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A Review Of The Medicinal Potential And Botanical Characteristics Of Justicia Wynaadensis

Sandhya Patil*, Dr. Ganesh R. Phadtare, Dr. Sanjay Arote, Preeti Lambkane, Darshana Shejwal

Research Scholar*, HOD Pharmacolgy Department, Principal
IVM's Krishnarao Bhegade Institute of Pharmaceutical Education and Research, Talegaon Dabhade, Pune, Maharashtra, India 410507

Abstract: *Justicia wynaadensis, frequently referred to as "Maddu Thoppu" or the "Medicinal Leaf" within the Western Ghats region, serves as a vital ethnomedicinal shrub. It is traditionally ingested for its health benefits, especially during the monsoon period in Coorg, Karnataka. This review offers a thorough examination of its botanical traits, folklore applications, phytochemical makeup, and contemporary pharmacological uses. From a botanical perspective, the species is recognized for its characteristic purple extract and specific morphological markers within the Acanthaceae family. Chemical analyses indicate a diverse array of bioactive constituents, such as phenols, flavonoids, alkaloids, and key minerals, which underpin its medicinal value. Recent studies emphasize its significant antioxidant, antimicrobial, anti-inflammatory, and cholesterollowering effects, providing empirical support for its traditional role in regulating blood pressure and lipid levels. This paper consolidates existing data to highlight the species' promise as a foundation for new phytopharmaceuticals and natural food dyes, while also pinpointing essential areas for future clinical trials and commercial development.*

I. INTRODUCTION

Justicia wynaadensis is a small shrub or climber belonging to the family Acanthaceae, native to the Western Ghats region of South India, found in places such as Wayanad, Kodagu, Nilgiris, and Malabar Hills at elevations up to 3000 feet Justicia wynaadensis exhibits a slender, smooth, and terete stem that typically grows 2 to 3 meters in length. Its leaves are opposite, ellipticlanceolate, ranging 5 to 10 cm long with 6 to 8 pairs of prominent veins. The ‘ produces flowers in pairs on drooping spikes approximately 5 to 10 cm long; these flowers have a hairy throat and a glabrous ovary. Flowering occurs mainly from November to March. The shrub thrives in moist deciduous and evergreen forests as well as on forest margins and roadsides within the Western Ghats, adapting well to elevations up to 3000 feet.

Indigenous communities in the Western Ghats, particularly the Kodava tribe, have used Justicia wynaadensis traditionally during the monsoon period (July to August) when the plant is believed to be at peak potency. The juice or purple-colored extract derived from the leaves is applied as a remedy to boost immunity, control blood sugar and blood pressure, and improve skin health. Ethnobotanical documentation attributes its therapeutic effects to the antioxidant and antiinflammatory properties of the plant, also recognizing it as an immunomodulatory agent among local practitioners.

PHYTOCHEMICAL CONSTITUENTS OF JUSTICIA WYNAADENSIS:-

Phytochemical analyses of Justicia wynaadensis show the presence of various bioactive constituents, including alkaloids, steroids, flavonoids, cardiac glycosides, and polyphenols.

RANK	CLASSIFICATION
Kingdom	Plantae
Subkingdom	Tracheophytes
Division	Angiosperms
Order	Lamiales
Family	Acanthaceae
Genus	Justicia
Species	J.Wynaadensis
Synonyms	Adhatoda wynaadensis,Ecbolium wynaadense

These compounds contribute to the plant's medicinal potential by providing antioxidant, anti-inflammatory, antibacterial, antifungal, and cytotoxic activities.

Notably, the presence of 4′Trihydroxyflavone and other flavonoids has been highlighted as important for combating multidrug-resistant strains of microorganisms.

Justicia wynaadensis (Nees) T. Anders, a member of the Acanthaceae family, is a traditional medicinal plant primarily used by the Kuruchiar tribes in the Wayanad district of Kerala, India, and

known for its high antioxidant and phenolic content.

. • Phenolic Compounds & Flavonoids:- These are the primary bioactive components responsible for the plant's high antioxidant activity.

• Key Identified Compounds:- : 3,3′,4′trihydroxyflavone, Dihydrocoumarin, Phytol, and Palmitic acid.

• Natural Pigments: Anthocyanins (ranging from 87-30 to 296 mg C3G/100 g), Carotenoids (3.23-23.02 mg/100 g), and Betaxanthins/Betacyanins.

PHARMACOLOGICAL ACTIVITIES OF JUSTICIA WYNAADENSIS:-

- Antimicrobial and Antibacterial Activity Studies have isolated 3,3′,4′Trihydroxyflavone (from the chloroform fraction) as a potent antimicrobial compound, which has shown significant activity against various pathogens. The antimicrobial action is attributed to the presence of high levels of phytochemicals such as flavonoids, phenolics, saponins, and fatty acids (linoleic acid, myristic acid, palmitic acid, and stearic acid).

- Anti-inflammatory Properties The plant is traditionally used as an external application for rheumatic swellings.It is recognized for its antiinflammatory properties, providing relief in inflammatory conditions.

- Cardiovascular and Lipid-Lowering Effects J. wynaadensis can reduce the concentration of cellular cholesterol and cholesteryl esters. It has shown a novel inhibitory effect on the uptake of oxidized low-density lipoprotein (ox-LDL) by human macrophages, suggesting its potential to treat hypercholesterolemia and atherosclerosis.

- The hypocholesterolemic effect is attributed to the presence of phytosterols that displace cholesterol in bile salt micelles, thus inhibiting its absorption, and to flavonoids that act systemically to reduce endogenous cholesterol synthesis and improve endothelial function.

- Anticancer and Cytotoxic Activity Leaf extracts have demonstrated cytotoxic effects on human cancer cell lines, particularly MCF7 (breast cancer) and HCT116 (colorectal cancer). Molecular docking studies (a computational method) using GC-MS results of both in vivo and in vitro (callus) extracts have identified compounds that interact with Thymidylate synthase, a target enzyme for cancer treatment

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