The Pharma Innovation Journal 2023; SP-12(9): 749-751

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(9): 749-751

www.thepharmajournal.com
Received: 24-06-2023
Accepted: 30-08-2023

PI Ganesan
Professor and Head, Department of Veterinary Medicine, Apollo College of Veterinary Medicine, Jaipur, Rajasthan, India

Divyanshi Sharma
UG Scholar, Apollo College of Veterinary Medicine, Jaipur, Rajasthan, India

Corresponding Author:
PI Ganesan
Professor and Head, Department of Veterinary Medicine, Apollo College of Veterinary Medicine, Jaipur, Rajasthan, India

Babesia gibsoni based clinical studies in a Shih-Tzu dog

PI Ganesan and Divyanshi Sharma

Abstract
A 6 months old male, Shih-Tzu dog get admitted in a private veterinary clinic, Jaipur. The dog showed the clinical signs of pyrexia, conjunctivitis, Mucopurulent nasal discharge. Microscopic examination of the Giemsa stained blood smear revealed small form of *Babesia gibsoni* within erythrocytes. The Hemato-biochemical parameters revealed changes in their values from the normal values. The observed clinical signs by various authors with changes in their Hemato-biochemical parameters in *B. gibsoni* infected dogs compared with this clinical case and attributed factors discussed. Based on the above findings and as per the recommendation, the dog was treated for *B. gibsoni* infection successfully with Atovaquone at the dose rate of 3.5 mg/kg body weight administered per OS (PO) every 8 hours with azithromycin at the dose rate of 10 mg/kg body weight PO for 10 days. The recurrence of the infection for *B. gibsoni* was not observed in this case by its clinical signs and the dog was observed for a period of 60 days after the treatment with normal habits.

Keywords: Canine, babesiosis, treatment, Atovaquone

Introduction
Canine babesiosis is a clinically significant and geographically wide spread Hemo-protozoan disease of domesticated dogs and wild canids (Irwin 2010) [8]. The large *Babesia canis* and the small *Babesia gibsoni* are two organisms known to infect the dogs (Uilenberg: 2006) [16]. Typical intra erythrocytic piroplasms often occur in *Babesia gibsoni*. The organisms in the RBCs are small signet ring forms both in single and in multiple (Wang J *et al.* 2019; Solano-(Gallego L *et al.* 2016; Soulsby. 1982) [19, 14] Jain K J *et al.* (2017) [9] reported *B. gibsoni* infection in dogs in South Kerala. Clinical cases associated with infection by *B. gibsoni* have also been described in Germany (Hodiz A, *et al.* (2015) [6]. It is reported that the *Babesia gibsoni* infection is common in fighting dogs. The course of infection related to disease manifestation may be acute and chronic. The clinical signs and laboratory abnormalities differ among Babesia species. In *B. gibsoni* infection moderate to severe infection with lymph node enlargement, splenomegaly, small bowel diarrhea, weight loss, protein –losing nephropathy and abdominal effusion are reported (Solano-Gallego L *et al.* 2016) [14]. Deprived appetite, pyrexia, pallor of mucus membrane, lethargy, diarrhea, melena, lymphadenopathy, jaundice, vomiting, hemoglobinuria and seizures were the major clinical signs in dogs infected with *B. gibsoni*. (Anju *et al.* 2022) [1]. Wang J *et al.* (2019) [19] reported that the clinical signs depend on the species of Babesia causing infection and other co-factors such as immune status and the host age.
Hematological study revealed low level of hemoglobin, RBC count and platelet count in *B. gibsoni* infected dogs. (Jain *et al.* 2017) [9]. Anemia was one of the clinical sign in canine babesiosis (Vishnurahav *et al.* 2014) [18]. A moderate to severe thrombocytopenia in *B. gibsoni* infection was observed by Anju, S *et al.* (2022) [1]. The reasons for low levels of the above hematological changes are attributed to immune mediated destruction of erythrocytes (Meinkoth *et al.* 2002) [10]. Low level of MCV and MCH were observed in the infected cases of *B. gibsoni* infections indicating normocytic normochromic anemia due to acute infection of the bone marrow (Schoeman *et al.* 2009) [12].
On biochemical analysis of infected dogs with *B. gibsoni* elevated alkaline phosphatase levels were reported by Anju S, *et al.*, (2022) [1], when BUN and creatinine maintained their values. Solano-Gallego L *et al.*, (2016) [14] reported anemia, neutropenia, leukocytosis, azotemia, elevated ALT and ALP in these infected cases.

The combination of atovaquone and azithromycin is the only treatment that has been proven to reduce parasitaemia with *B. gibsoni* infection with PCR limit of detection. The dose recommended is atovaquone 3.5 mg/kg body weight administered per OS (PO) every 8 hours along with azithromycin at the dose rate of 10 mg /kg body weight PO for 10 days. (Di Cicco Mf, *et al.* 2012) [5].

Some dogs infected with *B. gibsoni* and treated with atovaquone and azithromycin do not show relapse of the disease, and some remain PCR negative for several years. However, dogs that remain infected with *B. gibsoni* following treatment may present a different clinical picture. (Birkenheuer A J, *et al.* 2004; Birkenheuer A J, *et al*. 1999) [3, 4]

Materials and Methods

Case report

A 6 months old, male Shih Tzu dog from Jaipur city get admitted in a private veterinary clinic. The main complaint was anorexia, pyrexia (103.4 °F), conjunctivitis, pale mucus membrane and dehydration. Blood sample was collected and analyzed for haemato-biochemical reactions and blood smear examination was carried out using Giemsa stain. The dog was treated with atovaquone @ 3.5 mg/kg body weight (PO) every 8 hours with azithromycin @ 10 mg /kg body weight PO for 10 days based on clinical signs.

Results and Discussion

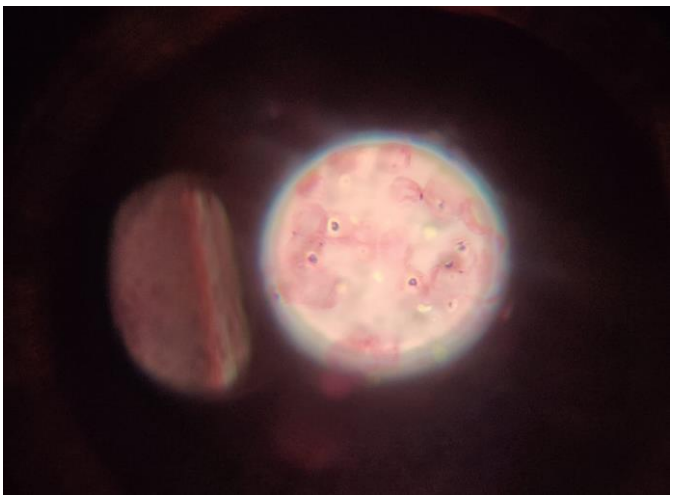

Fig 1: *Babesia gibsoni* in infected canine RBCs.

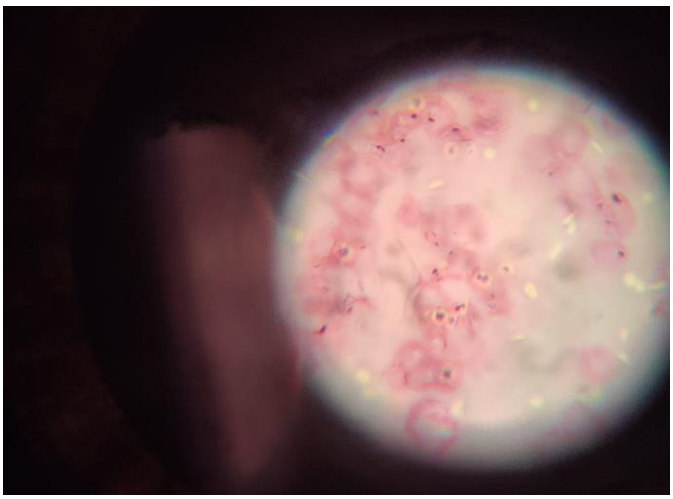

Fig 2: *Babesia gibsoni* in infected canine RBCs.

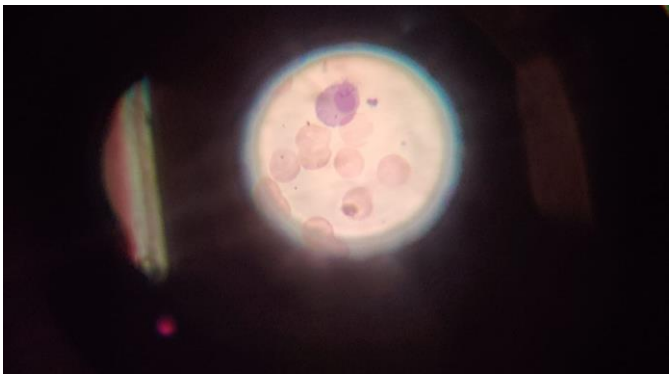

Fig 3: *Babesia gibsoni* in infected canine RBCs.

Table 1: Hematological parameters of dog infected with *B. gibsoni*

Parameters	Findings	Unit	Normal values	Diagnostic interpretation
Complete blood count				
Hemoglobin	11.8	g/dl	12.0-18.0	Mild anemia
TLC	7.4	Thou/cu.mm	6.0-17.0	---
Differential leucocyte count				
Neutrophils	70	%	60.0-70.0	
Lymphocytes	14	%	12.0-30.0	
Eosinophil	2	%	2.0-10.0	
Monocytes	4	%	3.0-10.0	
Basophils	0	%	0.0-1.0	
Absolute leucocyte count				
Neutrophils	6.08	thou/cu.mm	3.0-11.0	
Lymphocytes	1.05	thou/cu.mm	1.0-4.8	
Eosinophils	0.28	thou/cu.mm	0.1-1.3	
Monocytes	0.28	thou/cu.mm	0.1-1.4	
Basophils	0.00	thou/cu.mm	0.0-0.1	
RBC parameters				
RBC	4.48	mill/mm^3	5.5-8.5	Mild anemia
PCV	34.50	%	37.0-55.0	Mild anemia
MCV	54.70	fl	60.0-77.0	Microcytic
MCH	18.80	pg	19.5-24.5	Low
Platelet count	215.00	thou/cu.mm	200.0-900.0	
Biochemical profile				
SGOT/AST	40.30	U/L	9-49	
SGPT/ALT	50.10	U/L	8-57	
Alkaline phosphatase	155.55	U/L	10-100	Elevated
Blood urea nitrogen	20.4	mg/dl	8.8-25.9	

Microscopic examination of the dog's infected blood smear revealed small signet ring form organisms inside the RBCs (Fig 1, 2 & 3). T Wang J *et al.* 2019 [19]; Solano-Gallego L *et al.* (2016) [14] reported typical intra erythrocytic signet ring form piroplasms in the infected RBCs blood which confirms the *Babesia gibsoni*.

Varying clinical manifestations were reported by concerned authors in the *B. gibsoni* infected dogs. In this study the clinical signs expressed by the dogs were anorexia, pyrexia (103.4 °F), conjunctivitis, pale mucus membrane & dehydration. Solano-Gallego L *et al.*, (2016) [14] reported moderate to severe infection with lymph node enlargement, splenomegaly, small bowel diarrhea, weight loss, protein – losing nephropathy and abdominal effusion in *B. gibsoni* infections. Wang J *et al.* (2019) [19] reported that the clinical signs depend on the species of babesia causing infection and

other co-factors such as immune status and the host age, which is in concurrence with the present case also.

The hematological studies in this case revealed an Hb value of 11.8 g/dl (As against the normal range of 12-18): PCV values 34.50% (As against the normal range of 37-55): The RBC values were 4.48/mill/mm^3 (As against the normal range of 5.5-8.5).The MCV & the MCH values were 54.70 fl (As against the normal range of 60-77) & 18.80 p g. (As against the normal range of 19.5-24.5). Schoeman *et al.* (2009) [12] observed that the low level of MCV and MCH values in the infected cases of *B. gibsoni* indicating normocytic normochromic anemia which is due to the acute infection of the bone marrow. This observation is in concurrence with the findings of the present study. The elevated alkaline phosphatase in this study was 155.55 ul (As against the normal range of 10-100). Bilawal A *et al.* (2018) [2] attributed the reason for the elevation of alkaline phosphatase in *Babesia canis* infection for hepatic dysfunction. On biochemical analysis of infected dogs with *B. gibsoni*, elevated alkaline phosphatase levels were reported by Anju, S *et al.*, (2022) [1] which is in concurrence with this study.

Some clinical signs and clinic-pathological abnormalities differ among babesia species infecting dogs. Solano-Gallego L *et al.:* (2011) [13] & Irvin, PJ (2009) [7] reported that the varying clinical signs and hematological /biochemical parameter changes could be due to the inability of the immune system to eliminate the infection or when the immune system is in abatement.

Conclusions

The dog suffered with the clinical signs of pyrexia, anorexia, conjunctivitis, Muco purulent nasal discharge, mild dehydration with altered hematological and bio chemical changes, with the positive blood smear examination for *B. gibsoni* infection, where the infection of the dog for tick infestation could not be traced out. Based on the clinical picture, positive blood smear examination for *B. gibsoni* and Hemato-biochemical parameters studies, the dog was treated successfully with the recommended drug regimen.

References

1. Anju S, Vijayakumar K, Sulficar S, Shyma VH, Deepa PM. Hemato-biochemical changes associated with *Babesia gibsoni* infection in dogs. Journal of Veterinary and Animal Sciences; c2022. ISSN print: online 2582-0605
2. Bilawal A, Mandali G, Tandel F. Liver enzyme activity in dogs infected with *Babesia canis*. Intas Polivet. 2018;19(2):313-314.
3. Birkenheuer AJ, Levy MG, Breitschwerdt EB. Efficacy of combined atovaquone and azithromycin for therapy of chronic *Babesia gibsoni* (*Asian genotype*) infections in dogs. Journal of veterinary internal medicine. 2004;18(4):494-498.
4. Birkenheuer AJ, Levy MG, Savary KC, Gager RB, Breitschwerdt EB. *Babesia gibsoni* infections in dogs from, North Carolina. J Am Anim. Hosp. Assoc. 1999;35(2):125-128.
5. Di Cicco Mf, Downey ME, Beeler E, Marr H, Cyrog P, *et al*. Re–emergence of *Babesia conradae* and effective treatment of infected dogs with Atovaquone and azithromycin. Vet Parasitol. 2012;187(1-2):23-27
6. Hodiz A, Alic A, Fuehrer HP, Harl J, Wille-Piazzai W, Duscher CG. A molecular survey of vector-borne pathogens in red foxes from Bosnia and Herzegovina. Parasit Vectors. 2015;8:88
7. Irvin PJ. Canine babesiosis. From molecular taxonomy to control parasite vectors. 2009;2(1):S4.
8. Irvin PJ. Canine babesiosis. Vet. Clin Small Amin. 2010;40:1141-1156.
9. Jain KJ, Lakshmanan B, Shymala K, Preena JE, Aravindakshan. High prevalence of small Babesia species in canine population in Kerala, South India. Vet. World 2017;10:1319.
10. Meinkoth JH, Kocan A, Loud SD, Lorenz MD. Clinical and hemorrhagic effects of experimental infection of dogs with recently identified *B. gibsoni* like isolates from Oklahoma J Am. Vet. Med. Asso. 2002;220:185-189.
11. Reddy BS, Sivajothi S, Reddy LV, Raju KS. Clinical and laboratory findings of Babesia infection in dogs. J Parasitic Dis. 2016;40:268-272
12. Sohoeman JP. Canine babesiosis. Onderstepoort J Vet. Res. 2009;76:59-66.
13. Solano-Gallego L, Baneth G. Babesiosis in dogs and cats-expanding parasitological and clinical spectra. Vet Parasitol; c2011. p. 181-60
14. Solano-Gallego L, Sainz A, Roura X, *et al*. A review of canine babesiosis: The European perspective. *Parasit vectors.* 2016;9(1):336.
15. Soulsby EJL. Helminthes, Arthropods and Protozoa of domesticated Animals. ELBS; c1982. p. 809.
16. Uilenberg G. Babesia-a historical review. Vet Parasitol. 2006;138(1-2):3-10.
17. Fathipour V, Esmaeiljad B, Habibi G, Afshari A, Tavassoli M, Asri-Rezaei S, *et al*. *Babesia canis* caused clinical babesiosis in a female Shih Tzu dog. 2021;12(4):519-522.
18. Vishnurahav RB, Pillai UN, Alex PC, Ajithkumar S. Hematobiological changes in canine babesiosis. Ind. J Can. Pract. 2014;6:130.
19. Wang J, Liu J, Yang J, *et al.* Molecular detection and genetic diversity of *Babesia canis* in pet dogs in Henan Province, China, Parasitol Int. 2019;71:37-40.