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RESEARCH ARTICLE

ANTIMICROBIAL ACTIVITY OF STEM BARK EXTRACTS OF ACACIA TORTA CRAIB- PRELIMINARY STUDIES AND FUTURE PERSPECTIVES

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ABSTRACT

Acacia torta stem bark extracts are a focus of study in ethno pharmacology due to its reported antimicrobial activity against a wide range of pathogenic microbes. In this study, ethanolic extract (80%) of *Acacia torta* leaf extracts were studied for *in vitro* antimicrobial activity against two gram positive bacteria (*Staphylococcus aureus, Bacillus subtilis*), two gram negative bacteria (*Escherichia coli, Pseudomonas aeruginosa*), two fungal strains (*Candida albicans, Aspergillus niger*) by agar well diffusion method. The sample showed its highest inhibitory activity against *Bacillus subtilis,* followed by *Staphylococcus aureus, Pseudomonas aeruginosa* and *Escherichia coli. Aspergillus niger* showed resistance to lower concentrations of the plant extract, whereas, higher concentrations of the extract showed significant zones of inhibition against fungi.

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INTRODUCTION

Many new antimicrobials and antibiotics are being discovered in the recent days with the aid of high-end technological development, but many fail to produce a consistent effect against microorganisms due to the genetic ability of microbes to become resistant to such compounds and transmit the resistance to the next generations (Cohen, 1992). Such bacterial and fungal infections maybe associated with high chances of infection and morbidity in less immune patients and children. Also, many researchers have reported the ill-effects of antibiotics, over-use and misuse which could damage the vital organs like liver and kidney. So many researches are now being focused on traditional plant extracts to combat infectious microorganisms. Medicinal plants are a rich source of metabolites like tannins, alkaloids, flavonoids, phenols and quinones (Al-Zubaydi *et al*., 2009). *Acacia torta* stem bark extracts are obtained by preparing a decoction, and this decoction is reportedly used for cough and dysentery (Sarvalingam *et al*., 2011). So, this study was focused on the antimicrobial activities of crude ethanolic extracts of *Acacia torta*.

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MATERIALS AND METHODS

Plant material

Acacia torta plant collected from Sivaganga Dt Tamilnadu was shade dried was ground to powder. The powder was brought to the lab, and was extracted using soxhlet apparatus, using 80% ethanol as a solvent.

Microorganisms

Gram positive bacteria (*Bacillus subtilis, Staphylococcus aureus*), Gram negative bacteria (*Escherichia coli, Pseudomonas aeruginosa*), Fungi (*Aspergillus niger, Candida albicans*) were used for the in vitro assay. These strains were pre-procured and sub cultured strains in the laboratory.

Agar-well diffusion method

Sample preparation

10mg of sample + 500 µl of Ethanol + 500 µl of Acetone + 500 µl of Isopropanol were prepared for different concentrations of the sample.

For bacteria

Different concentrations of Samples (1.25mg, 2.5mg, and 5mg dissolved in 1mL of 10% DMSO) were used in this study.

Muller Hinton Agar (MHA) plates were inoculated with test organisms. The plates were evenly spread out. Then well were prepared in the plates with a cork borer. Each well was loaded with 0.2ml of corresponding concentration of sample and 10 mg of Chloramphenicol dissolved in 1 mL of 10% DMSO was used as a Positive control for antibacterial activity. The plates were incubated for 24 hrs at 37°C. The development of inhibition zone around the well was measured and recorded. (Malibari, 1991), (Zhou *et al*., 1996), (Gong *et al*., 2009)

For fungi

Antifungal activity was carried out using well diffusion method (Murray *et al*., 1995). Petri plates were prepared with 20 ml of sterile PDA (Hi- media, Mumbai). The test culture was swabbed on the top of the solidified media and allowed to dry for 10 min. Wells were made on the media using a well borer. Different concentrations of the sample (15, 30, 45, 60 µl per well) were loaded in the wells.

Table 1. Table Shows antibacterial activity of L sample by using Agar well diffusion method

Name of the Pathogen	Antibacterial Activity			Chloramphenicol
	Zone of Inhibition (mm)			
	Name of the Sample (mg)			
	L			
	1.25	2.5	5	
E.coli	12	14	16	20
Staphylococcus aureus	12	14	18	20
Bacillus subtilis	16	17	19	25
Pseudomonas aeroginosa	13	16	18	17

Table 2. Table shows Antifungal activity of ethanol extract against

Sample	Concentration (µg)	Zone of inhibition (mm)	
		Sample	Control (500 µg)
A.niger	150	-	21
	300	-	
	450	11	
	600	12	
Candia albicans	150	10	35
	300	11	
	450	13	
	600	14	

Figure 1. Antibacterial activity of Sample by using Agar well diffusion method

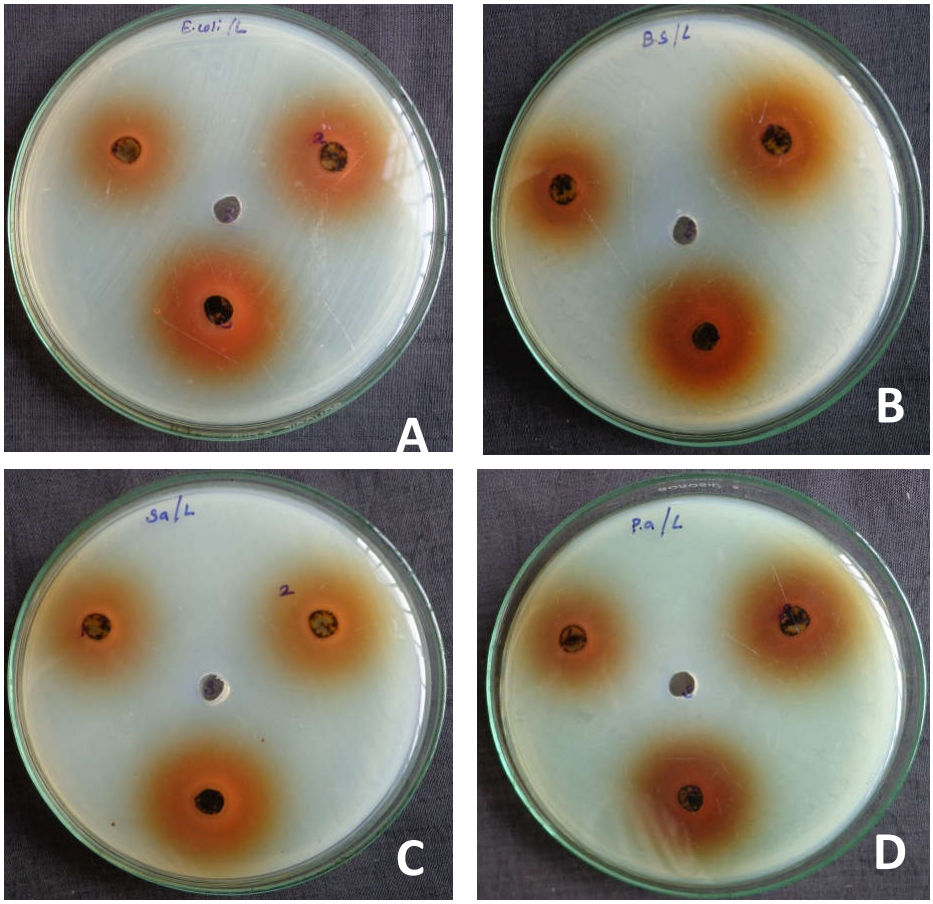

Figure shows three different Concentrations (1.25/2.5/5mg/100µl/well) of antibacterial activity of Sample by Agar well diffusion Method; A) E. coli; B) B.c- *Bacillus subtilis*; C) S.a- *Staphylococcus aureus*; D)*Pseudomonas aeroginosa*; Sample ; 1-1.25mg/well; 2-2.5mg/well; 3-5mg/well. Standard- Chloramphenicol.

Figure shows Antifungal activity of ethanol extract against

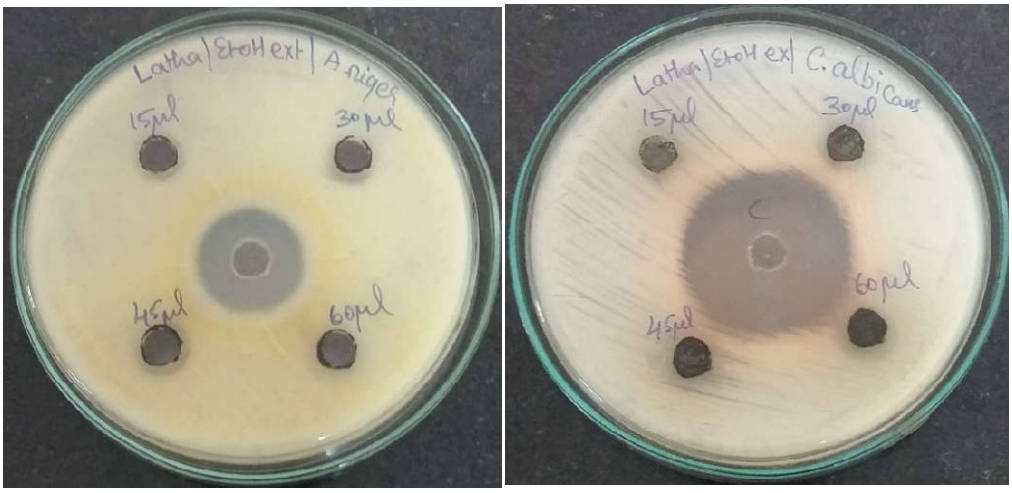

Figure shows three different Concentrations (1.25/2.5/5mg/100µl/well) of antibacterial activity of Sample by Agar well diffusion Method; A- *Aspergillus niger*, B- *Candida albicans*; Standard- Ketaconazole

Ketaconazole (100µg/well) was used as a positive control. These plates were incubated for 48 hrs at 28 °C. Zone of inhibition was recorded in millimetres (diameter) (Chung *et al*., 1998), (Zhang *et al*., 2009), (Li *et al*., 2005).

RESULTS AND DISCUSSION

The effects of the extract on six different micro-organisms are discussed in Tables 1 and 2. The results show that, the activity was the highest against *Bacillus subtilis*. *Aspergillus niger* showed resistance to low concentrations of the extract, whereas a distinct zone was observed at higher concentrations of the plant extract. Studies on antimicrobial activity of *Acacia torta* are much less reported. In general, the reports of antimicrobial activities of plants differ from various researches across the world. This might be due to variations in the nature of the plant based on geographical location, variations in the wild strains of micro-organisms, quality and quantity of the extract, solvents used (Bhakt *et al*., 2011), (Bolkari, 2009), (Bedi, 2010).

Conclusion

The results of this work suggest that the crude extract contains compounds that are effective against the test microorganisms. The future perspectives of this work include analysis of extract using Gas Chromatography and Mass Spectrometry to identify the various metabolites in the extract, docking of the lead compound with microbial receptors to check binding affinity of the receptor and ligand, so that it can be preceded to drug design and development.

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