Serum Protein Electrophoresis in Dogs With Intestinal Parasites

Alev AKDOĞAN KAYMAZ, Utku BAKIREL, Remzi GONÜL, Hüseyin TAN
Department of Internal Medicine, Faculty of Veterinary Medicine, Istanbul University, Avcılar 34850, Istanbul-TURKEY
Cem VURUŞANER
Department of Parasitology, Faculty of Veterinary Medicine, Istanbul University, Avcılar 34850, Istanbul-TURKEY

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Abstract: The serum of 66 dogs with intestinal parasites (showing gastrointestinal problems caused by taeniosis, coccidiosis, ancylostomosis, trichuriosis and ascarididosis) was examined by electrophoresis. There were 6 dogs with coccidiosis, 6 dogs with ancylostomosis, 6 dogs with trichuriosis, 24 dogs with taeniosis and 24 dogs with ascarididosis. After agar gel protein electrophoresis of the serum samples, $\alpha_1$ globulin levels were significantly lower in the coccidiosis group than in the other groups ($p<0.05$). While $\alpha_2$ globulin levels increased in the ancylostomosis group ($p<0.05$), these levels decreased significantly in the dogs with ascarididosis ($p<0.05$). There was no change in $\beta$ and $\gamma$ globulin levels in any of the groups. While the protein level increased in the dogs with taeniosis ($p<0.05$), these levels were lower in the coccidiosis group than in the other groups ($p<0.05$).

Key Words: Dog, intestinal parasites, serum electrophoresis

Introduction
Serum protein fractions showed fluctuation in the kind of bacterial, rickettsial and parasitic infections (1). Especially in young dogs, gastrointestinal problems caused by ascarididosis, taeniosis and coccidiosis are common (2). All parasitic infections may cause loss of proteins via gastroenteritis, which leads to hypoproteinaemia. Polyclonal gamopathies were noticed in some parasitic infections (2, 3).

In this paper, serum protein fractions, determined by agar gel protein electrophoresis, were studied in the sera collected from dogs with intestinal parasites.

Materials and Methods
Between 30 November 1996 and 1 December 1997, 66 dogs showing some gastrointestinal signs came to our clinic with complaints of anorexia, emesis and diarrhea. The breeds of dog included in this study ($n=66$) were Doberman pinscher ($n=10$), Irish Setter ($n=8$), collie ($n=6$), pointer ($n=5$), German shepherd ($n=11$), Sivas Kangal (Karabash) ($n=14$) and mixed breed ($n=12$). Ages varied from 0 to 4 months old. Sex was not taken into account in this study. After the physical examination, blood samples and faeces were collected from all dogs. In the hematological examination, total erythrocytes, leucocytes, formulae leucocytes, hemoglobin and haematocrit levels were detected. Samples of faeces for parasitological examination were obtained from the rectum, or at the time of defecation. The serum was separated and samples with visible haemolysis or lipaemia were discarded.

Determination of total protein concentration and agar gel protein electrophoresis were carried out using the methods described previously (4). Faeces was taken during the following days and analyzed by direct microscopy and flotation (5) and assessed according to the literature (3, 6). Ascarididosis was found in 24 dogs (Group 1), taeniosis in 24 dogs (Group 2), coccidiosis in 6 dogs (Group 3), ancylostomosis in 6 dogs (Group 4) and trichuriosis in 6 dogs (Group 5). The parasitic infections in all groups were certainly pure infections.
Dogs infected only with parasitic infection such as ascarididosis and taeniosis were used in this study. The parasitic infections were identified by family.

Variance analysis (7) and Duncan test (8) were used for statistics.

Results

It was found that $\alpha_1$ globulin levels were significantly lower in the coccidiosis group than in the other groups ($P<0.05$). While the $\alpha_2$ globulin level was significantly lower in the animals with ascarididosis ($P<0.05$), these levels were higher in dogs with ancylostomosis. There were no changes in $\beta$ and $\gamma$ globulin levels in any of the groups.

The protein levels were higher in the taeniosis group, but lower in the coccidiosis group than in the other groups ($P<0.05$) (Figure 1). While the albumin/globulin ratio was higher in the ascarididosis and coccidiosis groups, it was lower in dogs with trichuriosis ($P<0.05$).

In group 1, there was a negative correlation between $\alpha_1$ globulin and both haematocrit and hemoglobin ($P<0.05$). There were positive correlations between total protein and both $\alpha_2$ globulin and $\gamma$ globulin ($P<0.05$), between total protein and $\beta$ globulin ($P<0.01$), between albumin and the A/G ratio ($P<0.01$), between hemoglobin and haematocrit levels ($P<0.001$), between total protein and albumin ($P<0.001$). In group 2, there were negative correlations between $\alpha_1$ globulin and $\alpha_2$ globulin ($P<0.05$), between total protein and the A/G ratio ($P<0.05$), between leukocytes and haematocrit levels ($P<0.01$), between $\beta$ globulin and the A/G ratio ($P<0.01$). There were positive correlations between albumin and the A/G ratio ($P<0.01$), between erythrocytes and haematocrit and hemoglobin levels ($P<0.001$), between haematocrit and hemoglobin levels ($P<0.01$), and also between $\beta$ globulin and total protein concentrations ($P<0.001$). In group 3, there were negative correlations between $\alpha_2$ globulin and haematocrit levels ($P<0.05$), and between leukocytes and erythrocytes ($P<0.01$). There were positive correlations between $\beta$ globulin and $\gamma$ globulin ($P<0.01$), and also between total protein and albumin with $\beta$ globulin ($P<0.05$). In group 4, there were positive correlations between albumin and $\beta$ globulin, between $\gamma$ globulin and total protein, between erythrocytes and haematocrit levels, between haematocrit and $\gamma$ globulin, and also between $\gamma$ globulin and total protein concentrations ($P<0.05$). In group 5, there were positive correlations between total protein and haematocrit levels, between hemoglobin and $\alpha_2$ globulin, between albumin and the A/G ratio, between hemoglobin and erythrocytes ($P<0.05$), between haematocrit and erythrocytes, hemoglobin, and also between $\beta$ globulin and $\alpha_1$ globulin levels ($P<0.01$).

There was no statistical difference between the haemogram values of any of the groups (Table 1).
A variable reduction in the concentration of different serum proteins has been documented in canine protein-losing gastroenteropathy. Although in canine and human protein-losing enteropathy, albumin and globulin are usually more severely depressed (4), in our study, it was found that the total protein levels were lower in the coccidiosis group than in the other groups (P<0.05). However, it was seen that the protein levels were significantly lower in the taeniosis group (P<0.05). The albumin/globulin ratio was higher in the ascaridosis and coccidiosis groups (P<0.05) and lower in the trichuriosis group (P<0.05).

We did not encounter any conclusive findings in the relevant medical literature in terms of electrophoretic changes in serum protein fractions in dogs.

Changes in serum electrophoresis in dogs with ascaridosis, taeniosis, coccidiosis, ancylostomosis, and trichuriosis were investigated. It was found that \( \alpha_1 \) globulin levels were significantly lower in the coccidiosis group than in the other groups (P<0.05). While \( \alpha_2 \) globulin levels were higher in the ancylostomosis group, they were significantly lower (p<0.05) in dogs with ascaridosis.

The findings obtained in this study suggest that serum protein electrophoresis is useful in the differentiation of gastrointestinal parasitic infections. However, further sophisticated studies are warranted on this subject for final results.

**Table 1.** Haemogram levels in dogs with intestinal parasites (mean±SD).

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>Erythrocyte (x10^6 mm^3)</th>
<th>Leukocyte (x10^3 mm^3)</th>
<th>Hb g/dL</th>
<th>Hmct. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Ascaridosis</td>
<td>24</td>
<td>4.91±1.1a</td>
<td>14.98±6.9</td>
<td>10.65±2.2</td>
<td>31.8±7.5</td>
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<tr>
<td>(2) Taeniosis</td>
<td>24</td>
<td>4.76±1.3a</td>
<td>17.55±1.5</td>
<td>9.67±2.5</td>
<td>28.3±11</td>
</tr>
<tr>
<td>(3) Coccidiosis</td>
<td>6</td>
<td>3.31±0.4a</td>
<td>17.61±1.4</td>
<td>11.76±1.1</td>
<td>27.3±5.7</td>
</tr>
<tr>
<td>(4) Ancylostomosis</td>
<td>6</td>
<td>3.90±0.9ab</td>
<td>16.06±2.4</td>
<td>10.50±1.0</td>
<td>32.1±6.3</td>
</tr>
<tr>
<td>(5) Trichuriosis</td>
<td>6</td>
<td>3.92±1.7ab</td>
<td>17.20±2.3</td>
<td>9.26±3.3</td>
<td>27.8±11</td>
</tr>
</tbody>
</table>

a, b means in columns within a category with different superscripts differ (P<0.05)

**References**