

Serum Protein Electrophoresis in Dogs With Intestinal Parasites

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Received: 14.05.1998

Abstract: The serum of 66 dogs with intestinal parasites (showing gastrointestinal problems caused by taeniosis, coccidiosis, ancylostomosis, trichuriasis and ascarididosis) was examined by electrophoresis. There were 6 dogs with coccidiosis, 6 dogs with ancylostomosis, 6 dogs with trichuriasis, 24 dogs with taeniosis and 24 dogs with ascarididosis. After agar gel protein electrophoresis of the serum samples, α_1 globulin levels were significantly lower in the coccidiosis group than in the other groups ($p<0.05$). While α_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 β and γ 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

Intestinal Parazitli Köpeklerde Serum Protein Elektrofrez

Özet: Intestinal parazitli (taeniosis, coccidiosis, ancylostomosis, trichuriasis ve ascarididosis sebebi ile gastrointestinal şikayetlere sahip) 66 köpeğin kan serumları elektroforez kullanılarak muayene edildi. Altı köpekte coccidiosis, 6 köpekte ancylostomosis, 6 köpekte trichuriasis, 24 köpekte taeniosis ve 24 köpekte ascarididosis enfeksiyonları bulunmaktaydı. Serum örneklerine agar jel protein elektroforezi uygulanması sonrası α_1 globulin düzeylerinin diğer köpekler göre coccidiosis'li grupta bariz bir şekilde azaldığı izlendi ($p<0.05$). Ancylostomosis'li grupta α_2 globulin düzeyleri artarken ($P<0.05$), ascarididosis'li köpeklerde bu seviyelerin bariz bir şekilde azaldığı belirlendi ($P<0.05$). Hiç bir grupta α ve γ globulin düzeylerinde değişiklik saptanmadı. Protein düzeylerinin taeniosis'li köpeklerde artarken ($P<0.05$), diğer gruplara göre coccidiosis'li grupta azaldığı ortaya konuldu ($p<0.05$).

Anahtar Sözcükler: Köpek, bağırsak parazitleri, serum elektroforezi

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 diarrhoea. 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, leukocytes, formulae leukocytes, 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 trichuriasis 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 β and γ 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 trichuriasis ($P < 0.05$).

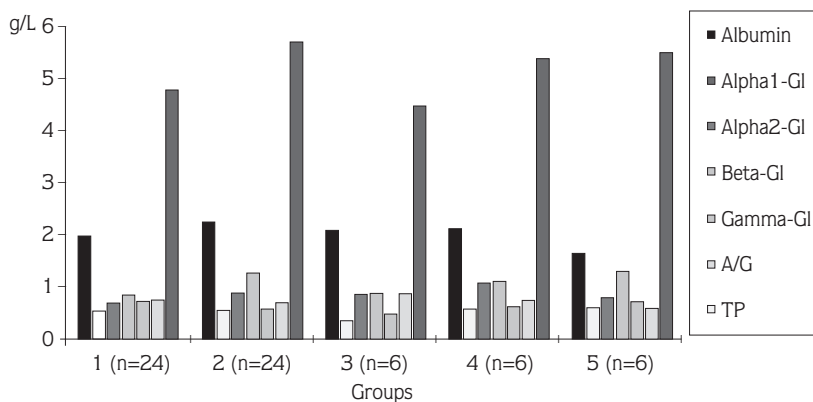


Figure 1. Total protein concentrations and fractions in the agarose gel electrophoresis. (GI: Globulin; A/G: Albumin/Globulin; TP: Total Protein)

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 γ globulin ($P < 0.05$), between total protein and β 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 β 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 β 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 β globulin and γ globulin ($P < 0.01$), and also between total protein and albumin with β globulin ($P < 0.05$). In group 4, there were positive correlations between albumin and both β globulin and total protein, between erythrocytes and haematocrit levels, between haematocrit and γ globulin, and also between γ 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 β 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).

Groups	n	Erythrocyte ($\times 10^6 \text{ mm}^{-3}$)	Leukocyte ($\times 10^3 \text{ mm}^{-3}$)	Hb g/dL	Hmct. (%)
(1) Ascarididosis	24	4.91 \pm 1.1a	14.98 \pm 6.9	10.65 \pm 2.2	31.8 \pm 7.5
(2) Taeniosis	24	4.76 \pm 1.3a	17.55 \pm 1.5	9.67 \pm 2.5	28.3 \pm 11
(3) Coccidiosis	6	3.31 \pm 0.4a	17.61 \pm 1.4	11.76 \pm 1.1	27.3 \pm 5.7
(4) Ancylostomosis	6	3.90 \pm 0.9ab	16.06 \pm 2.4	10.50 \pm 1.0	32.1 \pm 6.3
(5) Trichuriasis	6	3.92 \pm 1.7ab	17.20 \pm 2.3	9.26 \pm 3.3	27.8 \pm 11

Table 1. Haemogram levels in dogs with intestinal parasites (mean \pm SD).

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

Discussion

Reports have been made on leishmaniasis in dogs in which broad fluctuations in serum protein concentrations were observed during the course of the disease. Dogs naturally infected with *Dirofilaria immitis* have been reported to have significantly higher serum β -globulin levels than infected dogs (2, 9).

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 also higher in the ascarididosis and coccidiosis groups ($P < 0.05$) and lower in the trichuriasis 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 ascarididosis, taeniosis, coccidiosis, ancylostomosis and trichuriasis 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 ascarididosis.

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.

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