Mintage Journal of Pharmaceutical & Medical Sciences
RESEARCH ARTICLE

EVALUATION OF ANTIBACTERIAL ACTIVITY OF ETHANOLIC EXTRACTS OF *MIMOSA PUDICA* LEAVES

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Received - 10.06.2016; Reviewed and accepted - 24.06.2016

ABSTRACT

Objective: This study was carried out with an objective to investigate the antibacterial activity of ethanolic extracts of mimosa pudica. Methods: In the present study, the anti microbial activity of ethanolic extracts of *Mimosa pudica* was evaluated against medically important bacterial strains, two Gram-positive—*Staphylococcus aureus* and *Streptococcus pyogenes* and two Gram-negative—Escherichia coli and Pseudomonas aeruginosa. The antimicrobial activity was determined with the extract using agar disc diffusion method. The antibacterial activities of extracts (5, 25, 50, 100, 250 µgm/ml) of *Mimosa pudica* were tested against human pathogenic bacteria. Zone of inhibition of extracts were compared with the standard drug ampicillin for antibacterial activity. **Results:** The results showed that the *Mimosa pudica* has the antibacterial activity. Conclusion: The antimicrobial activity of *Mimosa pudica* was due to the presence of various secondary metabolites. Hence, these plants can be used to discover bioactive natural products that may serve as leads in the development of new pharmaceuticals research activities.

Keywords: *Mimosa pudica*, in vitro antibacterial activity, *Staphylococcus aureus, streptococcus pyogenes, Escherichia coli* and *Pseudomonas aeruginosa*.

INTRODUCTION

Antibiotics are one of our most important tools in bacterial infections and have greatly benefited the health-related quality of human life since their introduction. However, over the past few decades, these health benefits are under threat as many commonly used antibiotics have become less and less effective due to emergence of drug-resistant bacteria. It is essential to investigate newer drugs to the resistant strains of microorganisms. Drugs derived from natural sources play a significant role in the prevention and treatment of human diseases. In many developing countries, traditional medicine is one of the primary healthcare systems.

Plants used for traditional medicines contains a wide range of substances that can be used to treat chronic as well as acute infectious diseases and have therefore become sources of important drugs and the pharmaceutical source of bioactive agents that can be used in preparation of synthetic source.

Mimosa pudica (MP) is one of the plants that have long been used in traditional herbal medicine. It is widely found and cultivated in South America and Central America but is now a pantropical weed *Mimosa pudica* (MP) is a family of Leguminosae. *Mimosa pudica* plant name is derived from Latin word *pudica* means *shy, shrinking* also called *sensitive plant* [2]. Medical uses of *Mimosa pudica* are Hemorrhoids, Leprosy, Diarrhea, *Mimosa pudica* was applied to stop bleeding and reduce swelling, anti-inflammatory, AntiScorpion venoum [10] wound healing [11, 12] properties. It also has antibacterial activity [1] [8]. As very little literature is available for the antibacterial activity so, we decided to evaluate the Ethanolic extract of *Mimosa pudica* against pathogenic bacteria in order to detect new sources of antimicrobial agents. The study was aimed to evaluate the antibacterial activity of ethanolic extracts of *mimosa pudica*

MATERIALS AND METHODS

Plant Material

The dried *Mimosa pudica* plant were collected from the local market and authenticated by Professor and Head, Department of Botany, Government Degree College, Khammam.

Ethanolic extraction of *Mimosa pudica*

Ethanolic extraction of *Mimosa pudica* was done using Continuous hot percolation process or Soxhlet extraction or Soxhelation [3]. The apparatus used for continuous hot percolation process was Soxhlet apparatus which consists of three parts [4]:

- Round bottom flask containing the boiling solvent, here, water.
- Soxhlet Extractor in which the drug to be extracted was packed. It has a side tube which carries the vapors of the solvent from the flask to the condenser and a siphon tube which siphons over the extract from Soxhlet extractor to the flask.
- A condenser in which the vapors of the solvent are condensed again into the solvent.

The finely divided powder of the *Mimosa pudica* was placed inside a timble made from thick filter paper, which was loaded into the main chamber of the Soxhlet extractor. The Soxhlet extractor was placed onto a flask containing the powdered leaves, alcohol, solvent, water. The Soxhlet was then equipped with a condenser with an inlet and outlet. The solvent(70% alcohol) was heated to reflux. The water vapour traveled up the distillation arm and flooded into the chamber housing the thimble of solid material. The condenser ensured that any water vapour cools, and drips back down into the chamber housing the solid material. The chamber containing the powder was slowly filled with warm solvent. Some of the desired compound would then dissolve in the warm solvent. When the Soxhlet chamber was almost full, the chamber was automatically emptied by a siphon side arm, with the solvent running back down to the distillation flask. This cycle was allowed to repeat many times, over 6-8 hours for 7 days. During each cycle, a portion of the non-volatile component dissolves in the solvent. After many cycles the desired compound was concentrated in the distillation flask. After extraction the solvent is removed, typically by means of a rotary evaporator, yielding the extracted compound. The non-soluble portion of the extracted solid remained in the thimble, and was discarded.

Test Microorganisms and Growth Media

Staphylococcus aureus (MTCC 96), *Streptococcus pyogenes* (MTCC 442), Escherichia coli (MTCC 443), Pseudomonas aeruginosa (MTCC 424) strains were chosen based on their clinical and pharmacological importance [5]. The bacterial strains obtained from Malla Reddy Institute of medical sciences, were used for evaluating antimicrobial activity. The bacterial stock cultures were incubated for 24 hours at 37°C on nutrient agar, following refrigeration storage at 4°C. The bacterial strains were grown on Mueller-Hinton agar (MHA) plates at 37°C [10].

Antimicrobial Activity (Determination of zone of inhibition)

In vitro antibacterial activities were examined for ethanolic extracts of *Mimosa pudica* plant against four pathogenic bacteria (two Gram-positive and negative) were investigated by the agar disk diffusion method [5-7]. Each purified extracts were dissolved in dimethyl sulfoxide, sterilized by filtration using sintered glass filter, and stored at 4°C. For the determination of zone of inhibition, pure Gram-positive and Gram-negative, strains were taken. Ampicillin was used as a standard antibiotic in the present study [10]. All the extracts were screened for their antibacterial activities against the *Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, and Streptococcus pyogenes*. The sets of five dilutions (5, 25, 50, 100, and 250 µg/ml) [10] of *Mimosa pudica* extract and standard drugs were prepared in double-distilled water using nutrient agar tubes. Mueller-Hinton sterile agar plates were seeded with indicator bacterial strains (108 cfu) and allowed to stay at 37°C for 3 hours. Control experiments were carried out under similar condition by using standard drug ampicillin for antibacterial activity. The zones of growth inhibition around the disks were measured after 18 to 24 hours of incubation at 37°C for bacteria. The sensitivities of the microorganism species to the plant extracts were determined by measuring the sizes of inhibitory zones [10] (including the diameter of disk) on the agar surface around the disks, and values <8 mm were considered as not active against microorganisms.

Microbial activity

The antimicrobial activity of the alcoholic extracts of *Mimosa pudica* were studied in different concentrations (5, 25, 50, 100, and 250 µg/ml) against four pathogenic bacterial strains, two Gram-positive (*Staphylococcus aureus* MTCC 96, *Streptococcus pyogenes* MTCC 442) and two Gram-negative (*Escherichia coli* MTCC 443, *Pseudomonas aeruginosa* MTCC 424). These strains have been selected for the basis of its application purpose of further formulation study.

RESULTS

In the present study antibacterial potential of were assessed in terms of zone of inhibition of bacterial growth, less than 10mm zone of inhibition were taken as resistant and with 10mm or more than 10mm zone of inhibition were taken as sensitive microorganisms with ampicillin[13] as well as an ethanolic extract of *Mimosa pudica*.

The results obtained from the study indicate that the ethanolic extraction of *Mimosa pudica* exhibits antimicrobial activity against *E.coli, P.aeruginosa, S.pyogenes* and *S.aureus* at high concentrations (50, 100 and 200 micrograms/ml). *Mimosa pudica* at fewer concentrations (5, 25 micrograms/ml) has not shown clear zone of inhibition. The results of the antibacterial activities were presented in Tables

DISCUSSION

In this present study *Mimosa pudica* did not show antibacterial action at low concentrations i.e, 5µgm/ml. Ethanol extract of *Mimosa pudica* exhibited a significant antibacterial activity against all the four microorganisms used in the study at the test dose of 50,100 and 250µgm/ml. similar antibacterial activity of *Mimosa pudica* leaf extract was observed by S.K.gangi abhirami et.al [9]. The maximum antibacterial action against all the four microorganisms used in the study was shown at 250 µgm/ml. *Ecoli* was most sensitive with 17 mm zone of inhibition fallowed by *P.aeruginosa* and *S.aureus* with 16 mm zone of inhibition and *S.pyogenes* with 15 mm zone of inhibition The 250 µgms/ml of *Mimosa pudica* has exhibited almost similar zone of inhibition as that of 50 µgms/ml of standard ampicillin drugs on all the four microorganisms used in the study. These finding concludes that the ethanolic extract of *Mimosa pudica* has antibacterial action [9] against the four microorganisms which we have used in the present study and further studies are required to evaluate the efficacy of *Mimosa pudica* in other microorganisms.

CONCLUSION

Based on the above results, we conclude that, the antibacterial action of *Mimosa pudica* was less compared to that of the standard drug (ampicillin). However further investigations are required to study the phytochemical exhibiting the antibacterial property and its molecular mechanism of action.

Table 1: Antibacterial activity of ethanolic extracts of *Mimosa pudica* leaves against bacterial test organism.

Micro-organism	Antibacterial activity –zone of inhibition in mm				
	Alcoholic extracts of *Mimosa pudica* µg/ml				
	5	25	50	100	250
E.coli	-	11	13	16	17
P.aeruginosa	-	-	11	14	16
S.pyogenes	-	-	11	13	15
S.aureus	-	-	12	15	16

Table 2: Antibacterial activity of standard drugs against the bacterial organism.

Micro-organism	Antibacterial activity - zone of inhibition				
	Zone of inhibition in Ampicillin µg/ml				
	5	25	50	100	250
E.coli	13	15	17	19	21
P.aeruginosa	14	15	15	18	20
S.pyogenes	10	12	14	17	19
S.aureus	10	13	14	16	18

Conflicts of interest: Nil

Source of funding: Nil

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