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Evaluation of Anthelmintic Potential of *Alpinia galanga* Aerial Parts

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ABSTRACT

The aim of this study was to look into the anthelmintic potential of *Alpinia galanga* aerial parts extracts. The anthelmintic function of petroleum ether, methanolic, and aqueous extracts of *Alpinia galanga* aerial parts was tested using Indian adult earthworm *Pheritima posthuma* as experimental worms. Methanolic (50 and 100 mg/kg) and aqueous (100 mg/kg) extracts both demonstrated strong anthelmintic activity, with the methanolic extract being more effective than the aqueous extract. Paralysis was observed at (5.40±0.03416) and (2.40±0.03416) minutes in the case of methanolic extract at 50 mg/kg and 100 mg/kg concentrations, respectively, and death at (8.30±0.02887) and (6.40±0.04282) minutes. Paralysis was observed at (5.40±0.03416) and (2.40±0.03416) minutes in the case of methanolic extract at 50 mg/kg and 100 mg/kg concentrations, respectively, and death at (8.30±0.02887) and (6.40±0.04282) minutes. As compared to the standard compound, the methanolic extract of the aerial sections of *Alpinia galanga* displayed substantial anthelmintic activity in a dose-dependent manner.

INTRODUCTION

Helminths are well-known as a significant stumbling block to livestock development in the tropics and elsewhere. Parasitic gastroenteritis is caused by a combination of stomach and intestinal round worm infections. The World Health Organization reports that two billion people are infected with parasitic worms. Parasitic worms infect livestock and crops, reducing food production and resulting in financial losses. According to the World Health Organization, only a few medications are commonly used to treat helminthes in humans. Anthelmintics derived from natural sources may be useful in the treatment of parasitic infections [1,2]. *Alpinia galanga* is known as Greater galangal in English, and in Hindi, Kulanjan. In southern India, the plant is widely used as a traditional medicine [2,3]. The rhizome of *Alpinia galanga* is used as Rasna in southern India for rheumatism, intermittent fever, dyspepsia, and respiratory disorders. In rats, the plant has anti-inflammatory, anti-ulcer, anti-secretory, and cytoprotective properties [4]. In mice, the drug increased sperm motility and count while also increasing the weight of sexual organs. The essential oil's main components are methyl cinnamate, cineole, and d-pinene. The oil has antispasmodic properties in moderate doses. *Alpinia galanga* is used as a sex tonic by Unani physicians [5]. A thorough review of the literature shows that there are no experimental studies on the anthelmintic behavior of *Alpinia galanga* aerial sections. This inspired us to look into the antihelmintic properties of various aerial parts extracts of the plant under study.

MATERIALS AND METHODS

Drugs and Chemicals

Albendazole (Glaxo Smithkline), Petroleum ether (60-80^{0}C), Methanol (Rankem), Carboxy methyl cellulose [CMC] (Loba Chemie) were used in the experimental work.

Plant Material

In the month of December, fresh aerial parts of *Alpinia galanga* were collected from the Manoj Nursery, Opposite T.V. Tower Dubagga, Hardoi Road, Lucknow, and authenticated by a taxonomist from Teerthanker Mahaveer University, Moradabad. A voucher specimen was submitted to the Teerthanker Mahaveer College of Pharmacy. A total of 3.5 kg of aerial parts were sun-dried and mechanically reduced to a medium coarse powder before being stored in an airtight jar.

Preparation of Extract

Soxhlet apparatus was used to prepare petroleum ether, methanolic, and water extracts of *Alpinia galanga* aerial parts. Approximately 110 g of the drug was extracted using solvents with rising polarity, such as petroleum ether, methanol, and water. With each solvent, the extraction was carried out for 50-60 cycles. All of the extracts were concentrated under reduced pressure using a rotary evaporator. The petroleum ether, methanol, and water extract yields were found to be 2.37 percent, 7.66 percent, and 9.83 percent, respectively.

Experimental worms

Indian adult earthworms (*Pheretima posthuma*) were used to investigate anthelmintic activity. The earthworms were dug up from moist soil and washed in normal saline water to remove all soil and feces. Because of their easy availability, anatomical and physiological similarities with human intestinal roundworm parasites, earthworms of 3-6 cm length and 0.1-0.2 cm width were chosen for the desired experimental work. They are widely used for the initial evaluation of anthelmintic compounds (in-vitro) [6].

Anthelmintic Activity

The animals were divided into eight classes, each containing six earthworms, to test the anthelmintic activity of aerial parts of *Alpinia galanga*. In 0.5 percent Carboxy methyl cellulose, the regular drug and *Alpinia galanga* extracts were dissolved. Before beginning the experiment, the extract and regular drug solution were freshly prepared and poured into the petridishes. All earthworms were washed in standard saline solution before being put into the following formulations: vehicle (0.5 percent CMC solution), albendazole (20 mg/ml), petroleum ether (50, 100 mg/ml), methanolic (50, 100 mg/ml), and aqueous extracts (50, 100 mg/ml). The time it took to paralyze (the worm was said to be paralyzed when it didn't revive even in normal saline) and death was recorded (death was concluded when the worms lost their motility followed with their body colour fading away). Each group's results were expressed as the mean SEM of six animals [7-10].

RESULTS:

When exposed to crude extracts of aerial parts of *Alpinia galanga*, earthworms lost their motility after a brief stimulant impact. Each crude extract at 50 and 100 mg/ml caused dose-dependent paralysis, ranging from loss of motility to loss of response to external stimuli, and eventually death. The findings showed that *Alpinia galanga* had excellent anthelmintic activity at both low and high concentrations of methanolic extract and higher concentrations of aqueous extract. It was discovered that the methanolic extract was more potent than the aqueous extract. The findings revealed dose-dependent paralysis, which progressed from lack of motility to loss of response to external stimuli, ultimately leading to death. Paralysis was caused by 50 and 100 mg/ml petroleum ether, methanolic, and aqueous extracts at (18.40±0.0532 & 15.10±0.1949), (5.40±0.0341 & 2.40±0.0341), and (12.0±0.1826 & 7.30±0.0683) min, and death was caused by (25.20±0.0619 & 20.20±0.0632), (8.30±0.0288 & 6.40±0.0428) and (17.30 ± 0.0288 & 11.40 ± 0.0428) min respectively. The standard drug albendazole (20 mg/ml) caused paralysis and death at 8.50±0.1297 and 15.50±0.1232 minutes, respectively. The paralytic effect was triggered much earlier in the higher concentrations of each crude extract, and the time to death was shortened. Externally, haemorrhagic and necrotic spots were seen on the worms with higher concentrations. When the findings were compared to the standard drug albendazole, it was discovered that both the extracts (methanolic at 50 and

100 mg/ml and aqueous at 100 mg/ml) were competetively effective.

Table – 1: Effect of various aerial parts extract of *Alpinia galanga* on Indian Earthworms (*Pheritima posthuma*).

Test Substance	Concentration (mg/ml)	Time for Paralysis and Death (min) Mean ± SEM	
		Paralysis	Death
0.5% CMC	–	–	–
Albendazole	20	8.50 ± 0.1297	15.50 ± 0.1232
Petroleum Ether Extract	50	18.40 ± 0.05323	25.20 ± 0.06191
	100	15.10 ± 0.1949	20.20 ± 0.06325
Methanolic Extract	50	5.40 ± 0.03416	8.30 ± 0.02887
	100	2.40 ± 0.03416	6.40 ± 0.04282
Aqueous Extract	50	12.00 ± 0.1826	17.30 ± 0.02887
	100	7.30 ± 0.06831	11.40 ± 0.04282

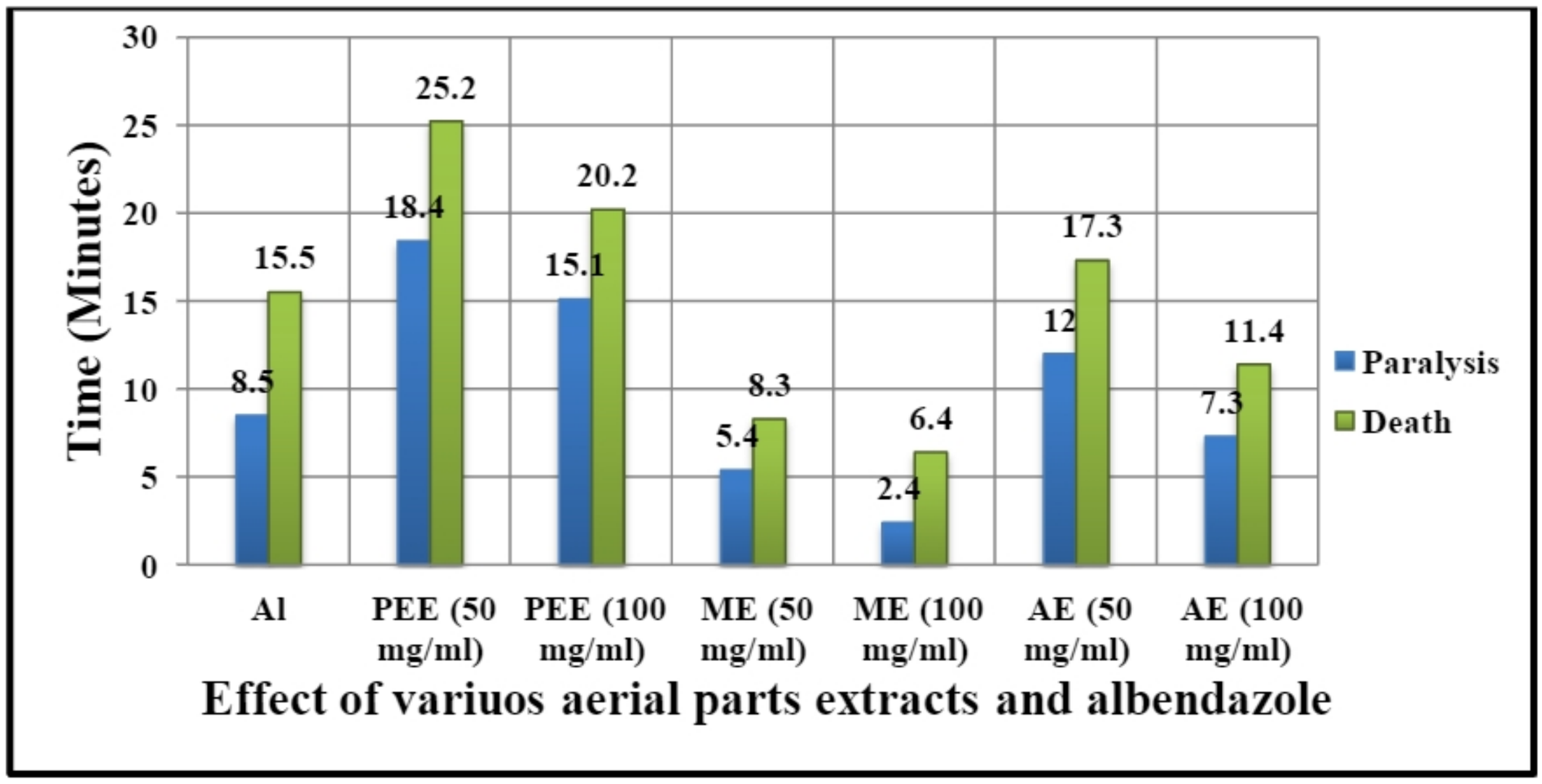

Figure 1: Anthelmintic activity of various aerial parts extracts of *Alpinia galanga*.

DISCUSSION

Table 1 shows the time it took for worms to be paralyzed and die after being treated with different extracts of *Alpinia galanga* aerial sections. The methanolic and aqueous extracts of *Alpinia galanga* aerial parts were found to have activity comparable to the standard drug albendazole. It paralyzed the worms before killing them in a dose-dependent manner. The extracts' potency was inversely proportional to the time it took for the worms to be paralyzed or die. At all concentrations tested, the extracts induced paralysis followed by death. Plant extracts include flavonoids, glycosides, fixed oils, fats, carbohydrates, and tannins, according to

preliminary phytochemical screening. The presence of flavonoids and tannin compounds can explain the anthelmintic behavior of the methanolic and aqueous extracts. The wormicidal activity of the methanolic and aqueous extracts against earthworms mentioned here indicates that they may be efficient against human parasitic injections. Synthetic phenolic anthelmintics, such as nidosamide, disrupt helminth parasite energy production by uncoupling oxidative phosphorylation. Another mechanism of action may be that they bind to free protein in the host animal's GIT or glycoprotein on the parasite's cuticle, causing death. Tannins are also known to have anthelmintic properties. There have also been studies of phenolics found in plant extracts being responsible for this activity [7,8,9].

CONCLUSION

When compared to the standard drug albendazole, which is effective against parasitic infections in humans, it was concluded and verified that the methanolic & aqueous extract of the aerial sections of *Alpinia galanga* have anthelmintic activity in a dose-dependent manner. The experimental evidence obtained in the laboratory model may provide justification for the plant's conventional use as an anthelmintic agent. The phytochemical profile of the plant could be investigated further in order to identify the active constituents responsible for its anthelmintic function.

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