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Review Article

**"EXPLORING THE PHYTOCHEMICALS AND
PHARMACOLOGICAL BENEFITS OF MIMOSA PUDICA"****Roshani V Garkal¹, Rugavedi D Hiwase², Vaishnavi D Bhatkar³, Pooja S Bekate⁴ and
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¹Bachelor of Pharmacy, Shraddha Institute of pharmacy, Washim, Maharashtra, India²Bachelor of Pharmacy, Shraddha Institute of pharmacy, Washim, Maharashtra, India³⁻⁵Department of Pharmacology, Shraddha Institute of pharmacy, Washim, Maharashtra, India**Abstract:***Mimosa pudica, commonly known as the sensitive plant, is recognized not only for its unique mechanical responses but also for its rich phytochemical profile and diverse pharmacological activities.**This plant contains various bioactive compounds, including alkaloids, flavonoids, tannins, and saponins, each contributing to its therapeutic properties.**Report indicated that Mimosa pudica exhibits anti-inflammatory, wound healing activity, antimicrobial, antiulcer, antifertility, antidiuretic and potential antidiabetic effects, supporting its traditional medicinal uses.**Mimosa pudica represents a promising source of natural compounds with diverse pharmacological activities, warranting further investigation to unlock its full therapeutic potential in modern medicine.***Corresponding author:****Pradnya V. Lahupanchang ***,

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INTRODUCTION:

Medicinal and aromatic plants are a significant component of the global flora, providing essential raw materials for the pharmaceutical and drug industries. India's traditional medical systems—Ayurveda, Siddha, Unani, and other indigenous practices—have long relied on numerous medicinal herbs, with more than 9,000 native plant species documented for their therapeutic properties. According to a World Health Organization (WHO) study, approximately 80% of the population in developing countries depends on traditional plant-based medicines to meet their healthcare needs.^[1]



Fig Mimosa pudica plant

Mimosa pudica L., commonly known as the sensitive plant, humble plant, shame plant, touch-me-not, or entreaty plant, is a fascinating creeping perennial herb from the Mimosaceae family. This plant is especially noted for its remarkable “shy” behavior: its delicate, compound leaves rapidly fold inward and droop when touched, only to reopen minutes later. The species epithet *pudica*—from the Latin for “bashful” or “shrinking”—aptly reflects this responsive movement, which captivates observers and adds to its ornamental appeal. This unique trait, coupled with its ease of propagation, makes *Mimosa pudica* widely cultivated and studied across various botanical and ecological contexts.^[2]

Mimosa pudica has a long-standing role in traditional medicine systems such as Ayurveda, Unani, and homeopathy. In Siddha medicine, it forms a key component of the herbal formulation Thottalvadi Chooranam, a powdered preparation of *M. pudica* that has shown significant antioxidant and antidiabetic effects in experimental studies. The root of *M. pudica* is noted for its bitter, pungent, cooling, and alexipharmic properties, as well as its detoxifying effects.^[3]

Mimosa pudica is a cornerstone in Greco-Arab, Ayurvedic, and Chinese medicine due to its extensive therapeutic applications. Originally cultivated in

Taiwan as an ornamental plant and for uses such as green manure and honey production, *M. pudica* is now integral to traditional Chinese medicine for treating ailments like tuberculosis, insomnia, anxiety, depression, arthritis, diabetes, and wounds, as well as kidney disease and Zoster therapy.

Phytochemical analysis reveals *M. pudica*'s rich array of compounds—tannins, flavonoids, terpenoids, and more—contributing to its potent pharmacological properties. These include hepatoprotective, anti-inflammatory, antimicrobial, wound healing, analgesic, antidiabetic, anxiolytic, antioxidant, anticancer, neuroprotective, and sedative effects, positioning *M. pudica* as a promising, multi-functional medicinal plant.^[4]

Mimosa pudica L., also known as “Touch-Me-Not” or “Sensitive Plant,” is a creeping herb from South and Central America. It belongs to the Mimosaceae family and is widely used in Ayurveda. The plant is used to treat menstrual bleeding, piles, bronchitis, and general weakness. All parts of the plant—leaves, flowers, roots, stems, and fruits—are used as medicine. Studies show that *Mimosa pudica* contains compounds like alkaloids, flavonoids, and tannins, which give it antimicrobial, antioxidant, and other health benefits.^[5]

Scientific classification of *Mimosa pudica*:-

Odour: Distinct

Taste: Astringent, bitter, pungent

Part of plant used: Whole plant or roots^[6]

2.2 English and vernacular names :-

Table 2 English and vernacular name of *Mimosa pudica*.

English: Shy plant, Sensitive plant, Touch-me-not plant
Hindi: Lajwanti, Chui-mui
Tamil: Thottal-chinungi
Malayalam: Tottalvadi, Tintarmani
Sanskrit: Lajja
Marathi: Lajjalu, Namaskari, Samangaa, Samokchini, Shamipatra

2.3 Parts of *Mimosa pudica*:

Root: Roots of *M. pudica* are recylindrical, tapering with secondary and tertiary branches, varying in length up to 2 cm thick. It has longitudinally wrinkled surface with hard and woody fracture, more or less rough; grayish-brown to brown.

Stem: The stem is cylindrical, branched, about 1.5 m in length and up to 2.5 cm in diameter, longitudinally grooved, external surface light brown, internal surface grey. The stem is erect in young plants, but become creeping with age.

Leaf: The plant has bipinnate, compound sessile five primary leaves with petiolate, stipulate, linear lanceolate. There are 10–20 pairs of secondary leaflets which are 0.6–1.2 cm long, 0.3–0.4 cm broad. Leaves are arranged symmetrically and close after touch hence it is called sensitive tree.

Flower: Flowers are pink, spherical in globose head arise from the leaf axils in mid-summer, 8–10 mm in diameter, 0.5 mm height. It shows radial symmetry and is four lobed, with four stamens, sessile ovary as well as numerous ovules. It forms blossoms in rainy seasons. Pollens have globose to ovoid heads and are circular with approximately 8 microns diameter and pollinated by insect and wind.

Fruit: Fruits are leguminous, simple, dry, 1–1.6 cm long, 0.4–0.5 cm broad having two to five seeds, The fruit consists of clusters of two to eight pods, these being prickly on the margins. The pods break into two to five segments and contain pale brown seeds about 2.5 mm long.

Seed: Seeds are compressed, oval-elliptic, and brown to gray in color. The seeds are 0–0.3 cm long and 2.5 mm broad. The seeds have hard seed coats which restrict germination. [6]

2.4 Botanical Description :-

Mimosa pudica L. was first formally described by Carl Linnaeus in *Species Plantarum* in 1753. The genus *Mimosa* about 400 species of herbs and shrubs. [7]

2.5 Geographical Distribution:-

The species is native to Brazil, the Caribbean, and South and Central America but has now become a pantropical weed. It is currently found in the Southern United States, South Asia, East Asia, Micronesia, Australia, South Africa, and throughout India. [7]

2.5 Plant Movement :-

The species is well-known for its rapid plant movements. Like several other plant species, it exhibits variations in leaf orientation called “sleep” or nyctinastic movements, where the leaves close during darkness and reopen in light. This movement is not solely light-dependent; the leaves also respond to stimuli such as motion, warmth, wind, or shaking by closing. These responses are classified as “seismonastic” movements. [8]

2.6 Microscopic Features of *Mimosa pudica*:

Root Epidermis:

The epidermis is multilayered, consisting of 3–4 rows of closely arranged, thin-walled, rectangular parenchyma cells

Cortex:

The cortex is made up of circular parenchyma cells with intercellular spaces. The inner cortex consists of multiple layers of cells (multiseriate).

Vascular Bundles:

The vascular bundles are surrounded by sclerenchyma. The phloem strands alternate with the xylem strands. The protoxylem is positioned towards the periphery (outside), while the metaxylem is located internally (inside). The phloem lies near the periphery, and the metaphloem is oriented towards the center.

Pith:

A small, centrally located pith is observed. [9]

3. PHYTOCHEMICALS OF *MIMOSA PUDICA*:

The phytochemicals, such as saponins, alkaloids, flavonoids, tannins and phenols were present. Ahuchaogu screened the phytochemicals of the EtOH extract of the whole *M. pudica* plant. The ethanol extract consisted of alkaloids (9.05%), flavonoids (8.32%), steroids (2.49%), saponins (8.15%), phenols (1.02%), tannins (0.083%), cyanogenic glycosides (0.122%) and anthocyanins (1.913%). [10]

Durgadevi and Karthika et al., (2018) reported the phytochemicals of the aq. Extract of *M. pudica* leaves. A qualitative analysis indicated the presence of flavonoids, alkaloids, proteins, steroids, tannins, saponins and terpenoids, while phlobatannins, phenols and reducing sugars were found to be absent. The quantitative phytochemical investigation of saponins, flavonoids, tannins and terpenoids were 0.48 mg/mL, 0.99 mg/mL, 0.80 mg/mL, 0.39 mg/mL and 0.39 mg/mL of the aq. Extract recorded, respectively [11] Sheeba et al., (2015) screened the phytochemicals of the MeOH extracts of *M. pudica* leaves. The plant showed the presence of flavonoids, phenols and tannins, while alkaloids, glycosides, terpenoids, amino acids and carbohydrates were found to be absent. [12] Parmar et al., (2015) measured the phytochemicals of the EtOH extract of *M. pudica* roots. Extracts showed the presence of tannins, alkaloids, terpenoids, flavonoids, sterols, phenolic compounds and proteins [13]

4. Ayurvedic formulations- [14]



1. Kutajaavaleha
2. Ural BPH capsule
3. Selip tablet and syrup
4. Samangadi churna
5. Palsineuron capsules.
6. Lakshadi churna
7. Pilocure tablet
8. Samangaadi Churna
9. Kutajavaleha,
10. Pusyanug Churna,
11. Bhret Gangadhara Churna

Dose:-[28]

Fresh juice: 10 – 20 ml.

Decoction: 50 – 100 ml in divided doses per day. 10–20 g of drug for decoction.

Capsule: 1 – 2 capsules daily or as directed by a physician

Traditional uses of Mimosa pudica :-

Ayurveda has declared that its root is bitter, used in the treatment of leprosy, dysentery, vaginal and uterine complaints, inflammations, burning sensation, asthma, leucoderma, and fatigue and blood diseases. Unani Healthcare System its root is resolvent, alternative, and useful in the treatment of diseases arising from blood impurities and bile, bilious fevers, piles, jaundice, and leprosy etc. Decoction of root is used with water to gargle to reduce toothache.

It is very useful in diarrhea, bleeding piles and urinary infections. It arrests bleeding and fastens the wound healing process. It is mainly used in herbal preparations for gynecological disorders. It has been said to have medicinal properties to cure skin diseases.

It is also used in conditions like bronchitis, general weakness and impotence. It is also used to treat neurological problems. The content of M. pudica has

a capacity of arresting bleeding and it fastens the process of healing of wounds. It is recommended in diarrhea, amoebic dysentery and bleeding piles. It is also used in herbal preparations of gynecological disorders. Its extract can cure skin diseases.[15]

5. PHARMACOLOGICAL ACTIVITY OF MIMOSA PUDICA:-

There are various types of pharmacological activity in *Mimosa pudica* like antiulcer, antidiabetic, hypolipidemic, wound healing, neuropharmacological, antivenom, diuretic, antimicrobial, anti-inflammatory, hepatoprotective, antifungal, anti-asthmatic, hyperglycemic, anticonvulsant, immune modulatory.

Antiulcer activity:-

Anti-inflammatory Effects:-

Raju K. et al.,(2013) reported that inflammation is a major contributor to the progression of ulcers, especially those caused by *Helicobacter pylori* infection or NSAIDs. The anti-inflammatory properties of *Mimosa pudica* are attributed to its ability to inhibit the production of pro-inflammatory cytokines and reduce the activity of enzymes like cyclooxygenase (COX) that mediate inflammation.

This anti-inflammatory effect helps in protecting the gastric mucosa from inflammatory damage and promotes the healing process.[17]

Enhancement of Mucus Secretion:-

Goel et al .,(2005) reported that mucus plays a critical role in protecting the stomach lining from acidic gastric juices. The polysaccharides and flavonoids present in *Mimosa pudica* stimulate mucus production, forming a barrier between the stomach epithelium and gastric acid. This increase in mucin secretion helps in preventing ulceration and promotes the healing of gastric mucosal injuries.[16]

Anti-diabetic activity:-

Singarapriyavardhanan et al.,(2022) reported that oral administration of 400 mg/kg *M. pudica* extract for 21 days significantly reduced serum glucose levels in streptozotocin (STZ)-induced diabetes in rats.[21]

Parasuraman et al.,(2019) reported that glucose levels in streptozotocin (STZ)-induced diabetes in rats were reduced upon administration of up to 500 mg/kg of methanolic extract of *M. pudica*. [20]

Konsue et al.,(2017) investigated that the antidiabetic effect of aqueous and hydroalcoholic extract of *M.*

pudica on STZ induced diabetic rats. Results from the study indicated that *M. pudica* demonstrated an antihyperglycemic effect by significantly lowering FBG levels in diabetic animals.[19]

Tunna TS et al.,(2015) investigated that recently, methanolic extract of aerial parts of *M. pudica* and its various fractions (ethyl acetate, acetone, and methanol) were found to inhibit the activity of diabetic enzymes like α - amylase and α -glucosidase. The extract and its fractions also showed free radical-scavenging activity as determined by 1,1- diphenyl-2-picrylhydrazyl-hydrate (DPPH), total flavonoid content, and total phenolic content assays. The study revealed that *M. pudica* is a potential candidate to treat diabetes.[18]

Antimicrobial activity:-

Lakshmibaite et al.,(2018) investigate that *Mimosa pudica* plant extracts of this plant has some properties under the laboratory study. In recently, antimicrobial properties would result in developing eco-friendly management of human infectious diseases by reducing side effects and the non-nutritive phytochemicals obtained from the *Mimosa pudica* plants have some characteristics including their difference mode of action .[22]

Tomar, Shrivastava and Kaushik et al.,(2014) reported on temporary several research works are carrying out to study about the antibacterial, antifungal and insecticidal properties of the *Mimosa pudica* plants extracts has ability to disruption of bacterial membrane potential permeabilization and leakage of the cellular contents.[23]

Wound healing activity:-

Ganesh et al .,(2009) investigated the wound healing activity of *M. pudica* ethanolic extracts. Mice Were used for this study and were acclimatized according to standard Laboratory protocols. Different doses of *M. pudica* 50, 100, 150 and 200 Mg/kg b. wt were administered to the animals for six weeks before the Creation of deep dermal excision wound. At the end of the experiment .The administration of *M. pudica* extracts of different concentration Increased the wound contraction In a dose-dependent manner, and Also reduction in wound healing time [25 ,26] .

Ganguly M, Devi N, Mahanta R and Borthakur MK et al., (2007) reported Damage in living tissue caused by a cut, blow, or other impacts is Termed as a wound. *M. pudica* chloroform extract possess wound Healing activity at a dose of 200 mg/kg in 5% ointment of the leaf Extracts. Wound healing is a natural process

initiated by trauma and Often terminated by scar formation; the wound healing activity was Reported to be performed by using excision and incision wound Models [24]

Different studies have also shown that both methanolic And aqueous extracts of *M. pudica* in simple ointment base at a Different concentration of 0.5%(w/w), 1%(w/w) and 2%(w/w) Possess wound healing activity. Three different types of models in Rats were used, which are excision, incision and estimation of Biochemical parameters. The 2%(w/w) methanolic and aqueous Extracts exhibited significant wound healing activity probably due to Phenols constituent in *M. pudica*.

Antifertility Activity :-

Kshema Johnson et al., (2014) studied that the root powder of *M. pudica* when given intragastrically at a dose of 150 mg/kg body weight in female *Rattus norvegicus*. It altered the estrous cycle pattern. There was a significant reduction in the number of ova[29].

M. Ganguly et al., (2007) evaluated that the effect of *M. pudica* extracts on the fertility of experimental mice. Antifertility efficacy was evident in the prolonged estrous cycle and reduction in the diestrous phase. Further analysis showed a decrease in several litters and suppression of FSH resulting in the disturbance of ovulation and estrous cycle[30].

S. Valsala et al., (2002) reported that the intragastric administration of 150 mg/kg of *M. pudica* root powder to female rats altered the estrous cycle pattern, reduced normal ova and significantly increased the number of degenerated ova.[31]

Anti-inflammatory activity:-

Nair PV et al., (2017) investigated that the anti-inflammatory effect of the whole plant of *M. pudica*, in thirty albino rats of both sexes was used for the experiment. 200 mg/kg, 400 mg/kg and 800 mg/kg extracts of *M. pudica* was administered to three different groups, 800 mg/kg concentration was the highest percentage inhibition. The result from this recent study was showed that *M. pudica* has anti-inflammatory properties.[32]

Azam et al., (2015) reported that the inhibitory effect of ethanolic extract of *M. pudica* against carrageenan-induced paw oedema in rats at various doses 100, 200 and 300 mg/kg[33].

NK Patel et al., (2014) reported that the lipopolysaccharide (LPS) induced pro-inflammatory

mediators such as interleukin 1 beta (IL-1 β), tumour necrosis factor-alpha (TNF- α), and nitric oxide (NO) were suppressed by bioactive compounds (L-mimosine, ethyl gallate, crocetin, gallic acid, crocin, caffeic acid and jasmonic acid) present in *M. pudica*, thus supporting the ethnomedicinal uses of *M. pudica* for the prevention and treatment of inflammatory related disorders[34].

bioactive compounds (L-mimosine, ethyl gallate, crocetin, gallic acid, crocin, caffeic acid and jasmonic acid) present in *M. pudica*, thus supporting the ethnomedicinal uses of *M. pudica* for the prevention and treatment of inflammatory related disorders[34].

Diuretic activity:-

Bharati B Zaware et al.,(2014) studied that the diuretic activity of *M. pudica* was first observed in methanol fraction of crude extract of the plant. Fractionation of the methanolic extract using column chromatography eluted a diuretically active subfraction. This was found to be nontoxic and increasingly diuretic at increasing dose levels. The median effective (ED₅₀) dose of the isolate was estimated to be approximately 1023.29mg/kg body weight. Then the diuretic activity of subfraction is compared with the following extracts (crude ethanol and water), normal saline solution (negative control) and furosemide (positive control). [35]

Baghel A et al.,(2013) reported that the Lipschitz test was employed for assessment of diuretic activity of petroleum ether, ethanolic and aqueous extracts of *Mimosa pudica* was based on water and sodium excretion in test animals and compared to rats treated with a high dose of urea. The ethanolic and aqueous extract of Plant was reported to be tested for evaluation of diuretic activity by using Furosemide 20 mg/kg as standard. Among two extracts ethanolic extract was reported to produce significant diuretic activity at doses of 100 and 200 mg/kg. Extract caused increase in total urine volume and ion concentration of Na⁺, Cl⁻, K⁺. at doses.[36]

Sangma TK et al.,(2010) extracted *M. pudica* leaves with water and the aqueous extract was fed to Wistar albino rats at doses of 100, 200, and 400 mg/kg. diuretic activity by the Lipschitz test was studied and results were compared with the standard drug furosemide. Colorimetry was used for biochemical analysis of urine collected from rats kept in metabolic cages. Prominent increase in urine containing electrolytes (Na⁺, K⁺, and Cl⁻) at 100 mg/kg body weight was seen. Although, diuretic activity was less

than with the standard drug furosemide. It was also investigated that an increased Phytochemical screening revealed the presence of alkaloids, tannins, and saponins in the aqueous extract of *M. pudica* leaves.[37]

Antidepressant activity :-

Gulzar Muhammad et al.(2016) noted that *M. pudica* extract increased mobility in the forced swimming test and reinforced the rate in DRL-72s like the standard drugs clomipramine and desipramine. The extract cannot increase open arms exploration time in the elevated plus maze test like diazepam. Studies concluded that *M. pudica* can produce antidepressant action.[38]

Sanaye M. M et al.(2015) investigated that the open field test (OFT) is a commonly used for measure of general locomotor activity and also to assess anxiety, depression. In addition, repeated exposure or extended session length provides a method for assessing habituation to the increasingly familiar chamber environment. it has been reported that, number of movements of animals and number of passage from chamber were significantly decreased in dose dependant manner at doses of 100 mg/kg and 200 mg/kg.[39]

Irfan Sajid et al.(2013) reported that the aqueous extract of *M. pudica* is employed to reduce depression in Mexico. study showed that behavioural actions of *M. pudica* extract at different concentration was tested. Results showed that *M. pudica* extracts, clomipramine, desipramine reduced immobility in the forced swimming test and increased the rate of reinforcers received in the DRL-72s test, results showed that *M. pudica* produces antidepressant effects in rats.[40]

Hafsa Ahmad et al.,(2012) investigated that in the study behavioral actions of aqueous extracts of *M. pudica* at various concentrations were tested. Results showed that clomipramine 1.25 mg/kg, desipramine 2.14 mg/kg and *M. pudica* 6.0 mg/kg and 8.0 mg/kg . reduced immobility in the forced swimming test and increased the rate of reinforces received in the DRL-72 s test; these data suggested that *M. pudica* produces antidepressant effects in the rat. *M. pudica* therefore produced an anti-depressant like profile similar to two tricyclic anti- depressants.[41]

6 . ADVERSE EFFECTS:

There is no doubting that this plant offers a number of health advantages, but it's important to remember that using anything excessively is never a wise way

particularly upon injection Similarly, overdosing on the touch-me-not plant might be proven potentially lethal.

When consumed in large quantities, the plant's tannins can be harmful. Those who intend to become pregnant should abstain from the use of this herb as it is used to prevent conception. Although *Mimosa pudica* is usually safe to eat, even though some people could have adverse reactions including Restlessness - Drowsiness -Emesis-Irritation of the skin.

7. SUMMARY

Mimosa pudica, commonly known as the sensitive plant, is recognized not only for its unique mechanical responses but also for its rich phytochemical profile and diverse pharmacological activities.

This plant contains various bioactive compounds, including alkaloids, flavonoids, tannins, and saponins, each contributing to its therapeutic properties.

Report indicated that *Mimosa pudica* exhibits anti-inflammatory, wound healing activity, antimicrobial, antiulcer, antifertility, antidiuretic and potential antidiabetic effects, supporting its traditional medicinal uses.

Mimosa pudica represents a promising source of natural compounds with diverse pharmacological activities, warranting further investigation to unlock its full therapeutic potential in modern medicine.

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