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Original Article

Antimicrobial Activity of *Dolichandrone arcuata* (Wight) Clarke

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Abstract

Dolichandrone arcuata is one of the large evergreen tree which belongs to the family Bignoniaceae. *Dolichandrone arcuata* was studied for its antibacterial activity. The leaves of this plant were dried, powdered and different extracts were prepared using different solvents like petroleum ether, benzene, chloroform, ethanol and distilled water. Ten bacterias, namely *Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, Streptococcus pyogenes, Salmonella typhii, Serratia marcescens, Klebsiella pneumoniae, Enterobacter aerogenes, Proteus vulgaris* and *Bacillus subtilis* were used for investigation. The activity of each solvent extract was checked on each organism by disc diffusion method and then the zone size of each was measured. The results of our antibacterial assay revealed that plant extracts showed inhibitory activity against the tested organisms.
Key words: Antibacterial activity, *Dolichandrone arcuata*, solvent extract and inhibitory activity.

Introduction

The plant is a tree which to the family Bignoniaceae. The synonym for the plant is *Spathodea arcuata*. The tamil name for the plant is Ram palai. The plant was mainly distributed in the Pulghat lower ghats, The ecological status of the plant is very rare. It grows well in the moist deciduous forest. Their potential therapeutic properties are still unknown.

The medicinal value of plants has assumed a more important dimension in the past few decades. This is due largely to the discovery that extracts from plants contain not only minerals and primary metabolites but also a diverse array of secondary metabolites with antioxidant potentials Sofowora, 1993, Okigbo *et al*., 2009a). The use of plant extracts in traditional medicine is a worldwide practice. Medicinal plants form the basis of primary health care for majority of the people living in the rural and remote areas in Nigeria and other third world countries (Awosika, 1993). A number of medicinal plants have been found and put into use in ethnomedicine by traditional healers in the management of many diseases.

According to Sofowora (1993), African medicinal plants rank highest among plants used in the investigations of antimicrobial properties. This could be due to their high traditional medicinal use and also the ease of carrying out such tests. The organs or parts used in these plants vary from one plant to the other and these include the leaves, barks, roots, stems, flowers, fruits and even the seeds (Farombi, 2003; Nguelefack *et al*., 2005). The present investigation has been carried out to evaluate the antimicrobial activity of *D.arcuata* leaf extracts.

Materials and Methods

Plant collection

Leaves were collected from Singikulum. The plant was collected during the month of December 2007 and preserved. The morphological and taxonomical observations were made by using a student dissection microscope and the characters were identified and confirmed using the flora of Madras presidency. Fresh plant materials were shade dried and homogenized to a fine powder.

Plant extraction

The powdered medicinal plant material was taken and subjected to successive solvent extraction in the increasing order of polarity i.e. from non polar to high polar. The solvents used are Petroleum ether, Benzene, Chloroform, Ethanol and Distilled water. For above solvent extraction 50g of powdered plant material of *D.arcuata* was mixed with 250 ml of Petroleum ether and subjected to occasional shaking for 24 hrs. The extracts were filtered through Muslin cloth and extracts concentrated by evaporation at room temperature until the solvent gets evaporated completely. After complete drying the above said residues were extracted with all the other

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solvents separately. Then extracted materials were lyophilized by occasional shaking for 24 hrs.

Bacterial Strains

They were sub cultured in the Muller-Hinton agar medium. The samples for each bacterial strain were sub cultured in individual agar slants. *Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, Streptococcus pyogenes, Salmonella typhii, Serratia marcescens, Klebsiella pneumoniae, Enterobacter aerogenes, Proteus vulgaris* and *Bacillus subtilis.* All the strains were confirmed by cultural & biochemical characteristics and maintained in slants for further use.

Antimicrobial Activity

Antimicrobial assay of solvent extracts were performed by Disc diffusion method. (Bauer *et al* 1966). Lawn culture of *Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, Streptococcus pyogenes, Salmonella typhii, Serratia marcescens, Klebsiella pneumoniae, Enterobacter aerogenes, Proteus vulgaris* and *Bacillus subtilis* were developed on Muller hinton using sterile cotton swabs Streptomycin presoaked and dried discs of 6 mm diameter of whatman No. 1 filter paper were used as positive control. After the incubation period the inhibition zones around the discs were measured and recorded. The sterile impregnated disc with plant extract were placed on the agar surface with flamed forceps and gently pressed down to ensure complete contact of the disc with the agar surface. The plates were incubated at 37° C for 18 hrs. After the incubation the size of the inhibition zone were measured.

Antibacterial activity was determined by measuring the diameter of the zone of inhibition surrounding microbial growth. For each strain, controls were included that comprised pure solvents instead of the extract (Parekh and Chanda 2007). The experiments were repeated three times and the mean values were presented.

Results

The antimicrobial activity in terms of zone of inhibition was presented in Table 1. The results obtained from the disc diffusion assay showed that there has been an increasing effect on microbial growth inhibition with increasing concentration of the extract. The extract showed good inhibitory activity on almost all the microbes tested. The *in vitro* antibacterial activity of petroleum ether, benzene, chloroform ethanol and distilled water extract of *Dolichandrone arcuata* leaf and stem were showed in Table.1.

Table-1. Antibacterial Activity of *Dolichandrone arcuata* (Wight) Clarke.

Sl. No	Name of the bacteria	Diameter of inhibition zone (mm)										
		Petroleum ether		Benzene		Chloroform		Methanol		Distilled water		Control
		Leaf	Stem	Leaf	Stem	Leaf	Stem	Leaf	Stem	Leaf	Stem	
1	*Escherichia coli*	-	-	-	-	-	5	4	-	3	-	9
2	*Pseudomonas aeruginosa*	9	-	11	-	14	9	10	6	13	4	8
3	*Staphylococc us aureus*	-	10	-	-	-	7	-	16	-	-	3
4	*Streptococcus pyrogenes*	-	-	-	-	-	-	4	-	3	-	16
5	*Salmonella typhi*	-	-	-	-	-	6	3	-	-	-	13
6	*Serratia marcescens*	-	-	-	-	-	6	-	-	5	-	7
7	*Klebsiella pnuemoniae*	3	17	-	18	5	19	4	18	-	17	8
8	*Enterobacter aerogenes*	-	5	-	-	-	-	5	3	4	3	5
9	*Proteus vulgaris*	4	3	-	8	3	4	-	5	-	4	15
10	*Bacillus subtilis*	6	9	-	7	5	8	-	-	-	-	6

(-) No inhibition.

The maximum inhibition was recorded against *Klebsiella pnuemoniae* with the extract of chlororm in 19mm. The gram positive *S.aureus* was susceptible with the inhibition zone ranging from 18mm in benzene and methanol extract. The maximum inhibition was observed against *Klebsiella pnuemoniae* with the chloroform extract. The water extract showed significant effect against *Pseudomonas aeruginosa*. The observed activity may be due to the presence of potent phytoconstituents in the leaf and stem extracts. This may be indicative of a significant potential for isolating purer compounds.

Discussion and Conclusion

Antimicrobial activity of *Dolichandrone arcuata* leaf and stem extract is compared with the antibiotics of the respective organism. It was found that the extract in some cases exhibited the zone of inhibition which was equal or greater than the zone of inhibition of antibiotic(Rios and Recio 2005).As a result it is sure that these leaf extract can surely inhibit the growth of these microorganisms thereby preventing various disease such as skin infections, diabetes etc. *Dolichandrone arcuata* leaf extract thus provides safe, easy, effective and practical solutions to every day ailments leaving behind no toxins and creating a clean, pleasant atmosphere. The overall results indicate promising baseline information for the potential uses of solvent extracts of *D. arcuata leaf* in the treatment of infectious disease.

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