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Haemato-biochemical Study of Canine Babesiosis in Anand, Gujarat

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Abstract

The aim of this study was to evaluate the haemato-biochemical alterations in dogs infected with canine babesiosis presented at the College clinics at Anand, Gujarat. Blood was collected with and without anticoagulant from naturally infected dogs, which were found positive for babesiosis by direct blood smear examination. Statistical analysis of affected (n=24) and healthy (n=8) dogs revealed significant decrease in the mean values of haemoglobin, total leucocyte count, packed cell volume, platelets and lymphocytes and significant increase in the mean values of neutrophils and eosinophils indicating anaemia, thrombocytopenia, neutrophilia, lymphopenia and eosinophilia in infected dogs as compared to healthy ones. Similarly significant increase in the mean values of serum ALP, ALT, AST, globulin and BUN and decrease in albumin and A:G ratio were observed in infected dogs. The results showed significant alterations in haemato-biochemical attributes in dogs affected with canine babesiosis, and suggested need to rule out possibility of canine babesiosis in all anaemic dogs.

Key words: Canine babesiosis, peripheral blood smear, *Babesia* spp. and Hemato-biochemical changes.

Introduction

Canine babesiosis is a clinically significant and geographically widespread haemoprotozoan disease of dogs and wild canids (Irwin, 2010). The commonly occurring *Babesia* species in dogs are the *Babesia canis* and *Babesia gibsoni* (Taboada and Merchant, 1991). The life cycle of *Babesia* includes two stages: inside the host RBCs, in which the sporozoites convert into piroplasms, and the other inside the ixodid tick vector (Uilenberg, 2006). The most common haematological abnormalities found in canine babesiosis are anaemia and thrombocytopenia (Vercammen *et al.*, 1997). Biochemical abnormalities include increase in serum activity of aminotransferases (AST, ALT), alkaline phosphatase (ALP), hyperbilirubinemia, hypoalbuminemia, electrolyte and acid-base abnormalities (Bourdeau and Guelfi, 1995; Vercammen *et al.*, 1997). The objective of this study was to examine haemato-biochemical alterations in dogs affected with *Babesiosis*.

Materials and Methods

The study was performed on dogs presented to the Teaching Veterinary Clinical Complex of the College at Anand and at Nandini Veterinary Hospital, Surat, Gujarat. A total of 118 dogs were

examined clinically. For suspected 79 dogs detailed clinical examination was undertaken, and peripheral blood smears were made, stained with Giemsa-stain and examined under microscope to detect *Babesia* species in RBCs.

Hematological Parameters

Blood samples were collected aseptically from cephalic vein of babesiosis positive (n=24) as well as healthy (n=8) dogs in sterile vials without and with anticoagulant ethylene diamine tetra acetic acid (K₃EDTA) for haemato-biochemical evaluation. The haematological parameters were analyzed by autohaematoanalyzer (Hema 2062, Analytical technologies limited, Vadodara). Biochemical parameters like serum alkaline phosphatase (ALP), alanine amino transferase (ALT), aspartate amino transferase (AST), total bilirubin, blood urea nitrogen (BUN), serum creatinine, total plasma protein (TPP), albumin, globulin and albumin:globulin ratio were estimated by using standard procedures and kits of coral clinical systems, Goa on an autobiochemical analyzer (Mindray, BS-120, China). The data were subjected to the statistical analysis using unpaired 't' test (Snedecor and Cochran, 1990).

Results and Discussion

Out of 79 dogs screened for babesiosis, 24 dogs were found to be positive based on blood smear examination. The mean values of Hb, TEC, platelet count and PCV were significantly lower in babesiosis positive dogs as compared to healthy dogs (Table 1). These findings were in accordance with the earlier reports (Niwetpathomwat *et al.*, 2006; Shah *et al.*, 2011; Wadhwa *et al.*, 2011; Andoni *et al.*, 2012, 2013; Reddy *et al.*, 2014; Nalubamba *et al.*, 2015). The lowered Hb and TEC levels observed could be due to epistaxis, petechial haemorrhages and intra-vascular haemolysis or due to severe anaemia. The pathogenesis of thrombocytopenia during the infection may be due to platelet sequestration in the spleen or immune mediated platelet destruction and development of disseminated intravascular coagulation (Boozer and Macintire, 2003). Elevated body temperature could have contributory effect on thrombocytopenia (Oglesbee, 1999).

Table 1: Mean (± SE) haematological values in healthy and babesiosis positive dogs

Sr. No.	Parameter	Healthy dogs (n=8)	Babesiosis positive dogs (n=24)
1	Hb (g/dl)	13.23 ± 0.43	8.35 ± 0.69**
2	TEC (×10 ⁶ /μl)	6.66 ± 0.30	4.34 ± 0.36**
3	PCV (%)	38.46 ± 1.64	26.44 ± 2.21**
4	TLC (×10 ³ /μl)	12.30±0.91	16.00 ± 2.27
5	Neutrophils (%)	66.63 ± 1.60	78.28 ± 1.92**
6	Lymphocytes (%)	29.00 ± 0.76	16.31 ± 2.13**
7	Monocytes (%)	2.87 ± 0.54	2.62 ± 0.45
8	Eosinophils (%)	1.50 ± 0.33	3.76 ± 0.67**
9	Basophils (%)	0.00 ± 0.00	0.00 ± 0.00
10	Platelet count (×10 ³ /μl)	292.25±37.88	166.08±11.06*
11	MCV (fl)	64.44 ± 1.60	59.96 ± 1.97
12	MCH (pg)	21.50 ± 0.70	20.65 ± 0.96
13	MCHC (g/dl)	33.05 ± 0.56	31.02 ± 0.84

**p<0.01, *p<0.05.

The mean value of TLC was non-significantly higher in babesiosis positive dogs than in healthy ones. Amongst DLC, the levels of neutrophils and eosinophils increased, while lymphocytes

decreased significantly ($P < 0.01$) in dogs with babesiosis than healthy dogs (Table 1). These findings were in agreement with Shah *et al.* (2011), Andoni *et al.* (2012) and Vishnurahav *et al.* (2014).

Table 2: Mean (\pm SE) serum biochemical profile of healthy and babesiosis positive dogs

Sr. No.	Parameter	Healthy dogs (n=8)	Babesiosis positive dogs (n=24)
1	ALP (IU/L)	78.38 \pm 4.16	225.70 \pm 27.36**
2	ALT (IU/L)	34.81 \pm 3.20	74.97 \pm 6.94**
3	AST (IU/L)	45.44 \pm 4.83	85.52 \pm 9.89**
4	Total bilirubin (mg/dl)	0.40 \pm 0.06	0.67 \pm 0.06**
5	BUN (mg/dl)	14.84 \pm 0.88	27.18 \pm 2.29**
6	Creatinine (mg/dl)	1.04 \pm 0.13	1.34 \pm 0.32
7	Total protein (g/dl)	5.90 \pm 0.37	5.62 \pm 0.32
8	Albumin (g/dl)	3.57 \pm 0.38	2.15 \pm 0.15**
9	Globulin (g/dl)	2.33 \pm 0.07	3.47 \pm 0.26**
10	A:G	1.53 \pm 0.18	0.62 \pm 0.06**

** $p < 0.01$, * $p < 0.05$.

The mean values of serum ALP, ALT, AST and total bilirubin were increased highly significantly ($P < 0.01$) in dogs with babesiosis than healthy dogs (Table 2). This observation concurred with the earlier findings of Shah *et al.* (2011), Wadhwa *et al.* (2011) and Reddy *et al.* (2014). Increase in level of ALP was attributed to damage or abnormal function of biliary system (Crnogaj *et al.*, 2010). Increased activities of AST and ALT might be due to escape of these enzymes from the damaged hepatic parenchymal cells with necrosis or altered membrane permeability indicating hepatic dysfunction (Wadhwa *et al.*, 2011). Hyper-bilirubinaemia observed may be due to both intravascular and extravascular haemolysis (Irwin and Hutchinson, 1991).

The mean value of BUN increased ($P < 0.01$) in dogs with babesiosis almost to double the value of healthy dogs (Table 2), and concurred with the report of Reddy *et al.* (2014). Further, the differences in values of creatinine and total protein between babesiosis positive and healthy dogs were statistically non-significant. However, Andoni *et al.* (2013), Reddy *et al.* (2014) and Vishnurahav *et al.* (2014) reported significant increase in creatinine in babesiosis positive dogs. The mean values of albumin and A:G ratio were significantly decreased ($p < 0.01$) and globulin increased in dogs with babesiosis than healthy dogs. This observation suggested activated immuno-defense mechanism in infected dogs. However, no significant differences were seen in mean values of monocytes, MCV, MCH and MCHC between diseased and healthy dogs.

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Conflict of Interest: All authors declare no conflict of interest.

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