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Original Research Paper

Phytochemical Screening and Antibacterial Activity of *Mimosa pudica* L. and *Mimosa invisa* L. Against Selected Microbes

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ABSTRACT

The antibacterial activity of *Mimosa pudica* and *Mimosa invisa* were evaluated. The extract of these plants was obtained by using methanol and water as solvents. Antibacterial activity was screened by using agar well diffusion method against pathogenic bacteria, i.e., *Bacillus subtilis, Staphylococcus aureus, Klebsiella pneumoniae* and *Pseudomonas fluorescens. M. pudica* and *M. invisa* showed highest antibacterial activity against *K. pneumoniae* and *B. subtilis* respectively. Phytochemical screening revealed that *M. pudica* and *M. invisa,* in general, contain active constituents like alkaloids, tannins, flavanoids, steroids, phenols, glycosides, terpenoids, anthraquinones, etc. having a definite specificity.

INTRODUCTION

The scientific studies available on a good number of medicinal plants indicate that promising phytochemicals can be developed for many human health problems (Gupta 1994, Dahiru et al. 2005) including diabetes, cancer and other infectious diseases. Antibiotic resistance has become a global concern (Westh et al. 2004). There has been an increasing incidence of multiple resistance in human pathogenic microorganisms in recent years largely due to indiscriminate use of commercial antimicrobial drugs commonly employed in the treatment of infectious diseases. *Mimosa pudica* L. and *Mimosa invisa* L. belong to the Family Fabaceae. *M. pudica* has medicinal properties and is used in herbal preparations for gynaecological disorders. The juice of its leaves is used as an external application for sores and piles (Sadia Afreen et al. 2010). *M. invisa* does not have any special medicinal property. It is used as a nitrogen fixing cover crop and green manure. In Indonesia it is used as a fodder for buffaloes.

MATERIALS AND METHODS

Plant collection and extraction: The plants were collected from the regions of Nattika, Thrissur district, Kerala and dried under shade to avoid decomposition. The dried plants were coarsely powdered and subjected to successive solvent extraction using soxhlet apparatus. Each time about 3 g of dried powder was subjected to solvent extraction with water and methanol. The crude extracts were then concentrated by evaporation and the residues were weighed and made up to 10 mL with the respective solvents and kept in sterile bottles under refrigerated conditions for further use.

Antimicrobial screening: The bacterial strains selected for the study were *Bacillus subtilis, Staphylococcus aureus, Klebsiella pneumoniae* and *Pseudomonas fluorescens.* The four bacterial cultures were clinical isolates, obtained from Amala Ayurvedic Hospital and Research Centre-Lab, Amalanagar, Thrissur. The standard antibiotic used was ampicillin. The media used for bacterial assay were nutrient agar and nutrient broth. Each crude extract was studied to detect its antibacterial property against pathogenic and industrially important strains by agar well diffusion method (Cole 1994, Espinel-Ingroff et al.1998, Okeke et al. 2001). Two wells of 5mm diameter were bored in each plate with an aseptic cork borer, and bacterial strains were seeded on solidified agar medium by swab plate technique. By using pasture pipette 200 microlitre of the plant extracts were dispensed into the wells and incubated for 24 hr at 37°C. The zone of inhibition was calculated by measuring the diameter of the inhibition zone around the well including the well diameter. The standard antibiotic used was ampicillin.

Phytochemical screening: Qualitative phytochemical analysis of crude extracts was performed by suitable reagents for the detection of major chemical groups.

RESULTS AND DISCUSSION

All the extracts showed varying degrees of antibacterial activity. *M. pudica* showed antibacterial activity against all the four bacteria. Methanol fraction exhibited highest inhi-

Table 1: Antibacterial activity of plant extracts against selected pathogens (inhibition zone in mm).

Name of the plant	Extract used	*Bacillus subtilis*	*Staphylococcus aureus*	*Klebsiella pneumoniae*	*Pseudomonas fluorescens*
Mimosa pudica	Methanol	10.5	11.0	11.5	9.0
	Water	11.5	7.0	13.0	7.0
Mimosa invisa	Methanol	14.5	8.5	10.0	7.5
	Water	11.5	-	12.0	-

Table 2: Phytochemical screening of *Mimosa pudica* and *Mimosa invisa*.

Tests perfomed	*Mimosa pudica*		*Mimosa invisa*	
	Methanol extract	Water extract	Methanol extract	Water extract
Alkaloids	+	-	+	-
Tannins	+	-	+	-
Flavanoids	+	-	-	-
Steroids	+	+	+	-
Phenols	+	+	+	-
Glycosides	+	+	+	-
Terpenoids	+	+	+	+
Anthraquinones	+	-	+	-
Saponnins	-	-	-	-
Cardiac glycosides	-	-	-	-

bition zone (13 mm) against *K. pneumoniae* (Fig. 1). Methanol extract of *M. invisa* showed antibacterial activity against all the four bacterial pathogens and its water extract exhibited no antibacterial activity against *S. aureus* and *P. fluorescens* (Fig. 2). Methanol extract of *M. invisa* showed highest inhibition zone of 14.5mm against *B. subtilis* (Table 1). It could be assumed that the chemical profiles of its extracts were significantly different from that of *M. pudica*. A few other species of the genus *Mimosa* have previously been shown to possess antibacterial properties (Digrak et al. 1999). The investigated plant, *M. invisa* did not show strong antibacterial activity; however, negative results do not mean absence of bioactive compounds. They may be present in insufficient quantities in the crude extracts to show activity with the dose levels employed (Taylor et al. 2001). Lack of activity can thus, only be proven by using large doses. Preliminary phytochemical screening of *M. pudica* showed the presence of alkaloids, tannins, flavanoids, steroids, phenols, glycosides, terpenoids, anthraquinones. *M. invisa* attract the presence of alkaloids, tannins, steroids, glycosides, terpenoids, anthraquinones (Table 2). Alternatively if the active principle is present in high quantities, there could be other phytoconstituents exerting antagonistic effects or negating the positive effects of the bioactive agents (Jager et al. 1996). With no antibacterial activity for selected strains, the extracts may be active against other bacterial species which were not tested (Shale et al. 1999).

CONCLUSION

From this study it can be concluded that these traditional

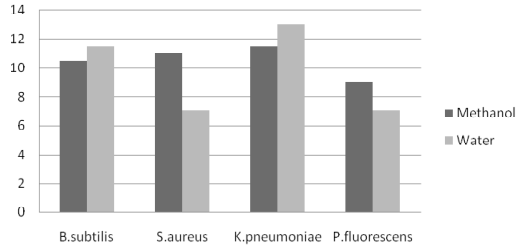

Fig. 1: Anatibacterial activity of *Mimosa pudica* against selected microbes.

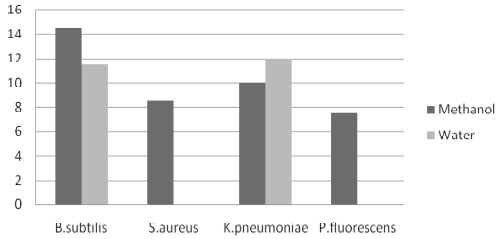

Fig. 2: Anatibacterial activity of *Mimosa invisa* against selected microbes.

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 medicines. The plants contain potential antibacterial components, that may be used for the development of phytomedicines for the therapy of infections. The presence of these phytochemicals in these plants is an indication that these plants have curative effects and, therefore, can be used as alternative medicine. Further study of *in vivo* antimicrobial activity and experiments involving activity guided fractionation are under way and the study is also aimed at extensive investigation and purification of active phytoconstituents with broad spectrum antimicrobial activity.

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