Int.J.Curr.Microbiol.App.Sci (2018) *7*(8): 1384-1388

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 7 Number 08 (2018)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2018.708.158

Clinico, Haemato-Biochemical Changes and Therapeutic Management of Canine Babesiosis

B. Roopali[1*], M. Roy[2] and S. Roy[1]

[1]Department of Veterinary Medicine, College of Veterinary Science & AH, Anjora, Durg (Chhattisgarh), India
[2]Department of veterinary Physiology and Biochemistry, College of Veterinary Science & AH, Anjora, Durg (Chhattisgarh), India

**Corresponding author*

Keywords

Babesia, Haemoglobinuria, Anaemia, Thrombocytopenia, Imizol®

Article Info

Accepted:
10 July 2018
Available Online:
10 August 2018

A B S T R A C T

The present study was carried out to investigate the haemato-biochemical changes and therapeutic management of canine babesiosis. Five male and 2 female dogs between 3-4 years old were presented to TVCC, Veterinary College, Durg and Private Clinic, Bhillai (Chhattisgarh) with a history of anorexia, tick infestation, lethargy, weakness and discolouration of the urine (haemoglobinuria). Blood samples were collected from the study group animals for the estimation of haemao-biochemical parameters. Haemoglobin, PCV, TEC and platelets were significantly reduced in affected dogs when compared to the healthy control. There was significant elevation of BUN, creatinine, ALT and globulin along with significant decrease in the total protein and serum albumin levels in the affected dogs. Microscopic examination of blood smear revealed pyriform shaped *Babesia canis* and oval or signet ring form *Babesia gibsoni* organisms was confirmed in affected animals. The infected dogs were administered single dose of inj imidocarb dipropionate (imizol®) @ 5 mg/kg BW deep IM along with other supportive treatment. Restoration of haemato-biochemical parameters were observed on 15th day of post treatment and were within normal physiological limits. Blood smears from the affected dogs were found to be negative after 48 hours of imizol® administration suggestive of absence of infection.

Introduction

Canine babesiosis caused by tick-borne organisms of the genus *Babesia*, is one of the most significant diseases worldwide. The commonly occurring *Babesia* species in dogs are the *Babesia canis* and *Babesia gibsoni* (Taboada and Merchant, 1991). The Sero-prevalence of babesiosis in the United States is higher in adult dogs than in dogs younger than 1 year but the lower prevalence was noted in kennels where more intensive tick controls were performed (Irwin, 2010). 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 hemolysis which leads to anemia and hemoglobinemia (Irwin, 2010). The typical clinical sign observed in animals with babesiosis is hemolytic anemia (Jacobson and Clark, 1994). Parasitemia results in increased osmotic fragility of erythrocytes and serum hemolytic factors causing haemolysis (Onishi and Suzuki, 1994: Makinde and Bobade, 1994). Clinical signs of canine babesiosis include: Fever, anorexia, depression, oliguria, hemoglobinuria, vomiting, lethargy, dehydration, icterus, pale mucous membranes, spleenomegaly and dyspnea (Irwin, 2010). Haematological abnormalities include anemia, thrombocytopenia, neutropenia and lymphopenia (Furlanello *et al.,* 2005). There are no studies about hematological and biochemical changes in dogs naturally infected with *Babesia* in Durg, Chhattisgarh, India. Hence, the present study was carried out to know the hematological and biochemical changes in dogs naturally infected with babesiosis and its therapeutic management.

Materials and Methods

A total of five male and two female dogs aged 3-4 years presented to the TVCC, Veterinary College, Durg and private clinic of Bhilai Chhattisgarh with a history of anorexia, tick infestation, lethargy, weakness and red coloured urine (haemoglobinuria) were included for the study.

Clinical examination of the affected dogs revealed pyrexia (105.2 ºF), enlarged lymph nodes and pale mucous membrane. Blood samples were collected from infected animals and 15th day after the treatment of animals for preparation of blood smear, estimation of hematological and biochemical parameters

For haemato-biochemical study around 5ml of blood was collected in sterile vials under aseptic conditions. About 1 ml blood of sample from each case was utilised for haematological estimation and blood smear preparation and remaining was processed for serum extraction.

Haematological parameters (haemoglobin, packed cell volume, total erythrocyte count, total leucocyte count, differential leucocyte count and platelet count) were estimated with the help of fully automated haematology cell counter- Automatic Blood Cell Counter, Model PCE 210, Manufactured by ERMA Inc., Tokyo, Japan.

Serum samples were used for the estimation of biochemical parameters like blood urea nitrogen, creatinine, total protein, albumin, and globulin by ARTOS® semi-automatic biochemical analyser using biochemical kits of Bayer company.

The diagnosis of babesiosis was confirmed by the demonstration of parasites within the infected erythrocytes in Wright-Giemsa stained thin blood smears.

All the affected dogs were treated with single dose of inj imizol® (manufactured by INTERVET) @ 5 mg/kg BW deep IM along with supportive treatment of D 25% (dextrose 25%) 100ml IV, melonex 2ml I/M, inj ondansetron @ 1mg/kg BW IV, inj neurobion 1ml IM for 3 days and, syrup dexorange 5ml bid P/O for two week.

Results and Discussion

The present study observed the clinical and haemato-biochemical changes before and after treatment. Clinical findings noted in the present study included pyrexia, haemoglobinuria, lymphadenopathy and pale mucous membrane which were in agreement with Conrad *et al.,* (1991) and Wadhwa *et al.,* (2011).

Haematological study

There was a significant decrease ($p<0.05$) in the haemogram (haemoglobin, TEC and PCV) and platelet counts compared to the healthy control dogs suggestive of severe anemia and thrombocytopenia (Table 1). The hematological findings of canine babesiosis in the present study were in agreement with the findings of Furlanello *et al.,* (2005) and Niwetpathomwat *et al.,* (2006). It is speculated that the anemia in babesiosis resulted from an increased osmotic fragility of erythrocytes, increased erythrophagocytic activity of macrophages and immune-mediated cleavage and thrombocytopenia due to immune-mediated platelets destruction (Makinde and Bobade, 1994; Onishi and Suzuki, 1994; Murase *et al.,* 1996 and Tvedten, 2004). The mean values of leucogram in babesiosis dogs showed insignificant change when compared to healthy control group and were within the normal physiological limits whereas leukocyte abnormalities of neutopenia and lymphopenia in canine babesiosis was observed by Furlanello *et al.,* (2005).

Biochemical study

There was a significant ($p<0.05$) increase in BUN, creatinine ALT and globulin levels in affected dogs as compared to healthy control group (Table 2). The present findings were in agreement with Salem and Farag (2014).

Significant ($p<0.05$) increase BUN and creatinine in canine babesiosis might have resulted due to acute renal failure (Schoeman, 2009). Scally *et al.,* (2004) reported a disproportionate rise in serum urea concentration has been related to catabolism of lysed erythrocytes. Elevation of ALT values in affected animals may be due to attributed to hepatic hypoxia in babesioses (Aysul *et al.,* 2013). There was a significant decrease ($p<0.05$) in serum total protein and albumin levels in affected dogs due to liver damage in affected animals.

Table.1 Haematological changes in babesiosis affected dogs and treated dogs

Parameter	Control group	Affected animals	Treated animals (on 15th day)
Haemoglobin (g/dL)	14.69 ± 0.19^{b}	9.09 ± 1.11^{a}	13.35 ± 1.03^{b}
TEC ($\times 10^{6}$ /µL)	6.12 ± 0.09^{b}	4.11 ± 0.32^{a}	5.79 ± 0.38^{b}
PCV (%)	44.55 ± 0.89^{b}	29.92 ± 2.88^{a}	39.12 ± 2.77^{b}
Platelets ($\times 10^{3}$/µL)	312.75 ± 13.62^{b}	79.50 ± 15.25^{a}	295.88 ± 29.05^{b}
TLC($\times 10^{3}$/µL)	12.47 ± 0.28^{a}	13.29 ± 1.39^{a}	13.35 ± 0.77^{a}
Neutrophils (%)	63.00 ± 0.65^{a}	66.75 ± 3.35^{a}	64.38 ± 1.05^{a}
Lymphocytes (%)	32.63 ± 0.82^{a}	28.50 ± 3.05^{a}	30.63 ± 1.45^{a}
Monocytes (%)	3.53 ± 0.35^{a}	3.25 ± 0.41^{a}	3.38 ± 0.32^{a}
Eosinophils (%)	0.88 ± 0.30^{a}	1.50 ± 0.42^{a}	0.63 ± 0.26^{a}

Means bearing different superscripts differ significantly ($p \leq 0.05$).

Table.2 Biochemical changes in babesiosis affected and treated dogs

Parameter	Control group	Affected animals	Treated animals (on 15th day)
BUN (mg/dL)	17.26 ± 0.43[a]	39.40 ± 3.20[b]	18.65 ± 1.95[a]
Creatinine (mg/dL)	0.80 ± 0.03[a]	2.1 ± 0.19[b]	1.24 ± 0.09[a]
ALT (IU/L)	67.22 ± 2.53[a]	159.82 ± 17.73[b]	77.13 ± 7.66[a]
Total protein(g/dL)	6.97 ± 0.09[a]	5.73 ± 0.43[b]	6.67 ± 0.15[a]
Albumin (g/dL)	3.50 ± 0.05[a]	1.53 ± 0.19[b]	3.07 ± 0.06[a]
Globulin (g/dL)	3.47 ± 0.06[a]	4.20 ± 0.34 [b]	3.60 ± 0.14[a]

Means bearing different superscripts differ significantly ($p \leq 0.05$)

Diagnosis and Therapeutic management

Microscopic examination of blood smears revealed pyriform shaped *Babesia canis* and oval or signet ring form *Babesia gibsoni* organisms in affected dogs. Imizol® administration was found effective and blood smear examination was found negative to babesia organisms after 48 hours of treatment. Treatment restored clinical signs and the affected dogs were found stable with normal body temperature. After two weeks of treatment, the haemato-biochemical values of the affected dogs were falling within the normal physiological limits. In the present study, treatment was successful in the affected dogs with a single dose of imizol® @ 5 mg/kg BW deep IM along with supportive therapy whereas, Lin and Huang (2010) reported that use of triple antibiotic, that is combination of doxycycline-enrofloxacin-metronidazole with or without diminazene aceturate to treat naturally occurring canine babesiosis. Schoeman (2009) reported successful treatment of canine babesiosis with imidicarb dipropionate @ 5 mg/kg once or twice IM, 14 days apart.

The present study concluded that the the most significant abnormalities in canine babesiosis are anaemia and thrombocytopenia and a single dose of imizol® along with supportive therapy was found to be effective against canine babesiosis.

References

Aysul, N., Ural, K., Ulutas, B., Eren, H. and Karagenc, T. 2013. First detection and molecular identification of *Babesia gibsoni* in two dogs from the Aydın Province of Turkey. Turkish Journal of Veterinary and Animal Sciences. 37: 226-229.

Boozer, A.L. and Macintire, D.K. 2003. Canine babesiosis. Vet. Clin. North Am. Small Anim. 33:885-904.

Conrad, P., Thomford, J., Yamane I., Whiting, J., Bosma, L. and Uno, T. 1991. Hemolytic anemia caused by *Babesia gibsoni* infection in dogs. *Journal of the American Veterinary Medical Association.*199:601–605.

Furlanello, T.F., Fiorio, M., Caldin, G., Lubas, L. and Solano G. 2005. Clinicopathological findings in naturally occurring cases of babesiosis caused by large form Babesia from dogs of Northern Italy. Vet. Parasitol. 134:77-85.

Irwin, P.J. 2010. Canine babesiosis. Vet. Clin. North Am. Small Anim. Pract. 40: 1141-1156.

Jacobson, L.S. and Clark, I.A. 1994. The pathophysiology of canine babesiosis: New approaches to an old puzzle. J. S. Afr. Vet. Assoc. 65: 134-145.

Lin, M.Y. and Huang, H.P. 2010. Use of triple antibiotic combination of

doxycycline enrofloxacin-metronidazole combination with/ without diminazene aceturate to treat naturally occurring canine babesiosis caused by *Babesia gibsoni. Acta Vet Scand*. 52: 27-31

Makinde, M.O. and Bobade, P.A. 1994. Osmotic fragility of erythrocytes in clinically normal dogs and dogs with psrasites. *Res Vet Sci*. 57: 343-348.

Murase, T., Ueda, T., Yamato, O. and Maede, Y. 1996. Oxidative damages and enhanced ertythrophagocytosis in canine erythrocytes infected with *Babesia gibsoni*. *J Vet Med Sci*. 58: 259-261.

Niwetpathomwat, A., Techangamsuwan, S., Suvarnavibhaja, S. and Assarasakorn, S. 2006. A retrospective study of clinical hematology and biochemistry of canine babesiosis on hospital populations in Bangkok, Thailand. Comp. Clin. Pathol. 15: 110-112.

Onishi, T. and Suzuki, S. 1994. Changes of serum hemolytic activity and the number of reticulocytes in canine *Babesia gibsoni* infection. J. Vet. Med. Sci. 56: 611-612.

Salem, N.Y., and Farag, H.S. 2014. Clinico-pathological findings in *B. canis* infected dogs in Egypt. *Comp clin Pathol*. 23:1305-1307.

Schoeman JP. Companion animal clinical studies. Onderstepoort Journal of Veterinary Research 2009: 76: 59-66.

Taboada, J. and Merchant, S.R. 1991. Babesiosis of companion animals and man. Vet. Clin. North Am. Small Anim. Pract. 21: 103-123.

Tvedten H. Reference Values. In: Small Animal Clinical Diagnosis by Laboratory Methods, Willard, M.D. and H. Tvedten (Eds.) 4th Edn., Elsevier, Missouri, USA. 2004, pp: 417-419.

Wadhwa, D.R., Pal, B., Mandial, R.K., Kumar, A. and Agnihotri, R.K. 2001. Clinical, haemato-biochemical and therapeutic studies of canine babesiosis in Kangra valley of Himachal Pradesh. J. Vet. Parasitol. 25(1): 39-41.

How to cite this article:

Roopali, B., M. Roy and Roy, S. 2018. Clinico, Haemato-Biochemical Changes and Therapeutic Management of Canine Babesiosis. *Int.J.Curr.Microbiol.App.Sci.* 7(08): 1384-1388. doi: https://doi.org/10.20546/ijcmas.2018.708.158