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Antimicrobial activity of *Pentatropis microphylla* L. leaves

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Abstract: Phytochemical screening and antimicrobial activity of acetone and methanolic extracts of *Pentatropis microphylla* L. (Asclepiadaceae) leaves against various pathogens such as *Salmonella paratyphi*, *S. paratyphi* A, *Bacillus subtilis*, *B. thuringiensis*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Escherichia coli* and fungal pathogens like *Fusarium oxysporum*, *Aspergillus flavus, Mucor* sp., *Cladosporium* sp. were analysed in the present study. Phytochemical screening recorded positive results for alkaloids, tannins, steroids, glycosides, saponins and flavonoids. Among which flavanoids, phenols and steroids showed maximum degree of precipitation. Negative results are obtained for fixed oils. Maximum antibacterial activity was showed against *Pseudomonas aeruginosa* and *Salmonella paratyphi* B.
Key Words: *Pentatropis microphylla*, phytochemical, antimicrobial.

Introduction

The multidrug resistant strain of many microorganisms has revealed exploration of alternative antimicrobial agent. Medicinal plants have become the focus of intense study in terms of validation of their traditional uses through the determination of their actual pharmacological effects. Synthetic drugs are not only expensive and inadequate for the treatment of diseases but also often with adulterations and side effects. Therefore, there is need to search new infection fighting strategies to control microbial infections[1].

Plants naturally synthesize several carbon compounds, basically for physiologic functions or for use as chemical weapons against disease organism, insects and predators[2]. The investigation of plants for bioactive secondary metabolites is an area which most plant scientists have recently focused with an aim of discovering new clinically useful and commercially important plant products[3]. It is estimated that 70-80% of all over the world largely depend on traditional herbal medicine to meet their primary health care needs. The global demand for herbal medicine is growing[4]. With this background the leaves of *Pentatropis microphylla* L. (Asclepiadaceae) was used for the present study.

Materials and Methods

Preparation of extracts

The leaves of *Pentatropis microphylla* L. were collected from in and around Coimbatore, Tamilnadu, India. The collected leaves were washed and shade dried then made into coarse powder. Fifty gram of powder was successively extracted with solvents like acetone (250 ml) and methanol (250 ml) using soxhlet apparatus. Then the extracts were allowed to dry and stored at 4ºC.

Screening of active compounds

Phytochemical screening was carried out using standard methods[5,6] to detect the bioactive compounds like alkaloids, tannins, phenols, steroids, glycosides, saponins, flavanoids and fixed oils.

Pathogenic strains

Bacterial strains like *Salmonella paratyphi, S. paratyphi A, S. paratyphi B, Bacillus subtilis, B. thuringiensis, Proteus vulgaris, Pseudomonas*

aeruginosa and Escherichia coli and fungal pathogens which include *Aspergillus flavus, Fusarium* sp., *Cladosporium* sp., *Mucor* sp., were the pathogens selected for the present study. The bacterial strains were maintained in nutrient agar and the fungal species in potato dextrose agar slants and stored at 4°C.

Antimicrobial activity

Antimicrobial assay was performed using disc diffusion method[7]. Under aseptic condition, the liquid nutrient agar medium for bacteria and potato dextrose agar medium for fungi was poured in sterilized petri plates to a depth of 4 mm. After solidification of the media the strains were swabbed on the plates. The leaf extracts were used to saturate the disc (Whatman no.1, 6 mm) and placed on the seeded plates. The kanamycin 30 µg/disc was used as control for bacteria and Amphotericin (20 µg/disc) was used as control for fungi.

Table 1. Bioactive compounds of *Pentatropis microphylla* leaves

Compound	Acetone	Methanol
Alkaloids	+	++
Tannins	+	+
Phenols	-	+
Glycosides	+	+ +
Flavanoids	+ +	+ + +
Saponins	-	-
Steroids	+ +	+ + +
Fixed oil	_	_

Table 2. Antibacterial activity of *Pentatropis microphylla* leaves

S.No	Name of the bacteria	Acetone			Methanol			Control (kanamycin 30 µg/disc)
		25 mg/ml	50 mg/ml	100 mg/ml	25 mg/ml	50 mg/ml	100 mg/ml	
	Gram positive bacteria	**Zone of Inhibition (diameter in mm)**						
1	*Staphylococcus aureus*	7	9	9	7	8	8	26
2	*Bacillus thuringiensis*	8	8	10	7	8	10	21
3	*B. subtilis*	8	9	14	7	8	9	23
	Gram negative bacteria							
4	*Salmonella typhi*	8	10	11	7	8	10	25
5	*S. paratyphi A*	8	9	10	7	8	10	22
6	*S. paratyphi B*	9	11	14	7	7	8	25
7	*Pseudomonas aeruginosa*	10	11	13	9	9	11	25
9	*Proteus vulgaris*	9	9	12	7	8	10	22
10	*Escherichia coli*	9	10	13	8	8	9	22

Table 3. Antifungal activity of *Pentatropis microphylla* leaves

S.No	Name of the fungi	Acetone			Methanol			Control (Amphotericin 20 µg/disc)
		25 mg/ml	50 mg/ml	100 mg/ml	25 mg/ml	50 mg/ml	100 mg/ml	
		Zone of Inhibition (diameter in mm)						
1	*Fusarium oxysporum*	-	7	8	8	8	9	14
2	*Aspergillus flavus*	-	8	9	9	10	11	19
3	*Mucor* sp.	7	7	9	8	9	12	16
4	*Cladosporium* sp.	7	8	8	7	8	10	10

Results and Discussion

The preliminary phytochemical analysis represented in Table 1 showed the presence of bioactive compounds like alkaloids, tannins, phenols, steroids, glycosides and flavanoids.

Table 2 exhibited the activity of leaf extracts on bacterial pathogens. Both the extracts exhibited inhibition on all the pathogens studied. The maximum inhibition was exhibited by the methanol extract of the leaves against *Pseudomonas aeruginosa* and *Salmonella paratyphi B*, both having the same zone of inhibition followed by *Bacillus subtilis*. Whereas, table 3 exhibited the antifungal activity of *P. microphylla* leaves. The maximum inhibition was observed against *Mucor* sp followed by *Aspergillus flavus.*

The results of present investigation clearly indicated the antibacterial and antifungal efficacy of *P. microphylla* leaf extracts. This activity may probably due to the presence of bioactive compounds in the leaves. Several phytochemicals like flavonoids[8], phenolics and polyphenolics[9], tannins[10], terpenoids[11], sesquiterpenes[12], glycosides[13] are effective antimicrobial substances against a wide range of microorganisms. Thus, the study ascertains the value of the plant, which could be of considerable interest to the development of new drugs.

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