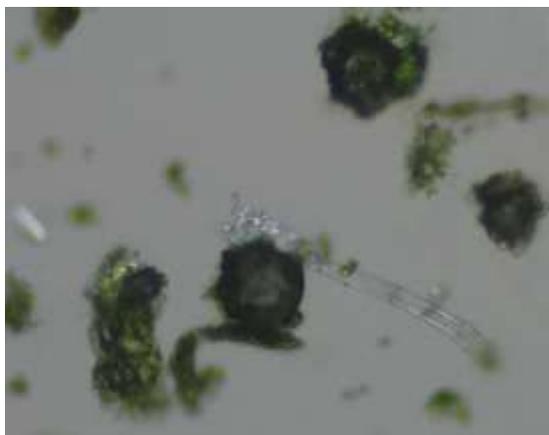


Fig.8: Diacytic Stomata in the lamina.



Cystolith and Tracheid



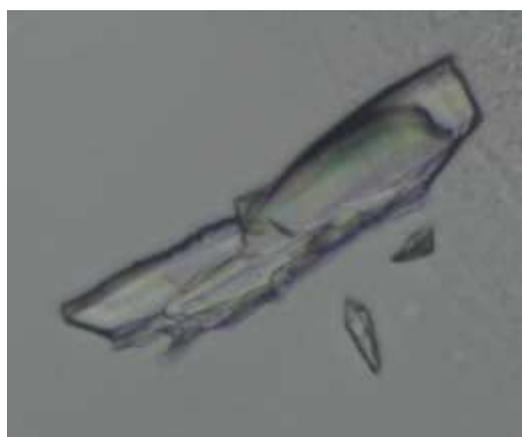
Calcium oxalate crystals, cystolith and Trichome.



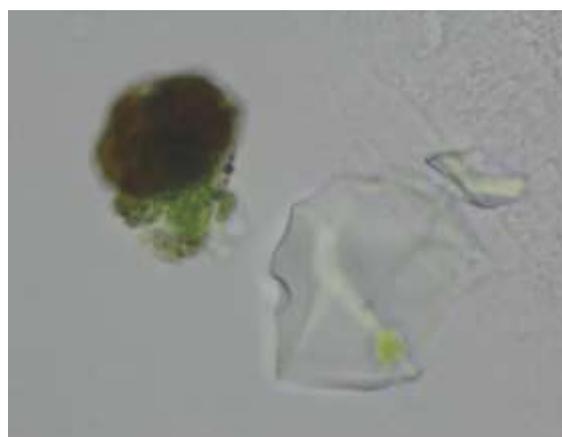
Trichomes



Pitted vessels



Vessels



Cystolith and group of epidermal cells

Fig.9: Powder Microscopy of leaves of *Blepharis maderaspatensis* Linn.

Powder Microscopy

The leaf powder appeared green in color under powder microscopy. Microscopic examination demonstrated the presence of epidermal cells, calcium oxalate crystals, xylem vessels, fibres, tracheid's, and both glandular and non-glandular trichomes.

Results of Preliminary Phyto-Chemical Analysis of powdered leaves of *Blepharis maderaspatensis* Linn.

Phytochemical evaluation of the powdered leaves of *Blepharis maderaspatensis* Linn. was carried out following standard procedures. Physicochemical parameters such as moisture content, total ash, acid-insoluble ash, water-soluble extractives, and alcohol-soluble extractives were analysed.

Table 3: Phyto-Chemical Analysis of powdered leaves of *Blepharis maderaspatensis* Linn.

Sl.NO.	EXPERIMENTS	<i>Blepharis maderaspatensis</i> Linn.
1	Foreign matter	Nil
2	Total Ash	13%
3	Acid Insoluble Ash	0%
4	Water Soluble Ash	0.5%
5	Percentage of moisture	4%
6	Volatile oil	Nil
7	pH	6.7

Table 4: Results of Qualitative analysis of Crude Drug extracts of powdered Leaves of *Blepharis maderaspatensis* Linn.:

Sl.No.	Test	Extract				
		Hot Alcohol	Hot Water	Cold Alcohol	Cold Water	
1	Detection of Alkaloid	Mayer's test	-	-	-	-
		Dragendroff's test	+	+	-	-
2	Detection of phenolic compounds	Ferric Chloride Test	+	-	+	+
		Lead acetate Test	-	+	+	+
3	Detection of Steroids	-	-	-	-	
4	Detection of fixed oils and fats	+	-	-	-	
5	Detection of Saponins	+	-	-	+	
6	Detection of Proteins	-	-	-	-	
7	Detection of carbohydrates	Fehling's test	-	-	-	-
		Benedict test	+	+	-	-
8	Detection of Tannin	Ferric chloride	+	-	-	+
		Lead acetate	-	+	-	+

+ For Present, - For absent

Table 5: Successive solvent extractive values of powdered leaves of *Blepharis maderaspatensis* Linn.

Sl.NO.	Solvent	% of extractive of <i>Blepharis maderaspatensis</i> Linn.
1	Petroleum Ether	0.2 %
2	Ethanol	6 %
3	Distilled water	2.3 %

Table 6: Qualitative Analysis results of Successive solvent extractives of powdered leaves of *Blepharis maderaspatensis* Linn.

Test	Extract		
	Ethanol	Petroleum ether	Distilled water
Detection of Alkaloids	+	+	+
Detection of Flavonoids	----	---	+
Detection of Phenols	+	---	+
Detection of Glycosides	---	---	+
Detection of Saponins	+	----	---
Detection of Steroids	+	+	---
Detection of Tannins	---	+	---
Detection of Terpenoids	+	+	+

+ For Present, - For absent

DISCUSSION

The pharmacognostical evaluation of *Blepharis maderaspatensis* Linn. provides key diagnostic features that aid in its correct identification. The macroscopic characteristics, such as the elliptic-ovate leaf shape, whorled phyllotaxy, and distinct coloration, serve as primary markers for recognition. Microscopic analysis revealed Diacytic stomata and cystoliths, both considered important taxonomic features of the genus *Blepharis*. The presence of calcium oxalate crystals and parenchymatous tissues further corroborates the structural uniqueness of the plant.

Powder microscopy confirmed the presence of trichomes, fibres, vessels, and crystals, which serve as additional diagnostic criteria when the drug is in powdered form. Preliminary phytochemical screening demonstrated the occurrence of bioactive secondary metabolites such as alkaloids, phenols, tannins,

flavonoids, saponins, and terpenoids. These compounds are known to exhibit wound healing, antimicrobial, antioxidant, and anti-inflammatory activities, thereby validating its traditional usage for treating wounds, ulcers, and related ailments.

The solvent extractive values indicated that ethanol was the most effective solvent for isolating phytoconstituents, suggesting that ethanol extracts may demonstrate greater pharmacological activity. Successive extraction with distilled water and ethanol revealed a richer profile of chemical compounds. Although *Blepharis maderaspatensis* Linn. is not yet documented in the Ayurvedic Pharmacopoeia of India, the present study establishes a preliminary standard profile that can serve as a foundation for future pharmacological research and clinical validation. As this study provides only an initial evaluation of the drug, comprehensive phytochemical and quantitative analyses are recommended to support future pharmacological assessment.

CONCLUSION

The present study provides a detailed pharmacognostical and preliminary phytochemical profile of *Blepharis maderaspatensis* Linn. Macroscopic and microscopic evaluations established clear diagnostic characters, while powder microscopy provided additional markers for identification in crude form. Phytochemical analysis confirmed the presence of multiple secondary metabolites with therapeutic potential. These findings highlight the importance of this underexplored species and provide baseline data for its inclusion in future pharmacopoeial standards. The study also supports the traditional claims regarding its medicinal value and encourages further pharmacological and clinical research to validate its therapeutic efficacy.

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