Research Article

Invitro Anthelmintic Activity of Different Solvent Extracts of *Sesamum indicum* Seeds

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ABSTRACT

Sesamum indicum, the most commonly used laxative also posses anthelmintic, demulcent, and emollient properties. The present study aimed at the in-vitro anthelmintic activity of aqueous and methanolic extracts of *Sesamum indicum* seeds. Various concentrations of the aqueous and ethanolic extracts (2.5, 5, 10, 25, 50 mg/ml respectively) were screened for their anthelmintic activity using *Pheritima posthuma*, the common Indian earthworm. The activities were compared with that of the standard drug Albendazole. The parameters that were considered for this activity are time of paralysis (P) and time of death (D) of the worms when they were dipped in the extracts. When the doses of the extracts are increased, a gradual increase in anthelmintic activity was observed. The aqueous extract showed good activity when compared to that of ethanolic extract. In conclusion, it was confirmed that the aqueous and ethanolic extracts of *Sesamum indicum* showed prominent anthelmintic activity.

Keywords: *Sesamum indicum,* Anthelmintic, Albendazole, *Pheritima posthuma*.

INTRODUCTION

Anthelmintics are the drugs which expels the parasitic worms or helminths from the body either by stunning or killing them. They may also be called as vermifuges, if they stun or vermicides, if they kill the worms[1]. Parasitic helminths affect animals and man, causing considerable hardship and stunted growth. Most diseases caused by helminths are of a chronic, debilitating nature. They probably cause more morbidity and greater economic and social deprivation among humans and animals than any single group of parasites. The prevalence of helminth diseases in Nigeria is very high, especially during the wet season when infection is as high as 100% in cattle. Such high infection rates prevent them from attaining optimum productivity, especially under the traditional husbandry system[2]. In developing countries, the helminth infections pose a large threat to public health and contribute to the prevalence of malnutrition, anemia, eosinophillia and pneumonia[3]. A number of plants have been tested for their anthelmintic efficacy. In Meghalaya, a part of North – East India, numerous indigenous plants are used by the natives, who believe them to be curative against worm infections[4]. Although the use of alternate drugs has also been advocated as a measure to avoid the development of resistant strains of helminth parasites and as a means of reducing the cost of controlling helminthic diseases, the emergence of resistant strains of pathogenic helminth has stimulated the desire to search for additional chemotherapeutic agents from plant sources that might allow more efficient control of helminth parasites[5].

Sesamum indicum (Pedaliaceae) an annual shrub is native to Africa and India. It has opposite leaves which are broad and lanceolate. Flowers are large, bell-shaped. The fruit is an oblong capsule with small seeds. The plant is cultivated mainly for its seeds which are small and flat ovals with mild, nutlike flavour. Sesame seeds have been used as a medicine since antiquity. They are considered to be antioxidant, anthelmintic, anticancer, demulcent, emollient and laxative properties. The oil is used as an antibacterial agent in preparations of mouth wash which prevents the tooth and gum diseases. It can be used to relieve anxiety and insomnia. It is also used to relieve *Verruca vulgaris* and *Verruca plana*, the warts which are usually found on the soles of the foot and around the toes[6]. However, the anthelmintic activity of *Sesamum indicum* has not so far been scientifically proved, so the present study was carried out to assess the anthelmintic activity by using their aqueous and ethanolic extracts.

MATERIALS AND METHODS

Plant material

The seeds of *Sesamum indicum* belonging to the family *Pedaliaceae* were collected from local area of Guntur district (India) and was identified and authentified by Dr. Sreenivasa Prasanna, M.Pharm., PhD, M.L.College Of Pharmacy, Singarayakonda and the voucher specimen (MPESFPS – 03/12) was preserved in the department of Pharmacology, Malineni Perumallu Educational Society's Group of Colleges, Guntur, India.

Drugs and chemicals

Albendazole (Micro Lab. Ltd., Goa), normal saline, chloroform and ethanol are used.

Animals

Healthy adult Indian earthworms *Pheritima posthuma* (Annelida, Megascolecidae) was used for evaluating the anthelmintic activity due to its anatomical and physiological resembles with the intestinal round worm parasites of human beings. Because of easy availability, earthworms have been used extensively for the preliminary *in vitro* evaluation of anthelmintic activity. All earthworms were of approximately equal size. They were collected from local place, washed and kept in water[7].

Extraction procedures

Preparation of aqueous extract of *Sesamum indicum*

The seeds of *Sesamum indicum* was collected, dried under shade and powdered. 50g of the powder was extracted by cold maceration process in 200 ml of distilled water for 3 days in the room temperature with intermittent shaking. After incubation, the extract was filtered through filter paper and then it was concentrated. After cooling 2 drops of chloroform was added for preservation. Condensed extracts were weighed and stored in air-tight containers at 4^0C till further investigation.

Preparation of ethanolic extract of *Sesamum indicum*

The seeds of *Sesamum indicum* were extracted by soxhelation process using 200ml of ethanol. In this procedure, a total amount of 50g of powdered seeds was soxhelated for 6 hours. This cycle may be allowed to repeat many times, over hours until all the active contents get extracted which was indicated by a colour change. The extract was filtered and then it was concentrated. After cooling 2 drops of chloroform drops are added for preservation. Condensed extracts were weighed and stored in air-tight containers at 4^0C till further investigation.

Phytochemical analysis

Preliminary phytochemical screening of aqueous and ethanolic extracts of *Sesamum indicum* was performed for the detection of the constituents that were responsible for the activity.

Anthelmintic assay

The anthelmintic activity was evaluated on adult Indian earthworm by the reported methods with slight modification[8]. 50 ml formulations containing *Sesamum indicum* in five different concentrations of aqueous extract of its various fractions (2.5, 5.0, 10, 25 and 50 mg/ml) and ethanolic extract of its various fractions (2.5, 5.0, 10, 25 and 50 mg/ml) were prepared and six worms (same type) were placed in it. Here, normal saline was used as the vehicle. The wide range of dose was taken to establish the relationship between dose and pharmacological activity and also to find out the minimum and maximum dose that can be better therapeutically effective in comparison to standard drug. 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 were recorded after ascertaining that the worms neither moved when shaken vigorously nor when dipped in warm water (50^0C) followed with fading away of their body colour. Albendazole (20 mg/ml) was used as reference standard. A separate beaker with saline solution which was used as a vehicle in the study was also kept as a negative control.

RESULTS

The aqueous and ethanolic extracts of *Sesamum indicum* showed better yields. Preliminary phytochemical screening of aqueous and ethanolic extracts of *Sesamum indicum* revealed the presence of carbohydrates, glycosides, alkaloids, polyphenols, tannins, phytosterols and flavonoids (Table – 1). In addition, the ethanolic extract contains fixed oils and steroids, whereas the aqueous extract in addition contains saponins.

Anthelmintic assay

Both the aqueous and ethanolic extracts of *Sesamum indicum* showed anthelmintic activity in dose dependent manner as shown in table – 2. As the dose increased, there is an increase in the anthelmintic action. Among both the extracts, the aqueous extract of *Sesamum indicum* showed very good

anthelmintic activity. The results of the activity were represented graphically. The fig – 1 indicates the anthelmintic activity of aqueous and ethanolic extracts of *Sesamum indicum* on Indian Earthworm *Pheretima posthuma* in comparison with that of the standard drug albendazole.

DISCUSSION

Earthworms are invertebrates in which the outer layer of the earthworm is a mucilagenous layer and composed of complex polysaccharides. This layer being slimy enables the earthworm to move freely. Any damage to the mucopolysaccharide membrane will expose the outer layer and this restricts its movement and can cause paralysis. This action may lead to the death of the worm by causing damage to the mucopolysaccharide layer[9]. All anthelmintics essentially kill worms by either starving them to death or paralyzing them because worms have no means of storing energy. Any disruption in this process results in energy depletion. Interfering with feeding for 24 hours or less is sufficient to kill most adult parasites. Preliminary phytochemical screening of aqueous and ethanolic extracts of *Sesamum indicum* revealed the presence of carbohydrates, glycosides, alkaloids, tannins, polyphenols, phytosterols and flavonoids. The possible mechanism of action of polyphenols may be interference with energy generation by uncoupling oxidative phosphorylation or they may interfere with glycoprotein of cell surface or they can bind to free proteins in the gastrointestinal tract of host animal or glycoprotein on the cuticle of the parasite and cause death[10]. Alkaloids may act on central nervous system and causes paralysis of the earthworm. The effect would be due to presence of alkaloids which may suppress the transfer of sucrose from the stomach to the small intestine together with its antioxidant effect which is capable of reducing the nitrate generation which could interfere in local homeostasis which is essential for the development of helminths[11]. Albendazole binds to free β-tubulin, inhibiting polymerisation and thus interferes with the microtubule dependent glucose uptake by the worms[12]. Thereby the presence of all these active chemical constituents in the plants leads them to show a better anthelmintic activity. Thereby the presence of all these active chemical constituents in the plants leads them to show a better anthelmintic activity.

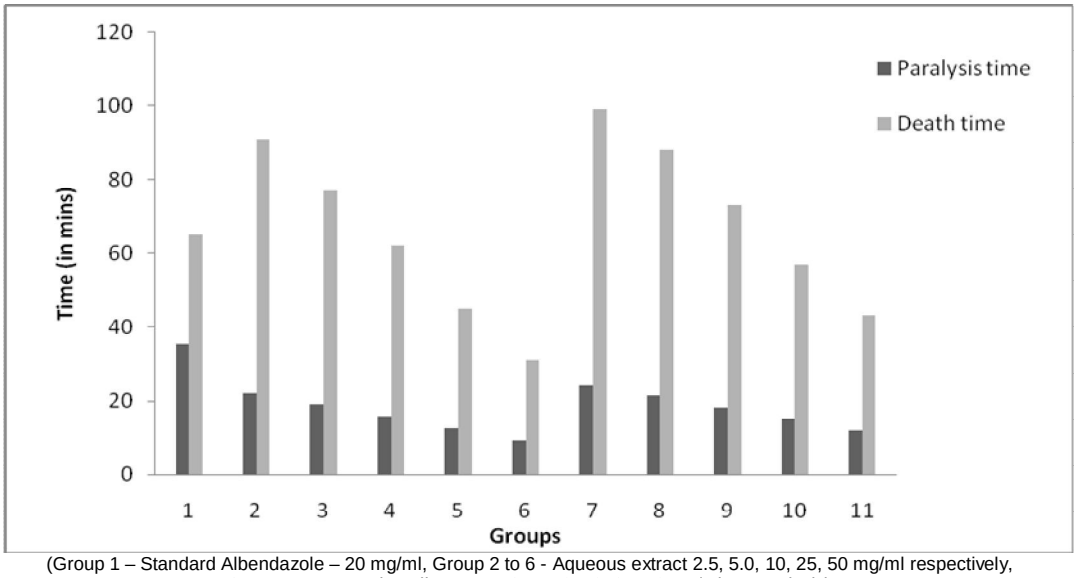
Factors unknown to us may influence the anthelmintic activity of this plant. For instance, the active component(s) contained in the plant may vary in relation to location, age, and stage of development of the plant and whether the plant is freshly harvested or preserved. It is therefore possible that seed extracts from different regions and kept under different conditions may have varying anthelmintic effects[13].

Table 1: Phytochemical screening of aqueous and ethanolic extracts of seeds of *Sesamum indicum*

S. No	PHYTOCHEMICAL CONSTITUENTS	AQUEOUS EXTRACT	ETHANOLIC EXTRACT
1	Carbohydrates	+	+
2	Fixed oils	–	+
3	Glycosides	+	+
4	Alkaloids	+	+
5	Flavonoids	+	+
6	Tannins	+	+
6	Polyphenols	+	+
7	Steroids	–	+
8	Saponins	+	–

Table 2: Anthelmentic activity of aqueous and ethanolic extracts of seeds of *Sesamum indicum*

Groups	Treatment	Concentration (mg/ml)	Time taken for Paralysis (min)	Time taken for Death (min)
1	Vehicle	–	–	–
2	Albendazole	20	35.4	64.9
3	Aqueous extract of *Sesamum indicum*	2.5	22.2	91
		5	19.1	77
		10	15.9	62
		25	12.7	45
		50	9.2	31
4	Ethanolic extract of *Sesamum indicum*	2.5	24.3	99
		5	21.4	88
		10	18.3	73
		25	15.2	57
		50	12.0	43



(Group 1 – Standard Albendazole – 20 mg/ml, Group 2 to 6 - Aqueous extract 2.5, 5.0, 10, 25, 50 mg/ml respectively, Group 7 to 11 – Ethanolic extract 2.5, 5.0, 10, 25, 50 mg/ml respectively)

Fig 1: Anthelmintic activity of aqueous and ethanolic extracts of *Sesamum indicum* seeds on Indian Earthworm *Pheretima posthuma*

CONCLUSION

From the above results, it was concluded that the aqueous extract of *Sesamum indicum* showed more potent anthelmintic activity than that of the ethanolic extract. Further work will emphasize the isolation and characterization of active principles responsible for anthelmintic activity and to establish the effectiveness and pharmacological rationale for the use of *Sesamum indicum* as an anthelmintic drug.

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