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Review Paper

The Multifaced Medicinal Plant *Melastoma Malabathricum*: Ethnobotany and Beyond

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ABSTRACT

Melastoma malabathricum is a tropical plant of medicinal value and is multipurpose in nature. This particular plant is used in Malay for wounds, ulcers, and hypertension and even in Indian and Indonesian medicine. A mix of all parts of this shrub such as its bark, roots, and leaves have shown to aid medicinally. This leads to the synthesis of metabolites like terpenoids, flavonoids, alkaloids, and tannins. Other than the uses mentioned above this plant also has been observed to be effective in wound healing, functioning as an antioxidant, and even anticancer. Some of these treatments such as anti-inflammatory, antidiabetic and hepatoprotective medicine is used where toxicity is not present even in high dosages. As for now, the plant shows promise but is not properly clinically validated. With more research, this particular plant can be of great use as it shows great bioactive characteristics. This comprehensive review emphasizes the potential of *Melastoma malabathricum* as a source of bioactive compounds and a promising candidate for therapeutic development

INTRODUCTION

Treating illnesses using medicinal plants has been practiced by humans for centuries, and the first plant medicines, historical documents and monuments strongly with the fact that humans have always sought for medicines in nature. The many diseases we fought long ago made us search for medicinal effects in certain parts of plants like

bark, seeds and fruit bodies. This means that the awareness of the use of medicinal herbs is now increasing ^[1-4]. *Melastoma malabathricum* Linn, Considered a herb, falls under Melastomataceae family that contains two subspecies they are *Melastoma malabathricum* L. ssp. and *Melastoma malabathricum* Linn ssp. Normale ^[5]. Containing more than 4,000 species across the globe,

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melastomataceae plants are indigenous to tropical and subtropical parts of the world. It is a herb or shrub which grows into small trees 12 to 20ft high^[6]. Likewise, it is a well-known herb and different types of treatments are made from its leaves, shoots, and roots to cure different diseases. Communities and tribes believe that *Melastoma malabathricum* has multiple medical uses. Although the type of therapies that *Melastoma malabathricum* can provide is actively mentioned in traditional medicine, there is no proof for this at the clinical level. Since time immemorial, leaves, roots, and/or barks of the plant have been used by Malaysians, Indians, and Indonesians for various types of folk medicine for multiple ailments and sicknesses. The entire plant is said to have medicinal qualities and has the potential to be a herbal therapy^[7]. The aim of this review is to analyze and expand on *Melastoma malabathricum* pharmacological properties, phytochemical components and ethnomedicinal uses.

METHODOLOGY

Conducted a systematic review for articles on *Melastoma malabathricum* on Google Scholar, PubMed, Scopus and Web of Science between 2000 and 2024. The data was compiled from articles related to traditional uses of the plant, phytochemistry, and pharmacological activities. The data collected was evaluated qualitatively in terms of critical issues in order to be able to integrate the major conclusions. Approval for the ethics review board was not required, and the results will be published in peer-reviewed journals and conferences as well as by informing the medical and scientific society.

Plant profile

Plant profile *Melastoma malabathricum* is a small shrub that has prevalently been located in previously cleared land, waste areas, and on roadsides across southeast asian nations especially in Malaysia. However, this is widely distributed in the Pacific islands as well as in the tropical and temperate regions of Asia^[5].

Taxonomical classifications^[7]

Kingdom : Plantae
Order : Myrtales
Family : Melastomataceae
Genus : *Melastoma*
Species : *malabathricum*.

Vernacular names^[8]

English : Malabar, Melastome
Hindi : Phutki
Kannada : Ankerki, Kenkarike, Doddanekkare
Tamil : Katalai
Malayalam : Athiraani

Description of plant:

Melastoma malabathricum is a shrub that usually ranges between 0.5 to 1m but can also reach a height of around 5m. The stem of this plant is rough and bristly with small and scale-like structures. The leaves have a long petiole, ovate blade shape and either elliptical or elliptic-lanceolate structure which are usually stiff and papery in texture. Similar to the leaves, the flowers also have various colors of petals including dark purple, light pink and white which also have yellow-brown large needle like bracts. Mature and ripe fruit have a dark purple soft sweet pulp that contains a number of seeds that are bright orange in color^[5].



Fig 1. Leaves, shoot flower and root of *Melastoma malabathricum* plant

Active constituents:

A qualitative phytochemical test conducted on *Melastoma Malabathricum* revealed that the plant contains flavonoids, alkaloids, steroids, phenols, fixed oil, terpenoids and tannins which were majority of the compounds identified. However, the plant was examined for saponins and glycoside but both were negative [8-11].

Toxicity studies

Toxic effects such as alterations in the rats' eyes, change in patterns of behavior, salivation, diarrhoea, and sleep norms were not evident during the 14-day research period. Additionally, there were no deaths amongst the rats treated to dosages of 2,000mg/kg and 5,000mg/kg. When put in correlation with the control rats, the body weight of the male and female ones changed but

most likely not in a notable manner. Extensive gross necropsy showed no organ changes too. Biochemical and clinical examinations further defined the normal functioning of kidney and liver by showing similar areas of tissue changes between the control and other groups when combined with histopathology evaluating organs^[12]. After applying *Melastoma malabathricum* to group of rats, the extracts displayed no toxicity indicating it is safe for oral use, even at 5,000 mg/kg maximum dosage. In line with a research process, even at 10% concentration of it, female rats bearing skin conditions were not observed to have adverse effects^[13].

Medicinal uses:

Ethnomedicinal uses:

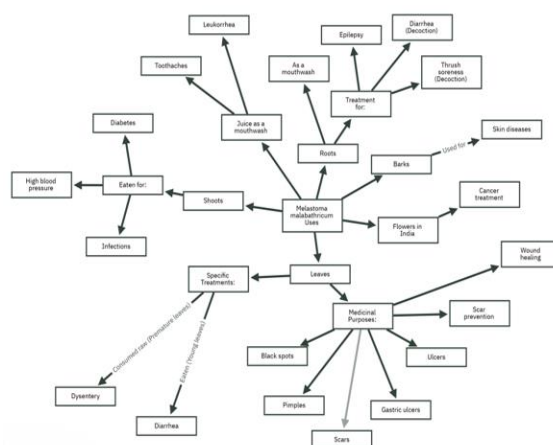


Fig 2. Traditional uses of *Melastoma malabathricum*

In folk medicine *Melastoma malabathricum* is claimed to be useful for many applications, however, there is no evidence in clinical studies to support its use. Broadly, the Malay, Indian and Indonesian folk medicine practitioners normally utilize the various parts (e.g., leaves, roots, and/or barks) of the plant to cure miscellaneous ailments and diseases^[7]. Leaves of a plant have a range of medicinal uses which includes curing a wound, preventing scar formation, and treating dysentery, diarrhea and piles. Diarrhea can also be treated with young leaves, whereas dysentery can be cured with premature leaves that have not been cooked.

Infections, hypertension, diabetes, and mouthwash are some of the things that could be worked on using shoots and juice, or sore throats and even leukorrhea. Ulcers, gastric ulcers, scars, pimples and black spots in turn can be treated with leaves. Some roots are also useful as a mouthwash while others are good for epilepsy. Diarrhea and thrush soreness can be alleviated by using root decoctions. Barks help alleviate skin diseases and flowers are used in India to treat cancer^[13-15].

Pharmacological uses

Although *Melastoma malabathricum* has been widely used in various symptoms and diseases,

only a few pharmacological studies have been reported. It is reported to contain Antidiabetic activity^[16] antihyperlipidemic^[16] Antioxidant activity^[16,27] Hepatoprotective Activity^[17] Antiulcer activity^[18] Anticancer Study^[19] Wound healing^[20] Antibacterial activity^[12,28]

Immunomodulatory effect^[12] Anticoagulant activities^[21] antinociceptive activity^[22] Anti-Obesity Effects^[23] cytotoxicity^[24,27] Anti-inflammatory activity^[25] and Antidiarrheal activity^[26].



Fig 3. Pharmacological uses of *Melastoma malabathricum* plant

RESULTS AND DISCUSSION

Melastoma malabathricum is a plant with multiple antioxidant, antidiabetic, and wound healing effects. In addition to its functional applications, its chemical components, such as flavonoids and tannins account for its beneficial activities. The performed toxicity tests assured the harmlessness of the extracts even in high dosages. Utilization of the plant in traditional medicine also corresponds with the pharmacological investigations and provides a rationale basis for using it as a source of natural medicine.

Future directions

In order to use *Melastoma Malabathricum* to its full benefits, it is important to ascertain its efficacy and safety through clinical validation alongside pharmacokinetics. Studying its molecular mechanisms and bioactive compounds can help in identification of useful therapeutic targets. It is important to understand the dose responsive synergistic effects of *Melastoma Malabathricum* alongside conventional treatment and employment in novel drug formulations and approaches to increase its value. Since widespread pharmaceutical use will be implemented, large

scale cultivation accompanied by sustainable harvesting methods should become the aim of the future work.

CONCLUSION

Melastoma malabathricum has long been used in folk medicine. In spite of the systematic research being limited it still goes on to have numerous applications as an ethnomedicine. Its rich phytochemicals like alkaloids, flavonoids, tannins goes on to support its wide variety use which includes anticancer, antioxidant, antidiabetic and most prominently, hepatoprotective properties. To validate its historic uses, toxicological investigations showcase it being safe up until considerable levels. In this modern world however, there is a shortage of clinical studies which showcase its effectiveness in various areas. There is hope though for this plant as a source for creating medicinal molecules, shrinking the gap between traditional knowledge and modern pharmacology.

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