WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 5.990
Volume 5, Issue 01, 1495-1502. Research Article ISSN 2277– 7105

EVALUATION OF ANTHELMINTIC ACTIVITY OF *FICUS BENGHALENSIS* LINN ROOT EXTRACTS

Lokesh K. Bhardwaj* and Dr. Kaushal K. Chandrul

Department of Pharmaceutical Science, Shri Venkateshwara University, *Gajraula*, Distt:- Amroha, Uttar Pradesh.

Article Received on
17 Nov. 2015,

Revised on 08 Dec. 2015,
Accepted on 29 Dec. 2015,

***Correspondence for Author**
Lokesh K. Bhardwaj
Department of Pharmaceutical Science, Shri Venkateshwara University, Gajraula, Amroha, Uttar Pradesh.

ABSTRACT

The increasing use of synthetic drugs are very effective in curing the disease but have a number of side effects and high cost of synthetic medicines has created an interest in studying the medicinal plants as an alternative source of synthetic medicines. Crude drugs, are obtained from plants are less effective with respect to cure of disease but herbal drugs are relatively free from side effects. The objective of this study was to evaluate the anthelmintic efficacy of root extracts of *Ficus benghalensis* Linn. (Banyan Tree) against *Pheretima posthuma* and *Ascardia galli*. All the extracts were used as test solutions. Piperazine citrate was included as standard drug and normal saline as control. Three concentrations 25mg/ml, 50mg/ml, 100mg/ml of each extract and standard drug at the concentration of 25mg/ml were studied. Observations were made for the time taken to paralyze and death of the earthworm. Significant anthelmintic effects of crude extracts on live worms were observed in terms of the paralysis and death of the worms. However, ETE and AQE were more efficacious than CHE and PTE. The results showed ETE demonstrated paralysis at 4.25 min and death at 8.9 min of worms in shortest time as compared to piperazine citerate, paralysis at 4.0 min and death at 8.06 min especially at higher concentration of 100 mg/ml in case of *Pheretima posthuma*. While in case of *Ascardia galli* ETE showed paralysis at 6.68 min and death at 9.98 min. AQE caused paralysis of *Pheretima posthuma* and *Ascadia galli* in 5.18 min and 8.03 min and death at 11.26 min and 11.28 min respectively.

KEYWORDS: Anthelmintic, Piperazine citrate, *Ficus benghalensis*, *Pheretima posthuma*.

INTRODUCTION

The increasing prevalence of anthelmintic resistant strains of helminths, drug residues in animal products and high cost of conventional anthelmintics has created an interest in studying medicinal plants as an alternative source of anthelmintics.[1] Modern synthetic medicines are very effective in curing diseases but also cause a number of side effects. Crude drugs are less efficient with respect to cure of disease but are relatively free from side effects. A large number of medicinal plants are claimed to possess anthelmintic property in traditional system of medicine and are also utilized by ethnic groups worldwide.[2] Parasites have been of concern to the medical field for centuries and the helminths still cause considerable problems for human being and animas. During the past few decades, despite numerous advances made in understanding the mode of transmission and the treatment of these parasites, there are still no efficient products to control certain helminths and the indiscriminate use of some drugs has generated several cases of resistance. [3]

Ficus benghalensis Linn. Syn.-*Ficus Indica* Linn, family-Moraceae. The plant is a large deciduous tree found throughout the forest tract of India, in sub-Himalayan region, Rohilkhand, in deciduous forests of Deccan and in all districts from sea level to 1200m, in deciduous and semi evergreen forests of south India. (The Wealth of India 1988). [4] This plant is commonly known as Banyan tree or vata or vada tree in ayurveda. *Ficus benghalensis* is a remarkable tree from India that sends down its branches and great number of shoots, which take root and become new trunks. Traditionally all parts of the plant are astringent, acrid, sweet, refrigerant, anodyne, vulnerary, depurative, anti-inflammatory, ophthalmic, styptic, antiarthritic, diaphoretic, antidiarrhoeal, antiemetic and tonic.[5] It is used in Ayurveda for the treatment of diarrhea, dysentery and piles, teeth disorders, rheumatism, skin disorders like sores and to boost immune system, as a hypoglycemic.[6] Bark contains tannins, wax, esters and glucoside, 20-tetratriaconthene-2-one, 6-heptatriacontene-10-one, pentatriacontan-5-one, beta sitostirol-alpha-D-glucose and meso-inositol. Two flavonoid compounds, viz. 5,7-dimethylether of leucopelargonidin 3-0-alpha-L-rhamnoside and 5,3-dimethyl ether of leucocyanidin 3-0-alpha-D galactosyl cellobioside were present in the bark of *Ficus benghalensis.*[6,7] Pharmacologically various extracts of *Ficus benghalensis* has shown analgesic and anti-inflammatory (Thakare V N *et al*., 2010) [7] anti-arthritic (Bhardwaj L K *et al*., 2010)[8] antioxidants (Shukla R *et al*., 2004)[9] antidiabetic (Sharma S *et al*., 2007),[10] immunomodulatory (Gabhe S Y *et al*., 2006)[11] and antimicrobial (Gayathri M et *al*., 2009)[12] activity in experimental animals.

The literature survey revels that, the aerial roots of *Ficus benghalensis* for anthelmintic activity, has not been systematically investigated so far. Therefore the present study was designed to evaluate the anthelmintic properties of aerial root extracts of *Ficus benghalensis* against Indian earthworms *Pheretima posthuma* and roundworms *Ascardia galli.*

MATERIALS AND METHODS

Plant material

The fresh plant material of *Ficus benghalensis* were collected from the Jawaharlal Nehru Medical college campus (JNMC), Belgaum in the month of June-July. The plant material was authenticated by Dr. Harsha Hegde, Scientist B, Regional Medical Research Center, Indian Council of medical Research (ICMR) Belgaum Karnataka. The voucher specimen (RMRC-508) has been deposited in ICMR herbaria and Department of Pharmacognosy, KLES College of Pharmacy, Belgaum, India.

Preparation of Extracts

The aerial roots were collected and shade dried for 4-5 week and the material was subjected to pulverization, made course powder. Successive solvent extraction was performed with Pt-Ether (60-80), Chloroform and 95% Ethanol. The dried root powder about 90 g was exhaustively extracted by hot continuous extraction using soxhlet apparatus with Pt-Ether (60-80), chloroform, and 95 % ethanol in increasing order of polarity up to 48-50 siphons separately. The extracts were filtered and concentrated by distillation process. The concentrated mass was dried under vacuum till constant weight for each of extract. For aqueous extract the dried root powder 200 g was macerated with 1000 ml chloroform water (1:9) for seven days. Chloroform water was used to prevent the growth of microorganism in the extract. The extractive was filtered and concentrated over a water bath at 40-45 ^{0} C and further dried in vacuum oven till constant weight.

Animals

Indian adult earthworms *Pheretima posthuma* and *Ascardia galli* were selected for the anthelmintic study. The earthworms were collected from department of zoology, R. L. Science College, Belgaum, Karnataka and washed with normal saline to remove all fecal matter. The earthworms of 3-5 c.m.in length and 0.1-0.2 c.m.in width were used for the present experimental protocol. The earthworm resembles both anatomically and physiologically to the intestinal roundworm parasites of human beings, hence can be used to study the anthelmintic activity.[13]

Experimental Method for Anthelmintic Study

The successive solvent root extracts and aqueous root extract of *Ficus benghalensis* were investigated for their anthelmintic activity against *Pheretima posthuma* and *Ascardia galli.* The earthworms were divided in to fourteen groups containing six worms in each group in two sets respectively. All the extracts were dissolved in to normal saline at different concentrations and than volume was adjusted to 20ml with normal saline. The standard drug solution was prepared with distilled water and volume was adjusted 20ml with normal saline. All the extracts and standard drug solutions were freshly prepared before stating the experiment. Different concentration 25mg/ml, 50mg/ml and 100mg/ml of all the extracts and 25mg/ml of standard drug solutions at the volume 20 ml were poured in different petridishes and all the earthworms before released in petridishes were washed in normal saline.

The anthelmintic experiment was carried out as per Bhardwaj *et al* [14] with or without minor modifications. In the first set of the experiment each group of six earthworms (*Pheretima posthuma*) was released in to 20 ml of prepared formulations as per following mannor respectively.

1st Group – Normal Saline as control.
2nd Group – Piperazine citrate 25mg/ml solution as standard
3rd,4th and 5th Group – Pt.Ether extract (PTE) solutions at different concentrations.
6th, 7th and 8th Group – Chloroform extract (CHE) solutions at different concentrations.
9th, 10th and 11th Group – Ethanol extract (ETE) solutions at different concentrations.
12th, 13th and 14th Group – Aqueous extract (AQE) solutions at different concentrations.

In the second set of experiment the same experiment was carried out for *Ascardia galli* worms. Observations were made for the time taken to paralyze and death of individual earthworm. Time for paralysis was noted until there was no movement could be observed in earthworms. Paralysis was said to occur when the worms do not revive even in normal saline and death was concluded when the worms lost their mortality followed with fading away of their body colour.[15]

RESULT AND DISCUSSION

The predominant effect of Piperazine citrate on the worms is to cause a flaccid paralysis that result in expulsion of the worm by peristalsis. Piperazine citrate by increasing chloride ions conductance of worm muscle membrane produces hyperpolarisation and reduced excitability that leads to muscle relaxation and flaccid paralysis.[16] From the observations [Table – 1] the

root extracts of *Ficus benghalensis* were showed not only paralysis also showed death of earthworms. All the extracts were found to show the anthelmintic activity when compared to standard drug. The ETE and AQE were more efficacious than CHE and PTE. The result showed ETE at higher concentration 100mg/ml demonstrated paralysis at 4.25 min and death at 8.9 min of worms in shortest time as compared to piperazine citrate at 25mg/ml, cause paralysis at 4.0 min and death at 8.06 min in case of *Pheretima posthuma.* While in case of *Ascardia galli* ETE showed paralysis at 6.68 min and death at 9.98 min respectively. AQE caused paralysis of *Pheretima posthuma* and *Ascardia galli* at 5.18 min and 8.03 min and death at 11.26 min and 11.28 min respectively. Whereas PTE and CHE also exhibited anthalmintic activity, PTE showed paralysis of *Pheretima posthuma* and *Ascardia galli* at 11.33 min and 12.04 min and death at 17.44 min and 17.60 min at higher concentration 100mg/ml. CHE at higher concentration 100mg/ml caused paralysis of *Pheretima posthuma* and *Ascardia galli* in 10.40 min and 10.02 min and death at 15.40 min and 13.35 min respectively.

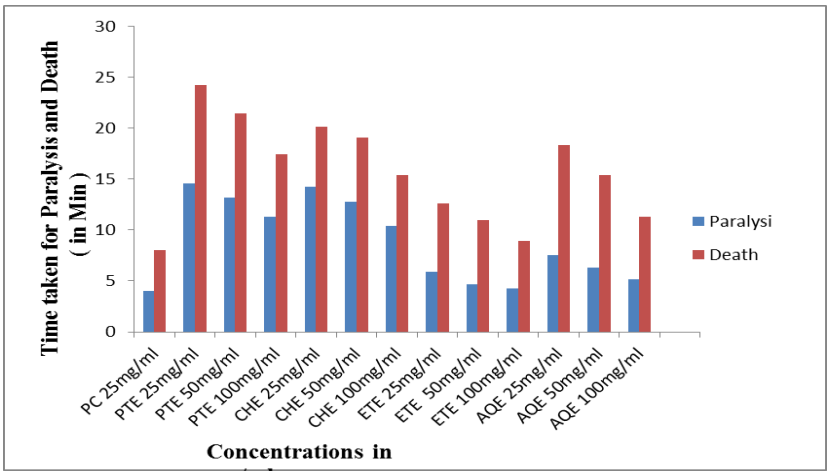

Fig-01; Comparative data of paralysis and death time for *Pheretima posthuma.*

Table 1: Anthelmintic activity of root extracts of *Ficus benghalensis* Linn against earthworms - *Pheretima posthuma* and roundworms - *Ascardia galli.*

Extract treatment	Concentration mg/ml	*Pheretima posthuma*		*Ascardia galli*	
		P (Min)	D (Min)	P (Min)	D (Min)
Control	-	-	-	-	-
Piperazine citrate	25	4.0±0.05	8.06±0.20	6.29±0.07	8.09±0.06
Pt. Ether Extract (PTE)	25	14.58±0.13	24.25±0.56	19.90±0.45	27.57±0.10
	50	13.22±0.22	21.47±0.26	15.96±0.27	24.21±0.25
	100	11.33±0.32	17.44±0.04	12.04±0.42	17.60±0.40
Chloroform Extract (CHE)	25	14.58±0.04	20.11±0.06	14.57±0.25	20.10±0.20
	50	12.80±0.06	19.10±0.11	12.06±0.43	16.93±0.05
	100	10.40±0.27	15.40±0.30	10.02±0.45	13.35±0.10

Ethanol Extract (ETE)	25	5.88±0.50	12.60±0.21	9.67±0.06	16.96±0.07
	50	4.69±0.26	10.93±0.20	8.01±0.13	11.84±0.10
	100	4.25±0.16	8.90±0.16	6.68±0.30	9.98±0.15
Aqueous Extract (AQE)	25	7.52±0.41	18.32±0.48	10.66±0.18	18.12±0.06
	50	6.33±0.06	15.40±0.30	9.71±0.16	13.40±0.17
	100	5.18±0.03	11.26±0.36	8.03±0.30	11.28±0.03

Results are expressed as Mean ±SEM (n = 6). Values of P and D are in minutes.

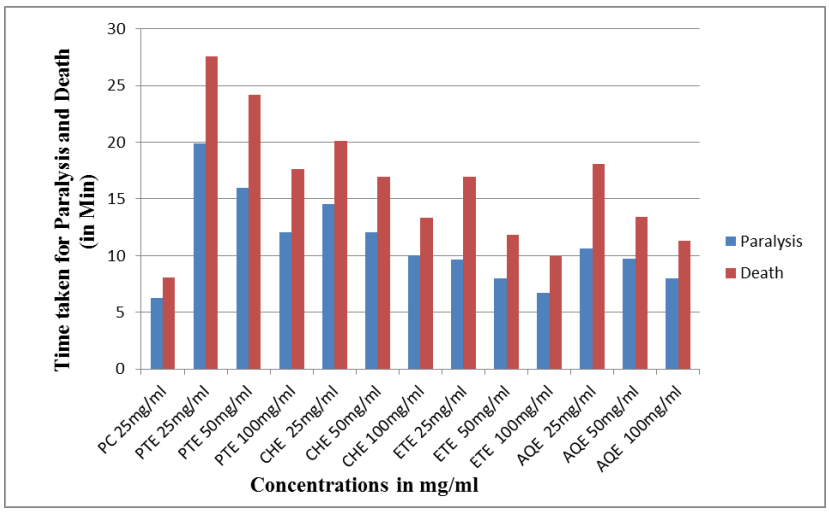

Figure -02; Comparative data of paralysis and death time for *Ascardia galli.*

CONCLUSION

From above laboratory result it is concluded that all the root extracts of *Ficus benghalensis* exhibited anthelmintic activity in dose dependant manner. The ETE and AQE at 100mg/ml concentration showed shortest time of paralysis and death for both types of worms as compared to standard drug. In the present study the anthelmintic experiment was performed on the earthworms *Pheretima posthuma* and *Ascardia galli* due to its anatomical and physiological resemblance with the intestinal roundworms parasite of human being. [13]

ACKNOWLEDGEMENT

Authors would like to thanks to Prof. (Dr.) Kaushal Chandrul, Dean Faculty of Pharmacy, Shri Venkateshwara University, Gajraula and Prof. (Dr.) U.S. Sharma, Director, Sir Madan Lal Institute of Pharmacy for providing their valuable suggestions and facilities to conduct of this work.

REFERENCES

1. Tariq K.A, Chishti M.Z, Ahmad F and Shawl A.S, Anthelmintic activity of extracts of Artemisia absinthium against ovine nematode. Veterinary Parasitology 2009; 160(1-2): 83-88.

2. Mali R.G and Mehta A.A, A Review on Anthelmintic Plants. Natural product Radiance. 2008; 7(5): 466-475.
3. Deore S.L. and Khadabadi S.S In vitro anthelmintic studies of Chlorophytum borivilianum Sant. & Fernendez tubers. Indian J of natural Product and Resources 2010; 1(1): 53-56.
4. Wealth of India, A Dictionary of Indian Raw Materials and Industrial Products, New Delhi, Council of Scientific and Industrial Research, 1988; 1V(F-G); 24-27.
5. Arya Vaidya Sala. Indian Medicinal Plants-A compendium of 500 species.Vol-III, Madras, Orient Longman Ltd. 1997; 20-26.
6. Aswar M, Aswar U, Watkar B, Vyas M, Wegh A, Gujar.K N. Anthalmintic activity of Ficus benghalensis. Int. J. of Green Pharmacy, 2008; 1: 170-172.
7. Thakare V N, Suralkar A A, Deshpande A D, Naik S R. Stem bark extraction of Ficus benghalensis Linn for anti-inflammatory and analgesic activity in animal models. Indian J of Exp Bio 2010; 48: 39-45.
8. Lokesh k. Bhardwaj, et al. Study on efficacy of treatment with Ficus benghalensis leaf extracts on Freund's adjuvant induced arthritis in rats. Int. J. Drug Dev. & Res. 2010; 2(4): 744-749.
9. Shukla R. Gupta S, Gambhir J K, Prabhu K M, Murthy P S. Antioxidant effect of aqueous extract of the bark of Ficus benghalensis in hypercholesterolaemic rabbits. J. Ethnopharmacol 2004; 92: 47-51.
10. Sharma S, Chaturvedi M, Edwin E, Shukla S, Sagrawat H, Evaluation of the phytochemicals and antidiabetic activity of Ficus beghalensis Int.J.Dev Ctries 2007; 27(2): 56-59.
11. Gabhe S Y, Tatke P A, Khan T A, Evaluation of the immunomodulatory activity of the methanol extract of Ficus benghalensis roots in rats. Indian J Pharmacol, 2006; 38(4): 271-275.
12. Gayathri M, Kannabiran K. Antimicrobial activity of Hemidesmus indicus, Ficus benghalensis and Pterocarpus marsupium roxb, Indian J of Pharma Sci 2009; 1: 578-581.
13. Sandeep Kumar H.K. et al. Evaluation of anthelmintic activity of Pistia stratiotes Linn. Journal of Basic & Clinical Pharmacy 2010; 2(1):103-105.
14. Bhardwaj L.K, Anand, Chandrul K.K, Patil K.S. In vitro anthelmintic activity of Ficus benghalensis Linn. Leaves extracts. Asian J Pharm Clin Res. 2012; 5(4): 118-120.
15. Khadse C.D. and Kakde R.B. In Vitro anthelmintic activity of Fenugreek seeds extracts against Pheritima posthuma. Int J Res.Pharm.Sci. 2010; 3(1): 267-369.

16. Ambujakshi H.R. et al. Anthelmintic activity of Gmelina Arborea Roxb. leaves extract. Int J Pharma Res and Dev 2009; 9(1): 1-5.