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Anthelmintic Activity of Fruit Extracts of *Syzygium cuminii* Linn.

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ABSTRACT

The anthelmintic activity of fruit extracts of an Indian Medicinal plant *Syzygium cuminii* Linn. was evaluated on earthworms of *Pheretima posthuma*. This is because earthworms have anatomical and physiological resemblance with that of intestinal roundworm parasites of human beings. Here anthelmintic activity of the herb was determined by time taken for paralysis and death of earthworms after suitable treatment and comparison with standard drug piperazine citrate. The ethanol extract of *Syzygium cuminii* fruit at concentration of 50 mg/ml showed most pronounced activity. The results suggest that fruits of *Syzygium cuminii* possess anthelmintic activity. There is scope for future study on this plant.

Keywords: *Syzygium cuminii*, anthelmintic, piperazine citrate.

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INTRODUCTION

Nowadays various anthelmintics are showing ineffectiveness towards helminthes parasites. Issue of resistance is coming in picture. Hence there is increased search of new anthelmintics[1]. Medicinal plants may contain answer to this type of problem. The active ingredients present in the plant may have the ability to destroy the helminthes. Knowledge about the active ingredient responsible to show the action, its mechanism of action is essential. The responsible active ingredient in the plant may be one or more than one[2]. There are a number of active biochemical compounds from plants such as essential oils, enzymes, tannins that acts against parasites[3]. *Syzygium cuminii* Linn. belonging to the family Myrtaceae commonly known as jamun in India is a popular tree especially in the rural areas of the country. The tree may grow over 10 meters with many branches and regular glossy leathery leaves. The small white flowers are produced in large numbers which after a period of time give rise to small green fruit. These later grow into oval-shaped, 1-3 cm long, bright purple or black, fleshy, sweet and astringent one seeded fruits[4]. It is commonly known as java plum in English, jamun in Hindi, brahaspati in Sanskrit[5]. The parts used are fruit, leaves, dried seeds and bark. The bark is used as decoction in cases of chronic diarrhoea, dysentery and as gargle in sore throat and spongy gums. A paste made of the bark is applied over inflamed parts. Juice of tender leaves is used in diarrhea in children. Powdered seeds of the fruit are used as a remedy in diabetes. Syrup or vinegar prepared from ripe fruit is useful in spleen enlargement and efficient astringent. Leaves are antibacterial and used in vomiting. The ash of leaves is used for strengthening the teeth and gums[4,5,6]. The present study was based on the reports that the fruit extract of *Syzygium cuminii* Linn exhibited significant activity against the ringworm[7,8]. However there is no scientific report available regarding anthelmintic activity of this plant against the worm *Pheretima posthuma*. Hence, the present study was undertaken to investigate the anthelmintic activity of fruit extracts of *Syzygium cuminii* Linn.

MATERIALS AND METHODS

Plant material

The fruits of *Syzygium cuminii* Linn (family: Myrtaceae) were freshly collected from and around Bajpe, Mangalore, Karnataka, India. The plant material was taxonomically identified by Dr. Noeline J. Pinto, H.O.D, Dept. of Botany, St. Agnes College, Mangalore, Karnataka. The seeds were separated and kept aside and only pulp was used. The material was then homogenized to a coarse powder using a mechanical grinder and stored in air tight containers at room temperature

for further experimental use.

Extract preparation

The powdered drug was repeatedly extracted in a soxhlet apparatus using solvents of increasing polarity. This process was continued for 48 hours with each solvent. The extracts were then collected, concentrated by evaporation and finally dried. This dried form was used in experiment.

Evaluation of anthelmintic activity

Activity was done on adult Indian earthworm *Pheretima posthuma* because it shows anatomical and physiological resemblance with intestinal roundworm parasites of human beings[9-11]. Institutional animal ethical committee approved the research study. IAEC-CPCSEA guidelines were followed throughout the research study. The following extracts of petroleum ether, benzene, chloroform, acetone, ethanol and aqueous were evaluated at the concentrations of 10, 20 and 50 mg/ml. Standard drug piperazine citrate was tested at the concentration of 15 mg/ml[12-16]. The earthworms were collected from the moist soil of water-logged areas of Karambar, Karnataka, India. Then they were washed with normal saline to remove faecal matter. Worms of almost equal size (around 6 cm) were taken into account[14-18]. Twenty groups of *Pheretima posthuma* were placed in Petri dishes each containing six earthworms. Following groups were made. Group 1: Piperazine citrate (15 mg/ml), Group 2: Petroleum ether extract (10 mg/ml), Group 3: Petroleum ether extract (20 mg/ml), Group 4: Petroleum ether extract (50 mg/ml), Group 5: Benzene extract (10 mg/ml), Group 6: Benzene extract (20 mg/ml), Group 7: Benzene extract (50 mg/ml), Group 8: Chloroform extract (10 mg/ml), Group 9: Chloroform extract (20 mg/ml), Group 10: Chloroform extract (50 mg/ml), Group 11: Acetone extract (10 mg/ml), Group 12: Acetone extract (20 mg/ml), Group 13: Acetone extract (50 mg/ml), Group 14: Ethanol extract (10 mg/ml), Group 15: Ethanol extract (20 mg/ml), Group 16: Ethanol extract (50 mg/ml), Group 17: Aqueous extract (10 mg/ml), Group 18: Aqueous extract (20 mg/ml), Group 19: Aqueous extract (50 mg/ml) and Group 20: Control (1% tween 80 in normal saline). Time taken for paralysis and/or death of individual worms up to 4 hours of test period was taken into account. The experiment was carried out at room temperature. The time of paralysis (P) means that there is no movement of the earthworm except when shaken vigorously. Death time (D) means that the earthworm failed to show any activity even after vigorous shaking or when dipped in warm water ($50^{o}C$).

Statistical Analysis:

Data was analyzed statistically by using Graph Pad Prism Version 4 software (Graph Pad Inc., USA). Data is presented as Mean±SEM. Confidence level was taken as 95%.

RESULTS AND DISCUSSION

On exposure to crude extracts of fruits of *Syzygium cuminii* Linn. the earthworms showed dose dependent paralysis to death. Ethanol extract at 50mg/ml showed the most pronounced effect. In lowest time i.e 24 mins it caused the death of the experimental earthworms. This finding can be said comparable to the standard drug. See Table I.

Table I: Anthelmintic activity of fruit extracts of Syzygium cuminii Linn

Test substance	Concentration (mg/ml)	Time taken (in minutes)	
		Paralysis (P)	Death (D)
Piperazine citrate	15	12.0 ± 0.77	23.67 ± 0.33
Petroleum ether extract	10	0 ± 0	0 ± 0
	20	0 ± 0	0 ± 0
	50	0 ± 0	0 ± 0
Benzene extract	10	156.7 ± 0.61	0 ± 0
	20	116.30 ± 0.33	0 ± 0
	50	79.33 ± 0.67	0 ± 0
Chloroform extract	10	0 ± 0	0 ± 0
	20	0 ± 0	0 ± 0
	50	0 ± 0	0 ± 0
Acetone extract	10	50.50 ± 0.34	65.0 ± 0.26
	20	37.33 ± 0.33	50.0 ± 0.52
	50	13.50 ± 0.22	24.67 ± 0.33
Ethanol extract	10	44.50 ± 0.56	72.83 ± 0.54
	20	26.83 ± 0.40	46.33 ± 0.56
	50	15.0 ± 0.26	24.0 ± 0.37
Aqueous extract	10	42.17 ± 0.54	83.50 ± 0.56
	20	30.17 ± 0.40	64.0 ± 0.57
	50	15.0 ± 0.37	25.67 ± 0.95
Control		-	-

Values are expressed as Mean ± S.E.M. (n = 6). Control worms were alive up to 24 hours of the experiment.

Earthworms move by ciliary movement. The outer layer of the earthworm is responsible for its movement. It is mucilaginous in nature. It is composed of complex polysaccharides. So if there is any damage to this mucopolysaccharide membrane outer layer would get exposed which is detrimental to earthworms. It can cause paralysis to death.

Piperazine citrate shows anthelmintic effect by increasing chloride ion conductance in worm muscle membrane. This produces hyperpolarization. This results in blockage of neuromuscular transmission and causes muscles to relax.

Helminthic infections of the gastrointestinal tract of human beings has its own adverse effects. It gives rise to various other diseases. Earthworms are widely used because it has got anatomical

and physiological resemblance with human intestinal worms. Also adult Indian earthworm, *Pheretima posthuma* are easily available.

CONCLUSION

The present study proved scientifically the anthelmintic activity of *Syzygium cuminii* Linn. Hence this drug looks promising in the treatment of helminthes infection. There is scope for further work regarding isolation of the responsible active ingredient etc.

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