Journal of Medicinal Plants Research Vol. 5(22), pp. 5356-5359, 16 October, 2011
Available online at http://www.academicjournals.org/JMPR
ISSN 1996-0875 ©2011 Academic Journals

Full Length Research Paper

Phytochemical screening and antimicrobial activity of the plant extracts of *Mimosa pudica* L. against selected microbes

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Accepted 15 April, 2011

***Mimosa pudica* is the herb that shows sensation on touch. It has been identified as Lajjalu in Ayurveda and has been found to have antiasthmatic, aphrodisiac, analgesic, anti-inflammatory and antidepressant activities. In the present study the active phytocomponents of *M. pudica* were revealed using phytochemical analysis. The antimicrobial activity of *Mimosa* was studied using disk diffusion method. The activity was tested against *Straphyloccus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa and Candida albicans* at different concentrations of 25, 30 and 35 mg/ml and the results have been illustrated.**

Key words: *Mimosa pudica*, antimicrobial activity, antiasthmatic, aphrodisiac, analgesic.

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 anticancer. Several plants and herb species used traditionally have potential antimicrobial and antiviral properties (Shelef, 1983; Zaika, 1988) and this has raised the optimism of scientists about the future of phyto-antimicrobial agents (Das et al., 1999). Several phytochemical surveys have been published, including the random sampling approach which involved some plant accessions collected from all parts of the world (Arthur, 1954). The major chemical substances of interest in these surveys were the alkaloids and steroidal sapogenins, however also been reported (Lozoya and Lozaya, 1989). There unsaturated sterols, triterpenoids, essential oils etc., have is other diverse groups of naturally occurring phytocomponents such as flavonoids, tannins, currently a large and ever expanding global population base that prefers the use of natural products in treating and preventing medical problems because medicinal plants have proved to have rich therapeutic potential.

Although, the herbal medicine has the side effect but compared to the synthetic medicine is lesser and due to this demand has been increased from last decade. *Mimosa pudica* is derived from the word “mimic” means to allude, to sensitivity of leaves and “pudica” means bashful, retiring or shrinking. Mimosa mimics the animal sensitivity that is sensitivity to light, time of day, gravity or like sundew drosera which react to the contact of insect. So mimosa is known as sensitive plant, humble plant, shame plant, sleeping grass, touch me not, lajjalu in Ayurveda and Namaskari in Sanskrit. *M. pudica* is an indoor plant having fascinating behavior (Gibson, 1966). Sleeping grass (Tropical Biological Association), 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. Sensitive plant is a small, prostrate or ascending, short-lived shrub. Some authors consider it a woody herb. It may reach 1 m in height

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Table 1. Phytochemical screening of metanolic extract of *Mimosa pudica*.

Chemical constituent	Tests	Ethanolic extract
Alkaloids	Mayers test	+
	Dragendroff's test	+
	3. Wagners test	+
Carbohydrates	Molisch's test	-
	Benedicts test	-
	Fehling's test	-
Glycosides	Modified Borntragers	-
	Legal test	-
Saponins	Foam test	+
	Froth test	+
Phytosterols	Salkowski test	+
	Libermann Burchard	-
	Tschugajew test	-
Fats and Oil	Stain test	-
Resins	Acetone water test	+
Phenols	Ferric chloride test	+
Tannins	Alkaline reagent	+
Flavanoids	Gelatin test	+
	Lead acetate test	+
Proteins	Xanthoproteic test	_
	Ninhydrin test	-
	Biuret test	-
Diterpenes	Copper acetate test	+

when supported on other vegetation and more than 2 m in horizontal extension. The reddish-brown, woody stems are sparsely or densely armed with curved prickles. The root system consists of a taproot and extensive fibrous roots with nodules. The twigs are fine and flexible and support leaves with one or two pairs of pinnae and 15 to 25 pairs of oblong leaflets 3 to 12 mm long. The flowers are pink and clustered in globose heads. 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 (Howard, 1988). Minosa 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 are also been utilized. Several research works have been carried out to study about the phytochemical components of *M*. pudica (Ahmad and Beg, 2001; Deininger, 1984) and also about the antimicrobial activity of the plant (Ojalla et al., 1999; Palacious and Reyes, 1991). The present study intends to study about the antibacterial activity of the "plant extracts" of *M. pudica* against selected microbes.

MATERIALS AND METHODS

Sample preparation

M. pudica leaves were collected from the Indian Institute of Horticulture Research, Bangalore and was authenticated by the Senior Scientist Dr. T. N. Shivananda. Leaves were collected oven dried at 60°C for 6 h. Further the dried leaves were stored at 4°C and were used for further antimicrobial investigation.

Microorganisms used

The bacterial strains used were obtained from stock culture of the Department of Microbiology, Lovely Professional University, India. Two Gram positive and two Gram negative organisms namely: *Pyrogen* NCIM 2708, *Straphyloccus aureus* NCIM 2079 and *Escherichia coli* NCIM 2685, *Pseudomonas aeruginosa* NCIM 2242 and *Candida albicans* NCIM 2807 respectively used for the present study were grown and maintained on nutrient agar medium.

Preliminary phytochemical screening

Phytochemical screening of the plant extract was carried out to decipher the presence or absence of various phytocompounds (Evans, 1996) and is tabulated in Table 1.

Preparation of extracts and antibiotic solution

25 g of dried *Mimosa* leaves were extracted with various solvents namely: distilled water, absolute ethanol. Two separate methods were used for extraction of *Mimosa* leaves likely soxhalation for ethanolic extracts during 4 h and refluxation for aqueous extract during 6 h after standardization of method. Oven temperature was maintained at 45°C. Extracts were collected and filtered using Whatman No 1 filter paper and the filtrates were then subjected to evaporation under reduced pressure to get soft extract and stored in labeled sterile screw capped bottles at -15°C. The yieldof ethanolic extracts of the leaf were found to be 28 g. Stock solution of broad-spectrum antibiotic (Ampicilin as standard) was prepared as 30 mcg/ml (w/v) concentration in sterile distilled water. The concentration of 0.1 ml ampicillin was used for the antibacterial assay in this study.

Preparation of inoculum

The suspension of organism was prepared as per Mac-Farland nephlometer standard (Zaika, 1988). A 24 h old culture was used for the preparation of bacterial suspension. A suspension of organism was made in a sterile isotonic solution of sodium chloride and the turbidity was adjusted such that it contained approximately 1.5×10 cells/ml. It was obtained by adjusting the optical density (650 nm) equal to 0.5 ml of 1.175% barium chloride in 100 ml of 1.0% sulphuric acid.

Table 2. Antimicrobial activity of ethanolic extract of *Mimosa pudica.*

Samples	Conc. (mg/ml)	Organisms used				
		S. aureus	***E. coli***	***P. aeruginosa***	***Pyrogen***	***C. albicans***
Ethanolic extract	25	19.53±0.742*	19.0±1.06**	21.1±0.1528*	NA	NA
	30	23.96±0.606*	22.3±0.51**	21.43±0.470*	NA	17.1±0.43*
	35	23.23±0.233*	23.9±0.29**	22.4±0.176*	NA	19.9±0.30*
Ampicilline	2/100	25±0.00*	25.5±0.421*	24.3±0.4213*	23±0.0	NA
Fluconazole	2/100	NA	NA	NA	NA	24.6±0.513

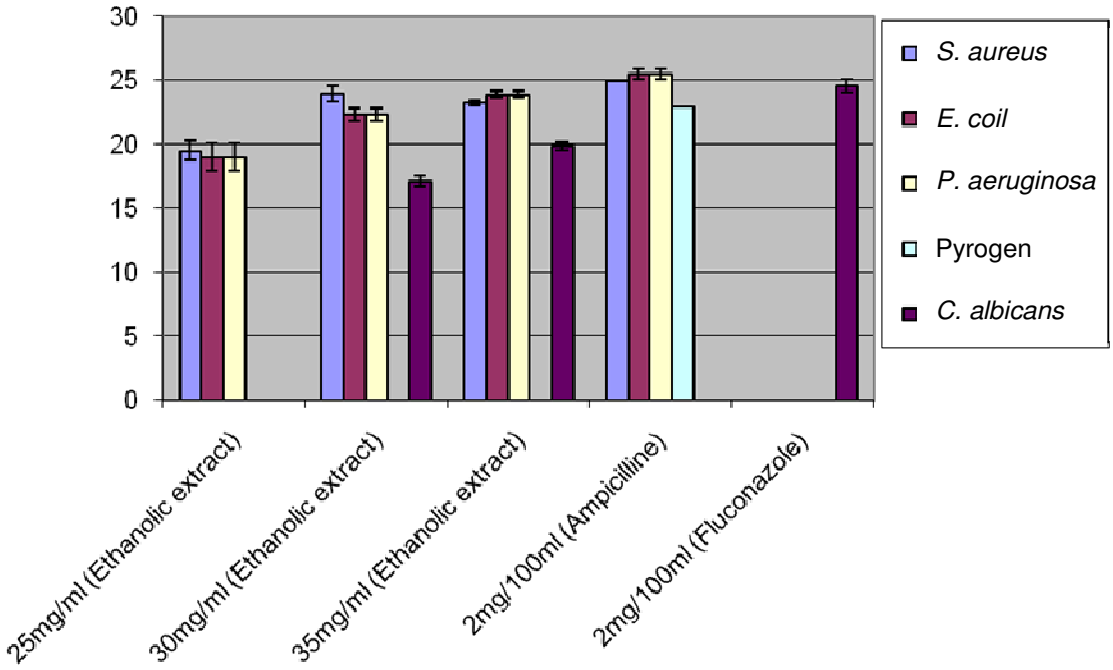

Figure 1. Graphical representation of antimicrobial activity of *Mimosa pudica* extracts with its SEM.

Determination of minimum inhibitory concentration (MIC)

Plate dilution method was followed to determine MIC of all the aforementioned extracts. Different concentrations were used (100, 200 and 300 mcg/ml) against 0.1 ml of 10^{-4} inoculum, dilution prepared from 24 h incubated culture of *E. coil, S. typhi, B. substilis* and *S. aureus* into different sterile Petri plates followed by pouring of 20 ml autoclaved nutrient agar media so as to understand the minimum concentration needed to prevent the growth of the microbial strain and use the obtained MIC from this test for evaluation of zone of inhibition for all extracts. The plates were prepared in triplicates and were incubated at 37°C for 48 h and the growth was observed.

Statistical analysis

The experimental results were repeated thrice and zone of inhibition were determined in millimeter. All the results were statistically expressed as the mean ± standard error of mean (SEM). Values of $P < 0.05$ were considered statistically significant.

RESULTS

The preliminary "phytochemical" screening of *M. pudica* extract showed the presence of bioactive components like terpenoids, flavonoids, alkaloids, quinones, phenols, tannins, saponins and coumarin. The antimicrobial activity in this plant is not so effective as compared to the standard ampicilline. The zone of inhibition of the extract was 23.96 mm for the *S. aureus* at 30 mg/ml while for the *E. coli* and *P. aeruginosa* it was 22.3 and 21.43 mm, respectively at the same concentration.

The zone of inhibition of the standard was found to be 25.5 mm at 2 mg/ml. The zone of inhibition is recorded and presented in the tabulation drawn along with its significant P value (Table 2 and Figure 1).

DISCUSSION

In the present era, medicinal herb resources are abundant, but these resources are dwindling fast due to the onward march of civilization (Vogel, 1991). Although a significant number of studies have been used to obtain purified plant chemical, very few screening programmes 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 (Veermuthu et al., 2006).

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 three potentially pathogenic micro-organisms *S. aureus*, *E. coli*, *P. aeruginosa*, *Pyrogen* and *C. albicans* at different concentrations of the extract to understand the most effective activity. The maximum zone of inhibition was obtained for *E. coli* and *S. aureus* at a concentration of 35 mg/ml. While *P. aeruginosa* exhibited good sensitivity against both the concen-trations. From the studies, it is concluded that the traditional plants may represent new sources of antimicrobials with stable, biologically active components that can establish a scientific base for the use of plants in modern medicine. These local ethno-medical prepa-rations 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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