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Ethnomedicinal, Antimicrobial and Pharmacological aspects of *Malva parviflora* Linn.: A review

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ABSTRACT

Malva parviflora Linn. has shown its pharmacological potential in different ailments. Leaves are used in the management of wounds and swelling. A lotion made from the leaves is used to treat bruises and broken limbs. The leaves of *M. parviflora* are used for drawing swollen, inflamed purulent wounds. Pharmacological studies shown that *M. parviflora* possesses antibacterial, antidiabetic, antifungal, hepatoprotective, neuroprotective, anti-irritant, antioxidant, anti-ulcerogenic, analgesic and other activities. It is well known that *M. parviflora* have been a major source of natural antioxidants. *M. parviflora* contains flavonoids and phenolic compounds. It was found that methanol fraction of polyphenols from leaves and stems of *M. parviflora* contain different amounts of phenols, flavonoid, saponin, alkaloid, resin and tannin. *M. parviflora* has been widely used in many parts of the world for curing various diseases.

Keywords: *Malva parviflora* Linn., folk medicine, antimicrobial potential, pharmacology, Phytochemistry.

1. INTRODUCTION

The use of the traditional plants combating microbial diseases is becoming the focus of numerous studies [1]. About 3.4 billion peoples in the developing world depend on plant based traditional medicines natural products have been an integral part of the ancient traditional medicine systems [2]. Plants have unlimited ability to synthesize secondary metabolites such as tannins, terpenoids, alkaloids, glycosides and phenols which have been found to have antimicrobial properties [3]. It has been estimated that 14-28% of higher plant species are used in medicinal purposes and that 74% of pharmacologically active plant derived components were discovered after following upon ethnobotanical uses of the plants [4-6].

Malva parviflora Linn. (family- Malvaceae) is an annual, biennial or a perennial herb plant. It is commonly known as cheese weed and locally known as "Sonchal". It is growing up to 40 inc. It has a deep strong tap root system and the leaves are dark green and have 5-7 toothed, rounded lobes [7].

M. parviflora has been widely used in many parts of the world for curing various diseases. People used a poultice made from the whole plant parts of the plant to treat boils, inflamed purulent wounds and swellings. A hot poultice of leaf is used to treat wounds and swellings and tea of the leaf is taken as a nerve tonic and used as a taenicide and for profuse menstruation. A dried powder or an infusion of the leaves and roots is used to clean wounds and sores. Tea of the leaf is used for treating dry, irritative, cough and bronchitis. A decoction of the leaves and roots is also used as a hair rinse to remove dandruff and to soften the hair, and tea of the leaf is also used to clean out the mother's system after childbirth. Seeds are demulcent, used to treat cough and ulcers in the bladder [7-10].

It was found that methanol fraction of polyphenols from leaves and stems of *M. parviflora* contain different amounts of phenols, flavonoid, saponin, alkaloid, resin and tannin. The methanol fraction showed high antioxidant potential [11]. Traditionally *M. parviflora* is used for the treatment of inflammation, pain and liver injuries [12].

M. parviflora has shown its pharmacological potential in different ailments. Leaves are used in the management of wounds and swelling. A lotion made from the leaves is used to treat bruises and broken limbs [13]. The leaves of *M. parviflora* are used for drawing swollen, inflamed purulent wounds [14]. Pharmacological studies show that *M. parviflora* possesses antidiabetic [15], antifungal [16].

1.1 Taxonomy

Kingdom - Plantae
Division - Tracheophyta
Class - Magnoliopsida
Superorder - Rosanae
Order - Malvales
Family - Malvaceae
Genus - *Malva*
Species - *parviflora*

1.2 Plant description

M. parviflora is an annual, a biennial or a perennial herb plant. The plant is growing up to 40 in., has a deep strong tap root system and the leaves are dark green and have 5–7 toothed, rounded lobes [7].

1.3 Common name

Smallwhorl mallow, cheeseweed, and cheeseweed mallow.

2. TRADITIONAL MEDICINAL USES

Traditional healers and herbalists use dried powder or an infusion made from leaves and roots of *M. parviflora* to clean wounds and sores. A hot poultice made from leaves is also used to treat wounds and swelling and is incorporated into a lotion to treat bruised and broken limbs. The leaves of *M. parviflora* used for drawing swollen, inflamed purulent wounds. However, if ingested it could be toxic as *M. parviflora* is reported to cause mortality in foraging livestock, such as sheep, horses and cattle. Sheep are the most often affected and develop clinical signs including staggering, trembling arched back and laboured breathing. Malvalic acid, an unsaturated fatty acid previously referred to as alphen acid, may contribute to the toxic effects of *M. parviflora* [13-14,17].

3. PHARMACOLOGICAL ACTIVITY

3.1 Antibacterial activities

Ododoet *et al.*, (2016) reported that the chloroform extract of *M. parviflora* showed antibacterial activity against *S. aureus* and *E. coli* (15 ± 0.41 mm) and MIC value of 20 mg/mL, while the ethanol extract showed antibacterial activity against only *S. aureus* with diameter of zone of inhibition (18 ± 3.20 mm) and MIC value of 15 mg/mL [18].

The hexane, chloroform and ethanol extracts of *M. parviflora* possesses antibacterial activity against *B. subtilis*, *S. aureus*, *E. coli* and *P. vulgaris*. The diameters of growth inhibitions against *B. subtilis* ranged from 10.81 to 15.3 mm for the chloroform extracts as compared to the values ranging from 9.34 to 10.56 and 9.67 to 12.87 mm for the hexane and ethanol extracts, respectively. The hexane, chloroform and ethanol extracts of *M. parviflora* shown antibacterial activity against *B. subtilis*, *S. aureus*, *E. coli* and *P. vulgaris*. Chloroform extract showed statistically greater antibacterial effects than hexane and ethanol extracts [13,16,19].

Tadeg *et al.*, (2005) reported the root of *M. parviflora* showed zone of inhibition (20 ± 0.0 mm) against *S. aureus*, but no zone of inhibition was noted against *E. coli*. Kalayou *et al.*, (2012) revealed the antibacterial activity on the leaves of *M. parviflora*, and the zones of inhibition were 9.70 ± 1.10 mm for *S. aureus* and 10.25 ± 2.20 mm for *E. coli* [20].

3.2 Antifungal activity

Islam *et al.*, (2010) assayed the antifungal activity of hexane and chloroform extracts of *M. parviflora* against *Aspergillus niger* and *Aspergillus oryzae* [19].

3.3 Antioxidant activity

The plant contains flavonoids and phenolic compounds. *M. parviflora* has shown significant antioxidant potential. The DPPH test demonstrated higher antioxidant potential at 4 mg/ml of *M. parviflora*. Also, the H₂O₂ test showed that this maximal antioxidant activity was at 2.5 mg/ml of *M. parviflora* [11].

Methanol extract and aqueous extract of *M. parviflora* exhibited a strong scavenging activity against the DPPH radical in a concentration-dependent manner. Values of IC₅₀ were 89.03, 2.65 and 76.67, 0.29 µg/mL for methanol extract and aqueous extract, respectively [21].

Shale *et al.*, (2005) reported the extracts of *M. parviflora* have a high inhibiting activity against cyclooxygenase-1 (COX-1) that is caused by at least two components acting synergistically [13]. Indomethacin, a nonselective COX inhibitor, inhibited the impact of inflammation in both inflammatory models. It is likely that the activity of the examined extracts is due to the presence of flavonoids and phenolic components. The total flavonoid content of *M. parviflora* was high compared with the phenolic and proanthocyanidin contents [7].

3.4 Neuroprotective activity

Aslam and Sial (2014) reported that ethanol extract of leaves of *M. parviflora* possesses significant antioxidant potential. In Morris water maze model, the ethanol extract considerably restored the defected memory of amyloid-β injected mice. The reduced levels of brain antioxidant enzymes such as glutathione peroxidase, glutathione reductase, catalase and superoxide dismutase were also restored significantly to similar levels as seen in normal control mice [22].

3.5 Hepatoprotective activity

Mallhiet *et al.*, (2014) reported the hepatoprotective activity of whole plant aqueous methanol extract of *M. parviflora*. Two doses of plant extracts (250 mg/kg and 500 mg/kg) were administered in paracetamol intoxicated mice and results were compared with silymarin [23].

3.6 Anti-inflammatory activity

Bouriche *et al.*, (2011) reported the anti-inflammatory activities of the methanol extract and aqueous extract of *M. parviflora* leaves. Croton oil-induced ear edema and acetic acid-induced vascular permeability were applied as acute inflammatory models to evaluate the anti-inflammatory activity of the extracts [21].

Duganiet *et al.*, (2017) investigated the anti-inflammatory effect of the methanol and aqueous extracts of *M. parviflora* leaves on acetic acid induced colitis in male Wistar albino rats. Treatments were followed by induction of colitis using intrarectal instillation of 2 mL of 4% acetic acid [24].

3.7 Anti-irritant activity

The acute and chronic irritant response was exhibited by the chloroform extracts of *M. parviflora*. Hexane and ethanol extracts also showed acute irritant response.

3.8 Antidiabetic activity

Gutierrez, (2012) found that with the hexane extract the blood glucose level, serum biochemical parameters, hepatic enzymes, thiobarbituric acid reactive substances, glycosylated hemoglobin, advanced glycation end products, and insulin level were restored in streptozotocin induced diabetic rats to nearly normal levels. Therefore hexane extract of *M. parviflora* leaves can efficiently inhibit insulin resistance, lipid abnormalities [15].

3.9 Wound healing activity

A hot poultice made from leaves is used to treat wounds and swellings. *M. parviflora* leaves and roots revealed anti-inflammatory activity *in vitro* via inhibition of COX-1 enzyme. *M. sylvestris* leaves showed anti-inflammatory activity on croton oil-induced ear edema. The aerial part of *M. sylvestris* demonstrated antimicrobial activity on wound infection microorganisms *in vitro*. Additionally, leaves exhibited antioxidant activity and inhibition of LPO *in vitro* [26].

3.10 Analgesic activity

In the acetic acid-induced writhing model, the extract showed a good analgesic effect characterized by reduction in the number of writhes when compared to the control. The extract caused dose-dependent decrease of licking time and licking frequency in rats injected with 2.5% formalin, signifying its analgesic effect. These results were also comparable to those of indomethacin [12].

3.11 Antiulcerogenic activity

A study showed that acetic acid caused severe inflammation of the colon and a significant increase in spleen weight/body weight, and an increase in colon weight/length ratio compared with normal control group. Pretreatment with MEMP and AEMP for 5 days followed by induction of colitis resulted in a significant attenuation of spleen weight and colon weight/length ratio compared with acetic acid control group. Methanolic extract provided better anticolitic effect than aqueous extract; the effect was prominent at the dose of 200 mg/kg. Histopathological findings confirmed the protective effect of the MEMP [24].

4. PHYTOCHEMISTRY

Farhan *et al.*, (2012) reported phytochemical screening showed that both the leaves and stems of *M. parviflora* contain the polyphenol, flavonoid, tannin, alkaloid, resin and saponin in leaves and stem of the plant. They also demonstrated that the total phenolic content (TPC) was found at higher levels in the stems and leaves of *M. parviflora* and this amount was at 40 mg/ml [11].

5. CONCLUSION

Extensive literature survey revealed the promising pharmacological includes antibacterial, antifungal antioxidant, antidiabetic, anti-inflammatory activities of the extract and isolated molecules of this.

In future study, the conversion of these pharmacological activities in to the modern drugs, proper scientific evaluation includes isolation of answerable phytochemicals, their mechanism of actions, toxicity and appropriate standardization need to be explored.

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