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EVALUATION OF ANTIBACTERIAL, ANTHELMINTIC, AND ANTIDIARRHOEAL ACTIVITIES OF ETHANOLIC AERIAL EXTRACT OF MIMOSA PUDICA LINN.

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ABSTRACT

Mimosa pudica an important medicinal plant having several benefits against many diseases belongs to the family fabaceae. The present study was designed to investigate the Antibacterial, Anthelmintic and Antidiarrhoeal activity of ethanolic extracts of aerial parts of Mimosa pudica linn. Antibacterial effect was tested against gram positive bacteria such as Bacillus subtilis and gram-negative bacteria such as Escherichia coli, Pseudomonas aeruginosa using cup plate method and agar well diffusion method. Anthelmintic activity of the plant extract was studied in parasitic worm Pheritima posthuma. The antidiarrhoeal potential of the ethanolic extract of mimosa pudica has been evaluated in Swiss albino mice against the standard Loperamide and using castor oil for inducing diarrhoea. The current detailed research study revealed *Mimosa pudica* aerial parts possess significant Antibacterial, Anthelmintic and Antidiarrhoeal potential. This research study could establish information for the possibility to develop a herbal formulation in future for the treatment of various ailments.

KEYWORDS: *Mimosa pudica*, Antibacterial, Anthelmintic, Antidiarrhoeal.

INTRODUCTION

Mimosa pudica is a creeping annual or perennial herb which is known to possess sedative, emetic, and tonic properties.[1] The benefits of *Mimosa pudica* has been mentioned in Ayurveda and has been in use from many years. Local natives used the plant leaves for various medicinal purposes such as treatment of depression, piles, insomnia, skin wounds, diarrhea, anxiety, urogenital disorders, and many more. *Mimosa pudica*, as it is commonly

referred to bashful/shrinking in Latin, is significant for both its traditional and therapeutic purposes. The leaves are extremely delicate, and pods are frequently dispersed by floating on water. They contain round and brown seeds measuring 2 or 3 mm in diameter.[2]

Helminthes is a general term commonly refers to worm. They are invertebrates characterized by elongated, flat or round bodies. These helminths are categorized according to the host organ in which they reside, e.g., lung flukes, extraintestinal tapeworms and intestinal roundworms. The helminths differ from other infectious organisms, the former have a complex body structure. They are multicellular and have partial or complete organ system.[3] Several of these parasites are responsible for causing diarrhea and dysentery.[4] Diarrhea a gastrointestinal disease that is responsible for approximately 5-8 million deaths per year around the world.[5]

Keeping the frequencies of diarrheal cases in mind the present study is focused on studying the pharmacological benefits of *Mimosa pudica* for fighting helminthes and providing the relief against diarrhea. The current study also focusses on Antibacterial potential of *Mimosa pudica.*

MATERIALS AND METHODS

Procurement and Identification of plant

The aerial parts of Mimosa pudica were collected from the surroundings of Surampalem, Andhra Pradesh, India.

Extract preparation

The freshly collected *Mimosa pudica* aerial parts were washed, cleaned, dried under shade for about 60 days. Shade dried leaves were ground to coarse powder, and stored in air tight container. The powder was extracted with ethyl alcohol by maceration followed by hot percolation process. The extract was concentrated by drying in a desiccator.[6]

Chemicals, Reagent and Equipments

Gentamicin (Ryvis Pharma), DMSO, Sodium chloride (Rishi chemicals), Peptone (bagwathi chemicals), Beef extract (Thermofischer), Agar and dextrose, Albendazole (AMGIS), Castor oil, Loperamide (LOPEWELL 2, Wellona Pharma).

Experimental animals

Albino mice (25-30gms) of either sex were selected and were well acclimatized to the experimental room at room temperature under controlled humidity conditions.

Antibacterial activity

Antibacterial activity was carried out using agar well diffusion method and cup plate method. Firstly, 100µl of tested bacteria suspension was spread on the nutrient agar plate. Then, it was placed at room temperature to dry. A sterile cork borer of 8mm diameter was used to make wells on the medium. Then 100µl of the extract was dropped into the well. The plate was then left for 30 minutes at room temperature to diffuse the extract and then incubated at 37ºc for 24 hours. If the extract has antibacterial activity, distinct zone of inhibition will appear surrounding the medium. The antibacterial activity of the extract was determine by measuring the diameter of zone of inhibition in terms of millimeter.[7]

Anthelmintic activity

Indian Earthworm belonging to the family "Pheritima Posthuma" were divided into Five groups with five worms in each for assessing Anthelmintic activity. The groups were labelled as positive control (Albendazole), Negative control (DMSO, NaCl 0.9 %), and the test groups treated with 100mg/kg, 200mg/kg and 500mg/kg of *Mimosa pudica* aerial extract. And all the groups were incubated in 37^0C.[8]

Antidiarrhoeal activity

In the present study animals were divided into four groups of five mice each. Group (I) was administered vehicle orally and served as control. Group (Ⅱ) served as standard and received loperamide (1mg/kg), orally, Group (Ⅲ) and (Ⅳ) were given orally ethanolic extract (150 and 300mg/kg) of Mimosa pudica extract respectively. They were fasted overnight before the test but were given free access to water. After 1 hour of administration of above doses all the mice were given with 1ml of castor oil orally to induce diarrhoea. The number of wet fecal dropping were measured for 6 hours.[9]

Statistical analysis

Results have been indicated in terms of means ± SEM. Differences between the groups were statistically determined by ANOVA with Dunnett's multiple comparison tests using Graph pad instat version of 5.0, Graph pad software.

RESULTS AND DISCUSSIONS

The present research study revealed the presence of various important phytoconstituents like Alkaloids, Tannins, Saponins, Carbohydrates and Proteins in ethanolic aerial extract of *Mimosa pudica*. The extract has shown signifcant Antibacterial activity against several gram positive and gram-negative bacterial strains.

Further the ethanolic extract of *Mimosa pudica* exhibited Anthelmintic activity against Pheritima posthuma (Earthworms). The varied concentrations of 100, 200, and 500 mg/kg caused paralysis and death of the worms, and these results were comparable with the standard Albendazole 10 mg/ml.

Castor oil induced diarrhoea in mice was evaluated for Antidiarrhoeal activity in albino mice. Ethanolic extract of Mimosa pudica exhibited decent antidiarrhoeal activity by reducing the total amount of fecal matter when compared to control group after the administration of castor oil. The result of antidiarrhoeal activity was compared with standard drug loperamide at 5mg/kg. The percentage inhibition of diarrhoea for 150mg/kg and 300mg/kg of mimosa pudica extract is found to be 74.2% and 77.92% respectively. The results are comparable to the standard drug which produced 87% of inhibition of diarrhoea.

Table 1: Antibacterial activity of mimosa pudica aerial extract.

Type of bacteria	Name of the microorganism	Zone of inhibition of Sample and Standard drug (in mm)			
		Mimosa pudica aerial extract 100mg/ml	Mimosa pudica aerial extract 200mg/ml	Mimosa pudica aerial extract 400mg/ml	Gentamycin (25mg/ml)
Gram positive bacteria	Bacillus subtilis	9.56±0.13	12.4±0.19	13.48±0.24	17.3±0.07
	Staphylococcus aureus	11.1±0.13	13.2±0.14	13.28±0.16	17.2±0.14
	Staphylococcus warneri	12.5±0.21	13.17±0.10	15.26±0.16	17.21±0.18
Gram negative bacteria	Eschereria coli	10.45±0.10	12.56±0.18	14.34±0.15	17.43±0.10
	Pseudomonas putida	11.37±0.14	14.34±0.13	14.46±0.12	16.10±0.17
	Pseudomonas aeruginosa	11.16±0.13	13.42±0.18	15.54±0.15	18.2±0.11

Values are expressed as mean±SEM, n=3

Table 2: Anthelmintic activity of ethanolic extract of mimosa pudica.

Type of Extract	Dose in mg/ml	Time taken for paralysis(min)	Time taken for death (min)
Ethanolic extract	100	29.40	35.56
	200	15.37	28.34
	500	3.29	16.36
Standard (Albendazole)	10	7.45	10.32
DMSO	–	–	–

Table 3: Effect of Ethanolic Aerial Extract of Mimosa pudica in Castor Oil Induced Diarrhoea in Mice.

Group	Dose (mg/ml)	Total no. of faeces	No. of Diarrhoea faeces	% Inhibition of Diarrhoea
Control	Normal saline	17.2± 0.07	15.4±0.09	-
Standard (Loperamide)	5mg/kg	4.2±0.04	2.0±0.07	87.01
Mimosa pudica (Low dose)	150	11.8±0.07	4.0±0.08	74.02*
Mimosa pudica (High dose)	300	9.2±0.09	3.4±0.09	77.92*

Values are expressed as Mean ± SEM; n=3 (Number of animals in each group); * *p<0.001 indicates significant when* compared to the standard group

Table 4: Effect of Ethanolic extract of Mimosa pudica in Loperamide Induced Constipation.

Treatment	Dose(mg/kg)	Weight of faeces (gm)
Control	Normal saline	0.943±0.002
Sodium picosulphate	5	3.856±0.851
Mimosa pudica low dose	150	1.84±0.005*
Mimosa pudica high dose	300	2.56±0.023*

Values are expressed as Mean ± SEM; n=3 (Number of animals in each group); * *p<0.001 indicates significant when* compared to the standard group.

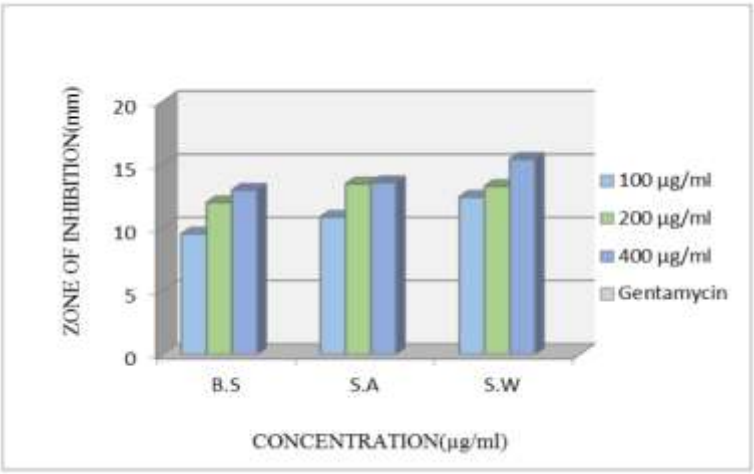

Fig. 1: Antibacterial activity of ethanolic extract of *Mimosa pudica* against gram positive bacteria.

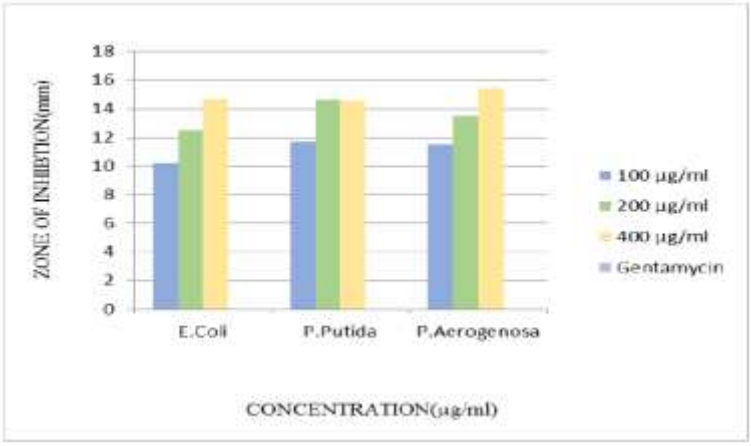

Fig. 2: Antibacterial activity of ethanolic extract of *Mimosa pudica* against gram negative bacteria.

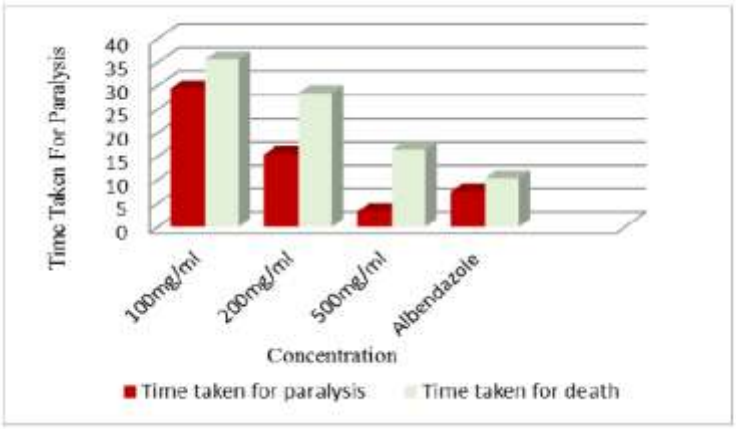

Fig. 3: Anthelmintic activity, after treated with ethanolic extract of *Mimosa Pudica.*

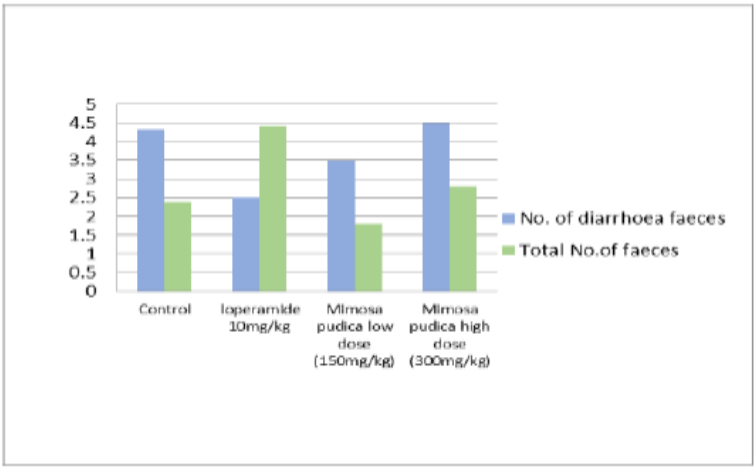

Fig. 4: Effect of ethanoilc extract of *Mimosa pudica* in Castor Oil Induced Constipation in Mice.

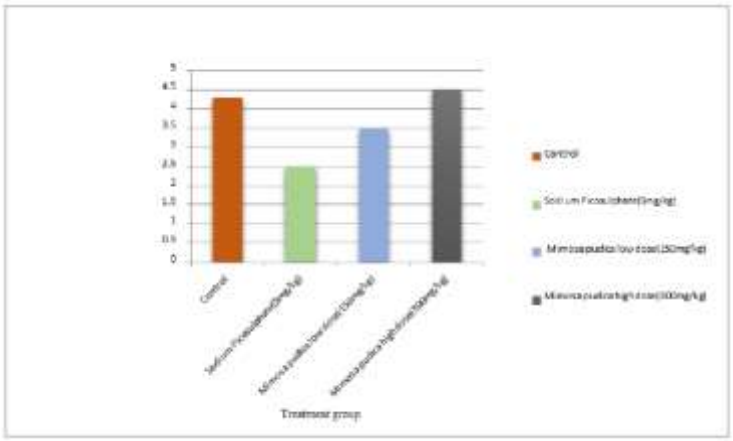

Fig. 5: Effect of ethanolic extract of *Mimosa pudica* in Loperamide Induced Constipation in Mice.

CONCLUSION

The present research study results indicates that the ethanolic extract of aerial extract of *Mimosa pudica* exhibits significant Antibacterial, mild Anthelmintic and Antidiarrhoeal activity. Further it is said that the active phytoconstituents present in the extract might be responsible for all these biological activities. Hence further attempts on isolation of pure multi molecules is necessary and possible mechanisms need to be established.

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