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. Preparations from Carica papaya, Butea frondosa, and Momordica charantia have been particularly well known for their antihelminthic action. 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. Incidentally, milk decoction of the fruits has been reported to exert anti-inflammatory activity (12). It was thus planned to study the anthelmintic effect of the decoction which was prepared by boiling 30 gms 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 petri dishes (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.**

<table>
<thead>
<tr>
<th>Name of the plant</th>
<th>Parts used</th>
<th>Yield of the aetheric extract mg/kg</th>
<th>Concentration mg/ml</th>
<th>Number of worms</th>
<th>Hours after incubation</th>
<th>Complete cessation of motility</th>
<th>Cent per cent death</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyrode solution (Plain)</td>
<td></td>
<td>68</td>
<td>0.02 ml</td>
<td>64</td>
<td>112</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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<tr>
<td>Tween 80</td>
<td></td>
<td>50</td>
<td>0.2 ml</td>
<td>88</td>
<td>96</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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<tr>
<td>Gum acacia</td>
<td></td>
<td>100</td>
<td>23</td>
<td>48</td>
<td>72</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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</tr>
<tr>
<td>Piperazine hexahydrate</td>
<td></td>
<td>50</td>
<td>11</td>
<td>48</td>
<td>48</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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<tr>
<td>Annona squamosa</td>
<td>Bark</td>
<td>45.0</td>
<td>100</td>
<td>48</td>
<td>64</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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<tr>
<td>Butea frondosa</td>
<td>Seeds</td>
<td>66.5</td>
<td>200</td>
<td>20</td>
<td>32</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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<tr>
<td>Carica papaya</td>
<td>Seeds</td>
<td>8.25</td>
<td>25</td>
<td>24</td>
<td>88</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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<tr>
<td>Dried seeds</td>
<td></td>
<td>50</td>
<td>12</td>
<td>40</td>
<td>48</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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<tr>
<td>Fresh seeds</td>
<td></td>
<td>300</td>
<td>12</td>
<td>24</td>
<td>48</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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<tr>
<td>Fruit latex</td>
<td></td>
<td>7.5*</td>
<td>10</td>
<td>16</td>
<td>24</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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<tr>
<td>Fresh juice</td>
<td></td>
<td>0.1 ml</td>
<td>15</td>
<td>16</td>
<td>24</td>
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<tr>
<td>Cedrus deodara</td>
<td>Essential oil from wood</td>
<td>0.02 ml</td>
<td>5</td>
<td>16</td>
<td>48</td>
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<tr>
<td>Ficus glomerata</td>
<td>Fruits</td>
<td>52.4</td>
<td>100</td>
<td>48</td>
<td>88</td>
<td>5, 23</td>
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<tr>
<td>Molucca odorata</td>
<td>Stem latex</td>
<td>100</td>
<td>11</td>
<td>24</td>
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<tr>
<td>Mo-nardica charantia</td>
<td>Fruit</td>
<td>64.4</td>
<td>100</td>
<td>24</td>
<td>64</td>
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<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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<tr>
<td>Pentaxis arbortristis</td>
<td>Leaves</td>
<td>32.2</td>
<td>100</td>
<td>40</td>
<td>64</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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<tr>
<td>Pouteria foetida</td>
<td>Whole plant (excluding root)</td>
<td>44.8</td>
<td>50</td>
<td>40</td>
<td>72</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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<tr>
<td>Sonneratia anacardium</td>
<td>Fruits</td>
<td>38.6*</td>
<td>27</td>
<td>64</td>
<td>96</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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<tr>
<td>Milk decoction</td>
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<td>12</td>
<td>40</td>
<td>64</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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<tr>
<td>Sapindus trifoliatus</td>
<td>Pericarp</td>
<td>10</td>
<td>16</td>
<td>24</td>
<td>5, 23</td>
<td>3, 7, 8, 10, 12, 15, 22, 24</td>
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</tbody>
</table>

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

Tyrode solution in gum controls.
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 palosamin (6 ; yield 250-300 mg/kg) which produces in vitro death of Ascaris lumbricoides 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 palosamin. Thus, in the concentration (200 mg/ml) tried here, the alcoholic extract would approximately contain 1 mg palosamin 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 American (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.
Anthelmintic Action of Medicinal Plants

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 vermiligenous 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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REFERENCES


