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Antibacterial activity of roots of *Argyreia speciosa* (Burm. f.) Bojer

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ABSTRACT

Argyreia speciosa is a potent medicinal plant in the Indian systems of medicine. Traditionally it is used as an antibacterial, antifungal, antipyretic, etc. In the present study the hydroalcoholic extract and its acetone, chloroform and methanol fractions of the root of A. speciosa were studied for their antibacterial activity by disc diffusion method against different gram positive (Staphylococcus aureus and Bacilus subtilis) and gram negative (Escherchia coli) bacteria. It was observed that the hydroalcoholic extract and its acetone, chloroform and methanol fraction showed significant activity against all the microorganisms tested here and the hydroalcoholic extract showed the highest activity (13 mm) against S. aureus.

Key words: *Argyreia speciosa*, disc-diffusion method, antibacterial activity, minimum inhibitory concentration.

INTRODUCTION

Argyreia speciosa (Convolvulaceae), commonly known as Vryddhadaru in Sanskrit is a woody climber and has been used as a ‘rasayana’ drug in the traditional Ayurvedic system of medicine. The roots of this plant have been regarded as alterative and tonic, and are said to be useful in rheumatism and diseases of the nervous system [1]. It is found throughout India, up to an altitude of 300m, viz., Assam, Bengal, Puri district of Orissa, Dehra Dun, cultivated in Rajasthan,

Konkan, Deccan, Mysore. Traditionally, the root is useful in anorexia, Loss of appetite, dyspepsia, flatulence, colic, ascites, haemorrhoids, hemiplegia, nervous weakness, neuralgic pains, cerebral disorders, synovitis and general debility [2]. The aim of the present study is to understand the antibacterial spectrum from natural resources and to support the traditional uses of Argyreia speciosa and its isolated compounds in the treatment of infectious diseases.

EXPERIMENTAL SECTION

Collection and authentication of plant material

Fresh plant/plant parts were collected randomly from Gujarat region, India and authenticated through Department of Biosciences, Saurashtra University, Rajkot, Gujarat, India (Specimen no. PSN492) and a voucher Specimen has been preserved for further reference. The roots were washed under running tap water; air dried under shade, coarsely powdered and kept in airtight container for further use.

Preparation of extracts

The roots were dried under shade, coarsely powdered and the hydroalcoholic extract was prepared by maceration. Further the acetone, chloroform and methanol fractions of the concentrated hydroalcoholic extract were prepared by using percolator.

Antibacterial activity

The antibacterial activity was evaluated by disc-diffusion method [3],[4]. The bacterial strains used were *E. coli* (NCIM - 2831), *S. aureus*, (NCIM - 2079) *B. subtilis* (NCIM - 2439). Nutrient agar media was taken in a pre-sterilized petri-dish and the microorganisms were grown. Accurately weighed 5mg of plant extract and its different fractions and dissolved separately into 1ml dimethyl sulfoxide (DMSO). From these solutions, 20 µl were transferred to sterile empty discs (0.7 cm), so that concentration becomes 100µg/disc. Discs were allowed to dry and then introduced on the upper layer of the seeded agar plate. Similarly disc of amikacin (30µg/disc) was placed on the seeded agar plate and incubated at 37^0C for 24 hr. The diameters of zone of inhibition (mm) were recorded and the experiment was done three times and the mean values are presented and compared with standard drug amikacin. The minimum inhibitory concentration (MIC) of the different extracts and fractions was also determined according to standard method [5],[6] using a concentration range between 3.9-2000 µg/disc.

RESULTS AND DISCUSSION

The hydro-alcoholic extract and its acetone, methanol and chloroform fraction of root of *A. speciosa* was tested and compared to that of Amikacin. The results of the sensitivity test are presented in Table 1. It was found that the hydro-alcoholic extract and its acetone, methanol and chloroform fraction (100µg/disc) gave promising inhibitory activity against all the bacterial strain tested herein. The largest zone of inhibition (13 mm in diameter) was recorded against *S. aureus* by hydroalcoholic extract and zone of inhibition of methanol (against *S. Aureus)*, acetone and chloroform fraction (against *E. coli)* was 12 mm each in diameter. Standard antibiotic Amikacin (30µg/disc) showed activity against all the bacteria. The MIC value of hydroalcoholic extract, its acetone, chloroform and methanol fractions was in the range of 15.6-31.2, 31.2-62.5, 15.6-62.5 and 31.2-62.5 µg/disc respectively (Table 2). Further, the hydroalcoholic extract and

its fractions were found to contain alkaloids, carbohydrates, protein tannins, flavonoids and amino acid, through preliminary photochemical screening[7]. The antibacterial activity may be due to one/more group of above phytoconstituents.

Table 1: Antibacterial Activity of *A. speciosa*

Test organism	*Zone of Inhibition in mm				Amikacin (30µg/disc)
	Different extracts(100µg/disc)				
	EXT-1	EXT-2	EXT-3	EXT-4	
E. coli (NCIM-2831)	12.33±0.57	12.67±0.57	11.33±1.52	12.0±2.0	19.33±1.12
S. aureus (NCIM-2079)	12.33±1.52	10.33±1.15	11.67±1.52	11.0±1.73	23.66±0.57
B. subtilis (NCIM-2439)	11.33±1.15	11±1.73	10.66±1.15	10.66±0.57	20.33±1.24

**Average of three readings; Values are expressed as mean ±S.D*

EXT-1, Hydro-alcoholic extract; EXT-2, Acetone fraction; EXT-3, Methanol fraction; EXT-4, Chloroform fraction

Table 2: Minimum Inhibitory Concentrations (MIC) Values of *A. speciosa* Against Pathogenic Bacteria

Test organism	Diameter of inhibition zone in mm. (Concentration in µg/disc)									
	Hydro-alcoholic Extract									
	2000	1000	500	250	125	62.5	31.2	15.6	7.8	3.9
S. aureus	17	15.5	15	13	13	11.5	11	9	0	0
E. coli	15.5	15	14	13	12	12.5	10	0	0	0
B. subtilis	14.5	13.5	13	12	11	11.5	10	9	0	0
Acetone fraction										
S. aureus	13.5	13	12	11	10	9	0	0	0	0
E. coli	14.5	13.5	13	12	12	11	10	0	0	0
B. subtilis	13.5	13	12	12	11	10	10	0	0	0
Methanol fraction										
S. aureus	13	12.5	12	12	12	11	10	0	0	0
E. coli	13.5	13	12	11	11	10	0	0	0	0
B. subtilis	13	12.5	12	11	11	10	9	0	0	0
Chloroform fraction										
S. aureus	14	13.5	13	12	11	10.5	0	0	0	0
E. coli	14	13.5	13	12	12	11	10	0	0	0
B. subtilis	13.5	12.5	12	11	11	10	9	8	0	0

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