IN VITRO ANTHELMINTIC ACTION OF SOME INDIGENOUS MEDICINAL PLANTS ON *ASCARIDIA GALLI* WORMS

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Summary: Different parts of ten indigenous medicinal plants were screened for their *in vitro* anthelmintic activity against *Ascaridia galli* worms of the birds. Preparations from *Carica papaya*, *Sapindus trifoliatus*, *Butea frondosa* and *Momordica charantia* were more effective than piperazine hexahydrate.

Key words: anthelmintic *in vitro* screening indigenous plants *Ascaridia galli*

INTRODUCTION

Various indigenous medicinal plants have been used for their anthelmintic action in both the Ayurvedic and Unani systems of medicine as also in traditional and folk medicines (see Table I for references). The present investigation deals with the *in vitro* screening of ten such plants.

MATERIAL AND METHODS

Dried and powdered plant materials (Table I) at serial numbers 5, 6, 9-12 were defatted with hot petroleum ether and then extracted with hot alcohol (95%). *Carica papaya* seeds were extracted by following similar steps in a cold system because, when exposed to heat the seeds lose their anthelmintic activity (9).

The crushed fruits of *Semecarpus anacardium* were extracted with hot petroleum ether only as the anthelmintic activity is reported (2) to be present in this fraction. Incidently, milk decoction of the fruits has been reported to exert anti-inflammatory action (12). It was thus planned to study the anthelmintic effect of the decoction which was prepared by boiling 30 gm of crushed fruits with 250 *ml* of milk for about 30 min.

Pericarp (350 *gm*) of the dried fruits of *Sapindus trifoliatus* was put into water (1200 *ml*) and was left at room temperature for about 48 hr. It was filtered and adjusted, by adding water, to a concentration of 250 *mg* of the original material per *ml* of the fluid.

For obtaining the fresh juice, *Momordica charantia* as also the *Carica papaya* (unripe) fruits were crushed and squeezed in a muslin cloth.

Various extracts, being water insoluble, were transformed into homogeneous emulsion by using tween 80. The emulsion was further diluted to required concentration with Tyrode solution. Finely powdered seeds of *Carica papaya* were homogeneously suspended in gum acacia. Tween 80, gum acacia as also the plain Tyrode solution were used as negative controls.

Piperazine hexahydrate, dissolved in Tyrode solution was used as positive control. Details of the concentration of various extracts used and the number of worms taken in each group are presented in Table I.

Vigorously motile worms, collected from freshly slaughtered birds, put in covered petridishes (10-12 worms for each 50 *ml* volume) containing different solutions were incubated at 39-40°C. The mass motility and per cent mortality was observed (21) at the intervals of about 8 and 16 hrs till all the worms were dead.

TABLE I: Effect of various plant extracts on the *Ascaridia galli* worms *in vitro*.

Name of the plant	Parts used	Yield of the alcoholic extract gm/kg	Concentration mg/ml	Number of worms	Hours after incubation		References
					Complete cessation of motility	Cent per cent death	
1. Tyrode solution (Plain)				68	64	112	
2. Tween 80			0.02 *ml*	50	88	96	
3. Gum acacia			100	23	48	72	
4. Piperazine hexahydrate			50	11	40	48	
5. *Anthocephalus indicus*	Bark	45.0	100	10	48	64	5, 23
6. *Butea frondosa*	Seeds	66.5	200	25	20	32	3, 7, 8, 10, 12, 15, 22, 24
7. *Carica papaya*	Seeds	8.25	25	12	24	88	3, 4, 8, 10, 12, 17
	Dried seeds		50	12	40	48	
	Fresh seeds		300	12	24	48	
	Fruit latex		7.5	10	16	24	
	Fresh juice		0.1 *ml*	15	16	24	
8. *Cedrus deodara*	Essential oil from wood		0.02 *ml*	5	16	48	23
9. *Ficus glomerata*	Fruits	52.4	100	10	48	88	8, 12, 16
	Stem latex		100	11	24	48	
10. *Momordica charantia*	Fruit	64.4	100	20	24	64	3, 8, 12, 23
	Fruit juice		0.1 *ml*	10	16	40	
11. *Nyctanthes arbortristis*	Leaves	32.2	100	32	40	64	3, 8, 12
12. *Paederia foetida*	Whole plant (excluding root)	44.4	50	12	40	72	11, 18
13. *Semecarpus anacardium*	Fruits	38.6*	50	27	64	96	3, 8, 12, 22, 23
	Milk decoction		100	12	40	64	
14. *Sapindus trifoliatus*	Pericarp		10	10	16	24	8, 12

Materials at serial numbers 5 and 12 were procured from Messrs United Chemicals and Allied Products, Calcutta and that at No. 8 from Essential Oil and Chemical Co., Jammu. All other materials were collected locally.

*Petroleum ether extract.

RESULTS

Results are presented in Table 1. Tween 80 yielded fine homogeneous emulsion of various plant extracts and had no adverse effect on the motility and longevity of the worms. Although gum acacia gave a fine homogeneous suspension of the finely powdered *Carica papaya* dried seeds, it had mild adverse effect on the worms in that, it produced 100% mortality 28 hr earlier than tween.

In the concentrations used, the anthelmintic activity of fresh latex of *Carica papaya*, aqueous extract of the pericarp of *Sapindus trifoliatus* fruits, fresh juice of unripe fruit of *Carica papaya*, alcoholic extract of *Butea frondosa* seeds and fresh juice of *Momordica charantia* fruits was better than that of piperazine. Dry and fresh seeds of *Carica papaya*, essential oil of *Cedrus deodara* and latex of *Ficus glomerata* were less potent.

Varying doses of individual plant preparations were used and only those showing maximum activity are mentioned in the table. However, a dose-dependent effect was observed with many plant extracts.

DISCUSSION

The anthelmintic principle present in the alcoholic extract of *Butea frondosa* seeds is palasonin (6 ; yield 250-300 *mg/kg*) which produces *in vitro* death of *Ascaris lumbricoids* worms within 24 hr at a concentration of 1 *mg/ml* (7). In the present study, the alcoholic extract of *Butea frondosa* seeds (yield 66.5 *gm/kg*) produced 100% death of *Ascaridia galli* worms in about 32 hr. The yield of the alcoholic extract is about 220-264 times more than the yield of palasonin. Thus, in the concentration (200 *mg/ml*) tried here, the alcoholic extract would approximately contain 1 *mg* palasonin per *ml*.

In a clinical trial (17), fresh and dried seeds of *Carica papaya* has been reported to be as effective as piperazine in the treatment of children suffering from *Ascariasis*. It was also found effective against *oxyurides* in mice (10) and *Ascariasis* in dogs (14). It acts by blocking the neuromuscular activity of the worm (1, 9, 17). The present work confirms these findings in that the fresh and dry seeds of *Carica papaya* were equi-potent to piperazine. Further, the present findings also suggest that the fresh latex from *Carica papaya* was the most potent of all the plant materials used ; worms incubated with the latex were completely digested (dissolved) in that they did not remain intact. These findings confirm the earlier observations made on the *Ascaris* worms (13). The digestion of the worms could be due to the presence of the proteolytic enzyme, papain. The present finding that the alcoholic extract of *Carica papaya* failed to exert *in vitro* anthelmintic action agrees with the earlier report (9).

The latex from *Ficus glomerata* has been reported to possess *in vitro* (13) and *in vivo* (16) anthelmintic activity. Latex from *Ficus* trees was used as anthelmintic in South America (14). The present study confirms these reports and indicates that the latex from *Ficus glomerata* was more effective than the alcoholic extract of its fruits.

Semecarpus anacardium fruits have been used in helminthic infestations since ancient times (8,12,19,23). The *in vitro* trial conducted on earth worms indicated that the oil expressed by "Patal Yantra" method is highly effective (19) and the anthelmintic activity is due to the presence of anacardic acid in the oil (2). In birds, the petroleum ether extract of the fruit exerted a vermifugal action against *Ascardia galli* worms (20). The present *in vitro* study, however, indicates that the milk decoction of *Semecarpus anacardium* is more effective than its petroleum ether extract.

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