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Hematological Changes in Dogs Affected with Canine Babesiosis

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Abstract

Canine babesiosis caused by tick-borne organisms of the genus *Babesia*, is one of the most significant disease worldwide. The aim of this study was to determine the haematological changes in dogs naturally infected with *Babesia*. The hematological evaluation included haemoglobin (Hb), red blood cell (RBC) count, platelets, white blood cell (WBC) count, differential leucocyte count (DLC), packet cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC). The haematological findings in most of these dogs revealed microcytic hypochromic anaemia, lowered platelet count and 75% cases had 24% decreased PCV. The results of the study showed that *Babesia* infection in dogs caused anaemia and thrombocytopenia.

Key Words: Dogs, Babesiosis, Hematology, Changes, Anemia

Introduction

Canine babesiosis is an important world-wide disease caused by tick-born organisms. *B. canis* and *B. gibsoni* are the two predominant species that cause canine babesiosis and strains of these organisms are found worldwide. Once entered the host by vector, *Babesia* organisms get attached to the erythrocyte by endocytosis. *B. canis* multiplies within the erythrocytes by repeated binary fission creating merozoites, which may be seen most commonly as single or in pairs and results in destruction of the erythrocytes. The immunological response plays the most important role in pathogenesis of canine babesiosis. *Babesia* initiates a mechanism of antibody-mediated cytotoxic destruction of circulating erythrocytes. Autoantibodies are directed against components of the membranes of infected and uninfected erythrocytes. This causes intravascular and extravascular haemolysis, which leads to anaemia and haemoglobinemia (Pedersen, 1999 and Irwin, 2005). The clinical symptoms depend on the severity of the strain involved and host factors, such as age and immunologic response generated against the parasite. The purpose of this study was to determine the hematologic changes in dogs naturally infected with babesiosis presented to Teaching Veterinary Clinical Complex (TVCC), College of Veterinary Science and Animal Husbandry, Anand Agricultural University, Anand, Gujarat.

Materials and Methods

Samples of blood were collected from dogs naturally infected with *Babesia* during June 2015 to February 2016. In this study, a total number of 64 dogs belonging to the different breeds were examined for the presence of *Babesia* in peripheral blood smears. Each suspected dog was subjected to physical and clinical examination. The diagnosis of babesiosis was confirmed by observing parasites inside the infected erythrocytes in Giemsa stained thin blood smears (Kumar *et al.,* 2015). 5 ml blood was withdrawn from cephalic vein of diseased dogs in a sterile plastic K3EDTA vaccutainer for haematological analysis on auto-haematoanalyzer (Analytical, Hema 2062).

Results and Discussion

Eight cases of canine babesiosis were diagnosed during the period of the study by the microscopic examination of the stained blood smears. All the eight cases were positive with *B. canis* paired pyriform shape within the red blood cells.

The body temperature was recorded elevated, which could have contributory effect on thrombocytopenia (Murase *et al.,* 1994). The decrease of hemoglobin concentration below the reference value in all the cases resulted from extravascular haemolysis (Brockus and Andreasen, 2003). The mean haematological values are shown in Table 1.

A low red blood cell count, haematocrit and the concentration of haemoglobin define anaemia in dogs. The haematological parameters in most of the patients showed anaemia and thrombocytopenia which is a common clinical sign in infected dogs (Furlanello *et al.,* 2005). Direct parasitic damage contributes to the anaemia, which resulted from an increased osmotic fragility of erythrocytes (Makinde and Bobade, 1994) and immune-mediated platelet destruction. The destruction of the erythrocytes is multi-factorial, including direct parasite damage to the erythrocyte membrane and

Table 1: Haematological findings (Mean±SE) in canine babesiosis (n=8)

Parameter	Unit	Mean± SE	Reference range
Hb	g/dl	06.38±00.75	12.00-18.00
RBCs	10^6/µl	03.43±00.15	5.5-8.5
WBCs	10^3/µl	12.42±03.14	6-17
Neutrophils	%	71.38±04.75	60-70
Eosinophils	%	01.38±00.50	2-10
Basophils	%	00.00±00.00	Rare
Lymphocytes	%	24.50±05.25	30.00-40.00
Monocytes	%	03.75±00.75	12-30
Platelets	10^3/µl	167.50±05.75	200.0-500.0
PCV	%	18.80±01.10	37.00-55.00
MCV	fl	50.73±02.73	60.00-77.00
MCH	pg	16.75±00.38	19.50-24.50
MCHC	g/dl	29.70±00.98	32.00-36.00

the presence of the anti-erythrocyte antibodies which result in a secondary immune-mediated haemolytic anaemia. Thrombocytopenia is common in many cases of dogs infected with *B. canis*.

The mechanism of the thrombocytopenia is not yet fully understood in babesiosis and may relate to immune mediated platelet destruction and development of disseminated intravascular coagulation or sequestration of the platelet in the spleen. The contributory effect on the thrombocytopenia could have elevated body temperature. Additionally oxidative stress in babesiosis may cause damage to erythrocyte that result in their increased susceptibility to phagocytosis (Oglesbee *et al.,* 1999). In this study, leukocyte abnormalities were nonspecific, as either leukocytosis or leukopenia was observed. Changes in leukocyte count may occur in some severely affected patients. Lymphocytopenia was found in all the cases and may be due to concurrent viral infection associated with babesiosis (Showkat et *al.,* 2011). In general, the haematologic values in the study were in line with the results observed in previous studies. It is therefore concluded that the most significant and prognostic abnormalities found in canine babesiosis are microcytic hypochromic anaemia and thrombocytopenia.

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

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