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Evaluation of In Vitro Anthelmintic Activity of *Sesbania aculeata*

I. Srikanth *
K. Krishna Sai
G. Srihari
Dr. Ramanjaneyulu K
J. Himabindhu

Department of Pharmacognosy, Vishnu Institute of Pharmaceutical Education and Research, Narsapur, Medak

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ABSTRACT

Objective: The present study was aimed at the evaluation of *in vitro* anthelmintic activity of ethanolic leaf extract of *Sesbania aculeata* against Indian earthworm *Pheretima posthuma*.

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 *S. aculeata* showed significant activity at higher concentrations when compared to standard group (Albendazole).

Conclusion: It can be concluded that the ethanolic leaf extract of *S. aculeata* has shown more significant anthelmintic activity when compared to albendazole against Indian earthworm *P. posthuma*.

KEYWORDS

Anthelmintic activity, *Sesbania aculeata*, Albendazole, Ethanolic extract, *Pheretima posthuma*

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 anthelmintic produces 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 WHO (World Health Organization) estimated that 80% of population in developed countries rely on traditional medicine mostly plant drugs for their Primary Health Care needs [3]. It is estimated that by the year 2025 about 57% of population in developing countries will be influenced by this infection [4]. 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 anthelmintic [5].

Sesbania aculeata is a species of flowering plants in the pea family, Fabaceae. Fabaceae or Leguminosae is an important and third largest

family of flowering plants, which is commonly known as the legume family, pea family, bean family or pulse family. The name 'Fabaceae' comes from the defunct genus Fabaceae. Fifty species of *Sesbania* have been described in tropical and subtropical regions of the world. *S. aculeata*, is the species most commonly found in India. Locally, it is known by the name Dhaincha, Danchi and Dunchi. It is an erect, low annual sub shrub and reaches up to height of one to two meters. It has fibrous, pithy stems with long leaves. The leaves are pinnate, 1.2-2.5 cm long, 0.3 cm wide and are glabrous. It bears purple-spotted yellow flowers from September to November in Indian climatic conditions. It produces pods which contain light brown beans [6].

Oven-dry fiber of *S. aculeata* is reported to contain 0.71% ash, 0.94% fats and waxes, 2.3% nitrogenous matter, 9.76% pentosan, 16.3% lignin and 85.2% holocellulose (63.6% alpha cellulose) [7]. Seeds of the genus *S. aculeata* are reported to contain trypsin inhibitor and chymotrypsin inhibitors. The leaves of *S. aculeata* yield good concentration of (+) - pinitol which is an anti-diabetic agent [8]. It also has several medicinal uses and is used in treatment of various eye, skin and inflammations [9]. *S. aculeata* is used for soil erosion control, hedges, intercropping "mother plants," nitrogen fixation, and windbreaks, for fodder and fuel wood. It is used for manufacturing of paper, particle boards, pipes, ropes and as sizing and thickening agent. Lately, the *Sesbania aculeata* plant is used as biomass and supplies 128 kW of electricity at 240 V. in Bihar [10].

MATERIALS AND METHODS

Collection of Plant Material

Sesbania aculeata 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 pulveriser.

Collection of Worms

P. posthuma (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 plant were dried under shade and crushed in pulveriser and powdered. The powdered plant was extracted with ethanol in Soxhlet apparatus for 72 hours after completion of the extraction, the extracts were cooled at room temperature and filtered and evaporated to dryness using rotary evaporator.

Preparation of Concentrations

The ethanolic extract of *S. aculeata* was 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 standard method [11-13]. Adult Indian earthworm *P. posthuma* has anatomical and physiological resemblance to the intestinal roundworm parasites of human beings. Indian earthworms were placed in a Petri dish containing different concentrations (25 mg/ml, 50 mg/ml, 75 mg/ml, and 100 mg/ml) of ethanolic extract of *S. aculeata* and standard drug Albendazole. Each Petri dish contains earthworms and observed for time of paralysis as well as time of death. Time of paralysis recorded when no movement of any sort could be observed, except when the worm was shaken vigorously as well as 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

Ethanolic leaf extract of *S. aculeata* shows significant effect on *P. posthuma*. Higher concentrations of 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 1).

Table 1: Anthelmintic activity of ethanolic leaf extract of *Sesbania aculeata* and standard Albendazole

Extracts	Concentrations (mg/ml)	<i>Pheretima posthuma</i> Paralysis (min)	Death (min)
Ethanolic extract <i>S. aculeata</i>	25mg/ml	10±1.1	12±8.0
	50mg/ml	8±2.0	9±3.0
	75mg/ml	7±6.0	8±7.0
	100mg/ml	6±8.0	7±4.0
Albendazole	25mg/ml	16±1.7	21±1.2
	50mg/ml	15±1.3	19±1.2
	75mg/ml	14±1.3	17±1.5
	100mg/ml	12±1.0	16±2.1



Figure 1: *In vitro* experimental model setup to evaluate the anthelmintic activity

CONCLUSION

It can be concluded that the ethanolic leaf extract of *S. aculeata* produces better anthelmintic activity against Indian earthworm *P. posthuma*. At higher concentrations, the ethanolic extract showed higher activity.

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