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Anthelmintic Potential of Three Road-Side Plants

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ABSTRACT

Achyranthes aspera (Amaranthaceae), *Tephrosia purpurea* (Fabaceae), *Croton bonplandianum* (Euphorbiaceae) are traditional roadside plants, majorly found through waste land, open areas, along road side, railway abandoned field in wide open ravines. Thesethree commonly used traditional plants possess immense medicinal properties. *Tephrosia purpurea* is a poisonous plant, its seeds are used as substitute of coffee beans and use in leprosy, ulcers. The fresh juice of *Croton bonplandianum is* beneficial in severe headache and use to stop bleeding in cuts and wound. *Achyranthes aspera* possess anti-inflammatory property and its dry root powder use in severe respiratory problems like cough, asthma. The present study explores the anthelmintic activity of these three plants at three different concentrations i.e., 20, 50, 80 mg/ml against Indian earthworms (*Pheretima posthuma*). Time taken for paralysis and death was determined and the results were compared with that of standard drug albendazole (100 mg/ml). Out of all the three plant leaf extracts *Tephrosia purpurea* was found to be highly effective and showed dose dependent significant results for paralysis and death.

KEYWORDS

Medicinal plant extracts, Anthelmintic activity, In vitro-assay, Albendazole

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INTRODUCTION

Helminthiasis is a major health issue in both humans and animals from ancient times. All kinds of helminth infections affect every second person in the world. Many efforts have been put to control parasitic infections with a level of usefulness and security over predecessors. Besides human complications it also causes significant economic losses[1]. Major cause of these infections are poor sanitation, malnutrition, lack of knowledge, practice about hygiene and over-crowded population[2]. It is a wide spread neglected tropical decease of developing countries and affect majorly underprivileged peoples. Over 200 million people and 600 million school age children are manifested by these parasites[3]. The helminthic parasites weakens the immune system and increase suspetibilty to HIV/AIDS, pneumonia, tuberculosis, malaria[4]. Trematode (flukes), cestode (tapeworm) and nematodes (round worm) are the comprising members of helminth infection. Nature is a big store house of remedies for ailments of mankind. Due to toxic effects of anthelmintic drugs, there's a great need to invent new bio-active constituents and plants can complete this need effectually. Anthelmintic derived from plants having numerous beneficial properties like little or no toxicity, environmentally compassionate, wide area of activity and biodegradability[5].

Recently we tested 50 % hydroethanolic leaf extracts of three road side plants *Achyranthes aspera* (puthkanda), *Tephrosia purpurea* (sarpunkha), *Croton bonplandianum* (ban tulsi) at different concentrations (20, 50, 80 mg/ml) for anthelmintic activity against earthworm (*Pheretima posthuma*) in comparison to Albendazole 100 mg. These three plants are wasteland weeds and widely distributed throughout India, Sri Lanka along road side and in poor soils, open uncultivated areas.

MATERIALS AND METHODS

Drugs and chemicals

The drug Albendazole was procured from Apple Biotech, Ludhiana, PUNJAB on gratis basis along with complete analytical data. All organic solvents and chemicals purchased from SD fine chemical limited, Mumbai. All were analytical grade.

Plant material

The leaves of *Achyranthes aspera* collected from road side near Deepak Hospital, Ludhiana, Punjab. Leaves of *Croton bonplandianum, Tephrosia purpurea* collected from Khokhar Road, Near Railway Line, Mansa (Punjab). All the plant parts were identified and authenticated by Dr. Sunita garg,

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Preparation of Extract

All plant parts were dried in shade and grinded into coarsely powdered form and stored in air tight closed container for further research work. Each plant part powder was extracted with 50% ethanol through maceration technique. Minimum 100g quantity of each plant part was taken and kept in contact with solvent in a well closed container for 3 days. Frequent agitation was done to dissolve matter properly. The extract was filtered after 3 days and concentrated. The yield was hydroethanolic extract of each plant was found to be 7.6% w/w greenish (*A.aspera)*, 26 % w/w dark green *(C. bonplandianum)*, 9.6% w/w greenish syrupy *(T.purpurea)* with reference to shade dried plant material. This hydroethanolic extract used for the evaluation of anthelmintic activity at three different concentrations i.e., 20, 50, 80 mg/ml.

Earthworm collection and authentication

Healthy Indian adult earthworm (*Pheretima posthuma*) were collected from campus garden of Mata Ganga Hostel, G.H.G. Khalsa College of Pharmacy, GurusarSadhar, Ludhiana during rainy season and washed with normal saline water and used for study. Earthworms, 4-6 cm in length and 0.1-0.2 cm in width were used for all the experimental procedures due to its anatomical and physical resemblance with intestinal parasites of human being[6,7].

Anthelmintic Activity

The anthelmintic activity of freshly prepared plant extracts was evaluated as per the method of Sravani and Paarakh[8]. Total thirteen groups (n=4) were made. Out of thirteen groups, four groups were common. Every time volume used to determine paralysis and death time was 20 ml and six earthworms of equal size placed in petri dish. All the extracts were freshly prepared, properly labeled before starting the experiment and suspended in Tween 80 (0.1%) in normal saline. Observations were made for the time taken to paralysis and death of worms in minutes. Observations were done upto 4 hours of test period. Paralysis means worms movement stop even in normal saline and death means worms lost their integrity, motility by fading away its body colour[9]. The results of anthelmintic activity of each plant extract are given under result and discussion in the table 1.

Table 1 Anthelmintic activity of 50 % hydroethanolic extracts of leaves of *Achyranthes aspera, Croton bonplandianum, Tephrosia purpurea*

Groups	Treatments	Paralysis time (minute)	Death time (minute)
1	Naïve control	------->	------->
2	Vehicle	------->	------->
	Albendazole		
3	50 mg/ml	25.12±1.23	38.10±1.43
4	100 mg/ml	18.44±1.12	29.00±1.16
	Achyranthes aspera		
5	20 mg/ml	32.40±2.19	40.00±1.60
6	50 mg/ml	22.10±1.17	28.20±1.32
7	80 mg/ml	18.05±1.20	21.07±2.25
	Croton bondplandianum		
8	20 mg/ml	53.20±1.23	68.40±1.41
9	50 mg/ml	40.07±1.07	53.30±2.32
10	80 mg/ml	18.10±0.21	23.10±2.11
	Tephrosia purpurea		
11	20 mg/ml	20.41±1.29	35.12±0.27
12	50 mg/ml	15.20±1.45	26.15±0.34
13	80 mg/ml	10.12±0.38	18.03±2.16

All the results are expressed as mean± Standard deviation (n=4); naïve control and vehicle worms alive upto 24 hrs of observation; -------> worms were alive

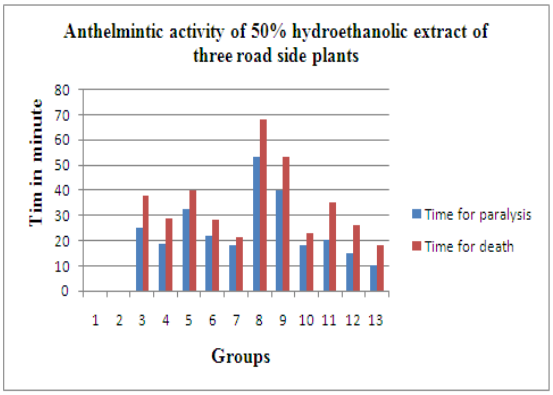

Fig 1 Anthelmintic activity of 50 % hydroethanolic extracts of leaves of *Achyranthes aspera, Croton bonplandianum, Tephrosia purpurea*

Each bar represent as mean ± standard deviation (n=4)

Group 1 (naive control), Group 2 (vehicle 0.1% Tween 80 in normal saline), Group 3 (Albendazole 50 mg/ml), Group 4 (Albendazole 100 mg/ml). Group 5 (*A.aspera* 20 mg/ml), Group 6 (*A. aspera* 50 mg/ml), Group 7 (*A. aspera* 80 mg/ml), Group 8 (*C. bonplandianum* 20 mg/ml), Group 9 (*C. bonplandianum* 50 mg/ml), Group 10 (*C. bonplandianum* 80 mg/ml), Group 11 (*T. purpurea* 20 mg/ml), Group 12 (*T. purpurea* 40 mg/ml), Group 13 (*T. purpurea* 80 mg/ml)

RESULTS AND DISCUSSION

The data in table 1 revealed that 50 % hydroethanolic extract of all the three plants produced dose dependent paralysis ranging from loss of motility to loss of response to external stimuli, which gradually produces death. Among all three plants extracts *Tephrosia purpurea* was found to be highly effective against earthworms (*Pheretima posthuma*)and give significant results in comparison to albendazole. At three different concentrations i.e., 20, 50, 80 mg/ml*Tephrosia purpurea* cause paralysis in 20.41, 15.20, 10.12 minutes and corresponding death in 35, 26, 18 minutes. At high concentration i.e., 80 mg/ml,

itcauses paralytic effect more quickly and death time was shorter. Potency of extracts was found to be inversely perportional to the time taken for paralysis and death of indivisual worms.

CONCLUSION

It may be concluded that out of three plant leaf extracts *Tephrosia purpurea* possess potent and significant dose dependent anthelmintic potential. Further studies are required to identify the actual constituents present in extract which are responsible for activity against earthworms. Also to establish the effectiveness and pharmacological rational for the use of *Tephrosiapurpurea* as an anthelmintic drug.

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