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Studies on the antimicrobial potential of *Hygrophylla spinosa* (Acanthaceae)

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ABSTRACT

Hygrophylla spinosa is used widely in ayurveda to treat a number of ailments; it is also used as vegetable in the study area and is also used in the folk medicine of different casts and tribes in the vicinity of the study area. In our present work, we have investigated the basic phytochemical profile of the plant along with its antimicrobial potential. The plant extract showed significant antimicrobial activity as compared with standard ciprofloxacin. The preliminary phytochemical screening showed the presence of glycoside, alkaloid, phenolic compounds, proteins, tannins etc. in the extracts tested.

KEYWORDS

Hygrophylla spinosa;
Antimicrobial Activity;
Phytochemical Screening.

INTRODUCTION

The quest for new antimicrobial agents seems perpetual, as microorganisms are getting resistant to the available antimicrobial agents day by day and are producing antibiotic resistant strains. So, we are screening the antimicrobial potential of locally available medicinal plants, whose use are evident in ayurveda or in folk medicine of the local communities to treat infectious disease or to accelerate the wound healing procedure. Our present work is a part of this bigger search. Hygrophylla spinosa (Acanthaceae) is commonly known as 'Kulekara' in Bengali, and is commonly found in India, Srilanka, Burma, Malaysia, and Nepal in water logged lands[1,2]. Traditionally the plant is used for treating urinary tract infection, as haematinic, in jaundice, in rheumatic arthritis, in diahorrhea, as analgesic and anti inflammatory etc[2]. The search of earlier literature revealed that the plant is having antioxidant and free radical scavenging activity, antinoceptive activity[3], hepatoprotective[4], antihyperglycemic[5] and antitumor[6] activity. In our present work we have studied the preliminary phytochemical profile of the plant along with its antimicrobial activity. Although, the presence of proteins, polyphenolic compounds, reducing sugars, glycosides etc., has already been reported in the earlier literature[7].

MATERIALS AND METHODS

Plant material

About 5 kg of the aerial plant material was procured from the local market in October, 2008 and was screened for defects and abnormalities; only healthy plant material was used in the study. A voucher speci-

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men of the plant is preserved in the herbarium of Department of Pharmacognosy, Institute of Pharmacy, Jalpaiguri for future reference. 3 kg of the aerial plant part was shade dried, cut into pieces and was grounded to form plant powder.

As a part of the pharmacognostic study we have performed ash analysis[8,9] and extractive value determination[8,9].

Extraction procedure

The finely powdered plant material was macerated using ethanol for 48 hrs with occasional stirring, the extract was then filtered and the plant material was re-extracted with the same solvent for a further period of 48 hrs in the same manner and was filtered, the filtrates were combined and was evaporated to dryness under reduced pressure at a temperature not exceeding 40°C to get the crude extract.

Preliminary phytochemical screening

The crude ethanolic extract was subjected to preliminary phytochemical screening using specific reagents[8,10,11]; the extract was also subjected to TLC using different solvent systems and specific derivatizing reagents[11] were used to confirm the identity of the phytoconstituents.

Antimicrobial study

The antimicrobial study was conducted by cup-plate agar diffusion method[10]. The different antibacterial stains used in the study were Shigella Sonnei, Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus and Bacilus subtilis. Culture media was prepared and after sterilization, was taken in sterilized Petri dishes and the microorganisms were grown by pouring microbial suspension on the solidified media in Petri dishes and incubating them at 30°C temperature for 24 hrs. After growth of the microorganism, pours were made using borer and different concentration of the extracts were placed in each hole, marketed standard disks were used as standard. The Petri dishes were further incubated at 30°C for a period of 24 hrs and the diameter of the zone of inhibition was measured. The diameter of zone of inhibition for each concentration was measured thrice against each microbial strain and the result shows the average diameter of zone of inhibition.

RESULTS AND DISCUSSION

The results of different pharmacognostic studies are shown in TABLE 1; preliminary phytochemical screening of the extract revealed the presence of polyphenolic compounds, glycosides, sugars, alkaloids etc. The results of the antibacterial activity study is shown in TABLE 2, and shows that the ethanolic extract of Hygrophilla spinosa at a dose of 100 mg/ml has almost equally potent antibacterial activity as compared with that of standard drug (Ciprofloxacin).

TABLE 1 : Ash Analysis and Extractive Values of Hygrophilla spinosa

1. Ash values	
(i) Total ash	18.7% of Dry weight
(ii) Acid insoluble ash	3.67 % of Total ash
(iii) Water soluble ash	16.07 % of Total ash
(iv) Sulphated ash	21.07 % of Total ash
2.Extractive values	
(i) Pet. Ether soluble extractive values	2.1 %
(ii) Chloroform soluble extractive values	4.85 %
(iii) Ethanol soluble extractive values	2.3 %
(iv) Water soluble extractive values	6.3 %

TABLE 2 : Antimicrobial Activity of the ethanolic extract of Hygrophilla spinosa

Microorganism	Diameter of Zone of Inhibition (mm)			
	25 mg/ml	50 mg/ml	100 mg/ml	Standard
Shigella Sonnei	18	21	25	26
Escherichia coli	12	14	18	27
Pseudomonas aeruginosa	16	19	20	29
Staphylococcus aureus	-	08	13	23
Bacilus subtilis	14	21	27	28

– diameter of zone of inhibition is negligible

As the plant extract contains a number of different significant phytoconstituents, so further study should be conducted to identify and isolate the active principle from the extract.

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