

IN VITRO ANTHELMINTIC ACTIVITY OF IPOMEA AQUATICA

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ABSTRACT

Objective: The present study was aimed at the evaluation of *in vitro* anthelmintic activity of ethanolic leaf extract of *ipomea aquatica* against Indian earthworm *Pheretimaposthuma*.

Methods: Four concentrations (25 mg/ml, 50 mg/ml, 75 mg/ml, 100 mg/ml) were tested and results were expressed in terms of time for paralysis and time of the death of worms. In this study, Albendazole was used as a standard drug.

Results: Ethanolic leaf extract of *ipomea aquatica* showed significant activity at higher concentrations when compared to standard group (Albendazole).

Conclusion: It can be concluded that the ethanolic leaf extract of *Ipomea aquatica* has shown more significant anthelmintic activity when compared to Albendazole against Indian earthworm *Pheretimaposthuma*.

Keywords: Anthelmintic activity, *ipomea aquatica*, Albendazole, Ethanolic extract, *Pheretimaposthuma*

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INTRODUCTION

Helminthic infections are among the commonest infections in man, affecting a large proportion of the world's population. In developing countries they pose a major threat to public health and contribute to the prevalence of malnutrition, anaemia, eosinophilia, and pneumonia. Anthelmintics are drugs that either kill or expel infesting helminths and the gastrointestinal tract is the abode of many helminths, although some also live in tissues, or their larvae migrate into tissues. They harm the host by depriving him of food, causing blood loss, injury to organs, intestinal or lymphatic obstruction and by secreting toxins. Helminthiasis is rarely fatal but is a major cause of morbidity [1].

Helminthiasis is a macro parasitic disease observed in humans and animals in which a part of the body is infested with parasitic worms such as Roundworms (Nematodes), Tapeworms (Cestodes) or Flukes (Trematodes). Typically the worm's reside in the GI Tract. Anthelmintics are drugs that destroy or expel parasitic intestinal worms from the body, by either vermifuges (stunning) or vermicides (killing). Most of the existing anthelmintics produce side effects such as abdominal pain, loss of appetite, nausea, vomiting, headache and diarrhoea. Since ancient times herbal drugs are used for the treatment of parasitic diseases in a human without any side effects. To eradicate the side effects of the present allopathic drugs now scientist are moving towards the herbal drugs what our ancient peoples used [2].

The gastrointestinal helminthes become resistant to currently available anthelmintic drugs, therefore, there is a foremost problem in the treatment of helminthes diseases. Hence there is an increasing demand towards natural anthelmintics [3].

Ipomea aquatica is a semiaquatic, tropical plant grown as a vegetable for its tender shoots and leaves. It is found throughout the tropical and subtropical regions of the world, although it is not known where it originated. This plant is known in English as water spinach, river spinach, water morning glory, water convolvulus, or by the more ambiguous names Chinese spinach, Chinese Watercress, Chinese convolvulus, swamp cabbage or kangkong in Southeast Asia [4].

Ipomea aquatica grows in water or on moist soil. Its stems are 2–3 metres (7–10 ft) or longer, rooting at the nodes, and they are hollow and can float. The leaves vary from typically sagittate (arrowhead-

shaped) to lanceolate, 5–15 cm (2–6 in) long and 2–8 cm (0.8–3 in) broad. The flowers are trumpet-shaped, 3–5 cm (1–2 in) in diameter, and usually white in colour with a mauve centre. Propagation is either by planting cuttings of the stem shoots that will root along nodes or planting the seeds from flowers that produce seed pods [5, 6].

Water spinach, *Ipomea aquatica* Forssk. (*Convolvulaceae*), is an aquatic or semi-aquatic Edible herb [7]. *I. aquatica* is used traditionally against various disorders like diabetes, liver malfunction, constipation and in the treatment of arsenic and heavy metal poisoning [7, 8] Literature reviews revealed the occurrence of significant amounts of phenolic compounds, flavonoids, saponins, β -carotene and ascorbic acid in *I. Aquatica* [7]. Genus *Ipomea* (*Convolvulaceae*) are used in traditional system of medicine all over the world and species *Ipomea aquatica* Forsk widely used as ailment in the treatment of liver diseases⁽⁹⁾ and constipation [10] *IA* contains several phytoconstituents such as vitamins, including A, B, C, E, and "U" (S-methyl methionine) and is used to treat gastric and intestinal Disorders [11].

MATERIALS AND METHODS

Collection of plant material

Ipomea aquatica leaves were collected in the month of August 2017 from Marvelly village, vatpally mandal, sangareddy Dist of Telangana, India. The plant was authenticated by D. Venkateshwar Rao, Deputy Director, Telangana. Forest Academy, Dullapally, Hyderabad, Rangareddy District. The fresh leaves were collected, removed all earthy matter, washed, shade, dried and powdered by a pulverizer.

Collection of worms

Pheretimaposthuma (earthworms) were collected from the manure and identified and washed with water to remove all kinds of dirty water from them.

Chemicals and drugs used

Ethanol, Normal saline, Albendazole

Preparation of plant extract

The leaves of the plant were dried under shade and crushed in a pulverizer and powdered. The powdered plant extracted with ethanol in Soxhlet apparatus for 72 h after completion of the

extraction, the extracts were cooled at room temperature and filtered and evaporated to dryness using rotary evaporator.

Phytochemical screening

The freshly prepared leaf extract of IAF was qualitatively tested for the presence of chemical constituents. Phytochemical screening of the extract was performed using the following reagents and chemicals: Alkaloids with Mayer's, Hager's and Dragendorff's reagent; Flavonoids with the use of sodium acetate, ferric chloride, amyl alcohol; Phenolic compounds and tannins with lead acetate and gelatin; carbohydrate with Molish's, Fehling's and Benedict's reagent; proteins and amino acids with Millon's, Biuret and xantho protein test. Saponins were tested using hemolysis method; Gum was tested using Molish's reagent and Ruthenium red; Coumarin by 10% sodium hydroxide and Quinones by Concentrated Sulphuric acid. These were identified by characteristic color changes using standard procedures [12].

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The screening results were as follows: Alkaloids +ve; Carbohydrates +ve; Proteins and amino acids +ve; Steroids -ve; Sterols +ve; Phenols +ve; Flavonoids +ve; Gums and mucilage +ve; Glycosides +ve; Saponins -ve; Terpenes +ve and Tannins +ve Where +ve and -ve indicates the presence and absence of compounds.

Preparation of concentrations

The ethanolic extract of *Ipomea aquatica* made into four different concentrations such as 25 mg/ml, 50 mg/ml, 75 mg/ml, 100 mg/ml

by dissolving in normal saline. The standard control group Albendazole was prepared by using 0.5% w/v Carboxy Methyl Cellulose (CMC) as a suspending agent.

Evaluation of anthelmintic activity

The anthelmintic activity was carried according to the standard method [13-15]. Adult Indian earthworm *Pheretima posthuma* has an anatomical and physiological resemblance to the intestinal roundworm parasites of human beings. Indian earthworms were placed in a Petridish containing different concentrations (25 mg/ml, 50 mg/ml, 75 mg/ml, and 100 mg/ml) of ethanolic extract of *Ipomea aquatica* and standard drug Albendazole. Each Petri dish contains earthworms and observed for time of paralysis as well as time death. Time of paralysis recorded when no movement of any sort could be observed, except when the worm was shaken vigorously as well as the time of death was recorded after ascertaining that worms neither moved when shaken. Finally, the test results were compared with standard reference compound Albendazole.

RESULTS AND DISCUSSION

Preliminary phytochemical screening of *Ipomea aquatica* indicates presence of carbohydrate, alkaloid, flavonoids, proteins and amino acids. ethanolic leaf extract of *Ipomea aquatica* shows significant effect on *Pheretima posthuma*. Higher concentrations of *Ipomea aquatica* extracts produce a paralytic effect much earlier and time taken for death was shorter. It shows maximum efficacy at 50 mg/ml concentration than the standard drug (Albendazole) (table 2).

Table 1: Phytochemical screening of leaves extract of *Ipomea aquatica*

Constituents	Aqueous extract
Carbohydrates	+
Amino acids	+
Glycosides	+
Proteins	+
Tannins	+
Flavonoids	+

Table 2: Anthelmintic activity of ethanolic leaf extract of *Ipomea aquatica* and standard Albendazole

Extract	Concentrations (mg/ml)	Pheretima posthuma	
		Paralysis(min)	Death(min)
Ethanolic extract	25 mg/ml	21±1.34	26±0.18
	50 mg/ml	17±0.94	22±0.62
	75 mg/ml	16±0.09	15±0.57
	100 mg/ml	9±0.61	12±0.99
Albendazole	25 mg/ml	40±0.43	43±1.38
	50 mg/ml	35±0.60	39±0.59
	75 mg/ml	31±0.81	35±1.38
	100 mg/ml	22±1.4	25±0.92



Fig. 1: In vitro experimental model setup to evaluate the anthelmintic activity

CONCLUSION

It can be concluded that the ethanolic leaf extract of *Ipomeea aquatica* has shown more significant anthelmintic activity when compared to Albendazole against Indian earthworm *Pheretima posthuma*.

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AUTHORS CONTRIBUTIONS

All the authors have contributed equally

CONFLICT OF INTERESTS

Declared none

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