EFFECT OF ANAGALLIS ARVENSIS PLANT AGAINST NATURAL INFESTATION OF SHEEP WITH FASCIOLA SP. 
A COMPARATIVE STUDY

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ABSTRACT □ The present work investigates the efficacy of oral administration of Anagallis arvensis plant in sheep naturally infested with Fasciola gigantica worms. Five apparently healthy and 5 infested animals were orally administered daily with powdered Anagallis arvensis plant (100 mg/kg b. wt.) for 14 days. Another 5 infested sheep were injected subcutaneously with a single dose of nitroxynil at a dose of 1 ml/ 25 kg b.wt.. Faecal, haematological and some biochemical parameters were performed before and 7, 14, 21 and 28 days after treatment. The results showed no viable eggs in the faeces at 7th day in infested sheep treated with Nitroxynil, meanwhile 60% and 80% reduction in egg count were recorded at 7th and 14th day respectively in infested sheep treated with the plant respectively. Haematological and biochemical results revealed a significant decrease in erythrocytic count, haemoglobin percent, haematocrit value, total proteins and albumin. There was an increase in the activities of serum Aspartate aminotransferase (AST), Alanine aminotransferase (ALT) in addition to leucocytosis, eosinophilia and monocytosis in sheep infested with Fasciola. These values returned to their normal values at 7th day post-treatment. No changes in the levels of calcium, inorganic phosphorus and creatinine in serum of all tested groups were observed. The plant administration displayed no adverse effects in the treated sheep.

INTRODUCTION

Worm infestation is considered one of the most important troubles of our domestic farm animals. Fascioliasis is one of the most dangerous problems among sheep and cattle in Egypt. Draz (1949) documented that a particular flock of 600 heads of sheep was reduced to 96 heads within two years because of fascioliasis. The number of sheep and goats in Egypt is 9.3 million heads and the treatment costs 4.6 million pounds per year against fascioliasis (Report of veterinary organization, 1992). The incidence of this disease in cattle and buffaloes ranged from 10-50% in dif-
ferent localities of the country (El- sherif et al., 1959; Ezzat et al., 1963 and Abdel- Rahman et al., 1977). There is no need to emphasize the adverse effect of liver fluke on the national economy and on the public health, the economic significance of this disease has largely been attributed to the tremendous loss of meat and milk production in addition to liver and may be meat condemnation in abattoirs (Euet et al., 1994). Human beings may also be accidentally infested when eating contaminated aquatic plants such as water-cress, and cases of chnric fascioliasis are periodically reported in different countries (Jones et al., 1977; Takeyama et al., 1988 and Bacq et al., 1991).

Anagallis arvensis L.sp. Latifolia is the blue species plant commonly present in Egypt as a small annual prostrate herb growing in wheat and clover fields, known in arabic as Ain El- Gamel, saboon elghelit, Qonfooda and Ommlebn (Halim et al., 1984), recently used as a molluscicide for control of intermediate hosts of schistosoma spp. and fasciola spp. (El- Sayed et al., 1990). This point attracted us to study its effect on fascioliasis in naturally infested sheep. The efficacy of the plant in comparison with the parenteral fasiolicide nitroxynil was also performed.

MATERIALS AND METHODS

(1) Plant : Anagallis arvensis L. SP. Latifolia (the blue species) was collected in March. The whole

plant was shade dried and powdered.

(2) Synthetic drug : Nitroxynil (Dovenix 25 %), Injectable solution. Rhone Merieux, France.

(3) Animals : A total of 15 Egyptian sheep aged from 18-30 months were used in the present study. The animals were housed and fed on ration of hay and concentrates, and water ad libitum. Of these sheep, 10 animals were naturally infested with Fasciola gigantica on faecal examination. Animals were grouped as follow.

Group I : 5 apparently healthy sheep were daily orally dosed with powdered Anagallis arvensis plant (100mg / kg b. wt.) for 14 days.

Group II : 10 fasciola infested sheep were experimented as :

(A) 5 animals daily treated orally by 100 mg powder plant / kg b.wt. for 14 days.

(B) 5 animals injected subcutaneously with a single dose of nitroxynil 25% (1ml / 25 kg b.wt.).

Sampling : Faecal samples were collected from the infested animals before and 7,14,21 and 28 days after treatment in small plastic bags. Floatation - sedimentation technique was adapted as described by Benbrooke and Sloss (1955). Identification of Fasciola eggs was based on the morphological characters as described by Yamaguti (1975). The degree of infestation was manifested by counting the eggs using the modified McMaster technique (Burger and Stoye, 1968). The efficacy of the crude plant and the drug was calculated on the basis of reduction in faecal egg count per gram faeces.
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Blood samples: From control and treated sheep blood was collected on E.D.T.A. (anticoagulant) for haematological studies. Another blood sample was collected in a centrifuge tube, left to clot and serum was separated for biochemical studies. All samples were collected pre and 7, 14, 21 and 28 days post treatment.

Haematological studies: Total leucocytic count (W. B. Cs), total erythrocytic count (RBCs), packed cell volume percent (PCV %), haemoglobin percent (Hb %) and differential leucocytic count were determined as described by Schalm (1979).

Clinical biochemistry: Serum values of Aspartate Aminotransferase (AST), and alanine aminotransferase (ALT), total proteins, Albumin, serum creatinine, inorganic phosphorus value and calcium were determined according to methods described by Reitman and Frankel (1957), Doumas (1975), Doumas et al. (1971), Husdan and Rapoport (1968), EL-Merzabani et al., (1977) and Gindler and King (1972) respectively.

Statistical analysis: The obtained results were statistically analysed using student "T" test according to methods described by Snedecor and Cochran, (1980).

RESULTS

The obtained results revealed that daily the oral administration of the dried Anagallis arvensis plant (100 mg / kg b. wt.) for 7 days in sheep produced 60 % reduction in Fasciola egg count. Anagallis arvensis produced 80% reduction in egg count when given for 14 days which persisted to the end of the experiment. Nitroxynil injected s/c at a dose of (1 ml/25kg b.wt.) to Fasciola infested sheep induced 100% reduction in egg count after 7 days of treatment. This effect persisted to the end of the experiment (Table 1). A significant decrease (P < 0.01) in RBCs, PCV % and Hb % was recorded in sheep infested with Fasciola. However, this decrease was alleviated after 14 days from the beginning of Nitroxynil injection or the plant administration (Table 2). Meanwhile, there was a significant increase (P < 0.01) in WBCs, eosinophils and monocytes in the infested sheep. This increase returned to the normal level after 7 days from Nitroxynil injection or powdered plant dosing (Table 3).

There was a significant increase in the activity of serum AST (P < 0.01), in addition to a significant decrease in total proteins (P < 0.01) (Table 4). These biochemical changes were normalized after 7 days. Albumin returned to the normal level after 14 days from the beginning of treatment with Nitroxynil or Anagallis arvensis plant. In the same time no changes were recorded in the serum levels of creatinine, calcium and inorganic phosphorus in all tested animals.

DISCUSSION

In the present study, the efficacy of powdered Anagallis arvensis L.SP. Latifolia (the blue species) against liver flukes infestation was studied. The oral administration of this plant de-

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Table (1): Comparative efficacy of Anagallis arvensis (whole dried plant) and Nitroxynil (Dovinex 25%) in sheep naturally infested with Fasciola gigantica.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Dose</th>
<th>Efficacy in percentage after</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>7th day</td>
</tr>
<tr>
<td>Anagallis arvensis</td>
<td>100 mg/kg b.wt daily for 14 days (orally)</td>
<td>60</td>
</tr>
<tr>
<td>Dovenix 25%</td>
<td>1 ml / 25 k g b. wt. s/c single dose</td>
<td>100</td>
</tr>
</tbody>
</table>
Table (2): Efficacy of oral and Fasciola infected sheep before and after 7, 14, 21 and 28 days of treatment with Anagallis arvensis.
<table>
<thead>
<tr>
<th>Group</th>
<th>Control Sheep</th>
<th>FecalS Inhaled Sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N = 6</td>
<td>N = 5</td>
</tr>
<tr>
<td>2</td>
<td>N = 10</td>
<td>N = 10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Before</th>
<th>After treatment with the plant (g)</th>
<th>After treatment with the plant (g)</th>
<th>Before</th>
<th>After treatment with the plant (g)</th>
<th>After treatment with the plant (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<td>2</td>
<td></td>
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</tbody>
</table>

Table (2): Leucogram of normal and Fecals infected sheep before and after 7' 14' 21' and 28 days of treatment with A. nigrum L. 

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Table (4): Some biochemical parameters in normal and Fasciola infested sheep before and after 7, 14, 21 and 28 days of treatment with Anagallis arvensis plant and nitrooxynil (Dovenix 25%).

<table>
<thead>
<tr>
<th>Group I: Normal sheep</th>
<th>Group II: Fasciola infested sheep</th>
<th>AS</th>
<th>ALT</th>
<th>Total proteins</th>
<th>Albumin</th>
<th>Globulins</th>
<th>Creatinine</th>
<th>Calcium</th>
<th>Inorganic phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before treatment</td>
<td>After administration</td>
<td>N = 5</td>
<td>N = 5</td>
<td>N = 5</td>
<td>N = 5</td>
<td>N = 10</td>
<td>N = 5</td>
<td>N = 5</td>
<td>N = 5</td>
</tr>
<tr>
<td>7th day</td>
<td>14th day</td>
<td>21th day</td>
<td>28th day</td>
<td>7th day</td>
<td>14th day</td>
<td>21th day</td>
<td>28th day</td>
<td>7th day</td>
<td>14th day</td>
</tr>
<tr>
<td>AST U/L</td>
<td>46.00 ± 2.61</td>
<td>45.40 ± 2.25</td>
<td>48.80 ± 2.67</td>
<td>47.00 ± 1.70</td>
<td>55.20 ± 1.41</td>
<td>39.4 ± 2.71</td>
<td>47.40 ± 1.81</td>
<td>44.00 ± 1.30</td>
<td>44.60 ± 1.85</td>
</tr>
<tr>
<td>ALT U/L</td>
<td>19.80 ± 0.86</td>
<td>21.00 ± 0.89</td>
<td>20.20 ± 0.37</td>
<td>22.40 ± 1.08</td>
<td>29.60 ± 1.12</td>
<td>21.2 ± 0.97</td>
<td>22.40 ± 1.70</td>
<td>21.60 ± 0.60</td>
<td>20.40 ± 0.76</td>
</tr>
<tr>
<td>Total proteins g %</td>
<td>6.91 ± 0.25</td>
<td>6.78 ± 0.13</td>
<td>6.67 ± 0.12</td>
<td>6.92 ± 0.29</td>
<td>6.85 ± 0.19</td>
<td>6.01 ± 0.26</td>
<td>6.26 ± 0.22</td>
<td>6.66 ± 0.09</td>
<td>6.98 ± 0.23</td>
</tr>
<tr>
<td>Albumin g %</td>
<td>3.89 ± 0.22</td>
<td>3.84 ± 0.15</td>
<td>3.67 ± 0.18</td>
<td>3.61 ± 0.11</td>
<td>3.68 ± 0.13</td>
<td>2.86 ± 0.16</td>
<td>3.08 ± 0.23</td>
<td>3.27 ± 0.23</td>
<td>3.43 ± 0.20</td>
</tr>
<tr>
<td>Globulins g %</td>
<td>3.03 ± 0.15</td>
<td>2.94 ± 0.16</td>
<td>3.01 ± 0.21</td>
<td>3.31 ± 0.13</td>
<td>3.17 ± 0.20</td>
<td>3.14 ± 0.16</td>
<td>3.18 ± 0.23</td>
<td>3.39 ± 0.23</td>
<td>3.15 ± 0.14</td>
</tr>
<tr>
<td>Creatinine mg %</td>
<td>0.64 ± 0.04</td>
<td>0.63 ± 0.04</td>
<td>0.65 ± 0.03</td>
<td>0.62 ± 0.07</td>
<td>0.61 ± 0.02</td>
<td>0.66 ± 0.02</td>
<td>0.66 ± 0.02</td>
<td>0.59 ± 0.03</td>
<td>0.57 ± 0.07</td>
</tr>
<tr>
<td>Calcium mg %</td>
<td>10.37 ± 1.09</td>
<td>9.82 ± 0.91</td>
<td>9.67 ± 0.29</td>
<td>10.00 ± 0.36</td>
<td>10.50 ± 1.56</td>
<td>10.61 ± 0.65</td>
<td>10.15 ± 0.87</td>
<td>9.12 ± 0.57</td>
<td>9.39 ± 0.75</td>
</tr>
<tr>
<td>Inorganic phosphorus mg %</td>
<td>4.46 ± 0.42</td>
<td>5.08 ± 0.39</td>
<td>5.03 ± 0.24</td>
<td>4.88 ± 0.22</td>
<td>4.70 ± 0.22</td>
<td>4.57 ± 0.37</td>
<td>4.71 ± 0.31</td>
<td>4.72 ± 0.20</td>
<td>5.35 ± 0.49</td>
</tr>
</tbody>
</table>

* P < 0.05  
** P < 0.01  
*** P < 0.001
sed egg count in the faeces by 60% when given for 7 days and 80% when given for 14 days. Nitroxynil injection induced 100% reduction in the egg count after 7 days of treatment. The obtained results concerning the effect of nitroxynil are compatible with those reported by Zeigler, (1979); Islam and samad, (1990); and Abdel wahed et al., (1997) who reported that the efficacy of nitroxynil was 100% against mature and immature liver flukes when given parenterally to infected cattle. The reported reduction in faecal egg count induced by Anagallis arvensis might be attributed to the depressant effect of the plant on oogenesis in the flukes, a finding which needs further studies in vitro and in vivo.

The improvement of blood picture of infected sheep after administration of the powdered plant or injection of Nitroxynil was previously reported by Haroun and Hussein, (1975); Kumar et al., (1982); and Abdel wahed et al., (1997). They reported an increase in RBCs count, PCV % and Hb % with a decrease in WBCs, eosinophils and monocytes after injection of Nitroxynil this result may be due to the fasciolicidal effect of the plant or Dovenix and the elimination of flukes and consequently the stoppage of liver damage and recovery of liver cells.

The decrease in RBCs count , PCV % and Hb concentration in sheep infested with Fasciola is in accordance with Spengler and Lseroff, (1981); coffin et al., (1984) and Lopez et al., (1994) who attributed this anemia to fluke hematophagia , proline - induced haemolysis and the significant reduction in liver cytochrome P 450 and increased haeme oxygenase. The increase in WBCs, eosinophils and monocytes in fascioliass coincides with Coles, (1980); Kumar et al., (1982) and Abdel-wahed et al., (1997) who reported that the increase may be due to parasitism and damaged liver cells.

The improvement in the activities of serum AST and ALT and the levels of total proteins and albumin after treatment of fascioliass with Anagallis arvensis or Nitroxynil was recorded . Such results agreement with that of Degheidy et al., (1990) after using of Dovenix 25 % in combating cattle fascioliass .

The elevated activities of serum AST and ALT with hypoproteinemia and hypoalbuminemia in Fasciola infested sheep, give a reference to liver damage and dysfunction is in concomitant with Haroun and Hussein (1975); Kumar et al., (1982) and Eissa, (1997) who revealed a significant rise in the activities of AST and ALT with a fall in serum total proteins and albumin in animals infested with Fasciola. Moreover, our results are confirmed by Lopez et al.,(1994) who reported an increase in total, direct and indirect bilirubin, elevation in hepatic haeme oxygenase and lowered liver cytochrome P 450 concentration in rats infested with Fasciola. Also Kaneko (1980) mentioned that the liver is the sole site of albumin synthesis and hypoalbuminemia is an important feature of chronic liver disease and chronic inflammatory disease. He also mentioned that elevations in ALT in sheep occur from hepatic necrosis.

It could be concluded that Anagallis arvensis
L. S. P. Latifolia (the blue species) induced a marked reduction of faecal egg counts of sheep infested with fascioliasis, a finding which needs further studies. Nitrocynil was efficient in treating sheep infested with fascioliasis.

REFERENCES

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