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Screening of Secondary metabolites and Antimicrobial activity of *Mimosa pudica*

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ABSTRACT

Mimosa pudica L. is a creeping annual or perennial herb. It has been identified as Lajjalu in Ayurveda and has been found to have antiasthmatic, aphrodisiac, analgesic and antidepressant .In the present study the active phytocomponents of *Mimosa pudica* were revealed using phytochemical analysis. The antimicrobial activity of*Mimosa* was studied using well diffusion method. The activity was tested against *Aspergillus fumigatus, Citrobacter divergen* and *Klebsiella pneumonia* at different concentrations of 50, 100 and 200µg/disc and the results have been illustrated.

Keywords: *Mimosa pudica*, antimicrobial activity, antiasthmatic, aphrodisiac, analgesic.

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INTRODUCTION

Herbal medicine involves the use of plants for medicinal purposes. The term "Herb" includes leaves, stems, flowers, fruits, seeds, roots, rhizomes and bark. There can be little doubt that the use of plants for healing purposes is the most ancient form of medicine known. 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 properties [1, 2] and this has raised the optimism of scientists about the future of phyto-antimicrobial agents [3].

Several phytochemical surveys have been published, including the random sampling approach which involved some plant accessions collected from all parts of the world. The major chemical substances of interest in these surveys were the alkaloids and steroidal sapogenins, however other diverse groups of naturally occurring phytocomponents such as flavonoids, tannins, unsaturated sterols, triterpenoids, essential oils etc., have also been reported [4]. There is currently a large and ever expanding global population base that prefers the use of natural products in treating and preventing medical problems because herbal plants have proved to have a rich resource of medicinal properties.

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. It belongs to the Fabaceae family. *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 (Germplasm Resources Information Network, 2008), Sleeping grass (Tropical Biological Association), Prayer plant, The species epithet "pudica" is a latinequivalent 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 (5 ft). 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 (US Forest Service, 2008)

This plant has a history of use for the treatment of various ailments and the most commonly used plant part for this purpose is the root, but flowers, bark and fruit can also be utilized. Several research works have been carried out to study about the phytochemical components of *Mimosa pudica* [5-7] and also about the antimicrobial activity of the plant [8-9]. The present study intends to study about the antibacterial Activity of the Plant Extracts of *Mimosa pudica* against selected Microbes.

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MATERIALS AND METHODS

Sample Preparation

Mimosa pudica leaves were collected together and shade dried. Since certain compounds get denatured in sunlight, it is dried under shade to avoid decomposition. The dried leaves were then pulverized well in an Udy cyclone mill. About 20g of the powdered leaves were soaked in 100ml of methanol. It was left for 24 hours so that alkaloids, terpenoids and other constituents if present get dissolved. The methanolic extract was filtered using Whatmann 41 filter paper. It was again filtered through Sodium sulphate in order to remove the traces of moisture.

Preliminary Phytochemical Screening

Phytochemical screening of the plant extract was carried out as per the methods and tests given by (10) to decipher the presence or absence of various phytocompounds.

Antimicrobial Assay

Media Preparation

Bacterial Media (Muller Hinton Media)

36g of Muller Hinton Media (Hi-Media) 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 sugar)

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 methanolic extract of 50µg, 100µg and 200µg were tested against two bacterial pathogens namely *Citrobacter divergens* and*Klebsiella pnemoniae*, for their antimicrobial activity. It was demonstrated by well diffusion method.

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Antifungal activity of the plant extract

The methanolic extract and aqueous extract of 100, 200 and 500µg were tested against different fungal pathogen *Aspergillusfumigatus* for their antifungal activity. It was demonstrated by well diffusion assay.

Well diffusion method

Antibacterial and Antifungal activities of the plant extract were tested using Well diffusion method [11]. The prepared culture plates were inoculated with different selected strains of bacteria and fungi using streak plate method. 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±2ºC for 24 hours for bacterial and 25±2ºC for 48 hours for fungal activity. The plates were observed for the zone clearance around the wells.

The extract of the dried leaves was used for the study. The methanol extract was dissolved in sterile distilled water to form dilution such as 50µg, 100µg and 200µg. Each concentration of the plant extract was tested against different bacterial pathogens. It was demonstrated by well diffusion assay [11]. 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

Table 1. Phytochemical Screening of Metanolic Extract of *Mimosa pudica.*

S.No	Tests	Leaves of *Mimosa pudica*
1	Terpenoids	+
2	Flavonoids	+
3	Steroids	-
4	Anthroquinone	-
5	Glycosides	+
6	Sugars	-
7	Alkaloids	+
8	Quinines	+
9	Phenols	+
10	Tannins	+
11	Saponins	+
12	Coumarin	+

Table 2. Antimicrobial activity of Metanolic Extract of *Mimosa pudica.*

S.No	Name of the Organism	Concentration of methanolic extract added and Zone of inhibition (mm)		
		50µl	100µl	200µ
1	*Aspergillus fumigatus*	6	8	12
2	*Citrobacter divergens*	-	-	-
3	*Klebsiella pneumonia*	12	14	20

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The preliminary Phytochemical screening of *Mimosa pudica* extract showed the presence of bioactive components like Terpenoids,Flavonoids, Glycosides, Alkaloids, Quinines, Phenols, Tannins, Saponins and Coumarin (Table 1).The results of the antimicrobial assay of the methanolic extract of *Mimosa pudica* indicated that the plant exhibited antimicrobial activity against the tested microorganisms at three different concentrations of 50, 100 and 200µg/disc. The potential sensitivity of the extract was obtained against all the three micro organisms tested and the zone of inhibition was recorded and presented below in the tabulation drawn (Table 2).

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DISCUSSION AND CONCLUSION

In the present era, plant and herb resources are abundant, but these resources are dwindling fast due to the onward march of civilization [12]. Although a significant number of studies have been used to obtain purified plant chemical, very few screeningprogrammes have been initiated on crude plant materials. It has also been widely observed and accepted that the medicinal value of plants lies in the bioactive phytocomponents present in the plants [13]. In the present investigation, the active phytocomponents of *Mimosa pudica* was studied and further the antimicrobial activity of the plant extract was also tested against three potentially pathogenic microorganisms *Aspergillus fumifatus, Citrobacter diversens* and *Klebsiella pneumonia* at different concentrations of the extract to understand the most effective activity. The maximum zone of inhibition was obtained for *Aspergillus fumigatus* and *Klebsiella pneumonia* at a concentration of 200µg/200µl. While *Klebsiella pneumonia* exhibited good sensitivity against both the concentrations, *Citrobacter divergens* showedresistanceagainst *Mimosa pudica* extract at all concentrations.

From the above studies, it is concluded that the traditional plants may represent new sources of anti-microbials with stable, biologically active components that can establish a scientific base for the use of plants in modern medicine. These local ethnomedical preparations and prescriptions of plant sources should be scientifically evaluated and then disseminated properly and the knowledge about the botanical preparation of traditional sources of medicinal plants can be extended for future investigation into the field of pharmacology, phytochemistry, ethnobotany and other biological actions for drug discovery.

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