Int. J. Chem. Sci.: 6(1), 2008, 245-249

PHYTOCHEMICAL STUDIES AND DEMONSTRATION OF ANTIMICROBIAL ACTIVITY OF *ERYTHROXYLUM MONOGYNUM*

B. SREEDHARREN[a], K. P. JAIGANESH[a], N. KANNAPPAN[*] and N. SULOCHANA[b]

Department of Pharmacy, Annamalai University, ANNAMALAI NAGAR (T. N.) INDIA
[a]Thantahi Rover College of Pharmacy, PERAMBALUR (T. N.) INDIA
[b]Department of Chemistry, National Institute of Technology, TIRUCHIRAPPALLI (T. N.) INDIA

ABSTRACT

The plant *Erythroxylum monogynum*, belonging to the family Erythroxylaceae, is a shrub cultivated almost in all districts of south west India. In the present work, physiochemical standards and phytochemical constituents of leaf of *Erythroxylum monogynum* were studied and reported that it contains alkaloids, carbohydrates, flavonoids and glycosides. Further, alcoholic extract of leaf of *Erythroxylum monogynum* is screened for antimicrobial activity against the organism *Escherichia coli, Pseudomonas aeruginosa* and *Staphylococus aureus* keeping the antibiotic amikacin as a positive control and the result showing that 12 mm and 13 mm zone of inhibition was observed in 45 and 60 mcg/mL of alcoholic extract of leaf, respectively where as 12 mm zone of inhibition was observed in 30 mcg/mL of amikacin in *Escherichia coli*.

Key words: Photochemical, Antimicrobial, *Erythroxylum monogynum*

INTRODUCTION

The plant *Erythroxylum monogynum* belongs to the family Erythroxylaceae and it is known by several names in vernacular language[1]. It is shrub or small trees cultivated almost in all districts of south west India. The wood have odour resembling to sandal wood and hence, the synonym bastard sandal. The stem and root of the plant is considered to be the best medicinal part of the plant[2]. Almost all parts of the plant are of medicinal use such as stem, root, bark, leaf and flower. It is available abundant in the green forest of the foothills. The wood contains alkaloids, diterpenoids, such as erythroxydiol and erythroxy triol, hibaene epoxide, devodarool, monogynol and hydroxyl monogynol diterpene,

[*] Author for correspondence; E-mail: nagappankannappan@rediffmail.com

hydrocarbons, (-) primaradiene, (-) atisirene, isoatisirene, (+) devadorene erythroxytriols Q and P[3]. Leaves roots and stems are used as anesthetic, anorexic, antiarrythmic, antibacterial, CNS stimulant, fungicide, mydriatic, antiseptic, cardiotonic, convulsant and these are some of the important activities of this drug[4].

EXPERIMENTAL

Collection

The leaf of *Erythroxylum monogynum* was collected in ther month of mid February from the foothills of Pachaimalai, near Annamangalam forest region, Tamilnadu and was dried under shade condition and then they were coarsely powdered and subjected to extraction process and other studies.

Physiochemical tests

Air dried coarsely powdered leaf was subjected to following analysis: determination of total ash, determination of water soluble ash, determination of acid in soluble ash, determination of sulphated ash, determination of loss on drying, determination of water soluble extractive value, determination of alcohol soluble extractive value and crude fibre content. The results are given in Table 1.

Alcoholic leaf extract

Shade dried leaf powder was extracted with 95% ethanol by continuous hot percolation method. After extraction, it was filtered and the excess of solvent was removed by distillation under reduced pressure. The extract was then stored in a dessicator. A dark brown colour residue was obtained. The extract was used for identification of constituents by phytochemical tests.

Aqueous leaf extract

The marc left after alcoholic extraction was taken and finally macerated with five litres of chloroform–water in a narrow mouthed bottle for three days. After completion of extraction, it was filtered and the solvent was removed by distillation under reduced pressure. The extract was then stored in dessicator. A greenish brown colour residue was obtained

Microbiological studies

Known concentration (30 mcg/mL) of amikacin antibiotic was placed ion agar

plate that has been inoculated uniformly over the entire plate of bacterial culture using *Escherichia coli, Pseudomonas aeruginosa* and *Staphylococus aureus* organisms to be tested. The plate was incubated for 18 to 24 hours at 37^{o}C. During this period, antibacterial agents diffused through the agar and may prevent the growth of organism, which is proportional to the diameter of inhibition zone around the disc. Muller-Hinton agar (MHA) medium is sterilized and poured into the plates, the agar was allowed to settle and stored at 4^{o}C. The surface of the MHA plate was inoculated with the swab of the growth of the above organism. The discs containing anti-microbial agent, aqueous and alcoholic extract of leaf were arranged on the surface of the inoculated plates in such a way so as to be at least 20 mm away from one another and incubated at 35-37^{o}C for 18-25 hours and results were observed. The plates were examined for the presence of inhibitory zones.

RESULTS AND DISCUSSION

Phytochemical constituents of leaf of *Erythroxylum monogynum* were studied and it was found that it contains alkaloids, carbohydrates, flavinoids and glycosides in all AqE, AcE and CD. The result also shows that it does not contain saponins, proteins and free amino acids. Fixed oils and fats, tannins, phenolic compounds, gums and mucillages were present in AqE and AcE but these were not found in CD.

Table 1. Physiochemical standards of leaf of *Erythroxylum monogynum*

Physical constants	Percentage of leaf (%)
Total ash	02.96
Water soluble ash	02.60
Acid insoluble ash	05.33
Sulphated ash	14.90
Loss on drying	02.40
Water soluble extractive value	14.40
Alcohol soluble extractive value	21.80
Crude fibre content	56.00

Table 2. Phytochemical consituents found in *Erythroxylum monogynum*

Chemical	Aqueous extract (AqE)	Alcoholic extract (AcE)	Crude drug (CD)
Alkaloids	+ve	+ve	+ve
Carbohydrates	+ve	+ve	+ve
Fixed oils and fats	+ve	+ve	-ve
Tannins and phenolic compounds	+ve	+ve	-ve
Saponins	-ve	-ve	-ve
Proteins and free amino acids	-ve	-ve	-ve
Gums and mucillages	+ve	+ve	-ve
Flavonoids	+ve	+ve	+ve
Lignin	-ve	+ve	-ve
Phytosterols	+ve	-ve	+ve
Glycosides	+ve	+ve	+ve

Table 3. Antimicrobial activity of alcoholic extracts of *Erythroxylum monogynum*

Organism	Gram reaction	Zone of inhibition (in mm)				
		Alcoholic extract (mcg/mL)				Control amikacin
		15	30	45	60	30 mcg/mL
Escherichia coli	-	-	-	12	13	12
Pseudomonas aeruginosa	-	-	-	-	11	19
Staphylococus aureus	+	-	-	12	15	23

Alcoholic extract of leaf of *Erythroxylum monogynum* was screened for antimicrobial activity against the organism *Escherichia coli, Pseudomonas aeruginosa* and *Staphylococus aureus* keeping the antibiotic amikacin as a positive control. The results

show that 12 mm and 13 mm zone of inhibition there in 45 and 60 mcg/mL of alcoholic extract of leaf, respectively where as 12 mm zone of inhibition was observed in 30 mcg/mL of amikacin in *Escherichia coli*. 11 mm zone of inhibition was observed in 60 mcg/mL of alcoholic extract of leaf where as 19 mm zone of inhibition was observed in 30 mcg/mL of amikacin in *Pseudomonas aeruginosa*. 12 mm and 15 mm zone of inhibition was observed in 45 and 60 mcg/mL of alcoholic extract of leaf, respectively where as 23 mm zone of inhibition is observed in 30 mcg/mL of amikacin in *Staphylococus aureus.* No zone of inhibition was observed in low concentration of alcoholic leaf extracts like 15 and 30 mcg/mL. Fractions showed good inhibitory effects against the above bacteria in higher concentrations like 45 and 60 mcg/mL.

REFERENCES

1. J. F. Caius, The Medical and Poisonous Plants of India, Scientific Publishers Jodhpur, India.(1988) p. 493.
2. N.C. Nair and A. N. Henry, Flora of Tamil Nadu, India, Vol. I, Botanical Survey of India, Southern Circle, Coimbatore, India, (1983) p.184.
3. Rastogi and Mehrotra, Compendium of Indian Medicinal Plant, Vol. I (1972) pp. 112-114.
4. S. P. Ambasta, The Useful Plants of India, C.S.I.R. Publication, New Delhi. (1986) p. 705.

Accepted : 22.11.2007