Immunological And Biochemical Changes In Draft Horses Naturally Infested With Gastrointestinal Nematodes With Trail Of Treatment With Fenbendazole In Sharkia Governorate

Nasr, SS¹, Neesren A Shawky² Aly Salah, ABS³ and Hussen E M⁴
(Parasitology¹ and Biochemistry (², ³ & ⁴) departments)
Animal Health Research Institute (Zagazig (¹, ² & ³) and Kafer El-Sheik² Branches)

ABSTRACT

This study is done to clarify some adverse effects of gastrointestinal nematodes on immunological and biochemical status of draft horses and modulating by fenbendazole. Parasitological examination of 50 faecal samples revealed presence of gastrointestinal nematodes eggs in 38 (76%), horses distributed according to age <1 year 15 (39.47%), >1-4 years 13 (34.21%), > 4-10 years 10 (26.32%), the type of infestations were single 12(31.58%) or mixed 26 (68.42%). The single infestation were Strongylus spp 6 (15.79 %), Parascaris equorum, 4 (10.53 %), Oxyuris equorum 2(5.26%) while mixed infestation were Strongylus spp with Parascaris equorum 7 (18.42%), Parascaris equorum with Oxyuris equorum 5(13.16 %) and Strongylus spp with Parascaris equorum with Oxyuris equorum 14 (36.84%). The treatment with Fenbendazole revealed 100% reduction in egg count/gm on day 9 post treatment.

Gastrointestinal nematodes induce leukocytosis, neutrophilia, eosinophilia, monocytosis insignificant rise in lymphocytes, γ, β, total globulin beside insignificant decrease in α globulin and A/G ratio coupled with significant rise in AST, ALT, urea, creatinine and significant reduction in T.protein, albumin, ALP, trace elements (selenium, copper, iron and zinc) compared with healthy horse.

The present study revealed that fenbendazole had a non significant effect on total and differential leukocytic count and biochemical parameters in healthy draft horses.

In conclusion, the present study showed that gastrointestinal nematodes induce some adverse effects on immune status and biochemical parameters. Those effects were returned to the normal levels at 15 days post treatment with fenbendazole.

INTRODUCTION

In the past and up till now especially in Egypt, equines did not receive much attention from scientists as compared with other species of animals and many findings about equines are still with unsettled results (1). Equines have the largest collection of parasites of all domestic livestock. These parasites cause damage to the animals both during infection phase and during larval emerged and developed fully to adult parasites (2). Parasitic infestation may be induces alteration in protein absorption ending with hypoproteinaemia (3).

Parasitic infestation may abolish immune system (4). Internal parasites adversely affect health status of horse inducing emaciation and decrease body weight (5) and also several diseases in animals (6). Immature worms migrating through body tissues open the way for bacteria to enter, causing some diseases (7).

Benzimidazole anthelmintic groups are widely used in veterinary medicine against trematode and GI parasites (8). Benzimidazoles have ovicidal effect. It acts by inhibiting the uptake of glucose in the parasite.
Nasr et al.,

(9). Fenbendazole is a member of the benzimidazole group of anthelmintics (10).

The objective of the present work was to evaluate the effect of gastrointestinal nematodes on immune state and some biochemical parameters in draft horses.

MATERIAL AND METHODS

Drugs

Fenbendazole (pancuron peste) produced by Intervet Company as syrings, each syring contains 24 gm (each 1 gm contain 187.5 mg fenbendazole) used in a dose of 7.5 mg /kgm body weight orally.

Animals

This study was carried out on 50 draft horses of different ages and sex from different localities in Sharkia Province. Faecal samples from all horses were collected and examined parasitolagically for identification of gastrointestinal nematodes (11).

Experimental design

Post parasitological examination, 20 horses were used in this investigation. They were divided into 4 groups (5 each). 1st group as healthy non infested (control), 2nd group healthy horses treated with one dose of fenbendazole (7.5 mg/Kg b.wt.), 3rd group infested with gastrointestinal nematodes did not receive treatment while 4th group infested with gastrointestinal nematodes treated with one dose of fenbendazole (7.5 mg/Kg b.wt.).

Faecal samples

Before and at 1st, 3rd, 6th, 9th and 12th day post treatment faecal samples were collected from rectum in labeled bags and transported to laboratory for parasitological examination by flotation technique (11). Eggs of gastrointestinal nematode were identified morphologically (12) and faecal culture were performed for larval identification (13).

Shedding of eggs/gram of faeces was examined by Modified McMaster egg counting (14). Efficacy % of anthelmintics was calculated on the basis of reduction in egg/gram post treatment (15).

Faecal egg count rate (FECR %) =

\[
\text{Pre-treatment EPG} - \text{Post-treatment EPG} \times 100
\]

Pretreatment EPG

Blood samples

Before and at 1st, 7th & 15th day post treatment 2 blood samples were collected from all horses. 1st sample was collected in tube contains EDTA for estimation of leukogram picture (16). 2nd one was taken for estimation of total protein (17), serum protein fractions were estimated (18). Transaminases (AST and ALT) (19), ALP (20), creatinine (21), urea (22), some trace elements (23) were determined.

Statistical analysis

The obtained data were statistically (T test) analyzed (24).

RESULTS AND DISCUSSION

The current study revealed, 38 (76%) out of 50 examined samples were infested with gastrointestinal nematodes, this infection was age depended as they found infection in horses <1 years was 15 (39.47%), >1-4 year were 13 (34.21%) and > 4-10 year were 10 (26.32%) (Table, 1). The same observation was recorded (25) who found that young horses susceptible to nematodes more than adult horses.
Table 1. Parasitological examination of faecal samples for gastrointestinal nematodes of draft horses different ages

<table>
<thead>
<tr>
<th>No. of examined faecal samples</th>
<th>+ve samples</th>
<th>-ve samples</th>
<th>Prevalence of +ve sample according to horse age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>50</td>
<td>38</td>
<td>76.00</td>
<td>12</td>
</tr>
</tbody>
</table>

Infestation with gastrointestinal nematodes in our study may be single 12 (31.58%) or mixed 26 (68.42%). Single infestation distributed as (Strongylus spp 6 (15.79%) parascaris equorum, 4 (10.53%) and oxyuris equorum 2 (5.26%)) or mixed, (double) 26 (68.42%) {Strongylus spp with parascaris equorum 7 (18.42%), parascaris equorum with oxyuris equorum 5 (13.16%)}. The mixed, (triple) strongylus spp with parascaris equorum and oxyuris equorum 14 (36.84%) (table, 2). Nearly same prevalence for gastrointestinal nematodes in horse in Sharkia Province (63%) was recorded (26). Mixed infection of gastrointestinal nematodes is most common in horses (27).

Table 2. Prevalence of single and mixed infestation with gastrointestinal nematodes in draft horses

<table>
<thead>
<tr>
<th>No. of +ve samples</th>
<th>Prevalence of +ve samples according type of infestation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>single infestation</td>
</tr>
<tr>
<td></td>
<td>T.number</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>38</td>
<td>12</td>
</tr>
</tbody>
</table>

Str = Strongylus spp  Para = Parascaris equorum  Oxy = Oxyuris equi

Fig. 1.
A) Egg of Oxyuris equi 40 X  
B) Egg of strongylus spp. X40  
C) Eggs of Parascaris equorum X40

Fig. 2.
A) female of Oxyuris equi 40 X  
B) Larvae of Strongylus spp. X40
Nasr et al.,

The healthy horses that received fenbendazole in a dose of 7.5 mg/Kg b.wt. induced a non significant effect in total and differential leukocytic count, protein picture, trace elements, liver enzymes, urea and Creatinine. Similar result was recorded previously (28) they stated that benzimidazol member not induces any toxic effect in dogs at dose below 10 mg/kg bw/day.

In this study, fenbendazole induce 100% faecal egg count reduction at day 9 post treatment, which agreed (29) who found fenbendazol has 100% efficacy against gastrointestinal nematodes at day 10 post treatment in horses. Fenbendazole was effective against Strongylus spp (30). Albendazole induce 100% reduction of gastrointestinal nematodes egg/gm at day post treatment in donkey (31). No gastrointestinal nematodes eggs at 10 day post use albendazole (32).

Table 3. Efficacy of fenbendazol against gastrointestinal nematodes in naturally infested draft horse (n=5)

<table>
<thead>
<tr>
<th>Pre treatment</th>
<th>Faecal egg count/ gram</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st day</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>G1</td>
<td>00</td>
</tr>
<tr>
<td>G3</td>
<td>989.93</td>
</tr>
<tr>
<td>±9.16</td>
<td>±9.32</td>
</tr>
<tr>
<td>G4</td>
<td>1052.37</td>
</tr>
<tr>
<td>±7.28</td>
<td>±6.80</td>
</tr>
</tbody>
</table>

Our study revealed leukocytosis, neutrophilia, eosinophilia, monocytosis beside an insignificant rise in lymphocytes in horses infested with gastrointestinal nematodes (table, 4). Same results were recorded (33) in horses infected with strongylus. Leukocytosis in horse infected with gastrointestinal nematodes may be due to inflammation in intestinal wall (34). Same finding was obtained (35) who found that gastrointestinal nematodes induce eosinophilia due to chronic inflammatory parasitism and harmful effect of toxins produced by parasites on the hemopoietic system. This eosinophilia may be due to chemotactic factors produced by parasites (36). Also, gastrointestinal nematodes in horse induces neutrophilia and monocytosis (37). These changes in leukogram may be due to destructive effective of the parasite on the epithelial cells of the gastrointestinal tract walls (38).

Table 4. Effect of gastrointestinal nematodes and treatment on leukogram of draft horse (n=5)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control group</th>
<th>Healthy fenbendazole treated</th>
<th>Diseased</th>
<th>Day post treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLC(10^5)</td>
<td>9.67±0.26</td>
<td>9.86±0.68</td>
<td>10.86±0.33*</td>
<td>10.60±0.24*</td>
</tr>
<tr>
<td>Neutrophils</td>
<td>3.83±0.09</td>
<td>3.86±0.20</td>
<td>4.13±0.10*</td>
<td>4.10±0.08*</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>3.23±0.13</td>
<td>3.27±0.23</td>
<td>3.33±0.12</td>
<td>3.26±0.06</td>
</tr>
<tr>
<td>Eosinophils</td>
<td>1.03±0.08</td>
<td>1.05±0.17</td>
<td>1.38±0.10*</td>
<td>1.32±0.05*</td>
</tr>
<tr>
<td>Basophils</td>
<td>0.47±0.12</td>
<td>0.50±0.08</td>
<td>0.57±0.07</td>
<td>0.54±0.04</td>
</tr>
<tr>
<td>Monocyte</td>
<td>1.11±0.07</td>
<td>1.18±0.12</td>
<td>1.45±0.12*</td>
<td>1.38±0.10*</td>
</tr>
</tbody>
</table>

*Significant at p < 0.05
Analysis of serum protein of horses infested with gastrointestinal nematodes revealed a significant decrease in protein, albumin beside insignificant decrease in $\alpha$ globulin, A/G ratio coupled with insignificant rise in $\beta$, $\gamma$ and total globulin (Table 5). Same result was obtained in stallion (39). Gastrointestinal nematodes induce significant decrease in protein, albumin and insignificant decrease in $\alpha$ globulin and A/G ratio (40). Parasitic infection led to reduction feed intake and absorption of required nutrients (41). Nematode induces enteritis and villous atrophy which leads to decrease absorption of nutrient, total protein and albumin (42) beside albumin leakage from damaged blood vessel due to its small molecular weight (35). and gastrointestinal nematodes induces anorexia and inability of the gut to absorb protein finally led reduction total protein and albumin (5). Strongyles induce insignificant elevation in $\gamma$ and total globulin (43). Moreover, gastrointestinal nematodes in horse induce insignificant increase in $\beta$ globulins (44). Rise in $\gamma$ and total globulin may be due to nematodes infestation and its inflammation (11).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Healthy Non treated (control)</th>
<th>Healthy fenbendazole treated</th>
<th>Non treated</th>
<th>Disease</th>
<th>Day post treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
</tr>
<tr>
<td>T. protein (g/dl)</td>
<td>7.50 ±0.41</td>
<td>7.60 ±0.85</td>
<td>5.95±0.45*</td>
<td>6.15±0.30*</td>
<td>6.93±0.58</td>
</tr>
<tr>
<td>Albumin (g/dl)</td>
<td>4.20 ±0.53</td>
<td>4.34 ±0.74</td>
<td>2.53±0.45*</td>
<td>2.60±0.41*</td>
<td>3.70±0.33</td>
</tr>
<tr>
<td>$\alpha$</td>
<td>1.05±0.09</td>
<td>1.01±0.09</td>
<td>1.00±0.10</td>
<td>1.03±0.11</td>
<td>1.07±0.12</td>
</tr>
<tr>
<td>Globulin $\beta$</td>
<td>0.99±0.10</td>
<td>0.95±0.10</td>
<td>1.15±0.22</td>
<td>1.13±0.09</td>
<td>1.12±0.13</td>
</tr>
<tr>
<td>$\gamma$</td>
<td>1.26±0.08</td>
<td>1.30±0.08</td>
<td>1.45±0.21</td>
<td>1.39±0.16</td>
<td>1.51±0.18</td>
</tr>
<tr>
<td>Total A/G Ratio</td>
<td>3.30±0.23</td>
<td>3.26±0.23</td>
<td>3.60±0.42</td>
<td>3.55±0.37</td>
<td>3.50±0.33</td>
</tr>
</tbody>
</table>

*Significant at p < 0.05

The present investigation revealed a significant increase in AST, ALT, creatinine and urea beside a significant decrease in alkaline phosphatase in horse infected with gastrointestinal nematodes (Table 6). Same results were recorded in stallion (39). Gastrointestinal nematodes induce rise in urea and creatinine in animals (45). Reduction in activity of alkaline phosphatase due to infection with gastrointestinal nematodes may be due to epithelial tissues damage of the intestinal walls by the parasites and their toxins (46).

In our study gastrointestinal nematodes induces a significant decrease in serum selenium, copper, iron and zinc in horses (Table, 6). Similar results were reported (47) in horses infected with gastrointestinal nematodes. Strongyles and parasites equorum cause inflammation of mucosa of intestine and diarrhoea leading to malabsorption of nutrients lead to decrease in serum trace elements (48). These changes may be due to gastrointestinal nematodes have deleterious effects on host nutritional status leading to nutritional deficiency (49). Also, gastrointestinal nematodes interfere with copper absorption by increasing PH of gastrointestinal tract (50). Deficiency of a single trace element among animals occurred rarely in field, while combinations of several minerals deficiency are common (51).
Table 6. Effect of gastrointestinal nematodes and treatment on some biochemical parameters of draft horse (n=5)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Healthy non treated (control)</th>
<th>Healthy fenbendazole treated</th>
<th>Non treated</th>
<th>Day post treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST (U/L)</td>
<td>189.06±1.65</td>
<td>180.14±0.97</td>
<td>194.31±1.41*</td>
<td>193.42±1.01*</td>
</tr>
<tr>
<td>ALT (U/L)</td>
<td>17.22±0.48</td>
<td>18.06±0.86</td>
<td>19.02±0.37 *</td>
<td>18.83±0.34 *</td>
</tr>
<tr>
<td>ALP (U/L)</td>
<td>168.20±0.98</td>
<td>169.41±1.83</td>
<td>164.31±0.92*</td>
<td>164.90±0.68*</td>
</tr>
<tr>
<td>Urea (mg/dL)</td>
<td>14.17±0.90</td>
<td>14.47±0.69</td>
<td>18.07±0.92*</td>
<td>17.25±0.74*</td>
</tr>
<tr>
<td>Creatinine (mg/dL)</td>
<td>1.95±0.32</td>
<td>2.05±0.42</td>
<td>2.97±0.16 *</td>
<td>2.85±0.19 *</td>
</tr>
<tr>
<td>Selenium (ug/100ml)</td>
<td>16.08±0.89</td>
<td>16.73±0.55</td>
<td>13.61±0.44*</td>
<td>14.15±0.32*</td>
</tr>
<tr>
<td>Copper (ug/dl)</td>
<td>99.21±0.83</td>
<td>99.59±0.61</td>
<td>95.47±0.94*</td>
<td>96.06±0.81*</td>
</tr>
<tr>
<td>Iron (mg/dL)</td>
<td>81.22±1.42</td>
<td>82.42±0.76</td>
<td>75.21±1.43*</td>
<td>77.35±1.10*</td>
</tr>
<tr>
<td>Zinc (ug/dl)</td>
<td>64.16±1.09</td>
<td>65.53±0.95</td>
<td>60.01±0.87*</td>
<td>61.21±0.59*</td>
</tr>
</tbody>
</table>

*Significant at p < 0.05

Treated diseased horse with fenbendazole showed improvement in leukogram and biochemical parameters at 15th day post treatment. Significant improvement in the hemato-biochemical parameters in horses infected with gastrointestinal nematodes and treated with Mebendazole were recorded by (1).

It could conclude that gastrointestinal nematodes in horse induce adverse effect on immune status and biochemical parameters. These adverse effects were returned to normal levels 15th days post treatment by fenbendazole.

REFERENCES

10. Gokhulut C, Akar F and Mckellar Q (2005): Excretion of fenbendazole and


34. Doxey D (1983): Clinical pathology and diagnostic procedure 2nd Ed Bailliere


المنشور العربي
التغييرات المناعية والبيوكيميائية في خيول الجر المصابة طبيعة
بالطفيليات الإسطوانية المعوية مع محاولة العلاج بالفيدنيدازول بمحافظة الشرقية

سامى شوقي محمد السيد نصر

أبهاب محمد حسين

أقسام الطفيليات والكيمياء (1،3،4)
معهد بحوث صحة الحيوان (فرع الزقازيق) (1،5،6،7)
وكفر الشيخ،

استهدفت هذه الدراسة معرفة أهم الفيدنيدازول في علاج الإصابة بالإيدن الإستوائي في عدد من الخيول، وذلك بدراسة تأثيرات الفيدنيدازول على عدد الخلايا المناعية لدى الخيول المصابة. وشملت الدراسة على عدد من الخيول من النوع العربي والأنجليزي. وجدت النتائج أن الفيدنيدازول هو علاج فعال للخلية المناعية في الخيول المصابة، وقد أثبت الفيدنيدازول فعاليته أكثر من العلاجات الأخرى. لذلك، فإن الفيدنيدازول يشكل علاجًا فعالًا في علاج الإصابة بالإيدن الإستوائي في الخيول.