

COMPREHENSIVE PHARMACOLOGICAL REVIEW ON MIMOSA PUDICA

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Summary

Mimosa pudica is commonly known as touch me not plant. It is a very important biologically and pharmacologically active plant. It has been used from ancient to the modern for many purposes. It contains most active principles like terpenoids, flavonoids, glycosides, alkaloids (mimosine), quinines, phenols, tannins, saponins, coumarin, sterols, steroids, saponin and flavonoids. This study indicates to highlight the role of few major constituents of plant, which have varied pharmacological actions and are be used as templates for designing new drugs. Mimosa pudica is one of those medicinal plants which have been used in the tradition pharmacopoeias for its various actions against variety of systemic and non systemic ailments.

Key words: Mimosa pudica, review, antivenom and wound healing.

Introduction

Mimosa pudica commonly known as touch-me-not plant in English, is a sensitive plant, belonging to family mimosaceae. Mimosa pudica L. is a creeping annual or perennial herb often grown for its curiosity value, as the compound leaves fold inward and droop when touched and reopens within minutes. Mimosa pudica is native to Brazil, but is now a pan tropical weed. The other names given to this plant are humble plant, shame plant, touch me not and prayer plant. The species epithet “pudica” is a latin equivalent for “Bashful” or “Shrinking”, because of its curious nature and easy procreation. The stem is erect in young plants, but becomes creeping or trailing with age. The plant grows to a height of 1.5m. The leaves are bipinnately compound with one or two pinnae pairs and 10-26 leaflets per pinna. The petioles are also prickly and on close examination, it is seen that the floret petals are red in their upper part and the filaments are pink to lavender. The fruit consists of clusters of 2-8 pods of 1-2cm long each, prickly on the margins. The pods break into 2-5 segments and contain pale brown seeds 2.5mm long. This plant has a history of use for the treatment of various ailments. Most commonly used plant part for this purpose is the root, but leaves flowers bark and fruit can also be utilized³⁷.

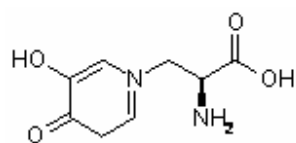
Mimosa pudica Linn, locally known as Lajukilata in Assam, India, is traditionally used as an agent for birth control among rural people. The roots of this plant in combination with other medicinal plants are traditionally used in the treatment of diseases like diarrhea, amebic dysentery, gynecological disorders, skin diseases and blood pressure disorders. A significant reduction in the number of ova in rats with the root extract of mimosa pudica. The plant has also been reported for the antifertility effect by measuring ovarian weight of rat²⁶.

It is a common plant in moist waste ground, lawns, open plantations and weedy thickets. It is native from middle America and now widely distributed in all tropical areas. In many countries, extract of *M. pudica* is used in the treatment of headache, migraine, insomnia, diarrhea and dysentery⁴⁰.

Phytochemical analysis

The preliminary phytochemical screening and TLC studies of mimosa pudica extract shown the presence of bioactive components like terpenoids, flavonoids, glycosides, alkaloids(mimosine), quinines, phenols, tannins, saponins and coumarin, sterols, steroids, sapogenin, alkaloids and flavonoids^{37,26}.

Qualitative phytochemical analysis revealed the presence of tannins especially hydrolysable tannins and alkaloids. The presence of alkaloid is confirmed by performing TLC and spraying with Dragendorff's reagent. The presence of hydrolysable tannins are confirmed by performing co-TLC on Silica Gel GF 254 as stationary phase, ethyl acetate:toluene:methanol:formic acid (3:3:0.2:0.8) as mobile phase and Gallic acid as the reference standard²⁷.



Mimosine

Pharmacological actions of mimosa pudica

Anticonvulsant activity³⁸

The decoction of *M. pudica* is having anticonvulsant activity against clonic seizures induced by PTZ. At the dose of 500 mg/kg given by ip route and also they were reported LD₅₀ of mimosa pudica 1417 (1009-2146) mg/kg. The plant extracts shown 12.5% against seizures. On the contrary, the extract did not possess a significant effect against PIC-induced seizure. The turning behavior induced by NMDA (75 mg/kg) antagonized by the dose of 3 mg/kg i.p. of CGP 37849, a well-known NMDA antagonist. In non-protected animals, the onset of the turning behavior is delayed significantly only at dose of 2000 and 4000 mg/kg.

Hyperglycemic activity¹⁷

Ethanol extract of *M. pudica* leaves dose of 250 mg/kg, possesses significant hyperglycemic effects when administered orally in normal and glucose loaded mice.

Hepato protective activity³¹

Mimosa pudica rhizomes has hepato-protective activity in CCl₄ induced cytotoxic assay. To 24-h pre-incubated rat hepatocytes, CCl₄ and the extracts are added and glutamic-pyruvic transaminase (GPT) values in the medium measured at 60 min thereafter the activity was observed.

Antimicrobial activity³⁷

The M. pudica methanolic extract produce antimicrobial activity against aspergillus fumigates, Klebsiella pneumonia at three different concentrations of extract 50, 100 and 200µg/disc.

Wound healing activity²⁷

The wound healing studies of roots of mimosa pudica indicate the presence of phenol constituents. In healthy wistar albino rats of either sex, weighing 150–200 g. It can be proposed that activity may be responsible for wound healing activity due to astringent property of tannins.

Excision wound study

Application of 2% methanolic extract of mimosa pudica shows 100% wound on 26th day and 97.32% with aqueous extract compared to control and standard povidine iodine.

Incision wound study

The effect of wound healing activity is determined by the tensile strength of the incision. The groups were divided as control group, treated with simple ointment base, standard group treated with povidone iodine and the test group treated with the extracts of different concentrations. The animals were treated with ointment containing 2% methanolic extract and 2% aqueous extract shows significant high ($P < 0.001$) tensile strength as compared to the control group.

Biochemical marker estimation

The presence of hydroxyproline is the indicator of severity of the excision, higher the hydroxyproline greater the wound. The biochemical marker such as hydroxyproline content in the scab of excision wound was reported in the animals treated with extracts on the 11th day and shown the wound healing property of plant. The animals were treated with 2% methanolic extract indicated significantly high ($P < 0.001$) levels of hydroxyproline (23.449 µg/500mg) as compared to control (9.203µg/500mg).

Antifertility activity²⁶

The root extract of pudica of dose 300 mg/kg body weight on female swiss albino mice age 85-100 days, weighing between 22 and 25g shown antifertility activity. It prolongs the estrous cycle and disturbs the secretion of gonadotropin hormones. The decrease in FSH level in the proestrous and estrus stages in the stages in the extract-administered group compared with those of control animals indicates the disturbance of estrous cycle and ovulation through suppression of FSH. Disturbance in the estradiol secretion with significant increase during the estrus stage of the cycle was observed with the plant extract treatment. However, these changes of the estrous cycle were found to revert

after withdrawal of the treatment. An increase in prolactin level was observed in the estrus stage of extract-administered group as compared with the control group. In the study, no significant changes were observed in the level of progesterone and LH with the treatment of root extract. A significant increase in the estradiol level in the diestrus stage found in the extract administered animals. This is accompanied by a significant decrease in the secretion of FSH in proestrus and estrus stages. The decreased number of litters (2.2 ± 0.31) observed in the root-extract-administered group compared with the control group (7.8 ± 0.49) may suggest the antifertility effect of the plant.

Anticancer activity⁰²

The principle constituent mimosa is used for treatment of lung cancer. The lung cancer cell lines H226, H322 and H358 are used for the study. Inhibitory effect of mimosine on proliferation of human lung cancer cells is mediated by multiple mechanisms. The apparent inhibitory effect of mimosine on cyclin D1 expression shown that mimosine may block cell cycle progression in earlier G1 phase. Study also indicated that mimosine inhibites cyclin E-associated kinase activity and blocks cell growth in late G1 phase. Although originally considered as a late G1 blocker, it becomes clear that mimosine has multiple targets in vivo. Moreover the drug has also been found to prevent the serum stimulated synthesis of cyclin-A proteins and activation of cyclin A-associated histone H1 kinase activity which put mimosine in the category of S phase inhibitors. Taken together, it is concluded that mimosine may significantly inhibit lung cancer cell proliferation and may affect the cell cycle progression at multiple points by regulating the expression of cyclins and the activity of cyclin D-associated kinases.

Anti-venom property^{01,35,18,39}

The whole plant extract administered (7.2 mg/kg bw) orally in mice shown to neutralizing the venom produced by SC administration of *Crotalus adamanteus*. The activity of mimosa pudica produced in mice is independently because of content of alkaloid present in the extract. The antivenom potential of *M. pudica* plant extract tested against cobra and krait venom in vivo and in vitro methods. LD₅₀ of cobra and krait found to be 10 µg and 3 µg. 0.14 mg and 0.16 mg *M. pudica* plant extracts are able to neutralize the lethal activity of 2LD₅₀ of *Naja naja* and *Bangarus caeruleus* venom respectively. Also shown anti-inflammatory activity against venom induced oedema. The edema reduced up to 30% with 2.5 mg of plant extract. The extracts in a dose of .13 mg and 0.16 mg are capable of inhibiting phospholipase A2 responsible for hemolysis of sheep RBC's induced by cobra and krait venom. Venom caused fibrinolytic activity is also antagonized by the extract³⁵. It has been reported that the aqueous extract is capable of inhibiting hyaluronidase and protease (venom enzymes) activities of different snake venoms *naja naja*, *vipera russeli*, *echis carinatus*¹⁸. About 200 mg of normal water extract and hot water extracts of roots are able to neutralize 35 mg and 20 mg of crude venom respectively. Both the normal and hot water extracts of roots, dose dependently inhibit the venom induced CPK (creatinin phosphokinase) released in mice. Hot water extract of the root has the highest protease neutralising potency compare to other methanolic and alcoholic extracts⁴¹.

Traditional use:

Place	Part used	Traditional Uses	Reference
Mien (Yao) in northern Thailand.	Entire plant	Insomnia, fever, fainting	Ref: 03

		dizziness	
Uttara Kannada district, Karnataka, India	Leaves	Fresh cuts to stop bleeding	Ref:04
Vietnamese traditional medicine.	Methanolic extract of pudica	Antiplasmodial Antimalarial	Ref:05
Uttar Pradesh state India	Leaf paste	Applied on cuts and wounds for healing	Ref:06
Ethno veterinary medicines used for ruminants in Trinidad and Tobago,		Oestrus induction in animals.	Ref:07
In some areas of Africa,	Unspecified parts	Convulsions in children and decoctions of young leave and stem are given for insomnia and nervousness.	Ref:08
Tharus of Nawalparasi district in central Nepal	Root and leaves	Gastric and swelling of body	Ref:09
Saramaccan Maroons in Suriname	Leaves	General health promotion Baby bathed with Leaves decoction.	Ref:10
Honduran	Leaves and Stems	Antimicrobial dental, digestivestomach ache, ulcers, insomnia, skin cleanser, female disorders menstrual pain, hemorrhage, childbirth,	Ref:11
South African Madagascar In Mauritius,	Decoctions of young leaves and stems	mental diseases children's convulsions insomnia	Ref:12
Survey of medical ethnobotanicals for dental and oral medicine conditions and pathologies	Unspecified part	Dental and oral medicine conditions for Pain	Ref:13
Mysore and Coorg districts, Karnataka state, India	Leaves	Blood in breast milk and dysmenorrhoea	Ref:14
Bidar district, Karnataka, India.	Leaves juice used	Gynecological disorders in women in abortion	Ref:15
Thai	Methanolic	Neuro-tonic remedies, Alzheimer's disease	Ref:16
India	Leaves	Piles and fistula	Ref:17

	and roots	urinary complaints	
Ugandas	Leaves infusion	Premature ejaculation	Ref:19
Yanesha (Amuesha), an Amazonian Peruvian ethnic group	Dry leaves	Insomnia, depression, sadness. Psychic problems	Ref:20
Maya of Livingston	Leaves	Insomnia	Ref: 21
Betsimisaraka and Tanalaeastern region of Madagascar	Leaves	Urine retention, spinal curvature, general fatigue	Ref: 22
Fiji Indians	Leaf tea or whole plant tea	Oliguria, dysentery, fever, syphilis, leprosy, stomach worms, venereal disease, insect bite, insomnia, nervousness and piles	Ref : 29
Kandha tribe of Orissa, India	Leaf juice	Impotency, spermatorrhea and nocturnal emission	Ref: 30
Chinese Yuncheungkonga	Root	Used in abortion	Ref:32
Mt. Yinggeling, Hainan Island, China Xi-long Zheng	Whole plant	Nervous	Ref:33
Thai indigenous plants		used in arsenic poisoning	Ref:34
Guaymi Indians in western panama. Trinidad and Thailand in India and Puerto Rico	Infusion of ground stem	Arthritis, diuretic Fever, anti-inflammatory	Ref: 42

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