IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
Research Article
January 2020 Vol.:17, Issue:2

Anthelmintic Activity of the Aerial Roots of *Ficus benghalensis*

IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Darshankumar D. Jain[1]*, Shrikant B. Lande[1], Sandip K. Jadhav[1], Hamid S. Hasni[1], Sunil P. Pawar[1]

1. P.S.G.V.P.M'S College of Pharmacy, Shahada, Maharashtra, India

Submission: 22 December 2019
Accepted: 28 December 2019
Published: 30 January 2020

Keywords: *Ficus benghalensis*, anthelmintic, *Pheretima Posthuma* and piperazine citrate, Medicinal Plant

ABSTRACT

The present research work had evaluated the anthelmintic activity of *Ficus benghalensis* L. (Moraceae) (Banyan tree) an important Indian plant having sacred value and associated with longevity. In present investigation Acetone: Water (70:30) extract of aerial roots of *Ficus benghalensis* was prepared and subjected for anthelmintic activity using Indian earthworm. The extract concentrations used for activity are 25, 50, and 100 mg/ml. The results of the study revealed that the 100 mg/ml concentration is having best anthelmintic activity. The phytochemical investigation was also performed on the extract and had shown the presence of phenolics, tannins, saponins; mucilage and alkaloid compounds existence and anyone from above may be responsible for anthelmintic activity.

INTRODUCTION

Helminthiasis also is known as worm infection, is any macroparasitic disease of humans and other animals in which a part of the body is infected with parasitic worms, known as helminths. The common helminths are tapeworms, flukes, and roundworms. The disease is very common in the tropical part of the world accounting the huge number of patients especially children and results in a poor birth outcome, poor cognitive development, poor school and work performance, poor socioeconomic development, and poverty. In present condition, this disease is considered as neglected tropical diseases which had kept research in this area at minimum level, but it is need of hour to bring back focus even world's leading pharmaceutical companies and non-governmental organizations through a project launched in 2012 called the London Declaration on Neglected Tropical Diseases, which aims to control or eradicate certain neglected tropical diseases by 2020[1].

Ficus benghalensis (Moraceae) is a sacred, large and evergreen plant of India having many aerial roots[2-3]. The plant is reported to possess several traditional medicinal claims such as according to Ayurveda it astringent to bowels; useful in the treatment of biliousness, ulcers, erysipelas, vomiting, vaginal complains, fever, inflammations, leprosy. According to Unani it is aphrodisiac, tonic, vulnerary, maturant, lessens inflammations; useful in piles, nose-diseases, gonorrhoea, etc. The plant is also investigated scientifically and traditional claims are authenticated few important are established claims are astringent [4-5]. The plant is also loaded with many important constituents and few important are carbohydrates, flavonoids, amino acids/proteins, steroids, saponins, leucopelargonidin-3-O-X-L rhamnoside, leucocyanidin,3-O-X-D galactosyl cellobioside, glucoside-β-glucoside, 20-tetratria conthene-2-one, 6-hepatatria contene-10-one, pentatricentan -5-one, β-sitosterol- α –D- glucose, mesoinositol and tannins[6-7].

The present study was undertaken to establish one of the traditional claims of the plant i.e. anthelmintic potential. The traditional claim is that aerial roots are having anthelmintic potential.

MATERIALS AND METHODS

A. Materials

a. Plant Material:

The aerial root of *Ficus benghalensis* was collected from the local area of Shahada and authenticated by Dr. Santosh K Tayade, HOD of Botany, Art's Science and Commerce College, Lonkheda, Shahada, Dist- Nandurbar (MH).

Preparation of Plant:

Collected aerial roots of *Ficus benghalensis* were dried and crushed to a coarse powder. Prepared powder was pass through sieve no 40 to get fine powder and was preserved for further activity.

b. Worms:

Indian earthworms *(Pheretima Posthuma)* were used in the study. The earthworms were collected from moist soil of Taloda city located in District of Nandurbar (MH).

c. Drugs and chemicals:

I] Piperazine citrate.

II] Saline solution.

B. Method:

a. Preparation of Extract:

Collected aerial roots of *Ficus benghalensis* were dried and crushed to a coarse powder and passed through sieve no 40 to get fine powder. The fine powder of crude drug was subject to extraction by maceration using Acetone: water (70:30), for 5 days then dried it by using evaporator. The dried extract was first subjected to determine basic phytochemistry through preliminary phytochemical testing and then anthelmintic activity.

b. Phytochemical investigation:

The dried extract primarily was subjected to phytochemical investigation using the chemical tests. The basic phytoconstituents such as carbohydrates, proteins, Flavonoids, alkaloids, steroids, etc were analyzed and results of the chemical tests were depicted in Table 1.

c. Anthelmintic Activity:

The *in-vitro* anthelmintic assay of the prepared extract of aerial roots of *Ficus benghalensis* was carried as per the method of Ajaiyeoba et.al. with necessary modification[8]. The assay was carried out on *Pheretima Posthuma an* adult Indian earthworm, due to easy availability and anatomical as well as physiological resembles with the intestinal roundworm parasite of a human being. In the assay anthelmintic potential of aqueous: acetone extract of (70:30) of aerial roots of *Ficus benghalensis* was evaluated. In the study, the first stock solution of 100 mg/ml concentration was prepared by suspending dried extract of aerial roots of *Ficus benghalensis* along with tween 80 in suitable concentration. Then subsequent dilutions were done to get the suspension of drug extract having concentration 50, and 25 mg/ ml. The final dilutions were made using distilled water. The stock solution and dilutions of extracts all were used as test solution in anthelmintic assay while Piperazine citrate (10 mg/ml) was used as a reference standard and saline water as a control.

25 ml of suspension containing a different concentration of crude extract of aerial roots of *Ficus benghalensis* (25, 50 and100 mg/ml in distilled water) were taken in separate Petri plates. To each Petri plate, 6 worms of the same type were placed. The time of paralysis and time of death of each worm was noted in every Petri plates. The 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 was recorded after ascertaining that worms neither move when shaken vigorously nor when dipped in warm water (50°C). The similar activity was performed for standard drug Piperazine citrate (10 mg/ml) and control saline solution.

The time of paralysis and time of death of worms of each concentration viz 100, 50, and 25 mg/ml were noted and reported in results in detail as Table 2 and graphical representation was also made. The results reported are mean values of triplicate results of the activity and statistical significance was also determined.

RESULTS AND DISCUSSION

a. Phytochemical investigation: The dried acetone water (70:30) extract of aerial roots of *Ficus benghalensis* when subjected for phytochemical investigation revealed presence of important phytoconstituents and that includes carbohydrates, alkaloids, flavonoids, steroids and tannins. In carbohydrates, both reducing and non-reducing sugars were found. Almost all test of tannins are found positive indicating a strong presence of tannins. The researcher's personal view is that tannin could be that material which had demonstrated anthelmintic activity, but confirmation can only be done after isolation and investigation of the isolated fraction which is out of the scope of study and can be a point of further study. The detailed test, observation and inference of phytochemical test are described in Table 1.

b. Anthelmintic activity :

The results of the study had demonstrated that dried extract of aerial roots of *Ficus benghalensis* possesses a good potential as anthelmintic. The detailed results demonstrate that suspension containing 100 mg/ ml concentration of dried extract of aerial roots of *Ficus benghalensis* has strongest anthelmintic action and requires 34 min to paralysis and 70 min for death of the Indian earthworms. Whereas weakest action was found with suspension having concentration 25 mg/ml of dried extract of aerial roots of *Ficus benghalensis* with 135 min required for paralysis and 215 for the death of Indian earthworm. The other concentrations of plant extract were also showed paralysis and death of worms and details of the time of paralysis and death time of Indian earthworm was reported in Table 2.

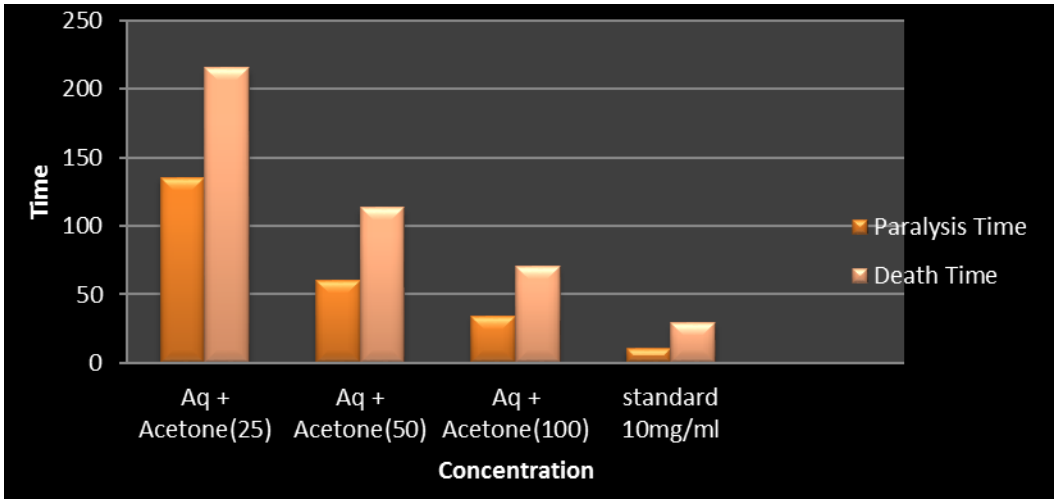
The result of the study finally concludes that the plant folk claim as anthelmintic was right and the potency of the extract of plant part was also comparable with standard anthelmintic drug piperazine citrate.

Table No. 1: Phytochemical Test of *Ficus benghalensis*

Sr. No.	Test	Observation
		Ficus Benghalensis
Test for Carbohydrate		
1	Molish Test	**Positive**
2	FehlingTest	**Positive**
3	Benedict Test	**Positive**
4	Barfoed Test	**Positive**
5	Iodine Test	**Positive**
Test for Flavanoids		
6	Shinoda Test	**Positive**
7	Extract + H_2SO_4	**Positive**
Test for Alkaloids		
8	Mayer's Test	**Positive**
9	Hager's Test	**Positive**
10	Wagner's Test	**Positive**
11	Dragendroff's Test	**Positive**
Test for Steroid		
12	Salkowski reaction	**Positive**
13	Liebermann-Burchard reaction	**Positive**
14	Liebermann's reaction	**Positive**
Test for Tannins		
15	Extract + 5% $FeCl_3$	**Positive**
16	Extract + Lead acetate	**Positive**
17	Extract +Bromine water	**Positive**
18	Extract +Pottasium dichromate	**Positive**
19	Extract + dil. $KMnO_4$	**Positive**
20	Extract + Acetic acid	**Positive**

Table No. 2: Anthelmintic activity of *Ficus benghalensis* aerial root extracts on Indian earthworm (*Pheretima Posthuma)*

Sr. No	Extracts	Conc. (mg/ml)	Indian Earthworms *(Pheretima Posthuma)*	
			Time of Paralysis	Time of Death
			(P) in min	(D) in min
1.	Aqueous + Acetone	25	135.25±1.15	215.38±4.0
		50	60.50± 2.11	113.28±3.40
		100	34.20± 1.55	70.44±1.50
2.	Control (Saline sol)	-	-	-
3.	Standard (Piperazine citrate)	10	10.30± 0.70	25.21± 1.75



Graph 1: Anthelmintic activity of *Ficus benghalensis* aerial root extracts on Indian earthworm (*Pheretima Posthuma)*

Statistical Analysis:

The data presented as mean + SEM. The activities of extract were compared with the control. The extract showed a significantly higher duration of paralysis and death. Value of $P<0.001$ was considered statistically significant.

From the observations made, a higher concentration of extract produced paralytic effect much earlier and the time to death was shorter for all worms. The aqueous: acetone extract showed anthelmintic activity in a dose-dependent manner giving the shortest time of paralysis (P) and death (D) with 100 mg/ml concentration, for worms. Evaluation of anthelmintic activity was

compared with reference standard Piperazine citrate. From the above results, it is concluded that *Ficus benghalensis* used by tribals traditionally to treat intestinal worm infections, showed significant anthelmintic activity. 50 mg/ml aqueous: acetone extract exert a paralytic effect in 60.50 ± 2.11 and death time in 113.28 ± 3.40. The experimental evidence obtained in the laboratory model could provide a rationale for the traditional use of this plant as anthelmintic. The plant may be further explored for its phytochemical profile to recognize the active constituent accountable for anthelmintic activity.

CONCLUSION

From the above results, it is concluded that the aqueous: acetone extract of *Ficus benghalensis* Linn. Showed potent anthelmintic activity to the standard anthelmintic drug. As acetone: water is the best solvent systems for tannins we could expect that the activity of extract may be due to tannins but Further studies using in vivo models are required to carry out and establish the effectiveness and pharmacological rationale for the use of *Ficus benghalensis* Linn. as an anthelmintic drug. The drug can be further explored for the isolation and characterization of the active constituents responsible for anthelmintic activity.

REFERENCES

1. Mousa O, Vuorela P, Kiviranta J, Wahab SA, Hiltohen R and Vuorela H. Bioactivity of certain Egyptian Ficus species. Journal of Ethnopharmacology.1994; 41, 71-76.
2. The Wealth of India, Volume-(F-G): In-A Dictionary of Indian Raw Materials and industrial products. Vol 4. New Delhi: Council of Scientific and Industrial Research; 1999.
3. Parrotta JA. Healing Plants of Peninsular India USA. Rico USA.: CABI Publishing; 2001.
4. Chopra RN, Chopra IC, Handa KL, Kapur LD. Indigenous drugs of India. Calcutta: U.N. Dhur and Sons Pvt. Ltd; 1958.
5. Achrekar S, Kaklaji GS, Pote MS, Kelkar SM. Hypoglycemic activity of Eugenia jambolana and Ficus benghalensis: Mechanism of action In-vivo. 1991; 5:143-147.
6. Jaiswal R, Ahirwar DA. Literature Review On *Ficus bengalensis*. International J. Adv. Pharm. Res. 2013; 51, 57-61.
7. Ramakrishna PS, Saxena KG, Chandra Shekara UM, Conserving the Sacred: For Biodiversity Management. Rawalpindi: Science Publishers;1998.