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Studies on the antimicrobial activity of *Heliotropium indicum* Linn.

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Abstract

Objective: To investigate the antimicrobial activity of alcoholic extract of *Heliotropium indicum.* Materials and method: Antimicrobial activity was studied at concentrations of 1 µg/ml, 100µg/ml, 1 mg/ml, 50 mg/ml and 100 mg/ml of the extract dissolved in propylene glycol against four strains each of Gram positive and Gram negative bacteria, three strains of fungi and two yeast by agar cup plate diffusion method. Results: The alcoholic extract of *Heliotropium indicum* was found to possess dose dependent antimicrobial activity in all the test organisms. Conclusion: The study lends support for the use of the plant as folklore medicine for the treatment of infectious diseases.

Key words: *Heliotropium indicum*, antimicrobial activity, bacteria, fungi, yeast.

1. Introduction

Heliotropium indicum Linn. (Boraginaceae) commonly called 'Hatisura' in Hindi is distributed widely through out India. The plant is bitter, astringent and cures intractable fevers and also used as a diuretic. The leaves are used to cure ulcers, wound and local inflammations [1]. The flowers are considered as emmanagogue in small doses and abortifacient in higher doses [2]. Shamsul and his co-workers isolated various alkaloids containing pyrrolizidine group from the aerial parts of the plant [3]. Literature reports reveal that rapanone and lupeol have been isolated from methanol and hexane extract of the plant, while estradiol was detected in the roots [4,5]. Pandey isolated heliotrine, a major alkaloid from the seeds and shown to possess ganglion blocking activity [6] whereas the petroleum ether extract of the plant was found to possess antifertility effect on female albino rats [7]. In the present investigate an attempt has been made to study the antimicrobial activity of the plant on the selected strains of micro-organisms.

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Table 1.
Effect of alcoholic extract of *H.indicum* on the selected strains of microorganisms

Type	**Strain**	**Zone of Inhibition**				**Standard***	**Control (Propylene glycol)**
		100µg/ml	**1mg/ml**	**50 mg/ml**	**100 mg/ml**		
Gram positive bacteria	*B.subtilis*	10	12	16	18	21	0
	B.pumilus	9	11	14	16	18	0
	S.aureus	8	—	10	11	12	0
	M.glutamicus	9	11	13	15	17	0
Gram negative bacteria	*P.aeroginosa*	8	10	14	15	20	0
	P.vulgaris	10	12	16	19	19	0
	S.marcescens	9	11	14	16	16	0
	E.coli	9	11	16	18	18	0
Fungi	*A.niger*	8	10	15	18	17	0
	R.oryzae	8	—	11	13	15	0
	A.wentii	9	11	15	18	22	0
Yeast	*S.cerevisiae*	8	—	11	13	20	0
	C.lunata	8	10	14	18	19	0

* Standard : For antibacterial activity – ampicillin (1 µg/ml); For antifungal activity – fluconazole (5 µg/ml); and antiyeast

2. Materials and method

2.1 Preparation of alcoholic extract

The plant material *Heliotropium indicum* was collected in and around our University campus. The air-dried whole plant including roots (1000 g) was powdered by using 'Wiley mill' and extracted in Soxhlet extraction apparatus with alcohol until there was no colour to the extract (24 cycles). The extract was concentrated under reduced pressure in rotary film evaporator (37 g).

2.2 Microorganisms used

Twenty four hours old cultures of *Bacillus subtilis, Bacillus pumilus, Staphylococcus aureus, Micrococcus glutamicus, Pseudomonas aeroginosa, Proteus vulgaris, Serratia marcescens* and *Escherichia coli* were used among the Gram positive and Gram negative bacteria. The fungi used were *Aspergillus niger, Aspergillus wentii* and *Rhizopus oryzae* while *Saccharomyces cerevisiae* and *Candida albicans* were among the yeast selected for testing the antimicrobial activity.

2.3 Antibacterial activity

The *in vitro* antibacterial activity of the sample solutions was studied by agar diffusion method [8]. The test organisms were seeded into sterile nutrient agar medium (Hi-media) by uniformly mixing one loopful of the inoculum with 20 ml of sterile melted nutrient agar after has been cooled to 48-50°C, poured in a sterile petridish. When agar solidified, four holes of uniform diameter (6 mm) were made using a sterile borer. Then in each cup 50 µl from different concentrations of the extract such as 1 µg/ml, 100 µg/ml, 1 mg/ml, 50 mg/ml and 100 mg/ml solutions were added after dissolving in suitable quantities of propylene glycol. Simultaneous controls with propylene glycol were also studied. Ampicillin (1 µg/ml) was used as a standard drug for comparison. The plates were incubated at 37°C for 24 h. The zone of inhibition was calculated by measuring the minimum dimension of bacteria free zone around the cup.

2.4 Antifungal and antiyeast studies

The antifungal and antiyeast activities were tested by the same procedure described for testing antibacterial activity using potato dextrose agar medium (Hi-media). The standard drug to compare the antifungal and antiyeast activities was fluconazole (5 µg/ml).

3. Results and Discussion

The zones of inhibition obtained with different concentrations of the extract and of the standard drugs were shown in table 1. The alcoholic extract of *Heliotropium indicum* was found to be having antimicrobial activity in a dose dependent manner (100 µg/ml, 1 mg/ml, 50 mg/ml and 100 mg/ml) against all the test organisms. Significant activity was found with the extract at a concentration of 100 µg/ml as compared with standard. This study provides justification for the use of the plant in folk medicine to treat various infectious disorders.

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