Original Article

Antimicrobial Activity of *Cedrus deodara* Linn. and *Hemidesmus indicus* Linn. Plants Against Clinically Important Micro-organism

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ABSTRACT

Background: Antibacterial activity of several herbal plants has been reported in present time. In the present communication, antibacterial activity of *Cedrus deodara* Linn. *and Hemidesmus indicus* Linn. plants have been reported that may be an alternative source to develop an alternative treatment of bacterial infection.
Objective: The plant species namely *Cedrus deodara* Linn. (Fam. Pinaceae) and *Hemidesmus indicus* Linn. (Fam. Apocynaceae) used in urinary disorders in India were tested for their antibacterial activity against both Gram-positive and Gram-negative bacteria.
Material and Method: Soxhlet extraction of medicinal plants *Cedrus deodara* Linn. and *Hemidesmus indicus* Linn. were performed at 65^0C with ethanol, chloroform and water. The extracted materials was then kept in water bath to evaporate solvent totally and then kept on a rotary shaker at 190-220 rpm for 6 h to make the final volume one fourth of the original volume and stored at 4^0C in airtight bottles. Then, antibacterial activity was determined by disk diffusion method.
Results: No inhibitions were observed with ethanol and chloroform extracts of both *Cedrus deodara* and *Hemidesmus indicus* samples.
Conclusion: The potential active compound of *Cedrus deodara* Linn. *and Hemidesmus indicus* Linn. C. is suggested for further phytochemical analysis and other biological properties.

Keywords: *Cedrus deodara*, *Hemidesmus indicus*, Antibacterial activity, Agar disc diffusion assay.

INTRODUCTION

The problem of microbial resistance is growing and the outlook for the use of antimicrobial drugs in the future is still uncertain. Therefore, appropriate steps needs to be taken to reduce this problem, for example, to control the use of antibiotic, develop research to better understand the genetic mechanisms of resistance, and to continue studies to develop new drugs, either synthetic or natural[1-4]. The ultimate goal is to offer appropriate and efficient antimicrobial drugs to the patient. Medicinal plants are known to produce certain bioactive molecules which react with other organisms in the environment, inhibiting bacterial or fungal growth. Higher plants have been shown to be a potential source for new anti-microbial agents. The use of plant extracts and phytochemicals, both with known antimicrobial properties, can be of great significance in therapeutic treatments. The plants used, as drugs are fairly innocuous and relatively free from toxic effects or were Natural products perform various functions and many of them have interesting and useful biological activities[5-7]. There are more than 35,000 plants species have been used in various human cultures around the world for medicinal purpose. Biologically active compounds present in medicinal plants have always been of great interest to scientists working in this field[8-12]. The present study was designed to evaluate the antibacterial activity of some important medicinal plants such as *Cedrus deodara* Linn. *(Fam. Pinaceae)* locally known as 'Devdaru' and *Hemidesmus indicus* Linn. *(Fam. Apocynaceae)* locally known as 'Anantmool' used in urinary disorders in Ayurveda[13].

MATERIALS AND METHODS

Plant material

Heartwood of *Cedrus deodara* & root of *Hemidesmus indicus* were collected. Roots were washed in tap water, air dried and ground to fine powder and stored in airtight bottles. The specimens were identified by a taxonomist.

Extraction of plant material

The fresh root & heartwood samples were washed, dried and ground to fine powder using blender. About 25 g of ground powder was taken in stoppered flask and successively extracted with ethanol, chloroform and water or 5 days with occasional shaking. After 5 days extract was filtered and evaporated on a water bath.

Test microorganisms and microbial culture

Four bacterial strains & two fungal strains were used in this study, two gram-positive *Staphylococcus aureus* (MTCC 98) and *Bacillus cereus* (MTCC 430) and two gram-negative (*Escherichia coli* (MTCC 1687) & *Pseudomonas aeruginosa* (MTCC 1688), Yeast *Candida albicans* (MTCC 227) & Mould *Aspergillus niger* (MTCC 281). The bacterial strains were cultivated at 37°C and maintained on nutrient agar slant at 4°C & Fungal strain were cultivated at 25°C and maintained on sabouraud dextrose agar slant at 4°C.

Preparation of antimicrobial disc

Sterile discs were procured from Hi-media and used for the preparation of antimicrobial disc. The extracts of the medicinal plants were incorporated to the sterile disc. Each sterile disc was incorporated individually with the volume equivalent to 50 mg/ml dose of the extracts using a calibrated micropipette. Precautions were taken to prevent the overflow of the

solvent from the outer surface of the disc. To ascertain this, the discs applied in small quantities and the discs were allowed for air drying followed by another dose of the extract.

Assay of Antibacterial activity

The cultures were smeared on the sterile, air-dried nutrient agar plates and sabouraud dextrose agar plates using sterile cotton swab. Sterile discs loaded with known quantity of antibacterial compounds were placed on the surface of agar petriplates with the help of flame sterilized forceps. Control discs were placed in the agar plates incorporating at the solvents only. Then the bacterial petriplates were incubated at 37˚C for 24 hrs and fungal petriplates were incubated at 25˚C for 48 – 72 hrs . The zone of inhibition was observed and measured with the help of a Vernier calipe.

RESULTS AND DISCUSSION

No inhibitions were observed with the ethanol and chloroform extracts of both *Cedrus deodara* and *Hemidesmus indicus* samples. The water extracts of the plants possesses antibacterial properties[14]. In the antibacterial studies on the water extracts of both *Cedrus deodara* showed sensitive inhibition in 50 mg/ml dose against *Pseudomonas aeruginosa, Staphylococcus aureus, Bacillus cereus, Escherichia coli, Candida albicans* and *Aspergillus niger*. *Hemidesmus indicus* showed sensitive inhibition against against *Staphylococcus aureus, Bacillus cereus and Escherichia coli,* no inhibition against *Pseudomonas aeruginosa, Candida albicans* and *Aspergillus niger*.

CONCLUSIONS

In Conclusion, this study highlights the antibacterial activity of *Cedrus deodara* Linn. *and Hemidesmus indicus* Linn. which are worthy of further investigation for their phytochemical analysis. Our results support the use of these plants as traditional medicine and suggest that some of the plant extracts possess compounds with good antibacterial and antifungal properties that can be used as effective antimicrobial agents in the field of biomedical science.

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Table 1. Antibacterial activity of standard antibiotics

Name of microorganisms	Zone of inhibition (diameter) in mm						
	Cr	Cx	F	Va	Ak	Cf	Fr
Staphylococcus aureus	32	21	22	16	31	34	22
Bacillus cereus	-	-	17	-	23	28	-
Escherichia coli	20	-	19	18	21	36	18
Pseudomonas aeruginosa	-	-	17	-	20	27	-

Cr = Cephaloridine, Ak = Amikacin, Cx = Cloxaccilin, Cf = Ciprofloxacin, F = Framycetin, Fr = Furozolidone, Va = Vancomycin

Table 2. Antibacterial activity of *Cedrus deodara* extracts

Name of Microorganisms	Zone of inhibition (diameter) in mm		
	Water	Ethanol	Chloroform
Staphylococcus aureus	14 mm	8 mm	9 mm
Bacillus cereus	8 mm	No zone	No zone
Escherichia coli	8 mm	No zone	No zone
Pseudomonas aeruginosa	No zone	No zone	No zone
Aspergillis niger	7 mm	No zone	No zone
Candida albicans	12 mm	No zone	No zone

Table 3. Antibacterial activity of *Hemidesmus indicus* extracts

Name of Microorganisms	Zone of inhibition (diameter) in mm		
	Water	Ethanol	Chloroform
Staphylococcus aureus	9 mm	No zone	No zone
Bacillus cereus	10 mm	No zone	No zone
Escherichia coli	11 mm	No zone	No zone
Pseudomonas aeruginosa	No zone	No zone	No zone
Aspergillis niger	No zone	No zone	No zone
Candida albicans	No zone	No zone	No zone