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Review Article on Pharmaceutical, Pharmacological Activities and Therapeutic Potential of "Mimosa Pudica"

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ABSTRACT:-

Mimosa pudica is an indoor plant with a distinctive personality. His leaves, which have been accustomed to the effects of mechanical stimulation, can nevertheless respond to electrical stimulation by closing, and vice versa. M. Pudica has a variety of bioactive compounds with a variety of pharmacological effects. Because of the unrivaled chemical variety, standardized plant extracts provide endless prospects for new pharmacological pharmaceuticals.

Keywords:- Mimosa pudica, Phytochemistry, Wound healing activity.

Introduction: -

Mimosa pudica is also known as the sensitive plant, the modest plant, the shame plant, the sleeping grass, the touch me not plant, the Lajjalu plant in Ayurveda, and the Namaskari plant in Sanskrit. Mimosa pudica is an indoor plant with a unique personality [1]. His leaves, which have been accustomed to the effects of mechanical stimulation, can nevertheless respond to electrical stimulation by closing, and vice versa [2]. A prickly under shrub with a height of 45-90 cm. In most cases, the roots and leaves are used in the treatment. Bitter, astringent, acrid, cooling vulnerary, alexipharmic, resolving, diuretic, antispasmodic, emetic, constipating, and febrifuge are some of the properties of the roots [3]. Herbal medicine is founded on the idea that plants contain natural compounds that can help people stay healthy and get better [4]. Mimosa pudica [5] is a plant whose name implies "to point" and "to be shy." Samberg attempted to link animal system with plant neural capability using Mimosa pudica sensitivity [6]. The seed of M. Pudica is extruded into glucuronoxylan polysaccharide, a hydrogelable material that is employed for the delayed/substance/targets release of several medications [7]. Obesity is the most common cause of insulin resistance, which is induced by a western-style high-fat diet and lack of physical activity [8]. This predicament has compelled scientists to look for new antimicrobial substances, as well as develop alternative antimicrobial medications to treat infections caused by medicinal plants. In recent years, research has centered on plants, revealing a vast array of therapeutic herbs employed in many traditional systems [9].

Figure 1 - Mimosa Pudica

Distribution:-

It has been declared a weed in the Northern Territory. Commonly found in open, damp, waste places, open grassland, and open thickets in the Philippines. Pantropical weeds are present [10]. Mimosa pudica is a South and Central American native. It has been introduced to many other regions, including Tanzania, South Asia, Southeast Asia, and several Pacific Islands, where it is considered an invasive species [11]. [As depicted in Figure 1]

Taxonomical classification:-

The taxonomical classification of the plant is [12]

Kingdom – Plantae

Division – Magnoliophyta

Class– Magnoliopsida

Order – Fabales

Family – Mimosaceae

Genus – Mimosa

Species – M.pudica

Classical and common names:-

Ayurveda – Lajjalu, Namaskari, Samangaa, Samokchini, and Shamipatraa

Siddha – Thottal Chinungi [13].

Vernacular names:-

Sanskrit –Lajja

English – Sensitive plant

Hindi – Laajvanti and Chhui-mui

Bengali – Lajjabati

Telugu – Attapatti and Peddanidrakanni

Tamil – Tottaaladi and Thottalchnungi

Kannada – Lajja, Nachika and Mudugu-davare

Malayalam – Tintarmani

Morphology:-

In young plants, the stem is upright, but as the plant becomes older, it becomes creeping or trailing. It has the ability to hang quite low and floppy. It reaches a height of around 0.5m and a spread of about 0.3m. Mimosa stems are upright, slender, thorny, and well-branched. It has a delicate touch. Bipinnate [14] leaves are fern-like and pale green in color, with a tendency to close when disturbed. It has 15 to 25 pairs of leaflets that are sharp and bristly, measuring 9 to 12 mm long and 1.5 mm wide. The flowers of this axillary plant are lilac pink in color and grow in globose heads. Winds and insects both pollinate the blossom. 6-10 layers with tangentially elongated cells. The secondary cortex is made up of granule-filled parenchyma with thin walls. It can reach a height of 0.5m and a spread of 0.3m. This branch is starting to turn brown [15]. The stem has 4 to 8 layers. The secondary cortex is made up of massive, relatively thick-walled parenchymatous cells that are reddish brown in color [16]. Mimosa fruits are 1.5 to 2.5 cm long pods with sutures that are thorny.

Plant Movement:- The contribution of localized aquaporing to seismic leaf motions in M. Pudica was studied in both the plasma membrane and the tonoplast [17]. Mimosa pudica is well-known for its quick growth. It, like a number of other plant species, goes through "sleep" or nyctinastic movement, which causes changes in leaf orientation. During the night, the foliage shuts and reopens in the light [18]. Fast-growing plants terrify animals, therefore they eat slower-growing plants. Another possibility is that it keeps hazardous insects at bay [19, 20].

Traditional Uses:-

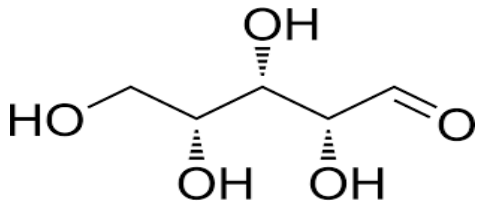
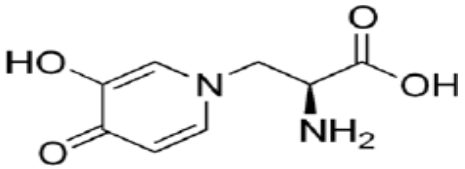
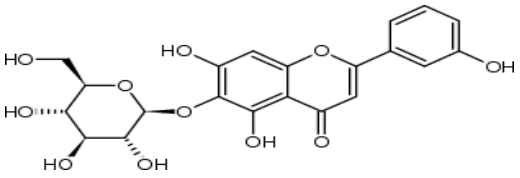
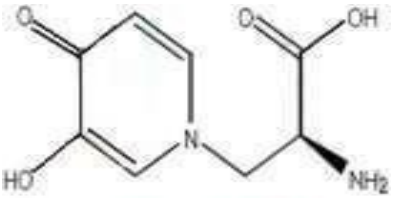
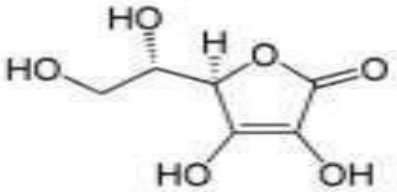
Diarrhoea (athisaara), amoebic dysentery (raktaatisaara), bleeding piles, and urinary infection all benefit from it.Laajvanti is bitter, chilly, pigmented, and alexipharmic, and it is utilized in Ayurveda to treat ailments such as leprosy, dysentery, blotting, and others [21, 22]. Its root is used to treat sleeplessness, irritability, premenstrual syndrome, hemorrhoids, and whooping cough in Western medicine [23].

Phytochemistry:- Bioactive components such as terpenoids, glycosides, alkaloids, quinines, phenols, tannins, saponins, and coumarins were found in the M.pudica leaf extract after preliminary phytochemical screening [24, 25]. Tannin levels in roots can reach 10%. Mucilage made up of d-xylose and d-glucuronic acid is found in the seeds. Green yellow fatty oil makes up up to 17% of the plant extract.

Crocetin diethyl ester and tannin have been isolated from the plant. The mucilage from seed is composed of D-xylose and D-glucoronic acid 4-O-(3, 5-dihydroxybenzoic acid)-b-D-glucoronic. P-coumaric acid and its derivatives are also found to be present in plant which acts as leaf opening substance in Mimosa pudica. Flavanoids present in M. Pudica leaves are 5-deoxyflavonol derivatives [26]. They thoroughly characterized the whole plant using advanced spectroscopic and chromatographic techniques and isolated various C-Cglycosylflavones, including7, 8, 3', 4'-tetrahydroxyl-6-C-[α-L-rhamnopyranosyl - (1→2)]-β-D-glucopyranosyl flavones; 5, 7, 4'-trihydroxyl-8-C-[α-L-rhamnosyl - (1→2)]-β-D-glucopyranosyl flavones; and 5,7,3',4'- tetrahydroxyl-6-C-[α-L-rhamnopyranosyl-(1→2)]-β-D-glucopyranosyl flavone [27].

This protein, which accounts for 5% to 6% of total extracted proteins, is assumed to be responsible for plant leaf movement [28]. M. Pudica seeds extrude glucuronic xylem polysaccharide, a hydrogelable substance that can be exploited for a variety of applications. The release of certain medications is delayed, continuous, and targeted. Laajvanti is also a good source of jasmonic and abscisic acids, which can be separated and identified by mass spectrometry [29]. [Displayed in table - 1]

Table 1 - Chemical constituents of M.pudica:-

Chemical name	Structure
D-xylose	
Mimosine	
5,7,3',4' –tetra hydroxyl -6-C-beta glucopyranosylflavones	
Mimosinic acid	
Ascorbic acid	

Pharmacology action:-

Wound healing activity:- The roots of M. Pudica were studied for wound healing activity by incorporating the methanolic and the total aqueous extracts are simple ointment base B.P. in concentration of 0.5% (w/w), 1% (w/w), and 2% (w/w). The M.pudica shoot methanolic extract, pudica root methanolic extract showed very good wound healing activity. It is used in excision, incision, and estimation of biochemical parameters. Healing of wound is abiology process that is initiated by trauma and often terminated by scar formation [30].

Antifertility activity: Mimosa pudica is a folk medicinal plant that is extensively used as an antifertility agent in India. It prolongs the estrous cycle with a considerable increase in the duration of the destroys phase and reduces the number of litters in albino mice when given orally at a dose of 300 mg/kg body weight/day. Gonadotropin release and estradiol secretion, which are hormones involved in the regulation of the estrous cycle, were also found to be altered by root extract [31].

Antimicrobial activity: M. Pudica whole plant extract has good antimicrobial activity against the pathogens utilized in the screening between the ranges of 7-18 mm. At varied concentrations of 50, 100, and 200g/disc, M.pudica leaves are tasted against Aspergillus fumigatus, Citrobacter divergens, and Klebsiella pneumonia. The active substances discovered in the extract were terpenoids, flavanoids glycosides, alkaloids, quinines, phenol, tannins, saponins, and coumarin, which may be responsible for this action [32].

Anti-venom activity The aqueous root extract of Pudica hospice reduced the hyaluronidase and protease activities of Indian snake venom in a dose-dependent manner. The fatal action of 2LD50 of caerulus venoms was fully neutralized by 0.14mg and 0.16 mg of pudica extract, respectively [33].

Anti-depressant activity: Aqueous preparations from the dried leaves of M. Pudica are used to treat depression in Mexico. The behavioral effects of M. Pudica leaves were investigated at dosages of 2, 4, 6, and 8 mg/kg. M. Pudica, like the usual medicines clomipramine and desipramine, increased the mobility of the forced swim test and strengthened the rate in the DRL-72s[34].

Anticonvulsant activity: Mice were protected from pentylentetrazol and strychnine-induced seizures by a decoction of M. Pudica leaves given intraperitoneally at a dose of 1000-4000 mg/kg. M. Pudica had no effect on seizures caused by picrotoxin. It also inhibited the turning behavior generated by N-methyl-D-aspartate. Epilepsy is a serious neurological illness that affects up to 5% of the world's population at some point in their lives [35].

Anti-inflammatory activity The extracts tested to determine anti-inflammatory efficacy were petroleum ether, ethanol, and aqueous extracts. These concentrations of extracts, 50, 100, and 200 mg/kg, were employed, with Indomethacin, given orally, as a reference concentration of 10 mg/kg. The decrease of oedema caused by carrageenan was evaluated using carrageenan-induced rat paw oedema [36].

Antioxidant activity: The 1, 1-diphenyl-2-picrylhydrazyl-hydrate (DPPH) free radical scavenging experiment was used to test the antioxidant activity of the methanol crude extract of the aerial part of M pudica in vitro. Methanolic extracts have an IC50 value of 296.92/ml. When compared to ascorbic acid, which has an IC50 value of 131.29g/ml, the antioxidant activity was moderate [37].

Anti-hepatotoxicity activity: The ethanol extract of M. Pudica leaves was tested for its ability to protect the liver from the toxicity of carbon tetrachloride (CCl4). In Wistar albino rats, liver damage was seen. The experimental rats were given an ethanol extract of Mimosaceae leaves (200 mg/kg body weight, p.o.) for 14 days. Glutamate oxalic acetate transaminase, glutamate pyruvate transaminase, alkaline phosphate, blubbing, and total protein are all used to evaluate activity. As a result of the antioxidant capabilities of the plant, this investigation indicated that it has a hepatoprotective impact [38].

Anti-diarrheal activity: Several experiment models in Wistar albino rats were used to assess the anti-diarrheal activity of an ethanolic extract of M. Pudica leaves. The antidiarrhoeal effect of ethanolic extract leaves at doses of 200 and 400 mg/kg was substantial. Castor oi l-induced diarrhea and PGE2-induced enter pooling were used in the experiment. Pudica root extracts with water and ethanol are used to study this effect. Both extracts showed substantial ability to cure diarrhea and reduce gastrointestinal motility in this investigation [39].

Anti-hyperglycemic activity M. Pudica leaves given orally to mice at a dose of 250 mg/kg had a strong anti-hyperglycemic effect. The hypolipidemic effect of a chloroform extract of Laajvanti leaves against an atherogenic diet in Wistar albino rats, as well as blood levels of several biochemical markers, were investigated. Flavanoids, glycosides, and alkaloids may be the bioactive components responsible for this activity. The endocrine system controls how much sugar is stored and used for energy [40].

Anti-ulcer activity: This extraction was done using three different solvents (90 percent methanol, chloroform, and diethyl ether). Pylorus ligation, aspirin, and ethanol induced ulcer models are used to assess the anti-ulcer potential of an ethanolic extract of M.pudica leaves. Extract doses of 100 and 200 mg/kg were used. Orally, dose levels of common medication ranitidine of 20 mg/kg are employed. When proved to have good action, the extracts have been found to be safe up to a concentration of 2000 mg/kg body weight and 100mg [41, 42].

Toxicity studies: It has been reported that when an aqueous extract of M.pudica was tested for acute toxicity, no delirious signs were observed, indicating that the plant is safe even at doses of 2000mg/kg p.o [43].

Conclusion:-

The sensitive plant is often used for bleeding problems like as menorrhagia, dysentery, jaundice, leprosy, and so on, according to Ayurvedic scriptures. The medicine can also be exposed for the purpose of isolating and characterizing the active ingredient responsible for anthelmintic activity. This review of M. Pudica provides an encouraging catalyst for more research into the plant's benefits to human existence. The activity of essential enzymes involved in glucose and glycogen metabolism can be restored using an ethanol extract of Mp leaves. M. Pudica has a variety of bioactive compounds with a variety of pharmacological effects. Because of the unrivaled chemical variety, standardized plant extracts provide endless prospects for novel pharmaceuticals.

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