



ANTAGONISTIC ACTIVITY AND PHYTOCHEMICAL SCREENING OF LEAVES OF *MIMOSA PUDICA* AND *MORINGA OLEIFERA* AGAINST PATHOGENIC BACTERIA CAUSING URINARY TRACT INFECTION

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ABSTRACT

Due to the emergence of increased level of antibiotic resistance among uropathogens, urinary tract infections or UTI became a severe menace to mankind affecting millions of people every year. At this context, the present study was designed to compare the antagonistic activity exhibited by *Mimosa pudica* and *Moringa oleifera* against UTI causing bacteria and the phytochemical constituents possessed by them. Various solvent extracts of the leaves of *M. pudica* and *M. oleifera* were prepared and evaluated for their antagonistic activities against urinary tract infection causing bacteria by agar well diffusion method. Also the phytochemical screening of these two plants was done qualitatively. The results of the antagonistic activity of *M. pudica* and *M. oleifera* revealed that the leaves of both the plants possess remarkable antagonistic properties against bacteria causing UTI. The phytochemical analysis revealed the presence of secondary metabolites such as flavonoids, saponins, steroids, tannins and coumarins. From the above study, it can be concluded that the leaves of *M. pudica* can be considered as a potential agent of antagonistic properties that can be used to develop novel drugs against bacteria that cause UTI.

Keywords: Antagonistic activity, Phytochemical screening, *Mimosa pudica*, *Moringa oleifera*, Leaves.

1. INTRODUCTION

Every year, millions of people were diagnosed with urinary tract infections with frequent incidence among females [1]. Urinary tract infections are commonly caused by multi drug resistant (MDR) strains of *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Enterococcus faecalis* [2]. The evolution of multi-drug resistant pathogens has led to the exploration of alternative compounds having antimicrobial property [3]. According to World Health Organization (2000), the greatest resource to obtain drugs are medicinal plants. Also these plants should be investigated thoroughly to identify their properties, safety and efficacy [4].

Owing to this, the present study was designed to evaluate the antagonistic activities and phytochemical constituents of leaf extracts of two medicinal plants such as *Mimosa pudica* and *Moringa oleifera* against bacteria causing UTI. *Mimosa pudica* (family *Mimosae*) and *Moringa*

oleifera (family *Moringaceae*) are renowned medicinal plants with lots of traditional importance.

Mimosa pudica of family *Mimosae* commonly known as touch-me-not-plant or sensitive plant is indigenous in India especially in moist area. *Mimosa* is a prickly shrub that grows diffusely about 45-90 cms height with bipinnately compound leaves delicately arranged with 10-20 pairs of leaflets and pink colour flowers. The roots and leaves are generally used as bitter, astringent, cooling, antispasmodic, emetic, diuretic and constipating [5]. The leaves of *Mimosa* are used in treating hemorrhoids and urinary infections whereas the roots are used to treat fever, nervousness, insomnia, dysentery, stomach worms, syphilis, venereal diseases, leprosy, insect bite and piles [6]. Traditionally the decoction of roots is used for gravel and other urinary complaints [7]. This plant is said to possess hepatoprotective, hypolipidemic, antifertility and wound

healing properties. The seeds of this plant also exhibit diuretic property [8].

Moringa oleifera commonly known as horse radish tree or Moringa belonging to *Moringaceae* family is found distributed all over India, Southeast Asia, Africa and Caribbean Islands, and is a nutritious vegetable tree [9, 10]. All the parts of *Moringa oleifera* i.e., the roots, bark, leaves, flowers, fruit, seeds and pods act as circulatory stimulants and possess anti tumor [11], anti inflammatory, antipyretic, antiulcer [12], antispasmodic, diuretic [13,14], antioxidant, hepatoprotective, cholesterol lowering, antidiabetic activities [15]. The plant also exhibits emmenagogue, abortifacient and antifertility effects [16]. It has been reported that the stem bark of this plant possess antibacterial and antifungal activities [17-21].

For this research, the above mentioned plants were chosen to investigate their antagonistic properties and phytochemical constituents, thereby an approach to aid the process of drug research to treat urinary tract infections.

2. MATERIAL AND METHODS

2.1. Isolation and identification of test organisms

The pathogenic bacteria such as *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* were isolated from infected urine samples and confirmed by Gram's staining, culturing on selective media and by biochemical tests such as IMViC test series, catalase test, etc. After identification of bacterial isolates, the pure cultures were stored in nutrient agar slants at 4°C to determine the antagonistic activity of selected medicinal plants.

2.2. Collection of plant material

Fresh, healthy leaves of *Mimosa pudica* and *Moringa oleifera* were collected from Malayadi, Kanya Kumari District, Tamil Nadu. The leaves were thoroughly washed, shade dried at room temperature, then powdered using a mixer grinder and stored in airtight bottles for further study.

2.3. Preparation of Plant Extracts

Ten gms of the powdered plant parts were taken separately in conical flasks and 100 ml of different solvents such as hexane, acetone, methanol, ethanol and water were added to it and placed under dark condition. After 3 days, the contents were stirred well and filtered using Whatmann No.1 filter paper. After evaporation

the filtrates were collected and stored in sterile glass beakers for further study.

2.4. Antagonistic activity assay

Antagonistic activity of various extracts of leaves of *Mimosa pudica* and *Moringa oleifera* was evaluated against the four bacterial isolates by agar well diffusion method [22]. Sterilized Mueller Hinton agar was poured in petri plates. After solidification, the inoculum was swabbed on the entire surface of the agar medium. After some time, wells of 6 mm diameter were punched over the agar surface in each of the labeled plates for various plant extracts. 100 µl of respective plant extracts were added to each well with the help of micro pipette. Then the plates were kept for incubation at 37°C for 24 hours and observed for zones of inhibition after incubation. The results were recorded.

2.5. Phytochemical analysis of active plant extracts

The plant extracts were screened qualitatively [23-26] for the presence or absence of secondary metabolites such as alkaloids, carbohydrates, amino acids, phenols, flavonoids, saponins, steroids, glycosides, terpenoids, tannins, quinones, reducing sugars, catichins and coumarins.

3. RESULTS AND DISCUSSION

3.1. Antagonistic activity

The antagonistic activity of hexane, acetone, methanol, ethanol and water extracts of leaves of *Mimosa pudica* and *Moringa oleifera* were evaluated against the bacteria causing UTI such as *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* by agar well diffusion method. All the plant extracts except hexane and water extracts revealed different range of antagonistic activities against the tested bacterial isolates and the results were shown in table 1. The extracts of both plants exhibited greater antagonistic activity against *E. coli*. *Pseudomonas aeruginosa* is only sensitive to extracts of *Mimosa pudica* while *Staphylococcus aureus* was found highly resistant to all the plant extracts tested.

Findings from this study were in a fair correlation with the findings of Okiki *et al.* [27] in case of *E. coli* and *Klebsiella pneumoniae*, while the contradiction found with Okiki *et al.* [27] was the resistance shown by *Pseudomonas aeruginosa* against *Moringa oleifera* extracts in this study. Also the results of this study were found contrary to research works of Pandey and Husain [28] while concerning the antibacterial activity of *Mimosa pudica*

against *Staphylococcus aureus*. In our study, *Staphylococcus aureus* was found highly resistant to all the three extracts of *Mimosa pudica*.

3.2. Phytochemical screening of active extracts

Since the acetone, ethanol and methanol extracts showed significant activity, phytochemical screening of

these extracts were performed qualitatively and the results were shown in table 2. The results showed that all the extracts of plants possessed phytochemicals such as flavonoids, saponins, tannins and coumarins. The phytochemicals in all the three extracts of *Mimosa pudica* and *Moringa oleifera* were consistent.

Table 1: Antagonistic Activity of leaf extracts

Test Organisms	<i>Moringa oleifera</i>			<i>Mimosa pudica</i>		
	A mm	E mm	M mm	A mm	E mm	M mm
<i>Escherichia coli</i>	13	22	15	21	18	20
<i>Klebsiella pneumoniae</i>	-	11	12	14	12	13
<i>Pseudomonas aeruginosa</i>	-	-	-	10	15	16
<i>Staphylococcus aureus</i>	-	-	-	-	-	-

A-Acetone; E-Ethanol; M-Methanol; mm-millimeter

Table 2: Phytochemical analysis of various extracts

Phytochemical tests	<i>Moringa oleifera</i>			<i>Mimosa pudica</i>		
	A	E	M	A	E	M
Alkaloids	-	-	-	-	-	-
Carbohydrates	-	-	-	-	-	-
Amino acids	-	-	-	-	-	-
Phenols	-	-	-	+	+	+
Flavonoids	+	+	+	+	+	+
Saponins	+	+	+	+	+	+
Steroids	+	+	+	+	+	+
Glycosides	-	-	-	-	-	-
Terpenoids	-	-	-	+	+	+
Tannins	+	+	+	+	+	+
Quinones	+	+	+	-	-	-
Reducing sugars	-	-	-	-	-	-
Catachins	-	-	-	-	-	-
Coumarins	+	+	+	+	+	+

A-Acetone; E-Ethanol; M-Methanol; +- Presence; -- Absence

4. CONCLUSION

This study of screening for antagonistic activity of various extracts of leaves of *Mimosa pudica* and *Moringa oleifera* derived the conclusion that *Mimosa pudica* possess strong antagonistic activity when compared to *Moringa oleifera*. Though both the plants possess some sort of activity, *Mimosa pudica* can be considered as more potential agent in drug research against UTI causing bacteria.

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Conflicts of interest

The authors declare no conflicts of interest.

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