

PHYTOPHARMACOLOGICAL PROPERTIES OF *MELOTHRIA MADERASPATANA*: A REVIEW

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ABSTRACT

A medicinal plant plays a vital role in traditional systems. It is necessary to study the pharmacology activity of individual plants for treating diseases. *Melothria maderaspatana* Linn. belongs to the family of Cucurbitaceae, mostly present in South India, and it shows biological activities such as antibacterial, antioxidant, larvicidal, antiulcerogenic, antidiabetic, hypolipidemic, antihypertensive, immunomodulatory, and antihepatotoxic for treating various diseases which are discussed in this review paper.

Keywords: Medicinal plants, *Melothria maderaspatana*, Biological activities, Diseases.

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INTRODUCTION

Herbal plants are used in traditional medicine systems because of its medicinal values. These plants are the source of raw material in pharmaceutical industries. *Melothria maderaspatana* Linn. Cogn. is one among them. It belongs to the family Cucurbitaceae. It is an annually monoecious herb which was found in India at hilly region. The myths of medicine claim that it is a good diuretic stomachic, gentle claims anti-inflammatory, antipyretic sudorific, and antifatulent besides its use in biliousness and vertigo. A preliminary study was conducted to characterize phytochemicals present in *M. maderaspatana*, a plant drug used in traditional medicines [1]. It is called Musumusukkai in Tamil [2]. It is used in Siddha medicine against a variable disease [3]. An ethnobotanical study of medicinal plants used in Villupuram regions of Tamil Nadu was conducted [4]. This review paper deals with the pharmacological studies which have been explored.

ANTIBACTERIAL ACTIVITY

Harshiny *et al.* synthesized silver nanoparticles using leaf extract of *M. maderaspatana* and conjugate ceftriaxone. Results showed conjugated ceftriaxone with silver nanoparticles have better antioxidant and antimicrobial effect as compared to unconjugated nanoparticles [5]. Riyazullah *et al.* conducted the study that showed soil and environment were major factors which have tendency to affect the activity of medicinal plants. They collected *M. maderaspatana* from India and Sri Lanka and tested their antibacterial and antifungal activity using different organic extracts and result proved that ciprofloxacin used as a standard for antibacterial activity and clotrimazole used as a standard for antifungal activity [6]. Hemamalini and Varma proved antimicrobial activity of methanolic leaf extract and petroleum ether extract and results showed that methanolic extract was more effective [7].

ANTIOXIDANT ACTIVITY

Harshiny *et al.* confirmed the antioxidant activity of *M. maderaspatana* by 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay [5]. They studied antioxidant activity of *Melothria* on sham-operated and uninephrectomized DOCA-salt-induced hypertensive rats. They concluded that *M. maderaspatana* showed antioxidant activity [8]. This study showed that aqueous extract of *M. maderaspatana* was evaluated *in vitro* antioxidant activity by radical scavenging assays against DPPH, hydrogen peroxide, hydroxyl radical, and ABTS and result proved that *Melothria* extracts effectively scavenge all radicals [9]. Examined the antioxidant activity using a methanolic leaf extract to evaluate DPPH

assay and results showed that EC 50 value was <10 µg/ml [10]. They evaluated different fractions of *Melothria* and concluded ethyl acetate fraction showed a better activity. Confirmation was done by measuring the flavonoid content using total phenolic content and DPPH assay [11]. Studied antioxidant activities from roots, stems, leaves, and fruits of *M. maderaspatana* using acetone and methanol extracts and results showed methanolic extract gave a higher yield than acetone extract [12]. They studied free radical scavenging activity of *Melothria* and found that the leaves were showing maximum dose-dependent activity [13].

LARVICIDAL ACTIVITY

Chitra *et al.* tested the larvicidal activity of silver nanoparticles were synthesized using leaf aqueous extract against *Culex quinquefasciatus* and *Aedes aegypti*. Result showed synthesized silver nanoparticles have predominant larvicidal activity [14].

ANTIULCEROGENIC ACTIVITY

Gomathy *et al.* investigated the precautionary effect of ethanolic extract of *M. maderaspatana* against in domethacin-induced gastric ulcer in rats. Results proved that the ethanolic extract of *Melothria* has the ability to decrease acidity and increase mucosal defense in gastric area [15].

ANTIDIABETIC ACTIVITY

Srilatha and Ananda investigated *in vitro* antidiabetic activity of the phenolics and extract such as phloroglucinol and quercetin and results proved that it can be used as an antidiabetic nutraceutical [16]. Balaraman *et al.* evaluated antihyperglycemic effect of *M. maderaspatana* in the streptozotocin (STZ) diabetic rats and compared with activity *Coccinia indica* [17]. Petrus tested the antidiabetic activity of *M. maderaspatana* [18].

ANTIHYPERLIPIDEMIC EFFECT

Veeramani *et al.* studied crude ethanolic extract of *M. maderaspatana* leaf to test its antihyperlipidemic effect in DOCA-salt hypertensive rats and concluded that it can be used in protecting the liver, kidney, and heart against DOCA-salt [19]. Balaraman *et al.* evaluated the hypolipidemic effect of aerial parts of *M. maderaspatana* in the STZ-diabetic rats and result proved that extract showed effective recovery of biochemical parameters and decreased body weight in treating animals [17]. Pandey *et al.* studied that the evaluation of hypolipidemic

effect of aqueous extract of *M. maderaspatana* was conducted in high-fat diet-induced rats and results showed a significant hypolipidemic effect [20].

ANTIHYPERTENSIVE EFFECT

Veeramani et al. investigated the antihypertensive effect of *M. maderaspatana* an identified phytochemicals such as caffeic, vanillic, ferulic, p-coumaric, coumarin, and gallic acid from active fraction by gas chromatography-mass spectrometer [21]. The antihypertensive activity of ethanolic extract of *M. maderaspatana* was studied on sham-operated and uninephrectomized DOCA-salt hypertensive rats and concluded methanolic extract showed antihypertensive effect [22].

IMMUNOMODULATORY ACTIVITY

Thabrew et al. studied the effect of aqueous extract of *M. maderaspatana* on human complement system and the results concluded that the effects were dose dependent [23].

ANTIHEPATOTOXIC ACTIVITY

Jayatilaka et al. studied the potency of an aqueous extract of *M. maderaspatana* and *Osbeckia octandra*. They found that *M. maderaspatana* works more effectively in protecting the liver against CCl₄-induced dysfunction [24]. Veeramani et al. tested the renal defensive effect of C₄H₈O₂ (ethyl acetate) fraction of *M. maderaspatana* leaf on uninephrectomized DOCA-salt hypersensitive rats. They found that it controls the renal damage and also plays a role in controlling blood pressure [25]. Hepatocyte damage was induced by galactosamine and tert-butyl hydroperoxide. The protective effect of aqueous extract of *M. maderaspatana* against the damage was tested. They found that there was a decrease in activity during post-treatment with increase in time of exposure to the toxin [26].

OTHER PROPERTIES

Iman et al. tested *M. maderaspatana* for antiplatelet activity. Various solvents with high polarity (i.e. methanol, chloroform, ethyl acetate, and hexane) and aerial parts of plants are used to prepare the extract. Results showed antiplatelet activity in all solvents except in chloroform, only 50% activity were shown after comparing to Aspirin [2]. Jayatilaka et al. tested the efficacy of *M. maderaspatana* on CCl₄-induced changes in drug-metabolizing enzyme activity. They concluded that the aqueous extract of plants showed decreased CCl₄-mediated reductions in aniline hydroxylase and p-aminopyrine N-demethylase activities [27]. Researchers studied the effect of ethyl acetate fraction of *M. maderaspatana* (EAFM) on membrane-bound ATPase in DOCA-salt-induced hypertensive rats. Results showed that the administration of EAFM having a good blood pressure control and protects against deranged activity of membrane-bound ATPase in DOCA-salt-induced hypertensive rats [28]. Raja et al. studied the effect of *M. maderaspatana* leaf-tea consumption on blood pressure, lipid profile, anthropometry, fibrinogen, bilirubin, and albumin levels in patients with hypertension. They concluded that there was a gradual decrease in BP and also beneficial effects in others [29]. Subramani et al., synthesized silver nanoparticles (AgNP) using *M. maderaspatana* and evaluated their antibacterial activity. The silver nanoparticles thus acquired showed highly potent antibacterial activity toward Gram-positive (*Bacillus cereus*) and Gram-negative (*Escherichia coli*, *Pseudomonas aeruginosa*, and *Klebsiella* sp.) microorganisms [30].

CONCLUSION

Plants are the most important source for exploring potentially useful structural compounds for developing new therapeutic drugs [31]. In recent years, the use of natural herbal products has enhanced worldwide attentions. Many herbal products are claimed to assist in a healthy lifestyle [32]. *M. maderaspatana* is widely available in South India has been used to treat various diseases. The present review reports the various pharmacological potentials which are explored

by various researchers. The active exploration of natural sources has provided new developments based on the understanding of complex mechanisms. Such exploration will lead to a safe and effective pharmacological treatment.

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