International Journal of PharmTech Research
CODEN (USA): IJPRIF ISSN : 0974-4304
Vol. 3, No.2, pp 784-786, April-June 2011

In vitro Anthelmintic Activity of Ethanolic Extracts of *Barringtonia acutangula*(l.) Geartn.

D.Padmavathi[1]*, R. Vijaya Bharathi[2], A. Sarala[3]

[1]Department of Pharmacognosy, Oxford College of Pharmacy, Bangalore,India.

[2]Madras Medical College, Chennai,India.

[3]K.P. College of Pharmacy, Tiruvannamalai,India.

*Corres.author: dpadmammc@rediffmail.com
Ph: 09341332576*

Abstract: *Barringtonia acutangula* was commonly used in India by tribal people for the treatment of liver disorders, diarrheal diseases, eye diseases , spleenic disorders and worm infestation. In Tamil, it is known as Samutraphalam.The present study is an attempt to explore the anthelmintic activity of ethanolic extract of leaves of plant *Barringtonia acutangula*. The purpose of the present study was to find out the anthelmentic activity of ethanolic extract of *Barringtonia acutangula* in earthworms. The various doses of ethanolic extracts were evaluated for their anthelmintic activities on adult Indian earthworms, *Pheretima postuma*. All doses of ethanolic extracts were able to show anthelmintic activity. The activities are well comparable with the standard drug Piperazine citrate . All the doses of ethanolic extract of *Barringtonia acutangula* showed better anthelmintic activity. When the dose of the extract is increased, a gradual increase in anthelmintic activity was observed.
Keywords : *Barringtonia acutangula,* Anthelmintic activity, Piperazine Citrate.

Introduction:

Barringtonia acutangula belongs to the family Lecythidaceae and also called as Indian Oak (English), Ijal (Hindi), Samuttirappalam (Tamil), Kanapa – chettu (Telugu) and Kinijolo (Oriya) in different languages (1).

Barringtonia acutangula is an evergreen tree with Simple, alternate leaves, 40cm long pendulous racemes, 1.5cm across, fragrant and dark scarlet flowers with 4 lobed ovate calyx and 2 celled ovary. It has Ellipsoid to ovoid Berry, 1.5 x 0.6cm, fibrous, truncate at both ends, crowned by small persistent calyx. The berry bears one ovoid black seed .

The literature survey reveals that various parts of *Barringtonia acutangula* have been used as a folklore medicine for curing various ailments like hemiplegia, pain in joints, eye diseases, stomach disorders, anthelmintic, diarrhoea, cough, dyspnoea, leprosy, intermittent fever, spleenic disorders and poisoning (2).

There are no reports on systematic and scientific study of anthelmintic activity of leaf extracts. In the present study, we report the anthelmintic activity of ethanolic extract of the leaves of Barringtonia acutangula.

Worm infestation is one of the major global public health problems, more so in tropical countries. Worms can cause various allergic and general symptoms. In addition some of them can cause blood loss, nutritional deficiencies, urticaria and other allergic manifestations and even intestinal obstruction. It has been estimated that one billion people are infected with round worm Ascaries, with as many as 100,000 deaths annually, 900 million are infected with Hookworms, with as many as 60,000 deaths annually and 950 million are infected with Whipworm, Trichoris.

Chemotherapy is an effective tool for the control of helminthic parasitic infections, especially in children in underdeveloped countries. Improved drugs are still badly needed to treat these all types of helminthiasis.

A major challenge is to develop better drugs against systemic infections with helminthes that respond inadequately to the current compounds. Hence, both drugs and vaccines may be needed to combat helminth infections. This now exert a heavy toll on human health and productivity.

Materials and Methods:

Fresh leaves of *Barringtonia acutangula*(L.) Geartn. (Lecythidacea) collected from Presidency College Premises, Chennai, Tamilnadu. The plant was identified, confirmed and authenticated (PARC/2007/72) by comparing with an authentic specimen by a botanist Dr. P. Jayaraman, Plant Anatomical Research Centre, Tambaram, Chennai. A Voucher specimen has been deposited at Madras Medical College, Chennai, Tamilnadu, India. Dried, coarsely powdered Barringtonia acutangula leaf (100gm) was repeatedly extracted with Ethanol. The extract was concentrated under vacuum and the residue was used in the experiments.

Worm collection and authentication:

Indian earthworm *Pheretima posthuma* (Annelida) were collected from the water logged areas of soil and it was identified at the PG Department of Parasitology, Madras Veterinary College, Chennai.

Drugs:

The ethanolic extract of Barringtonia acutangula was tested in various doses in each group. Distilled water was used as control. Piperazine citrate were used as the standard drug.

Anthelmintic assay:

The anthelmintic assay was carried as per the method of Ajaiyeoba et al with necessary modifications (3). The assay was performed on adult Indian earthworm, *Pheretima posthuma* due to its anatomical and physiological resemblance with the intestinal roundworm parasite of human being (4). Because of easy availability, earthworms have been used widely for the initial evaluation of anthelmintic compounds *in vitro*(5,6)

50ml formulations containing different concentrations of crude ethanolic extract (10, 25, 50 and 100mg/ml in distilled water) were prepared and six worms were placed in it. Time for paralysis was noted when no movement of any sort could be observed except when the worms were shaken vigorously. Time for death of worms were recorded after ascertaining that worms neither moved when shaken vigorously nor when dipped in warm water (50ºC). Piperazine citrate (10mg/ml) was used as reference standard and distilled water served as control.

Statistical Analysis:

The experimental results are represented as mean ± S.E. (Standard error of the mean). Student's t-test was used for the evaluation of data and $P<0.05$ accepted as significant.

Table 1: Anthelmintic activity of Ethanolic leaf extract of *Barringtonia acutangula*:

Test substance	Concentration (mg/ml)	Time taken for Paralysis (P) and Death (D) of worms in minute	
		P	D
Vehicle	-	-	-
Ethanolic extract	10	52±0.96	69.33±1.36
Ethanolic extract	25	40.83±0.94	52.16±1.01
Ethanolic extract	50	34.5±1.48	45.5±1.48
Ethanolic extract	100	28.66±1.59	36.16±1.25
Piperazine Citrate	10	24.66±1.50	31.83±1.45

Each values is represented as mean ± standard deviation (n = 6). Data are found to be significant by testing through Student's t test. $P<0.05$ accepted as significant.

Results and Discussion:

Preliminary phytochemical screening of crude ethanolic extract revealed the presence of Triterpenes, Flavanoids, Carbohydrates, Phenolics, Tannins and Saponins. As shown in Table 1, ethanolic extract of *Barringtonia acutangula* exhibited anthelmintic activity in dose dependent manner giving equal effect with that of Standard drug at 100mg/ml concentration. The ethanolic extract produces paralysis at 29min and time of death of 36min respectively against the earthworm *Pheretima posthuma*. The reference drug Piperazine citrate showed the same at 25 and 32min respectively.

The predominant effect of Piperazine citrate on worm is to cause flaccid paralysis that result in expulsion of the worm by peristalsis. Piperazine citrate by increasing chloride ion conductance of worm muscle membrane produces hyperpolarisation and reduced excitability that leads to muscle relaxation and flaccid paralysis (7).

The leaf extract of *Barringtonia acutangula* not only produces paralysis, but also caused death of worms especially at a concentration of 100mg/ml shows nearly equal effect as compared to reference drug Piperazine citrate. Phytochemical analysis of the crude extract has revealed tannins to be among the chemical constituent contained with them. Tannins were shown to produce anthelmintic activities (8). Chemically tannins are polyphenolic compounds (9). Some synthetic phenolic anthelmintic eg. Niclosamide, oxyclozanide, bithionol etc., are shown to interfere with energy generation in helminth parasites by uncoupling oxidative phosphorylation.It is possible that tannins contained in the extract of *Barringtonia acutangula* produced similar effects. Another possible anthelmintic effect of tannins is that they can bind to free proteins in the gastrointestinal tract of host animal or glycoprotein on the cuticle of the parasite and cause death (10).

The origin of many effective drugs is found in the traditional medicine practices and in view of this it is important to undertake studies pertaining to screening of the folklore medicinal plants for their proclaimed biological efficacy. Thus from the results of current investigation, it may be inferred that ethanolic extract of *Barringtonia acutangula* possess significant anthelmintic activity.

References:

1. Yoganarashimhan., Medicinal Plants of India – TamilNadu, Vol II, Cyber Media, Bangalore, 2000, 71.
2. Jain S.K., Dictionary of Indian Folk Medicine and Ethnobotany, National Botanical Research Institute, Lucknow, India, 1991, 33.
3. Ajaiyeoba E.O., Onocha P.A., and Olarenwaju O.T., Invitro anthelmintic properties of Buchholzia coriaceae and Gynandropsis gynandra extract, Pharm. Biol., 2001, 39(3), 217-220.
4. Chatterjee K.D., Parasitolgy, Protozoology and Helminthology, Guha Ray Sree Saraswathy Press Ltd, Calcutta, 1967, 168-169.
5. Vidyarthi R.D., A Text Book of Zoology, S.Chand and Co, New Delhi, 1967, 329-370.
6. Vigar Z., Atlas of Medical Parasitology, P.G. Publishing House, Singapore, 1984, 216.
7. Martin R.J., Aminobutyric acid and Piperazine activated single channel currents from Ascaris suum body muscle, Br. J. Pharmacol., 1985, 84(2), 445-461.
8. Niezen J.H., Waghorn G.C., Charleston W.A.G., and Waghorn G.C., Growth and gastrointestinal nematode parasitism in lambs grazing either Lucerne (Medicago sativa) or Sulla (Hedysarum coronarium) which contains condensed tannins, J. Agri. Sci., 1995, 125, 281-289.
9. Bate–Smith E.C., The Phenolic constituent of plants and their taxonomic significance, dicotyledons, J. Linn. Soc. Bot., 1962, 58, 95-173.
10. Thompson D.P., and Geary T.G., The Structure and function of Helminthes surfaces, In: Biochemistry and Molecular Biology of Parasites (Ed. Marr J.J) Academic Press, Newyork, 1995, 203-232.

*****