

PHARMACOLOGY

ANTIMICROBIAL ACTIVITY OF EXTRACTS OF *ACANTHUS ILICIFOLIUS* EXTRACTED FROM THE MANGROVES OF KARWAR COAST KARNATAKA

Pradeep V. Khajure* and J.L. Rathod

Department of Marine Biology, Karnatak University P.G and Research Centre, Karwar 581303, Karnataka

Abstract

The antimicrobial activity of n-hexane, chloroform and methanol extracts of leaves and roots of the plant *Acanthus ilicifolius* were studied. Ampicillin and clotrimazole were used as standard antibacterial and antifungal agents respectively. The result of the study revealed that the n-hexane extract and chloroform extract of leaves exhibited strong inhibitory action against *Bacillus subtilis*, *Staphylococcus aureus*, *Candida albicans*, *Aspergillus fumigatus* and *Aspergillus niger* and moderate inhibitory action against *Pseudomonas aeruginosa* and *Proteus vulgaris*. The rest of the extracts showed good inhibitory activity.

Keywords: *Acanthus ilicifolius*, Agar disc diffusion method, Mangrove forest antimicrobial activity.

Acanthus ilicifolius (family of Acanthaceae) is a valuable medicinal plant that is widespread in tropical Asia and Africa, through Malaya to Polynesia (Xie *et al.*, 2005). *Acanthus ilicifolius* extracts have been used in various folk medicines as remedies against rheumatism, neuralgia, poison arrow wounds, coughs, asthma and bacterial infections with subsequent scientific supports to these claims (Mastaller, 1997). These created an interest to test the possible antimicrobial activity of different parts of this plant, which has not been reported; hence, the present study was undertaken. The phytochemical literature reveals the presence of 2-benzoxazolinone, lignan glucosides, benzoxazinoide glucosides, flavone glycosides and phenylethanoid glycosides in this plant. (Kanchanapoom *et al.* 2001). The present study was aimed at the preliminary investigation of antibacterial and antifungal activity of n-hexane, chloroform and methanol extracts of leaves and roots of *A. ilicifolius*.

Acanthus ilicifolius (Taxonomic Authority: Lour, Family: Acanthaceae) was collected from mangroves forest of Karwar, west coast of India (Lat. 14° 47' 11.33N. Long. 74° 01' 48.38E), during December 2009 and identified by a systemic Botanist (Figure 1).

The shade dried parts of the whole plant (Leaf and roots) were coarsely powdered (50–200 g) and extracted with n - hexane, chloroform and methanol respectively for 48 hours in soxhlet apparatus. After evaporation of the solvent under reduced pressure, the respective extracts were obtained. Considering that the methanolic extract suits for better activity (Chatterjee, 2007), it was successively partitioned with ethyl acetate and acetone affording 0.150 gm and 0.200 gm (residue dry) of each fraction respectively.

Figure 1: *Acanthus ilicifolius* plant with flower.



The *in vitro* antibacterial and antifungal studies of the n-hexane, chloroform and methanol extracts of the leaves and roots were carried out by the Agar disc diffusion method (Barry, 1976). All the extracts were separately dissolved in dimethylsulfoxide (DMSO) to get 10 mg/ml solutions. Ampicillin (1 mg/ml) and clotrimazole (1 mg/ml) were used as standard antibacterial and antifungal agents respectively. The antibacterial activity was evaluated by employing 24 h cultures of *Bacillus subtilis*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Proteus vulgaris* using Muller Hinton Agar medium. Antifungal activity was carried out against 24 h cultures of *Candida albicans*,

* Corresponding Author, Email: pradeepkhajure98@gmail.com

Aspergillus fumigatus and *Aspergillus niger* using Sabouraud dextrose agar medium. Accurately 0.2 ml of the test and standard solutions were transferred to cups aseptically and labeled accordingly. The microorganism inoculated plates were then maintained at room temperature for 2 h to allow the diffusion of the

solutions into the medium. The Petri dishes used for antibacterial screening were incubated at $37\pm 1^\circ$ for 24 h, while those used for antifungal activity were incubated at $28\pm 1^\circ$ for 48 h. The diameters of zone of inhibition surrounding each of the wells were recorded.

Table 1. Antimicrobial activity of *Acanthus ilicifolius*

Test Organisms	Zone of Inhibition in mm					
	n-Hexane Extract*		Methanol Extract*		Chloroform Extract*	
	Leaves	Roots	Leaves	Roots	Leaves	Roots
<i>B. subtilis</i>	21	18	17	15	20	15
<i>S. aureus</i>	20	17	12	14	22	10
<i>P. aeruginosa</i>	20	16	12	12	18	10
<i>P. vulgaris</i>	22	16	14	15	18	14
<i>C. albicans</i>	20	19	16	12	24	20
<i>A. fumigatus</i>	22	17	17	12	22	18
<i>A. niger</i>	22	20	15	14	22	18

*10mg/ml

Table 1 enumerates the antibacterial and antifungal activity of the extracts of different parts of the *Acanthus ilicifolius*. The n-hexane, chloroform and methanol extracts of the different parts of the plant exhibited strong to moderate activity against the test microorganisms. The results revealed that, the n-hexane and chloroform extracts of leaves exhibited strong inhibitory action against *Bacillus subtilis*, *Staphylococcus aureus*, *Candida albicans*, *Aspergillus fumigatus* and *Aspergillus niger* and moderate inhibitory action against *Pseudomonas aeruginosa* and *Proteus vulgaris*. The rest of the extracts showed moderate activity.

References

Barry AL., (1976). The antimicrobial susceptibility test principle and practices. London: ELBS; pp. 180.

Geissberger P and Sequin U., (1991). Constituents of *Acanthus ilicifolius* L.: do the components found so far explain the use of this plant in traditional medicine? *Acta Tropica*. 48(4):251-261.

Kanchanapoom T, Kamel MS, Kasai R, Yamasaki K, Picheansoonthon C, Hiraga Y., (2001). Lignan glucosides from *Acanthus ilicifolius*. *Phytochemistry*. 56:369-72.

Mastaller, M., (1997). *Mangroves: The Forgotten Forest between Land and Sea*. Tropical Press, pp. 97.

Mclaughlu J. L. et al., (1988). The use of biological assays to evaluate botanicals. *Drug Information Journal*. (32):513-524.

Xie, LS. et al., (2005). Pharmacognostic studies on mangrove *Acanthus ilicifolius*. *Zhongguo Zhong Yao Za Zhi*, 30: 1501-3.