EFFECT OF TRICHINELLA SPIRALIS INFECTION ON SOME DIAGNOSTIC INDICES IN DOGS

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Abstract

Ten parasite free dogs were grouped into 2 groups:

Group I, a negative control and Group II, infected with 5000 T. spiralis larvae / each dog. Trichinella spiralis infected dogs under study became off food, and diarrhoeic by the 2nd up to the 7th day post-infection. Vomiting has been observed in one of the infected dogs. Fever was recorded on the 2nd up to the 21st day post-infection.

The main blood changes were significant decrease in haemoglobin concentration (7th – 21st days P.I.) and mean corpuscular haemoglobin concentration (MCHC) by the 7th day P.I. together with a significant increase in total eosinophil and leucocyte counts (4th – 21st days P.I.).

Serum biochemical alterations were detected on the 7th day up to the 28th day P.I. (end of experiment) depending on the test used. Serum biochemical changes included a significant decrease in total serum proteins, albumin, urea and creatinine concentrations, together with increased serum globulin concentration and serum ALT activity levels.

It could be concluded that, blood and serum diagnostic indices are supplementary tests during vague trichinosis symptoms.

INTRODUCTION

Trichinosis is a cyclozoontic disease characterized by three successive stages: [1] intestinal, [2] muscle invasion, and [3] convalescence (Beaver & Jung, 1984). The clinical signs which accompany trichinosis of man and animals, are very variable and may simulate those of a variety of other diseases. They include, diarrhoea, fever, retroperitoneal pain, dyspnoea, pain of affected muscles, depression and sometimes oedema of the face (Soulsby, 1982, Beaver & Jung, 1984 and Bowman et al., 1991).

Few of the reviewed literatures dealt with the clinical signs, haematological and serum biochemical changes accompanying dog trichinosis. Among them were Bowman, (1991) and Reina, et al. (1989), who detected minor signs of gastrointestinal upset, a slight eosinophilia and detectable alterations in plasma protein levels during the course of experimental trichinosis in dogs.
The present report aimed at studying the effect of *T. spiralis* infection on some haematological diagnostic indices.

**MATERIALS AND METHODS**

**Material**

1. **Animals**

   Ten mongrel pups, less than two months old were separated from their mothers and kept individually in sufficiently clean-screened bottom-wire cages, on hygienic nutritious diets. Faecal and blood samples were examined parasitologically over two months period to ensure that they are parasite-free. The dogs were grouped into two groups (each of five).

   - Group I : Negative control.
   - Group II : *T. spiralis* infected.

2. **Trichinella spiralis larvae**

   *T. spiralis* larvae were obtained from the digested diaphragms of infected pigs according to the method described by Nabilh, (1978).

**Parasitological Examination**

Faecal and blood samples were examined according to the methods described by Allen and Ridley (1970) and Coles (1986).

Infecive *T. spiralis* larvae obtained from the diaphragms of infected pigs were collected, maintained and propagated in white rats according to the methods described by Nabilh, (1978). Collected *T. spiralis* larvae were suspended in 20% gelatin saline (37°C). After a thorough mixing, 0.1 ml of the suspension was spread onto a microscope slide and the whole larvae were counted to determine the appropriate infective dose (Mikhail and Tadros, 1973). A minimum of three counts were made to determine the mean count / 0.1 ml of suspension. Dogs of the IInd group received 5000 larvae / each dog via a stomach tube.

Blood samples were collected from all dogs 5 days before the infection procedure and on the 4th, 7th, 15th, 21st and 28th days post-infection (P.I.) of the IInd group. Whole blood samples were examined for haemoglobin concentration, packed cell volume, total eosinophils and leukocyte counts according to the methods described by...

Serum samples, were used for the determination of total proteins according to Hoffmann and Richterich (1970), albumin and globulins (Doumas, et al., 1971), Urea (Patton and Crouch, 1977), creatinine (Henry, 1974) and aminotransferases (ALT and AST) according to Reitman and Frankel, (1957).

Data was analyzed statistically using the Student's t-test, and differences between means were considered significant at p-value less than 0.05.

RESULTS

The observed clinical signs of acute trichinosis among infected dogs, under study, included rise of body temperature by the 2nd up to the 21st day post-infection, dogs became off food and diarrhosis by the 3rd up to the 7th day post-infection. Vomiting has been observed in one of the infected dogs. Blood and serum changes during acute trichinosis, were presented in Tables 1, 2, 3 and 4.

DISCUSSION

The observed clinical signs of acute trichinosis among infected dogs under study, were similar to the clinical symptoms of acute trichinosis of man and animals recorded by Vaslinin (1983), Beaver and Jung (1984), Koiof’tsev et al. (1987) and Bowman et al. (1991).

Data presented in Table 1, showed significant decrease in haemoglobin concentration, among T.spiralis infected dogs, between the 7th – 21st days post-infection (P.I.) together with a significant decrease in mean corpuscular haemoglobin concentration (MCHC) by the 7th day P.I. The decreased haemoglobin and MCHC in T.spiralis infected dogs, under study, are in complete agreement with Curca et al. (1996) findings, and could be attributed to the decreased iron absorption through the degenerated intestinal mucosa (Reina et al., 1989) and the lowered liver iron levels in T.spiralis infection, recorded by Theodoropoulos and Greve (1986).

Data presented in Table 2 points to a significant increase in leukocyte and total eosinophil counts of T.spiralis infected dogs under study. Eosinophilia together with leukocytosis, observed between the 4th – 21st days P.I., are in general agreement with the findings recorded by Vaslinin (1983), Figallová and Prokopíć (1998), Soffar (1990) and Bowman et al. (1991). The observed eosinophilia and leukocytosis, among
Table 1. Haemoglobin, Packed Cell Volume and Mean Corpuscular Haemoglobin Concentration (mean ± S.E.) in Free and *T. spiralis* Infected Dogs.

<table>
<thead>
<tr>
<th>Time</th>
<th>Haemoglobin (g/dl)</th>
<th>P.C.V. (%)</th>
<th>M.C.H.C. (g/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G. I (n = 5)</td>
<td>G. II (n = 5)</td>
<td>G. I (n = 5)</td>
</tr>
<tr>
<td>Pre-infection</td>
<td>13.5 ± 0.12</td>
<td>13.6 ± 0.10</td>
<td>41.6 ± 1.40</td>
</tr>
<tr>
<td>4th d. P.I.</td>
<td>13.6 ± 0.11</td>
<td>13.4 ± 0.12</td>
<td>41.5 ± 1.05</td>
</tr>
<tr>
<td>7th d. P.I.</td>
<td>13.6 ± 0.21</td>
<td>12.1 ± 0.42</td>
<td>42.3 ± 0.63</td>
</tr>
<tr>
<td>15th d. P.I.</td>
<td>13.6 ± 0.28</td>
<td>11.6 ± 0.30</td>
<td>42.6 ± 1.65</td>
</tr>
<tr>
<td>21st d. P.I.</td>
<td>13.5 ± 0.19</td>
<td>12.5 ± 0.16</td>
<td>43.4 ± 1.63</td>
</tr>
<tr>
<td>28th d. P.I.</td>
<td>13.6 ± 0.16</td>
<td>13.8 ± 0.16</td>
<td>42.1 ± 1.48</td>
</tr>
</tbody>
</table>

Table 2. Total Leukocyte and Total Eosinophil Counts (mean ± S.E.) in Free and *T. spiralis* Infected Dogs.

<table>
<thead>
<tr>
<th>Time</th>
<th>Leukocyte Count (cell/µl)</th>
<th>Eosinophil Count (cell/µl)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G. I (n = 5)</td>
<td>G. II (n = 5)</td>
</tr>
<tr>
<td>Pre-infection</td>
<td>9990 ± 388</td>
<td>10150 ± 575</td>
</tr>
<tr>
<td>4th d. P.I.</td>
<td>10140 ± 375</td>
<td>12710** ± 727</td>
</tr>
<tr>
<td>7th d. P.I.</td>
<td>10290 ± 350</td>
<td>14880*** ± 1087</td>
</tr>
<tr>
<td>15th d. P.I.</td>
<td>9660 ± 293</td>
<td>11590** ± 532</td>
</tr>
<tr>
<td>21st d. P.I.</td>
<td>10210 ± 270</td>
<td>13770*** ± 978</td>
</tr>
<tr>
<td>28th d. P.I.</td>
<td>9690 ± 419</td>
<td>10660 ± 276</td>
</tr>
</tbody>
</table>

Dog eosinophilia > 750 cell/µl blood (Coles, 1986)

* = Significant at P < 0.05    ** = Significant at P < 0.02
*** = Significant at P < 0.05
Table 3. Total Blood Proteins, Albumin and Globulins concentrations (mean ± S.E.) in Free and T.spiralis Infected Dogs.

<table>
<thead>
<tr>
<th>Time</th>
<th>Total Proteins (g/dl)</th>
<th>Albumin (g/dl)</th>
<th>Globulins (g/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-infection</td>
<td>8.76 ± 0.23</td>
<td>7.12 ± 0.17</td>
<td>3.70 ± 0.08</td>
</tr>
<tr>
<td>4th d. P.I.</td>
<td>7.18 ± 0.22</td>
<td>6.92 ± 0.30</td>
<td>3.02 ± 0.15</td>
</tr>
<tr>
<td>7th d. P.I.</td>
<td>7.22 ± 0.15</td>
<td>6.14***</td>
<td>3.96 ± 0.14</td>
</tr>
<tr>
<td>15th d. P.I.</td>
<td>7.44 ± 0.15</td>
<td>7.48 ± 0.07</td>
<td>3.94 ± 0.15</td>
</tr>
<tr>
<td>21st d. P.I.</td>
<td>7.36 ± 0.15</td>
<td>7.12 ± 0.22</td>
<td>3.80 ± 0.17</td>
</tr>
<tr>
<td>25th d. P.I.</td>
<td>7.14 ± 0.15</td>
<td>7.15 ± 0.24</td>
<td>3.88 ± 0.11</td>
</tr>
</tbody>
</table>

Table 4. Urea, Creatinine, ALT and AST Serum Concentrations (mean ± S.E.) in Free and T.spiralis Infected Dogs.

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G. I</td>
<td>15.9 ± 1.9</td>
<td>20.8 ± 1.1</td>
<td>23.1 ± 0.9</td>
<td>23.6 ± 2.5</td>
<td>21.4 ± 2.1</td>
<td>21.1 ± 1.3</td>
</tr>
<tr>
<td>Urea</td>
<td>G. II</td>
<td>15.1 ± 1.3</td>
<td>17.5 ± 1.1</td>
<td>8.7*** 1.5</td>
<td>8.6*** 0.8</td>
<td>22.8 ± 1.4</td>
<td>24.0 ± 2.5</td>
</tr>
<tr>
<td>(mg/dl)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creatin.</td>
<td>G. I</td>
<td>0.82 ± 0.06</td>
<td>0.84 ± 0.06</td>
<td>0.80 ± 0.06</td>
<td>0.78 ± 0.04</td>
<td>0.80 ± 0.06</td>
<td>0.75 ± 0.02</td>
</tr>
<tr>
<td>(mg/dl)</td>
<td>G. II</td>
<td>0.77 ± 0.01</td>
<td>0.80 ± 0.03</td>
<td>0.84*** 0.03</td>
<td>0.69*** 0.01</td>
<td>0.76 ± 0.04</td>
<td>0.74 ± 0.03</td>
</tr>
<tr>
<td>ALT</td>
<td>G. I</td>
<td>32.2 ± 2.2</td>
<td>29.2 ± 2.5</td>
<td>32.1 ± 2.6</td>
<td>27.8 ± 1.7</td>
<td>28.9 ± 1.9</td>
<td>32.5 ± 2.9</td>
</tr>
<tr>
<td>(U/ml)</td>
<td>G. II</td>
<td>36.9 ± 2.5</td>
<td>41.2** 2.8</td>
<td>35.9 ± 1.3</td>
<td>45.8*** 4.1</td>
<td>47.2** 5.1</td>
<td>39.9 ± 1.1</td>
</tr>
<tr>
<td>AST</td>
<td>G. I</td>
<td>31.3 ± 2.9</td>
<td>30.9 ± 1.6</td>
<td>30.5 ± 2.2</td>
<td>26.9 ± 2.7</td>
<td>29.6 ± 1.2</td>
<td>29.1 ± 2.8</td>
</tr>
<tr>
<td>(U/ml)</td>
<td>G. II</td>
<td>32.3 ± 1.9</td>
<td>30.6 ± 2.4</td>
<td>94.8 ± 1.2</td>
<td>29.6 ± 0.9</td>
<td>40.8 ± 6.1</td>
<td>39.8 ± 4.1</td>
</tr>
</tbody>
</table>

* = Significant at P < 0.05
** = Significant at P < 0.02
*** = Significant at P < 0.01
*T. spiralis* infected dogs, represent a body reaction to the invasive stages of the parasite within the infected dogs under study.

Table 3 demonstrates a significant decrease in serum total proteins on the 7th day P.I. of the *T. spiralis* infected dogs under study. Significant decrease in serum albumin together with a significant increase in serum globulins was detected between the 21st – 28th day P.I.

The detected alterations in serum proteins, among *T. spiralis* infected dogs under study, are in general agreement with the findings recorded by Przyjalkowski and Wolf-Golabeck (1985) and Reina et al. (1989). The decreased serum total proteins detected by the 7th day P.I. of the *T. spiralis* infected dogs, could be attributed to the seized food uptake (Coles, 1986) during the intestinal phase of trichinosis. The latter decrease of serum albumin levels (21st – 28th day P.I.) could be a matter of the liver pathological changes, recorded by Krstev et al. (1986), Reina et al. (1989) and El-Nokaly et al. (1997) in *T. spiralis* infection. The significantly increased serum globulin concentration by the 21st day post-infection denotes an immunological response of *T. spiralis* infected dogs under study.

Table 4 denotes a significantly decreased serum urea concentration (7th – 15th day P.I.), among *T. spiralis* infected dogs, that could be attributed in one part to the decreased food uptake (Coles, 1986) during the intestinal phase of *T. spiralis* infection, and in the other part to the hepatic pathological changes recorded by Krstev et al. (1985), Reina et al. (1989) and El-Nokaly et al. (1997). The significantly decreased serum creatinine concentration (7th – 14th day P.I.) in *T. spiralis* infected dogs could be a sign of increased glomerular filtration as a result of glomerulonephritis recorded by Todero et al. (1992) in *T. spiralis* infected animals. This, in turn, is greatly explained by the fact that "Creatinine is excreted by glomerular filtration, and significant quantities are neither excreted nor reabsorbed by the tubules" (Coles, 1986).

The significantly increased serum ALT levels among *T. spiralis* infected dogs (4th – 21st day P.I.), are indicative of hepatic changes. Such increased serum ALT levels agreed with Baiorinene and Firantene (1989) findings and could be attributed to the hepatic pathological changes in livers of *T. spiralis* infected animals, recorded by Krstev et al. (1986), Reina et al. (1989) and El-Nokaly et al. (1997).

Serum AST levels revealed no significant variation at any of the experiment time, between the non-infected control and the *T. spiralis* infected group of dogs under study.
From the obtained results of the present study, it could be concluded that, blood and serum diagnostic indices are supplementary tests during trichinosis symptoms. Decreased haemoglobin serum total proteins, albumin, urea and creatinine concentrations, together with increased total eosinophil and leukocyte counts, serum globulin concentration and serum ALT activity levels, might be indicative of acute trichinosis among febrile dogs with gastrointestinal upset.
REFERENCES


أثر الإصابة بالتركيكينيلا سبيراليس على بعض القياسات التشخيصية في الكلاب

عادل نبيه، عيد العزيز المعز

معهد بحوث صحة الحيوان - مركز البحوث الزراعية - وزارة الزراعة - الدقى - جيزة

اجريت هذه الدراسة على عدد عشرة كلاب عمر 2 - 4 أشهر خالية من الأمراض الطفيلية حيث تم تقسيمها إلى مجموعتين (خمسة كلاب بكل مجموعة).

المجموعة الأولى: مجموعة التكاثر الضابط، تحتوي على خالية من الفيروس.
المجموعة الثانية: مجموعة الاعتبار، ثم أุดت العدوى بها بعد خمسة أيام,v بواسطة آتية، نورا، من براقين.

إبان التربينكينيلا سبيراليس لكل كلب منها، وقد ظهرت أعراض الانتفاخ في العضلات، الإسهال بين أفراد مجموعة الاعتبار خلال اليوم الثاني إلى اليوم السابع من تاريخ العدوى. كما تشمل حدوث حالات الفقي في كلب واحد فقط من أفراد هذه المجموعة. هذا ما يشير إلى ارتفاع في درجة حرارة الجسم طوال الليل، والعديد من جويا المقاومة لحالات العدوى.

وبدور منتشأ في الإصابة بالتركيكينيلا سبيراليس على بعض القياسات التشخيصية لعينات:

- الدم والبيولوجيا: اكتساب رجاحة في إنتاج هيموجلوبين الدم مع حدوث ارتفاع معيّن في تعداد خلايا الدم البيضاء، وكلاً من الدم النباتي، الدم الأخضر، والدم الحمسي.
- بروتين الاليكس، الاليكس، الكرياتينين مع حدوث ارتفاع معيّن في تركيزه في بروتين الاليكس، الاليكس، الكرياتينين مع حدوث ارتفاع معيّن في تركيزه في بروتين الاليكس، الاليكس، الكرياتينين مع حدوث ارتفاع معيّن في تركيزه في بروتين الاليكس، الاليكس، الكرياتينين مع حدوث ارتفاع معيّن في تركيزه في بروتين الاليكس، الاليكس، الكرياتينين مع حدوث ارتفاع معيّن في تركيزه في بروتين الاليكس، الاليكس، الكرياتينين مع حدوث ارتفاع معيّن في تركيزه.

بينما لم يحدث تغير معين في تركيز إيزيمات الأسيتامينوفين أو تراستريوز في الفئران الماصية. مما يوحي بضرورة استخدام القياسات التشخيصية في اتخاذ قرارات.

كما تشير الدراسات إلى احتمال أن تكون الفيروسات المضاعفة لعيون العدوى والبيولوجية.

ويمكنها أن تستخدم لتشخيص الإصابة بالتركيكينيلا سبيراليس لدى الaleza في تدابير الوقاية.