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Short Communication

Phytochemical Analysis and Anti Microbial Activity of *Mimosa pudica* Linn.

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Abstract

Ethanolic extracts of Mimosa pudica leaves were screened 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.

Key words: *Mimosa pudica*, antimicrobial activity, phytochemical.

Introduction

Indian ayurvedic system is one of the noteworthy systems of traditional medicine practice that uses mainly certain plants for the treatments of ailments in both man and other animals. Although the popularity of herbal medicine recorded a sharp decline after the introduction of allopathic chemical drugs, herbal medicines are gaining growing interest because of their cost-effective, ecofriendly attributes, and true relief from disease condition. The harmful side effects and high cost of the other forms of treatment and their non availability to the poor populations, who live in remote areas, are also the reasons for the demand for herbal medicine. The increasing prevalence of multidrug resistant strains of bacteria and the recent emergence off strains with reduced susceptibility to antibiotics raises the specter of untreatable bacterial infections and adds urgency to the search for new infection-fighting strategies[1]. Contrary to the synthetic drugs, antimicrobial substances of plant origin are not associated with many side effects and have an enormous therapeutic potential to heal many infectious disease[2].

Tradition medicines are used by about 70 percent of the world population. Antimicrobial properties of certain Indian medicinal plants were reported based on folklore information and only few reports are available on inhibitory activity against certain pathogenic bacteria and fungi[3]. Use of plants as source of medicine has been inherited and is an important component of the health care system in India. In these systems of Indian medicine, most practitioners formulate and dispense their own recipes; hence this requires proper documentation and research[4]. Higher plants produce a large number of diverse chemical compounds with different biological activities[5]. It is believed that these compounds may have important ecological roles. India is the largest producer of medicinal herbs and is appropriately called the botanical garden of the world[6]. Biologically active compounds from natural sources have always been of great interest to scientists working on infectious diseases. In recent years there has been a growing interest to evaluate plants possessing antimicrobial activity against various disease[7].

Mimosa pudica Family Mimosae known as sensitive plant in English and lajvanti or chuimui in local Hindi language. The plant is distributed through out in India in moist locality. A diffuse prickly under shrub, is about 45-90 cm in height. Leaves bipinnately compound, pinnate 2-4 delicately arranged with 10-20 pairs of leaflets, rachis clothed with ascending bristles. Flowers pink, in globose heads, penduncles prickly, usually in auxiliary pairs all along the branches.Fruits bristly pods, flat, straw colored consisting of 3-5 one seeded segments. The roots and leaves are commonly used in treatment as bitter, astringent, acrid, cooling vulnerary, alexipharmic, diuretic antispasmodic, emetic, constipating and febrifuge[8].The present study intends to study about the phytoconstituents and antimicrobial activity of the plant extracts of *Mimosa pudica* against pathogenic microbes.

Material and Methods

Collection of Plant Materials: Plant materials were collected from revenue village of Pattukkottai and they were dried in shade and coarsely powdered. 500g of the powder was extracted successively wit ethanol in an aspirator bottle at room temperature. The powder was soaked in the solvent for 72 hours and nearly 80% of the solvent was removed by distillation on a water bath at atmospheric pressure and last traces were removed under reduced pressure using rotary evaporator.

Preliminary Phytochemical Screening: Ethanol extract was then treated with various reagents which revealed the presence of various phytoconstituents[9].

Antibacterial assay: Media Preparation: Bacterial Media (Muller Hinton Media): 36g of Muller Hinton Media (Himedia) was mixed with distilled water and then sterilized in autoclave at 15lb pressure for 15 minutes. The sterilized media were poured into Petri dishes. The solidified plates were bored with 5mm diameter cork bearer. The plates with wells were used for the antibacterial studies.

Fungal Media (Potato dextrose Agar): 200g of potato slices were boiled with distilled water. The potato infusion was used as water source of media preparation. 20g of dextrose was mixed with potato infusion. 20g of agar was added as a solidifying agent. These constituents were mixed and autoclaved. The solidified plates were bored with 6mm diameter cork borer. The plates with wells were used for antifungal studies.

Antibacterial activity of the plant extract: The ethanolic extract of 25µl, 50 µl, 75 µl and 100 µl were tested against two bacterial pathogens namely *Bacillus subtilis*, *Pseudomonas aeruginosa* and *Klebsiella pneumonia* for their antibacterial activity. It was demonstrated by well diffusion method.

Antifungal activity of the plant extract: The ethanolic extract of 25µl, 50 µl, 75 µl and 100 µl were tested against different fungal pathogens *Aspergillus flavus* and *Trycophyton rubrum* for their antifungal activity. It was demonstrated by well diffusion method.

Well diffusion Method: Antibacterial and antifungal activities of the plant extract were tested using Well diffusion method[10]. The prepared culture plates were inoculated with different selected strains of bacteria and fungi. Wells were made on the agar surface with 6mm cork borer. The extracts were poured into the well using sterile syringe. The plates were incubated at 37ºC±2 ºC for 24 hours for bacterial and 25ºC±2 ºC for 48 hours for fungal activity. The plates were observed for the zone clearance around the wells.

The extract of the dried leaves of *Mimosa pudica* was used for the study. The ethanol extract was dissolved in sterile distilled water to form dilution such as 25µl, 50 µl, 75 µl and 100 µl. Each concentration of the plant extract was tested against different bacterial and fungal pathogens. The zone of inhibition was calculated by measuring the diameter of the inhibition zone around the well (in mm) including the well diameter. The readings were taken in three different fixed directions in all 3 replicates and the average values were tabulated.

Results and Discussion

The preliminary phytochemical screening of ethanol extract showed the presence of Steroids, Carbohydrates, Saponins, Flavonoids and Tannins (table.1). The results of the antimicrobial assay of the ethanol extract of *Mimosa pudica* indicated that the plant exhibited antimicrobial activity against the tested microorganisms at four different concentrations of 25 µl, 50 µl, 75 µl and 100 µl/disc. The potential sensitivity of the extract was obtained against all the microorganisms tested the zone of inhibition was recorded and presented in table 2 and 3.

Table-1
Phyto chemical screening of ethanol extract of *Mimosa pudica*

Sl. No	Test	Ethanol Extract of *Mimosa pudica*
1	Alkaloids	+
2	Glycosides	+
3	Terpenoids	-
4	Carbohydrates	+
5	Proteins	+
6	Steroids	+
7	Flavonoids	+
8	Phenols	+
9	Tannins	-
10	Quinones	-
11	Saponins	-

\+ Indicates the present - Indicates the Absent

Table-2
Anti bacterial activity of ethanol extract of *Mimosa pudica* by well diffusion method

S. No	Organisms	Concentration of extract (µl) /zone of inhibition (mm)				
		Control	25µl	50µl	75µl	100µl
1.	*Bacillus subtilis*	17	13	17	18	20
2.	*Pseudomonas aeruginosa*	20	13	14	16	17
3.	*Klebsiella pneumonia*	19	12	13	15	17

Table-3
Antifungal activity of ethanol extract of *Mimosa pudica* by well diffusion method

S. No	Organisms	Concentration of extract (µl) / zone of inhibition (mm)				
		Control	25µl	50µl	75µl	100µl
1.	*Aspergillus flavus*	11	12	15	17	21
2.	*Trycophyton ruburum*	10	10	12	13	15

Medicinal plants possess a variety of compounds of known therapeutic properties[11,12]. Hence, much attention has been paid to plant derived antibacterial compounds based on the knowledge that plants have their own defense system. The therapeutic use of such plant products is an alternative strategy to prevent the spread of disease. In the present investigation the active phytocomponents of *M.pudica* was studied and further the antimicrobial activity of the plant extract was also tested against potentially pathogenic microorganisms *B.subtilis, P.aeruginosa K.pneumonia, A.flavus* and *T.rubrum* at different concentrations of the extract to understand the most effective activity. The maximum zone of inhibition was obtained for *B.subtilis* and *A. flavus* at a concentration of 100 µl. The minimum zone of inhibition was observed in all tested organisms at a concentration of 25µl.

This shows that the organic extract particularly ethanol exhibited better antibacterial activity and may be due to the anti bacterial principles which are either polar or non-polar and effectively extracted only the organic solvent medium[13,14,15]

Conclusion

From above studies, it is concluded that the susceptibility of various microbial agents to different concentrations of *Mimosa pudica* indicates that plant is the potential source for antimicrobial compound. So further work on the profile in order to determine the nature of bioactive principles present in the plant and their mode of action.

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