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Review Article

A REVIEW ON *MIMOSA PUDICA* LINN. WITH SPECIFIC REFERENCE TO ANTIMICROBIAL ACTIVITY

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ABSTRACT
Mimosa pudica Linn. has been found to be a potent herb and used by different traditional practitioner in different ailments. Different communities use *Mimosa pudica* Linn. as a primary ingredient in different traditional formulation. In *Charak Samhita* it is mentioned that decoction of the plant could be used for vaginal wash in vaginal infections. South Asian peoples have been using *Mimosa pudica* Linn. for several ailments for decades. *Mimosa pudica* Linn. is an annual or perennial herb found to have several activities like Anthelminthic, anti hyperglycemic, anti inflammatory, antipyretic, antispasmodic, antitussive, antiviral, calmative, contraceptive, depilatory, diuretic, emetic, expectorant, poison, sedative, tranquilizing. People of different community used the medicinal value of the plant for the treatment of tooth ache, urinary tract infection and vulvovaginal infections. It is well justified that there would be a potent antimicrobial activity against several bacterial and fungal strains.

Keyword: *Mimosa, Infectious Disease, Charak Samhita, Vaginal, Urinary Tract Infection*

INTRODUCTION
Since time of civilization plants have been a major source of medicine. The different Indian literatures of ancient time mention the use of plants in treatment of various diseases in human and in animal. India has about 45000 plant species and out of which several thousands have been claimed to possess medicinal properties. It is hereby to acknowledge sincerely that plant extracts and its products contribute substantially in four major areas to human and animal health: (i) as food, (ii) as flavouring agents and spices, (iii) as perfumes and cosmetics, and (iv) as pharmaceutical excipients and medicine. In the hindmost area we know that there are at least more than 100 compounds from nearly 90 different plant materials which are available globally as single entity prescription products. In addition, there are many thousands of plant extracts as well as plant derived materials which are employed commercially in various parts of the world. For approximately 85% of the world's population (5.2 billion of 6.1 billion people), it is these plant materials which are a primary source of health care (Tan *et al.*, 2004).
Ayurveda, Siddha, Unani and Folk medicines are the most widely practiced system of indigenous medicines. Ayurveda is most widely practiced developed systems and found throughout the India. Ayurveda dating back to 1500-800 BC has been an integral part of Indian culture. The term comes from the Sanskrit root *Au* (life) and *Veda* (knowledge).
As the name implies it is not only the science of treatment of the ill but covers the whole gamut of happy human life involving the physical, metaphysical and the spiritual aspects. Ayurveda recognises that besides a balance of body elements one has to have an enlightened state of consciousness, sense organs and mind if one has to be perfectly healthy. Ayurveda by and large is an experience with nature and unlike in Western medicine, many of the concepts elude scientific explanation. Ayurveda is gaining prominence as the natural system of health care all over the world. Today this system of medicine is being practiced in countries like Nepal, Bhutan, Sri Lanka, Bangladesh and Pakistan, while the traditional system of medicine in the other countries like Tibet, Mongolia and Thailand appear to be derived from Ayurveda. Phytomedicines are also being used increasingly in Western Europe. Recently the US Government has established the "Office of Alternative Medicine" at the National Institute of Health at Bethesda and its support to alternative medicine includes basic and applied research in traditional systems

of medicines such as Chinese, Ayurvedic etc. with a view to assess the possible integration of effective treatments with modern medicines (Thomas, 1997).

The quest for plants with medicinal properties continues to receive attention as scientists are in need of plants, particularly of ethno botanical significance for a complete range of biological activities, which ranges from antibiotic to anticancerous. Several plants and herb species used traditionally have potential antimicrobial and antiviral propertiesb (Shelef, 1983; Zaika, 1988) and this has raised the optimism of scientists about the future of phyto-antimicrobial agents (Das *et al*., 1999). *Mimosa pudica* Linn has been found mysterious plant having multi activity like Anthelminthic, aphrodisiac (Pande and Pathak, 2009), antihyperglycemic, anti-inflammatory, antimicrobial, antipyretic, antispasmodic, antitussive, antiviral, bactericide, calmative, contraceptive, depilatory, diuretic, emetic, expectorant, poison, sedative, tranquilizing etc. *Mimosa pudica* Linn. have been using as an ingredient in different polyherbal Ayurvedic preparations. People used decoction of the whole plant *Mimosa pudica* Linn. in vaginosis, urinary tract infection, tooth ache and infections in the lower genital tract of female. Due to the challenging mechanism and frequent drug resistance of different microbes newer antimicrobial of traditional medicines have a great importance. Folk medicines have been dealing with the treatment of different diseases from the pre-historic time. In simplest word we can say there is a huge demand and need of searching antimicrobial activity of folk origin. A common plant, *Lajjalu* (Sanskrit), scientifically known as *Mimosa pudica* Linn. is locally known as Nilajiban (Assamese), and Chui-mui in Hindi, Han xiu cao in China and Lajwania in Indo-Fijian locality.

Description of the Plant

Mimosa pudica Linn is a common herb which grows throughout in India. The stems are branched, with bristly hairs. The leaves are small leaflets on stalk, and on touch they fold together. *Mimosa pudica* Linn is traditionally used in Indian system of medicine for the treatment of various diseases. This short lived evergreen sub shrub is usually treated as an annual. It is grown for its curiosity value- the fern like leaves close up and droop when touched, usually re-opening within minutes. It has prickly stems and small, fluffy, ball shaped pink flowers in summer. It grows to a height of 5 ft and spreads around 3 ft- a perennial plant, it grows to a height of 0.5m with a spread of 0.3m. In some areas this plant is becoming a noxious weed.

The stem is erect, slender and branching. The leaves are bi-pinnate, fern like and pale green- closing when disturbed. The flowers are pale lilac pink, occurring in globes heads and appearing in summer. Indigenous to the northern hemisphere, it is adaptable to most soils in an open, sunny position, and is drought and frost tender. Due to its ability to fix nitrogen from the air it does well on poor soils. "Sensitive Plant" folds up its leaves when touched or exposed to a flame. This plant requires a medium light exposure, an evenly moist soil, and temperatures between 60 and 85 degrees. One should use caution when handling seedlings because the plant dislikes root disturbance. Mimosa may be difficult to grow and is sensitive to over watering (Gurung, 2002).

Scientific Classification

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Fabales
Family: Fabaceae
Subfamily: Mimosoideae
Genus: Mimosa
Species: *M. pudica*

Macroscopic Observation

Stems: Reddish-brown to brown color, prickly.

Leaves: Immediately fold by if touched, pinnate 4, often reddish, leaflets 12-25 pairs, acute, bristly, 9-12mm long, 1.5mm wide.

Flowers: Pink, in globules heads, nearly 1cm in diameter, auxiliary, peduncles up to 2.5cm long.

Pods/Fruits: Crowded, flat, prickly, briskly. The legume (pod) is linear-oblong, 1.0 to 1.5 cm long and 3 mm broad, with bristles on the margins. The pods are born in groups and contain two to four brown seeds.
Seeds: Bristles on seed pod cling to fur and clothing, about 2 mm broad, rounded, brown.
Roots: The root system consists of a taproot and extensive fibrous roots with nodules.

***Review on Anti-Microbial Studies on Mimosa Pudica* L.**

Chandra *et al.*, (2012) has explained the efficacy of extracts of six medicinal plants of India against some pathogenic bacteria. They elaborately explained the sensitivity of the pathogenic multi-drug resistant bacteria (*Aeromonas hydrophila*, *Bacillus licheniformis*, *Bacillus mycoides*, *Bacillus niacini*, *Bacillus subtilis*, *Escherichia coli*, *Geobacillus thermodenitrificans*, *Klebsiella pneumoniae*, *Paenibacillus koreensis*, *Paenibacillus larvae larvae*, *Proteus vulgaris*, *Pseudomonasaeruginosa*, *Pseudomonas flourescens*, *Pseudomonas putida* and *Staphylocccus aureus*) was tested against aqueous, acetone and ethanol extracts of mature leaves of *Mimosa pudica* Linn. (Mimosaceae) and *Moringa oleifera* Lam. (Moringaceae), stems of *Michelia champaca* Linn. (Magnoliaceae) and *Musa paradisiaca* Linn. (Musaceae), roots of *Momordica charantia* Linn. (Cucurbitaceae) and *Murraya koenigii* Linn. (Rutaceae) by agar well diffusion method. Gatifloxacin was the most effective antibiotic against all the reference bacteria.

Though all the extracts were found effective, the ethanol extract showed maximum inhibition against the test microorganisms followed by acetone and aqueous extract. *Bacillus niacini* is the most resistant bacteria and *Klebsiella pneumoniae* is the most sensitive bacteria against all the extracts used. MIC values of each bacterium were also determined.

Tamilarasi and Ananthi (2012) explained over the Phytochemical Analysis and Anti Microbial Activity of *Mimosa pudica* Linn. Ethanolic extracts of *Mimosa pudica* L. leaves were screened by them for phytochemical constituents and antimicrobial activity towards pathogens i.e. bacteria and fungi. The activity was tested against Bacillus subtilis, Pseudomonas aeruginosa, Klebsiella pneumonia, Aspergillus flavus and Trycophyton rubrum at different concentrations of 25, 50, 75 and 100 µl/ disc and the results have been illustrated. Phytochemical analysis of the extract revealed that the antimicrobial activity of the plant materials is due to the presence of active constituents like alkaloids or tannins.

Mohan *et al.*, (2011) explained how his team worked on Aqueous and methanol extract of two medicinal plants of *Caesalpinia sappan* L. and *Mimosa pudica* L. They evaluated antimicrobial activities against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Pseudomonous aeruginosa*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *Candida albicans* and *Aspergillus niger*. They used agar disk diffusion and broth dilution method for screening anitimicrobial activity. They found that the plant extracts were more active against Gram positive bacteria than the gram negative bacteria. The most susceptible were found *S.aureus*, followed by *B.subtilis*, while more resistant bacteria were *S.aureus*, followed by *E.coli*.

Arokiyaraj *et al.*, (2012) discussed on the Phytochemical screening, antibacterial and free radical scavenging effects of *Artemisia nilagirica*, *Mimosa pudica* and *Clerodendrum siphonanthus* -An in-vitro study. They evaluated methanolic extracts of leaves of *Artemisia nilagirica*, *Mimosa pudica* and *Clerodendrum siphonanthus* antibacterial activity and found microbial sensitivity against the *Klebsiella pneumoneae*, *Proteus mirabilis*, *Salmonella typhi*, *Staphylococcus aureous*, *Escherichia coli*, *Basillus subtilis*.

Preparation of Extract

Solvent Extraction

Required quantity of dried plant materials are extracted with required quantity of the solvent kept on a rotary shaker for 24h. There after it is filtered and centrifuged. The supernatant is collected and the solvent is evaporated to make the final volume and to be stored at 4°C in airtight bottles for further studies.

Aqueous Extraction

Required quantities of dried plant material are extracted in distilled water for a specific period at slow heat. Then, it is filtered through layers of muslin cloth and centrifuged a. The supernatant is to be collected. The supernatant is concentrated, autoclaved and stored at 4°C.

Antimicrobial Assay

The anti bacterial activity of different plants species was evaluated by agar disk diffusion method and agar well diffusion using Mueller Hinton Agar No.2 medium for the assay. The microorganism was activated by inoculating a loopful of the strain in the nutrient broth and incubated at room temperature on a rotary shaker. Then, a few ml of inoculums was inoculated into the molten Mueller Hinton agar media and after proper homogenization it was poured into petridishes. For the agar disk diffusion, the test compound was introduced on to the disk and then allowed to dry. Thereafter, the disk was impregnated on the seeded agar plate. For the agar well diffusion, a well was made in the seeded plates with the help of a cup-borer. The test compound was introduced into the well and all the plates were incubated at 37°C for 24h. The experiment was performed 3times under strict aseptic conditions. Microbial growth was determined by measuring the diameter of the zone of inhibition and values are presented (Aneta *et al.*, 2012).

Determination of Minimum Inhibitory Concentration (MIC)

MIC for each test organism was determined by following the modified agar well diffusion method. A twofold serial dilution of each extract was prepared by first reconstituting the dried extract in DMSO followed by dilution in sterile distilled water (1:1) to achieve a decreasing concentration rang. A 100 µl volume of each dilution is introduced into wells (in triplicate) in the agar plates already seeded with 100µl of standardized inoculum of the test microbial strain. All test plates were incubated aerobically and observed for the inhibition zones. MIC, taken as the lowest concentration of the test extract that completely inhibited the growth of the microbe, showed by a clear zone of inhibition is recorded for each test organism (Parekh *et al.*, 2005).

Bio-Autography Assay

Direct bio-autography method can be used to determine the phytoconstituents responsible for the anti microbial activity. HPTLC plate of specific dimension and size is coated used for the bio-autography assay. The chromatogram was developed in the solvent system. The chromatograms were dried at room temperature under a stream of air overnight, for complete removal of traces of solvents. Microbial cultures is grown and transferred in the Nutrition broth from agar with sterile swabs. The developed TLC plates were sprayed with concentrated suspension of cultures. The wetted plates are incubated for 24h and then sprayed with a 0.2% solution of Trypan Blue Dye. The plates were observed in visual light for the presence of blue coloured bands. The Rf values of the blue bands were then recorded (Mahule *et al.*, 2012).

CONCLUSION

The various traditional studies suggested that the plant *Mimosa pudica* Linn. seems to be active against several microbial strains. Therefore, a periodic study of the plant is necessary and there is a scope of doing research for antimicrobial activity which could able to justify the traditional values.

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