ANTIMICROBIAL ACTIVITY of MEDICINAL PLANTS AGAINST MICROBES

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ABSTRACT

An extract from the leaves of *Aerva lanata*, *Tribulus terrestris* were studied for antimicrobial activity against five bacterial and fungal species. It includes both Gram positive and Gram negative organisms. In current study four concentrations (5, 10, 15 and 20µl) of extract and two different solvents (ethanol and methanol) used. The maximum concentration of 100µl was excellent antibacterial properties in bacteria like *Pseudomonas* sp. (20.5±0.06mm), *Escherichia coli* (15.5±0.03mm) and *Staphylococcus aureus* (15.5±0.07mm) and fungi are *Penicillium* sp. (20.0±0.07mm) and *Fusarium* sp. (19.0±0.07mm) were observed in *Aerva lanata* ethanolic extract than compared to methanol extract than compared to *Tribulus terrestris* plant extract.

KEY WORDS: bacteria, fungi, *Aerva lanata*, *Tribulus terrestris.*

INTRODUCTION

Infections are a serious health problem infects millions of people each year. Among the infections, Urinary Tract Infection (UTI) is one of the major infections caused, and its being the second most common type of infection in the body. Urinary tract infections account for about 8.3 million doctor visits each year. Women are especially prone to UTIs (Hyattsville, 2004). These are treated with antibacterial drugs.

Medicinal plants play a major role in the life of human beings throughout the globe. These plants are commercially important because of the presence of various chemical substances with the power of curing different diseases and healing several ailments affecting the normal activity of human beings. These economically important plants are found growing in remote forests, hills and mountains where human invasion and intervention are minimum. Special knowledge about the location, usage and benefits i.e. the Traditional Aboriginal Knowledge (TAK) is prevalent among the members of certain tribal communities inhabiting in these geographical locations. Importance of medicinal plants was known to the outside world with the advent of communication technology and messages published in mass media. Increasing commercial pressure on these medicinal plants and competition among the drug manufacturers reflected on the purity and genuinity of the drugs. This ultimately resulted in several side effects in the physiological functions of the persons using these drugs. *Aerva lanata* (L.) Juss. Ex Schult. It belongs to the family Amaranthaceae. It is common throughout the hotter parts of India like Tamil Nadu, Andhra Pradesh and Karnataka. It is also found in Arabia, Egypt, tropical Africa, Indonesia, Philippines and Australia. It is being commonly prescribed by Ayurvedic doctors, alone or in combination, as a treatment for urinary infections. It

also possesses analgesic, anthelmintic, anti-inflammatory, anti-malarial, anti-venin, diuretic and sedative property (Appia *et al*., 2009 and Shahin *et al*., 2007).

Tribulus terrestris (Linn). Belongs to family Zygophyllaceae and known as Puncture- vine, caltrop, yellow vine, goat head and devil's horn in English. *Tribulus terrestris* is widespread in Mediterranean, subtropical and desert climates worldwide, but now widely distributed in warm regions of Europe, Asia, America, Africa, and Australia (Adaikan *et al*., 2000; Kostova and Dinchev; 2005; Verdu and Mas, 2006; Dinchev *et al*., 2007). The plant grows almost in all parts of India, ascending to 3,385 meters 5 (Mathur and Sundermoorthy, 2013). *Tribulus terrestris* is a famous herb traditionally used by different cultures for a number of conditions. In India and China, the medicinal use of this herb is traced 5,000 year back (Balch, 1990 and Bartram, 1995). In India, the fruits have been long used as a tonic and calculus infections, urinary discharges; it has a 5,000 year-old history of medicinal use in India. Traditionally it has been used for boosting hormone production in men and women. It is recommended as a diuretic and against kidney diseases and gravel. *T. terrestris* extract is used as a tonic to treat sexual dysfunction. It is an important constituent of various medicinal preparations worldwide like Dashmularishta and Tribestan (Sarwat *et al*., 2008).

MATERIALS AND METHODS

Sample collection

Aerva lanata and *Tribulus terrestris* plant samples were collected from Thanjavur District of Tamil Nadu. The Plant leaves were washed with tap water to remove the unwanted dust particles. Then they were shaded, dried, and then powdered by using mechanical blender and stored in air tight bottles.

Extract preparation (Betoni *et al*., 2006)

The 200gm of *Aerva lanata* and *Tribulus terrestris* plant samples were soaked with methanol and ethanol solvents for 2 hours. The samples were filtered individually with help of whatman no. 1 filter paper. The extracts were stored at refrigerated in a sterile bottle.

Antimicrobial activity of plant extracts (Savithramma *et al*., 2011)

The antimicrobial activities of plant extracts were carried out by well diffusion method. Nutrient agar and potato dextrose agar medium plates were prepared, sterilized and solidified. After solidification bacterial and fungal cultures were swabbed on these plates. Make four well in nutrient plates as well as potato dextrose agar plates with the help of corkborer. Then transferred 25, 50, 75 and 100µl of plant leaf extracts were poured separately in respective well. The petriplates were incubated at 37°C for 24 hrs for antibacterial activity and 30°C for 48hrs for antifungal activity, after to measured zone of inhibition.

RESULTS

The efficiency of antimicrobial properties of *Aerva lanata* in different concentration like 25, 50, 75 and 100µl was treated against *E.coli, Klebsiella pneumoniae, Proteus* sp. *Pesudomonas* sp. *Staphylococcus aureus, Aspergillus flavus, A.niger, A.terreus, Penicillium* sp. and *Fusarium* sp. performed. The maximum concentration of 100µl was excellent antibacterial properties in bacteria like *Pseudomonas* sp. (20.5±0.06mm), *Escherichia coli* (15.5±0.03mm) and *Staphylococcus aureus* (15.5±0.07mm) and fungi are *Penicillium* sp. (20.0±0.07mm) and *Fusarium* sp. (19.0±0.07mm) were observed in *Aerva lanata* ethanolic extract than compared to methanol extract (Table 1). According to Mezouar *et al.* (2012) methanolic extracts of root barks of *B. vulgaris* have presented a very weak antibacterial activity against all tested strains including *S. aureus*. Comparing results found in this investigation the antimicrobial activity of some medicinal plants from Tunisia, that methanolic extracts of *C.monspeliensis* leaves have shown an interesting activity against *P.aeruginosa, S. aureus, E.faecalis* with inhibition zones diameters of 18.0, 20.0 and 15.0 mm respectively (Taddel and Rosas-Romero, 2007). The cement dust polluted tamarind bark with different solvents was tested against clinical bacteria such as *Bacillus cereus, Escherichia coli, Pseudomonas aeruginosa, P.aeromonas* and *Staphylococcus aureus* were observed. For *Cassia*, some authors have reported the antibacterial activity of alcoholic leaf extracts against different bacterial strains, the results showed no activity of these extracts in terms of inhibition zones diameters against the tested strains such as *E. faecalis, K. pneumoniae, S aureus* and *P.aeruginosa* (Sharma and Kumar, 2009).

The efficacy of antimicrobial properties of *Tribulus terrestris* in different concentration of 25, 50, 75 and 100µl and different solvents were treated against *E.coli, Klebsiella pneumoniae, Proteus* sp. *Pesudomonas* sp. *Staphylococcus aureus, Aspergillus flavus, A.niger, A.terreus, Penicillium* sp. and *Fusarium* sp. The significant results were recorded against *Pseudomonas* sp. and *Staphylococcus aureus* and fungi *Fusarium* sp. and *Pencillium* sp. (Table 2). The medicinal plants are an importance source of medicine and play a key role in the human health system all over the world. Previously, Dhanabalan (2008) who found the antibacterial activity of methanol extract of *T. procumbens* against bovine mastitis causing *Staphylococcus aureus* strains, But in the present study, along with Staphylococcus sp. it inhibited the growth of other pathogenic bacteria species too. By this it clearly states that the plant is having a wider range of antibacterial activity. Rajesh (2011) documented the antibacterial activity of *A. lanata* against both Gram positive and Gram negative organisms by using aqueous and ethanol as solvents. In this current study, methanol extract of *A. lanata* showed a considerable activity against all the 50 cultures of the 8 pathogens studied. By this it once again shows its antibacterial potential against both the Gram positive and Gram negative organisms.

Table 1: Antimicrobial activity of *Aerva lanata* against uropathogens

Name of the microbes	Zone of inhibition (mm)							
	Ethanol				Methanol			
	25 µl	50 µl	75 µl	100 µl	25 µl	50 µl	75 µl	100 µl
Escherichia coli	-	9.11±0.03	13.0±0.04	15.5±0.03	9.08±0.03	11.5±0.04	12.4±0.02	18.3±0.02
Klebsiella pneumoniae	-	8.22±0.02	10.4±0.02	11.3±0.02	10.6±0.08	13.0±0.07	16.2±0.02	19.4±0.05
Proteus sp .	-	10.2±0.03	12.0±0.05	13.0±0.06	-	15.4±0.03	20.2±0.04	21.3±0.09
Pseudomonas sp.	-	9.23±0.05	16.5±0.07	20.5±0.06	9.77±0.06	15.3±0.09	19.5±0.05	22.0±0.07
Staphylococcus aureus	-	7.44±0.07	8.00±0.03	15.5±0.07	-	14.3±0.08	19.0±0.11	20.5±0.05
Aspergillus flavus	-	7.63±0.04	9.54±0.11	12.8±0.07	-	6.32±0.08	7.66±0.07	9.05±0.11
A.niger	6.00±0.02	8.99±0.11	14.3±0.04	16.0±0.05	5.11±0.02	7.03±0.02	9.33±0.06	15.6±0.09
A.terreus	9.78±0.06	12.6±0.04	16.0±0.11	18.5±0.11	6.88±0.11	8.56±0.06	10.0±0.11	17.7±0.05
Penicillium sp.	8.22±0.03	14.6±0.12	17.5±0.07	20.0±0.07	7.24±0.08	9.74±0.09	14.6±0.09	19.0±0.02
Fusarium sp.	10.6±0.11	12.6±0.09	14.3±0.06	19.0±0.07	-	10.6±0.12	17.0±0.07	21.2±0.08

Standard deviation ± error

Table 2: Antimicrobial activity of *Tribulus terrestris* against uropathogens

Name of the microbes	Zone of inhibition (mm)							
	Ethanol				Methanol			
	25 µl	50 µl	75 µl	100 µl	25 µl	50 µl	75 µl	100 µl
Escherichia coli	-	7.11±0.04	-	8.45±0.09	-	-	6.21±0.04	7.12±0.09
Klebsiella pneumoniae	-	8.22±0.02	7.22±0.04	9.23±0.06	6.08±0.07	6.78±0.04	9.77±0.07	11.3±0.08
Proteus sp.	-	6.22±0.04	5.73±0.02	7.08±0.02	12.0±0.04	8.14±0.07	11.5±0.05	14.2±0.06
Pseudomonas sp.	-	8.85±0.07	9.00±0.05	9.22±0.11	9.00±0.02	9.33±0.11	13.5±0.11	16.0±0.06
Staphylococcus aureus	-	9.66±0.06	11.0±0.12	12.0±0.09	13.0±0.08	10.3±0.07	15.0±0.07	18.4±0.11
Aspergillus flavus	5.11±0.04	7.44±0.06	8.34±0.02	11.6±0.07	6.43±0.09	9.21±0.01	11.0±0.02	15.3±0.12
A.niger	6.40±0.03	8.13±0.03	10.0±0.12	12.0±0.05	7.66±0.07	9.09±0.06	15.8±0.04	18.4±0.15
A.terreus	7.44±0.07	9.44±0.06	13.6±0.09	14.8±0.02	8.56±0.08	12.2±0.03	18.5±0.07	21.0±0.09
Penicillium sp.	9.66±0.09	14.3±0.02	16.5±0.08	18.4±0.06	9.30±0.03	15.3±0.02	17.0±0.07	23.0±0.06
Trichoderma sp.	10.7±0.12	12.3±0.11	16.3±0.07	21.0±0.03	9.44±0.07	17.0±0.06	20.0±0.06	25.0±0.05

Standard deviation ± error

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