Phytopharmacological Properties of Melothria Maderaspatana: A Review

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Received: 06 April 2017, Revised and Accepted: 12 May 2017

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 monoeccious 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 antiflatulent 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 exploded.

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]. Riyazuallah 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]. They 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 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 anti diabetic activity of the phenolics and extract such as chlorogalinol and quercetin and results proved that it can be used as an anti diabetic 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].

ANTHYPERLIPIDEMIC 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 and 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].

ANTITOXOPOTATOTIC ACTIVITY

Jayatlaksha 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 C6H5OH (ethyl acetate) fraction of M. maderaspatana leaf on uninephrectomized DOCA-salt hypertensive 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

Ilan 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]. Jayatlaksha 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 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 beneficial effects in others [29].

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 and 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.

REFERENCES


