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Antibacterial And Antifungal Activity of *Mimosa pudica* Linn. Against the selected bacterial and fungal strains.

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ABSTRACT

The *Mimosa pudica* Linn. is a plant having multi activity and has been using as a single herb or as in polyherbal preparation from the prehistoric time. The plant is claimed to be Anthelminthic, antihyperglycemic, anti-inflammatory, antipyretic, antispasmodic, antitussive, antiviral, calmative, contraceptive, depilatory, diuretic ,emetic, expectorant , poison, sedative and tranquilizing by different traditional practitioner, different community and in different literature. While in Ayurveda it was mentioned that the decoction of the whole plant was used to wash the vaginal infections. From different literature, it is come to know that in Bangladesh and in Sudan it is used in UTI and Oral infections. A clear justification arises that the plant may have antimicrobial activity. Finally plant were tested against six microbial strain out of which two were gram positive bacteria, two were gram negative bacteria and two were fungal strain. *Staphylococcus aureus* MTCC 3160, *Straphylococcus saprophyticus* MTCC 96 , *Klebsiella pneumonia* MTCC 4032, *Escherichia coli* MTCC 1303, *Aspergillus niger* MTCC 281 *& Candida albicans* MTCC 1637 obtained from department of microbiology, down town hospital, Guwahati were the choice of test organisms. The inhibition of zone were tested using the disc diffusion method. Ciprofloxacin and Fluconazole were used as positive control for the bacterial and fungal strain respectively whereas DMSO was used as negative control. The activity indexes were determined.

Keyword: Mimosa, Ayurveda, Vaginal, UTI, Herb.

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INTRODUCTION

The plants are the major source of medicine from the prehistoric time. The 80% of the total population of the world shows their reliability on phytomedicine. People trying to preserve and develop different plant parts as medicine using different orthodox methodology. It is very unfortunate that several useful traditional practices are due to lack of proper study now became endangered. North East India is the hub of medicinal plants. The whole North East India is full of hills and dense forest comprising of variety of species of different medicinal plants. The people of North East India used to utilizing plants as a primary source of medicine before and even after the practice of western medicine. Due the challenging mechanisms of microbial drug resistance, a constant study is necessary over the antimicrobial activity. It will be very effective if researchers able to highlight the traditional medicine using the reverse pharmacology. Reverse pharmacology may be the popular way to brought out the traditional medicine to the laboratory. A systemic study and implementation of modern pharmaceutical practice may bring more fruitful results. Mimosa originally native to tropical America is now a Pan-tropical weed distributed tropical wetlands throughout South East Asia, India, Africa and some Pacific Islands. The genus *Mimosa* has about 400 species of which *Mimosa rubcaulis* sub species *himalayana*, *M. pudica*, *M. prainiana* and *M. invisa* are found in India. The *Mimosa pudica* Linn. is a plant having multi activity and has been using as a single herb or as in polyherbal preparation from the prehistoric time[1-3]. The plant is claimed to be Anthelminthic, antihyperglycemic, antiinflammatory, antipyretic, antispasmodic, antitussive, antiviral, calmative, contraceptive, depilatory, diuretic ,emetic, expectorant , poison, sedative and tranquilizing by different traditional practitioner, different community and in different literature [4-6]. The *Chakma* community of Kanchanpura of Tripura practising the traditional formulation for the livelihood and they are using *Mimosa pudica* Linn. in different herbal formulation for the treatment of vaginal, urinal tract and oral infections. In other country like in Bangladesh, Sudan and Philippines, the traditional use of the plant is reported in different literature. It is justified to test the antimicrobial activity of *Mimosa pudica* Linn. against the selected microbial strains. our current studies include the anti microbial activity of *Mimosa pudica* extracts against the selected microbial strains and meanwhile it is to evaluate the activity index of the plant with the standard drugs.

MATERIALS AND METHOD

Collection and authentication of the plant

The entire plant *Mimosa pudica* Linn. was collected from Panikhaiti hills near Narengi, Guwahati of Assam. The whole plant were thoroughly washed in running water, segregated from the grass and other extraneous material. The authentication was carried out by the help of Dr. A. A. Mao (Scientist-in-charge), Botanical Survey of India (BSI), Shillong Eastern Regional Centre, Shillong- 793003, (Reference No. BSI/ERC/Tech/2013/249). The whole plant was dried in shade for 30 days. The shade-dried leaves were made into coarse powder and were used for further investigation.

Preparation of the extract

The shade-dried leaves of *Mimosa pudica* were powdered and about 500 grams of dried powder was extracted first with Methanol at 50 to 55^{o}C by continuous hot percolation, using Soxhlet apparatus. The extraction was continued for 72 hours. The Methanol extract was filtered and concentrated to dry mass is subjected for lyophilization. The lyophilized extracts were used for anti microbial studies. The initial phyochemical studies were carried out [7].

Selection of microorganism

Two Gram positive *Staphylococcus aureus* MTCC 3160, *Straphylococcus saprophyticus* MTCC 96 ,two Gram negative *Klebsiella pneumonia* MTCC 4032, *Escherichia coli* MTCC 1303,two fungi *Aspergillus niger* MTCC 281 & *Candida albicans* MTCC 1637 obtained from department of microbiology, down town hospital, Guwahati were the choice of test organisms.

Antimicrobial assay

The activity was determined using disc diffusion method by measuring the inhibition zone in mm. The methanolic extracts of *Mimosa pudica* Linn. were screened *in vitro* antibacterial activity against *Staphylococcus aureus* MTCC 3160, *Straphylococcus saprophyticus* MTCC 96, *Aspergillus niger* MTCC 281,*Candida albicans* MTCC 1637, *Klebsiella pneumonia* MTCC 4032, *Escherichia coli* MTCC 1303. Standard antibacterial drug ciprofloxin (10 µg/disc) and antifungal drug fluconazole (10µg/disc) were also tested under similar conditions. DMSO was used as solvent to dissolve the extract (250mg/ml) and hence DMSO was used as negative control. For testing antibacterial activity Mueller-Hinton agar plates were prepared aseptically to get a thickness of 5-6 mm. The plates were dried at 37°C before inoculation. The organism was inoculated in the plates prepared earlier by dipping a sterile swab in the previously standardized inoculum, removing the excess of inoculum by pressing and rotating the swab firmly against the sides of the culture tube above the level of liquid and finally streaking the swab all over the surface of the medium three times, rotating the plate through an angle 60° after each application. Finally, the swab was pressed round the edge of the agar surface. It was allowed to dry at room

temperature with the lid closed. The sterile disc containing test drugs, standard and blank were placed on the previously inoculated surface of the Muller-Hinton agar plate. Plates were prepared in triplicate and they were then incubated for 18-24 h at 37°C made for zone of inhibition around the discs and compared with that of the standard. All the compounds synthesized were tested for antibacterial activity against gram-positive and gram-negative bacteria. For testing antifungal activity Sabouraud dextrose agar plates were prepared aseptically to get a thickness of 5-6 mm. The plates were dried at 25°C just before inoculation. The organisms were inoculated as same manner as above. Plates were prepared in triplicate and they were incubated at 25°C for 24-48 h, after placing them in the refrigerator for one hour to facilitate uniform diffusion. Observations were made for the zone of inhibition around the discs containing the drug and compared with that of standard drug fluconazole [8-14].

Activity index

The activity index of the crude plant extract was calculated as described by Egharevba *et al.* [15]

Activity index (A.I.) =Mean of zone of inhibition of the extract/ Mean of zone of inhibition of standard antibiotic drug

RESULTS AND DISCUSSION

The different phytochemical studies revealed the presence of alkaloids, carbohydrate, glycoside and saponins. The other phytochemical tests were found negative. The phytosterols, Fixed oil and fats, phenolic compound and tannins, proteins and amino acid, gum and mucilage were not present. Meanwhile we have chosen wide range microbes that include both the gram positive and the gram negative bacteria along with fungal strains. The *Candida albicans* (**25.34±0.67**) and *Aspergillus niger* (**22±0.58**) both the fungal strains showed very good zone of inhibition. On the other hand the gram negative bacterial strain *Klebsiella pneumoniae* (**26.1±0.25**) were found be sensitive with the extracts where as *Escherchia coli* (**10.67±0.88**) were not as such sensitive with the extracts. The both gram positive bacteria *Straphylococcus saprophyticus* (**12.67±0.67**) and *Staphylococcus aureus* (**12.67±0.88**) were found to have lesser effective as compared to the other strains. The activity index of *Candida albicans*, *Aspergillus niger* and *Klebsiella pneumonia* were found more than one and very near to one respectively.

Table 1 : Phytochemical screening of *Mimosa pudica* Linn.

Test	Methanol Extract
Alkaloids	+
Carbohydrates	+
Glycosides	+
Phytosterols	_

Fixed oil and fats	_
Phenolic compound and Tannins	_
Saponins	+
Proteins & Aminoacids	_
Gums and Mucilage	_

Table 2: Inhibition of zones of the extracts and standard drugs.

SL. No.	Organism	Zone of inhibition Mean (mm) ± SEM	
		Standard	Extract
1.	*Candida albicans*	25±0.58	25.34±0.67
2.	*Escherchia coli*	19.67±0.88	10.67±0.88
3.	*Straphylococcus saprophyticus*	16.67±0.67	12.67±0.67
4.	*Klebsiella pneumoniae*	25.34±0.88	26.1±0.25
5.	*Staphylococcus aureus*	22.17±0.73	12.67±0.88
6.	*Aspergillus niger*	24.34±0.34	22±0.58

SEM= Standard Error Mean, All statistical analysis were done by using the software graph pad**.**

Table 3: Activity index

SL. No.	Organism	Activity Index
1.	*Candida albicans*	1.01
2.	*Escherchia coli*	0.54
3.	*Straphylococcus saprophyticus*	0.76
4.	*Klebsiella pneumoniae*	1.02
5.	*Staphylococcus aureus*	0.57
6.	*Aspergillus niger*	0.90

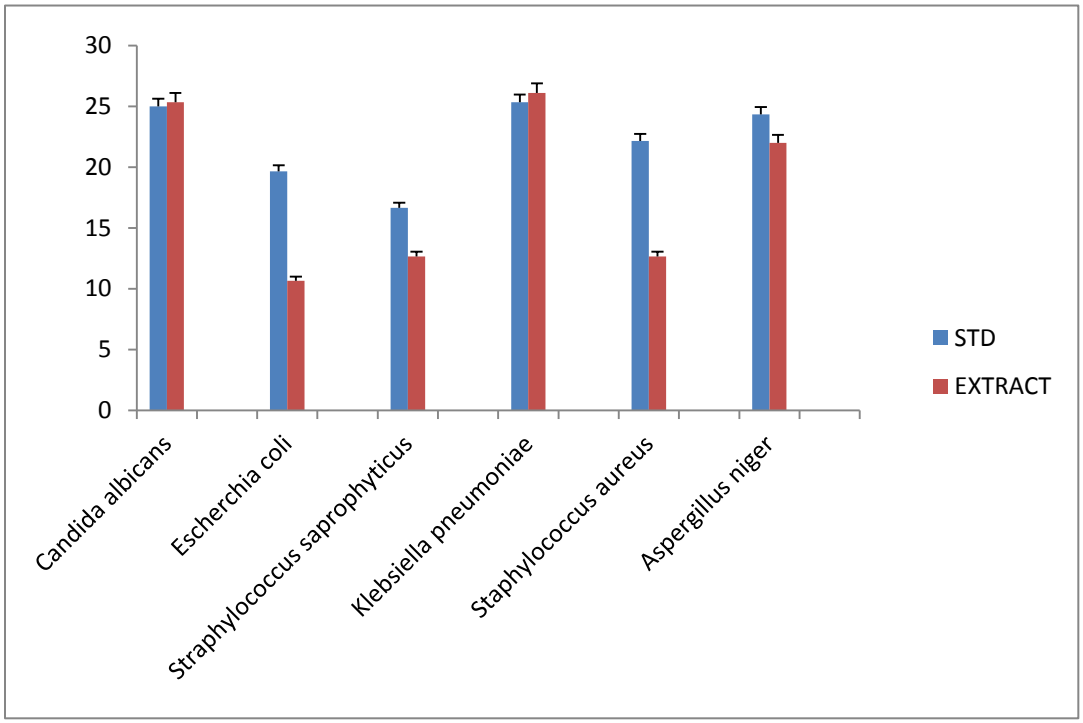

Figure 1: Bar diagram showing the inhibition of zones

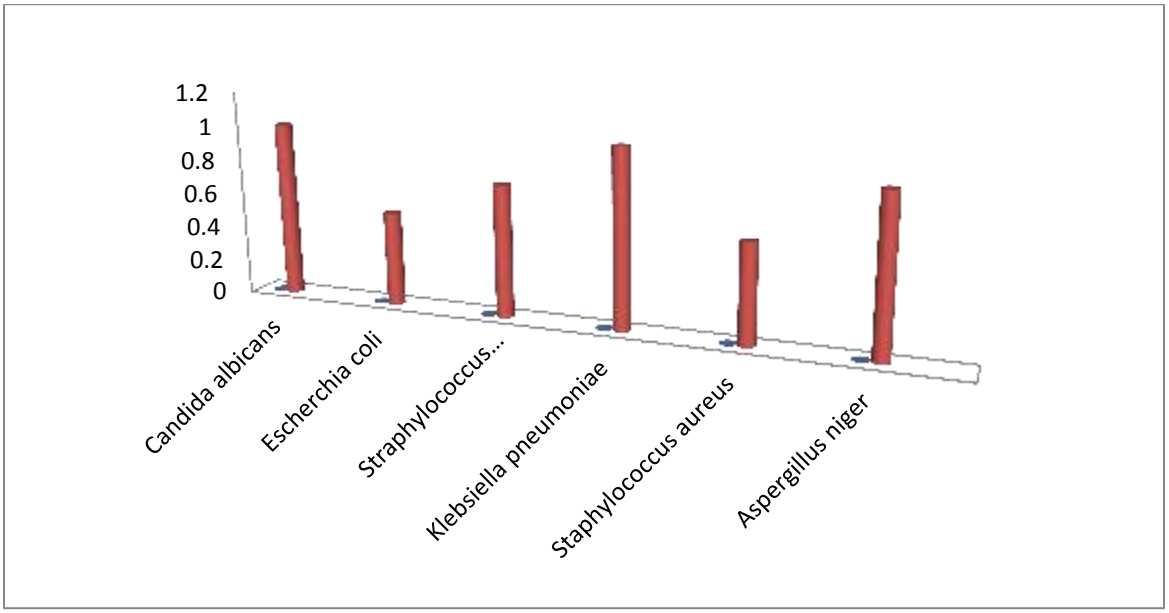

Figure 2: Bar diagram showing the Activity Index

CONCLUSION

The *Mimosa pudica* Linn. was found effective against the different microbiological strains. Thus the traditional values of the plant was justified. Further validated studies may revealed more results and a suitable herbal dosage form may designed against the selective pathogens.

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