

Anthelmintic Potential of *Andrographis paniculata*, *Cajanus cajan* and *Silybum marianum*

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ABSTRACT

Hydroalcoholic extracts of aerial parts of *Andrographis paniculata*, *Cajanus cajan* and *Silybum marianum* and their combinations were evaluated for anthelmintic properties using Indian adult earthworms (*Pheretima posthuma*) as a model, as they show physiological and anatomical resemblance with intestinal parasites and round worms. The results were compared with that of standard drug, piperazine citrate. *A. paniculata* showed better activity (paralysis and death time was 3.33 and 5.16 min respectively at a concentration of 40mg/ml), while its combination (1:1) with *S. marianum* extract was found to be the most potent (paralysis and death time was 2.83 and 6.33 min respectively at a concentration of 40mg/ml). This property is supposed to be due to the presence of phenolics (flavonoids and tannins) which are reported to have anthelmintic property.

Keywords: Anthelmintic property, *Andrographis paniculata*, *Cajanus cajan*, earthworm model, *Silybum marianum*.

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INTRODUCTION

Helmenthiasis is a highly prevalent disease mainly in the third world countries (1). Inadequate sanitation and poor hygiene may be the main reason behind the helmenthic infection (2). It is among the most important animal diseases inflicting heavy production losses. The gastro intestinal helmenthis has become resistant to the commonly used helmenthic drugs (3) and hence, there is a need to find the anthelmintic property from natural resources like medicinal plants, which may be effective against helmenthiasis and may have less or no side effects. *A. paniculata*, *C. cajan* and *S. marianum* belongs to family Acanthaceae, Compositae and Fabaceae respectively and shares some common medicinal properties such as antibacterial, antioxidant, hepatoprotective, etc (4-6).

MATERIALS AND METHODS

Plant material

The authenticated plants were collected from Natural Remedies Pvt. Ltd., Bangalore (sample invoice No. D119) and confirmed at Botany Department, Dr. H. S. Gour University, Sagar (M.P).

Chemicals and drugs

The following drugs and chemicals were used: Sodium chloride (HIMEDIA), Ethanol (RANKEM) and Piperazine citrate, a gift obtained from R. K. Pharmacy, Sagar.

Extract preparation

Dried and powdered plant materials were extracted with 70% ethanol using soxhlet apparatus. The extracts were concentrated and dried at 68°C and kept at 4°C for further studies.

Phytochemical test

Phytochemicals screening were performed to detect the presence or absences of various compounds such as tannins, flavonoids, alkaloids etc. as per standard methods (7).

Experimental model

The earthworms show physiological and anatomical resemblance with intestinal parasites and round worms (8) and were used for the anthelmintic assay. Indian adult earthworms (*Pheretima posthuma*, 5-7cm in length) were

freshly collected from organic farm of local earthworm breeding centre (N.H. 26, Sagar).

Experiment

The experiments were carried out by the method described by Jinu *et al.*, 2009 (9). All the three extracts were dissolved in normal saline and diluted to get final concentrations of 20 and 40 mg/ml. Piperazine citrate (20 mg/ml) was used as a standard drug. Sixteen groups, each containing six earthworms were taken for the experiment. Extracts and piperazine citrate were dissolved separately in their respective concentration in 10ml normal saline. For combinational study, the different extracts were taken in the concentration ratio of 1:1. Time taken for paralysis and death of individual earthworm was noted. The paralysis occurs when the worms were placed in normal saline and were not able to move. The death was confirmed when the earthworms lost their motility and fading off their body colors (10).

RESULTS AND DISCUSSION

Biological activities of the plant extracts are due to the presence of various chemicals present in it. The activity of these phytochemicals depends upon the solvent used

and the method of extraction (11). 70% ethanolic extracts showed maximum concentration of phenolic compounds (flavonoids). All the three plants analyzed for their anthelmintic potential showed a concentration depended activity. *A. paniculata* extract (40mg/ml) showed better activity (paralysis at 3.33 min and death at 5.16 min), while its combination with *S. marianum* extract (1:1) was found most potent (paralysis at 2.83 min and death at 6.33 min). The time taken by the standard drug (20mg/ml) for the paralysis and death of the worms was 7.0 and 14.83 min respectively. *C. cajan* extract showed the least activity, as it took longest time for paralysis (13.66 min) and death (17.0 min) of the worms (Table I).

Synthetic anthelmintic drugs like piperazine citrate, is known to cause paralysis of worms so that they are expelled in the faeces of men and animals. The extracts in the present study could cause paralysis as well as the death of the worms. These drugs may reach the target site in worms either orally or by diffusion and/or uptake through the cuticle, however the major uptake of the drug is through cuticle (12). All the three extracts when taken in combination, generally showed synergistically better activity as compared to individual effect. The variation in activity of the plant extract might be due to the difference in the proportion of the active compounds responsible for the anthelmintic property (13). The active

“Table I: Anthelmintic activity hydroalcoholic extracts of three plants”

Extract	Concentration (mg/ml)	Paralysis time (min.)	Death time (min.)
<i>A.paniculata</i> (Ap)	20	5.33 ± 0.40	7.50 ± 0.20
	40	3.33 ± 0.18	5.16 ± 0.14
<i>C. cajan</i> (Cc)	20	20 ± 0.23	25.83 ± 0.33
	40	13.66 ± 0.50	17 ± 0.23
<i>S.marianum</i> (Sm)	20	6 ± 0.23	10.16 ± 0.43
	40	3.83 ± 0.14	7.5 ± 0.31
Ap+Sm (1:1)	20	5 ± 0.23	8.5 ± 0.20
	40	2.83 ± 0.14	6.33 ± 0.18
Ap+Cc (1:1)	20	8.33 ± 0.18	12 ± 0.23
	40	5.5 ± 0.20	8.5 ± 0.31
Cc+Sm (1:1)	20	10.50 ± 0.20	13.66 ± 0.18
	40	6.33 ± 0.18	10 ± 0.23
Ap+Cc+Sm (1:1:1)	20	6.66 ± 0.38	10.50 ± 0.45
	40	4 ± 0.23	8.16 ± 0.36
Piperazine	20	7 ± 0.33	14.83 ± 0.36
Control (Normal saline)	-	-	-

All the values are expressed as mean ± SEM, N=6

constituents may be the phenolics such as flavonoids and tannins present in the plant extracts.

CONCLUSION

A. paniculata, *C. cajan* and *S. marianum* are well known for their medicinal properties (hepatoprotective and antioxidant). The present study on anthelmintic potential of these plants proves that their consumption may be good for health enhancement as well as intestinal problems.

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