International Journal of Livestock Research, Vol. 13 (7) Jul' 2023
http://www.ijlr.org
eISSN: 2277-1964

Case Report

Diagnosis and Therapeutic Management of Canine Babesiosis in India

Aditya Kumar[1], Afroz[2], Amit Kumar Verma[3]*, Arbind Singh[4], M. V. Jithin[4], Vinod Kumar Varun[4], Desh Deepak[4] and Tarun Kumar Sarkar[5]

[1]PhD Scholar, Veterinary Medicine, Govind Ballabh Pant University of of Agriculture and Technology, Pantnagar, Uttarakhand INDIA
[2]PhD Scholar, Veterinary Medicine, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh -250110, INDIA
[3]Associate Professor, Veterinary Medicine, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh -250110, INDIA
[4]Assistant Professor, Veterinary Medicine, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh -250110, INDIA
[5]Professor & Head, Veterinary Medicine, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh -250110, INDIA

*Corresponding Author: drakverma79@gmail.com

How to cite this paper: Kumar, A., Afroz, Verma, A., Singh, A., Jithin, M. V., Varun, V. K., Deepak, D., Pal, A., & Sarkar, T. K. (2023). Diagnosis and Therapeutic Management of Canine Babesiosis in India. *International Journal of Livestock Research*, 13 (7), 41-45.

Received : Jun 15, 2023
Accepted : Jul 30, 2023
Published : Jul 31, 2023

Abstract

Canine babesiosis is a clinically important disease of dogs and wild canids representing a significant veterinary issue globally, caused by large Babesia canis and the small Babesia gibsoni and transmitted through ticks. The aim of the present study was to describe the clinical manifestations, diagnosis and therapeutic management of babesiosis in a native breed dog with a history of tick infestation. A female native breed dog aged 10 months old was presented to Veterinary Clinical Complex with a history of tick infestation, inappetence, irritated behaviour, vomiting, emaciated, lethargy and brown urination for 5 days. Dog was under treatment at local dispensaries with antibiotics from the past 5 days with no recovery. Clinical examination of the dog revealed pyrexia (105oF), increased pulse rate, pale mucus membrane, lymphadenopathy and hepatosplenomegaly. The blood sample was collected in EDTA vial and clot activator vacutainers for laboratory examination. Giemsa stained thin blood smear examination revealed the presence of piroplasmic organisms (B. gibsoni) in the erythrocytes. Haemotology revealed leucocytosis (10600/cumm) with neutrophilia (7049/cumm) and anaemia (haemoglobin 7.8 g/dl) and in serum biochemistry the increased level of ALP, ALT and AST was noticed. Initially the primary treatment was given with inj. Meloxicam @ 0.5 mg/kg body weight and inj. Nurobion forte @ 2 ml on the first day of presentation, thereafter the confirmatory diagnosis of the disease inj. imidocarb @ 6.6 mg/kg body weight was given at 2 weeks interval along with fluid and supportive therapy. There was no adverse reaction and the dog showed clinical and haematological improvement from 3rd day of treatment onwards, recovered completely after 20 days and no parasite was detected in thin blood smear examination.

Keywords: B. gibsoni, biochemistry, canine, doxycycline, haematology, Imidocarb.

Introduction

Babesiosis in dogs is a clinically important haemoprotozoan disease of dogs and other wild canids leading to high morbidity and mortality in canines (Solano-Gallego and Baneth, 2011; Barbosa *et al.,* 2020; Preena*et al.,* 2021). The disease is caused by the large *Babesia canis* and the small *Babesia gibsoni* that are transmitted through Ixodid tick vectors *Rhipicephalus sanguineus* and distributed worldwide including Asia, Africa, Europe, the Middle East, and North America (Mittal *et al.,* 2019; Teodorowski *et al.,* 2020). The clinical signs of the disease vary with the species, strains and virulence of etiological agent and host factors such as age, immunity, and co-infections with another disease (Irwin, 2009). Canine babesiosis is often acute and clinically manifested by fever, haemolytic anemia with destruction of red blood cells and organ dysfunction such as liver, kidney or brain, while subclinical and subacute infection have also been reported (Irwin, 2009; Eichenberger *et al.,* 2016). The present report describes the clinical manifestations, diagnosis and therapeutic management of babesiosis in a native breed dog with a history of tick infestation.

Materials and Methods

Case History and Clinical Observation

A female native breed dog aged around 10 months (figure 1) was presented for veterinary assistance with a history of severe tick infestation, inappetence, irritated behaviour, vomiting, emaciated, lethargy and brown urination for 5 days. On clinical examination, the animal had pyrexia (105^{o}F), increased pulse rate, pale mucus membrane of the conjunctiva and oral mucosa, lymphadenopathy and hepatosplenomegaly. Based on the history and clinical examination, infection with haemoprotozoan parasite was suspected. The blood sample in EDTA and clot activator vacutainers was collected and processed for laboratory examination.

Laboratory Examinations

A thin blood smear was prepared and stained with Giemsa stain and observed under oil immersion lens of a microscope for the detection of blood protozoa (Potgieter *et al.,* 2004). The whole blood in EDTA @1mg/ml of blood was processed for the haematological examination (hemoglobin (Hb), total erythrocyte count (TEC), total leukocyte count (TLC), Differential leukocyte count (DLC), packed cell volume (PCV) (Schalm *et al.,* 1975). The whole blood in clot activator vial was centrifuged at 3000 rpm for 10 minutes and serum was separated and processed for the estimation of Albumin, Bilirubin- Total, Bilirubin- Direct, Serum glutamic oxaloacetic transaminase (SGOT/ AST), Serum glutamic pyruvic transaminase (SGPT /ALT), Alkaline phosphatase (ALP) (Schalm *et al.,* 1975).

Treatment

Initially, the primary treatment was given with inj. Meloxicam @ 0.5 mg/kg body weight and inj. Nurobion forte @ 2 ml on the first day of the presentation. After the confirmatory diagnosis of the disease, the dog was treated with fluid therapy along with symptomatic treatment like Inj. Meloxicam @ 0.5 mg/kg body weight, Inj. Ranitidine hydrochloride @ 0.5 mg/kg body weight, Inj. Ondensetron @ 1 mg/kg body weight, Inj. Hepamerz (L-Ornithine-L-Aspartate) @ 5 ml intravenously for 5 days. The dog was also given two injections of imidocarb @ 6.6 mg/kg body weight at 2 weeks apart. The oral treatment includes Tab. Doxycycline @ 10 mg/kg body weight for 14 days and oral haematinics (Syp. Sharcoferol pet 1tsp BID). The dog owner was advised to bring the dog after 14 and 20 days for furtherinvestigation. The dog showed clinical and haematological improvement from 3rd day of treatment onwards, recovered completely after 20 days and no parasite was detected in thin blood smear examination. The owner was further advised to continue oral haematinics (Syp. Sharcoferol pet 1tsp BID) for 30 days.

Result and Discussion

Giemsa stained thin blood smear examination revealed the presence of piroplasmic organisms (*B. gibsoni*) in the erythrocytes (Figure 2). The piroplasm of *B. gibsoni* is smaller in size (1×2.5um) and has a signet, rod or cocci shape. A single organism per erythrocyte is common, but multiple forms have also been reported.

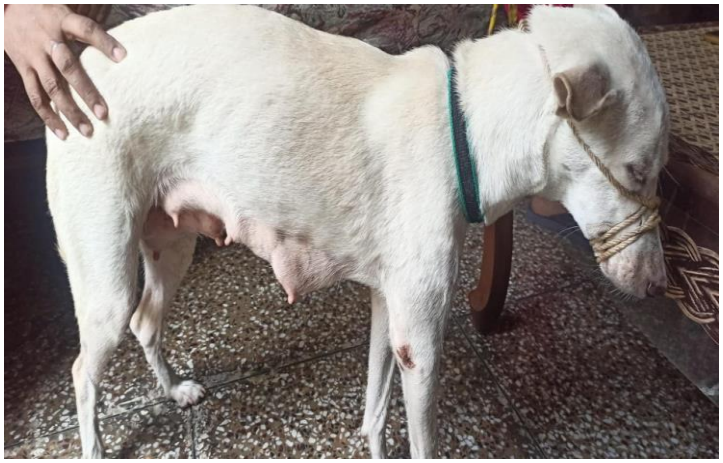

Figure 1: Female dog presented to Veterinary Assistance

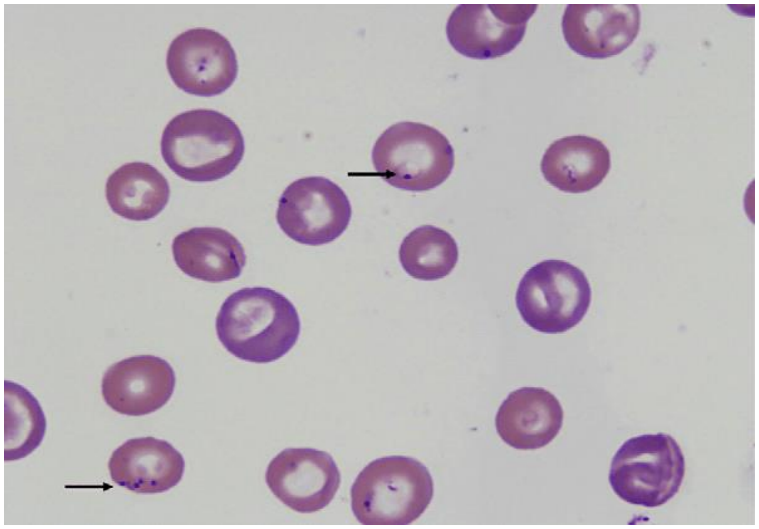

Figure 2: Giemsa stained blood smear revealing the presence of signet, rod or cocci shaped *B. gibsoni* organism in erythrocytes of blood smear

The haematological and biochemical parameters were presented in table 1 and 2, respectively.

Table 1: Hematological parameters of dog affected with canine babesiosis

Parameter	Test Value	Reference range
Hb (g/dL)*	9.2	12.0-18.0
TEC ($\times 10^6$/µL)	4.84	5.5-8.5
TLC ($\times 10^3$/µL)	23	6.0-17
Neutrophil (%)*	91	60-77
Lymphocyte (%)*	6.6	12-30
Eosinophil (%)*	1.3	2-10
Monocyte (%)	1.1	3-10
PCV (%)	27.3	37-55
MCV (fL)	56.4	60-77
MCH (Pg)	19	19.5-22.5

#Reference range adopted from Schalm et al., 1975. Hb=Hemoglobin, TEC=Total erythrocyte count, TLC=Total leukocyte count, PCV=Packed cell volume, MCV=mean corpuscular volume, MCH=mean corpuscular hemoglobin

Table 2: Biochemical parameters of dog affected with canine babesiosis

Parameters	Test value	Reference range

Bilirubin- Total (mg/dl)	0.91	0-0.4
Bilirubin- Direct (mg/dl)	0.77	0-0.1
SGOT (AST) (IU/L)	42.26	13-15
SGPT (ALT) (IU/L)	169.40	10-109
ALP (IU/L)	289.70	1-144
Albumin (g/dl)	5.29	2.3-4.0

#Reference range adopted from Schalm et al., 1975, SGOT=Serum glutamic oxaloacetic transaminase, SGPT=Serum glutamic pyruvic transaminase, ALP=Alkaline phosphatise

Haemotology revealed leucocytosis with neutrophilia and anaemia, while serum biochemistry revealed the increased level of ALP, ALT and AST.Preena*et al.,* 2021 also reported mild to moderate regenerative, normocytic and normochromic anemia in large *Babesia* species infection in dogs of the Kannur District of Kerala. Babesiosis in dogs produces two syndromes viz., haemolytic anemia and dysfunction of the liver and kidney due to a systemic inflammatory response (Jadhav *et al.,* 2011; Spariosu *et al.,* 2021). The clinical management of canine babesiosis involves the specific treatment along with symptomatic and supportive treatment. Different drugs and their combinations (Imidocarb dipropionate, Diminazene aceturate, Atovaquone and azithromycin, Buparvaquone and azithromycin, phenamidine, pentamidine, parvaquone, artemisinin derivativesand antibiotics with some anti-protozoal activity such as doxycycline, minocycline, clindamycin, enrofloxacin and metronidazole) have been reported for the effective treatment of babesiosis in dogs (Irwin, 2009, Solano-Gallego and Baneth, 2011; Iguchi *et al.,* 2015; Checa*et al.,* 2017; Baneth, 2018).

Imidocarb dipropionate is approved by the United States Food and Drug Administration (USFDA) for the treatment of canine babesiosis (Checa *et al.,* 2017) and excreted through the liver and kidney in the faeces and urine, respectively. Various mechanisms of action have been described for this drug including blockage of the entry of inositol into parasitized red blood cells leading to starvation of parasite (McHardy *et al.,* 1986), nucleic acid damage and cellular repair inhibition etc. (Baneth, 2018). The symptomatic treatment was aimed to relive the fever and other side effects of the drugs like, vomiting, acidity etc, while the supportive treatment was focused on the restoration of the adequate tissue oxygenation by correcting anemia, dehydration, and electrolyte imbalance etc.

Conclusion

In the present case report, the combination of Imidocarb dipropionate and Doxycycline reduced the parasitemia in the dog and the clinical signs including anaemia, inappetence and fever were also subsided with no adverse effect. It can be concluded that combination therapy of Imidocarb dipropionate @ 6.6 mg/kg two injections 2 weeks apart and tab. Doxycycline @ 10 mg/kg for 14 days is effective against *B. gibsoni* in dogs with no adverse reactions.

Acknowledgement

The authors are thankful to the Dean, College of Veterinary and Animal Sciences and Hon'ble Vice Chancellor, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh for the necessary help and the facilities provided during the study.

Contribution by Authors

Equal contribution

Conflict of Interests

Authors declare no conflict of interest for the research findings. There is no separate funding for this research. The authors have indicated that they have no affiliations or financial involvement with any organization or entity with a financial interest in, or in financial competition with, the subject matter or materials discussed in this article..

Publisher Disclaimer

IJLR remains neutral concerning jurisdictional claims in published institutional affiliation.

References

1. Barbosa COS, Garcia JR, de Melo Nasser Fava, N, Pereira, DA, da Cunha MJR, Nachum-Biala Y, Cury MC and Baneth G (2020) Babesiosis caused by Babesia vogeli in dogs from Uberlândia State of Minas Gerais, Brazil, *Parasitol Res.,* 119(3):1173-1176.
2. Checa R, Montoya A, Ortega N, González-Fraga JL, Bartolome A, Galvez R, Marino V and Miro G (2017) Efficacy, safety and tolerance of imidocarb dipropionate versus atovaquone or buparvaquone plus azithromycin used to treat sick dogs naturally infected with the Babesia microti-like piroplasm, *Parasit Vectors,* 10:145.
3. Eichenberger RM, Riond B, Willi B, Hofmann-Lehmann R and Deplazes P (2016) Prognostic markers in acute Babesia canis infections, *J. Vet. Intern. Med.,* 30:174-182
4. Iguchi A, Matsuu A, Matsuyama K and Hikasa Y (2015) The efficacy of artemisinin, artemether, and lumefantrine against Babesia gibsoni in vitro, *Parasitol. Int.,* 64:190-193
5. Irwin PJ (2009) Canine babesiosis: from molecular taxonomy to control, *Parasit. Vectors,* 2 (Suppl. 1): S4
6. Jadhav RK, Kumari RR, Javed Jameel A and Kumar P (2011) Emergence of Arthropod Transmitted infections in Kennel Dogs, *Veterinary World,* 4(11):522-528
7. Mittal M, Kundu K, Chakravarti S, Mohapatra JK, Singh VK, Raja Kumar B, Thakur V, Churamani CP and Kumar A (2019) Canine babesiosis among working dogs of organised kennels in India: A comprehensive haematological, biochemical, clinicopathological and molecular epidemiological multiregional study, *Prev Vet Med.,* 169:104696.
8. Potgieter FT and Stoltsz WH (2004) Bovine Anaplasmosis. In: Coetzer JAW, Tustin RC, Infectious Diseases of Livestock, Oxford University Press, Cape Town, South Africa, 594–616
9. Preena P, Sarangom SB, Ramesh Kumar KV, Seeja S and Rajalekshmi S (2021) Hematological alterations in large Babesia species infection in dogs of Kannur District of Kerala, *J Parasit Dis.,* 45(4):1090-1095
10. Schalm OW, Jain NC and Carrol EJ (1975) Veterinary Haematology 3rd edn. edited by OW Schalm, NC Jain and EJ Carroll, Lea and Febiger Publication, Philadelphia.
11. Solano-Gallego L and Baneth G (2011) Babesiosis in dogs and cats – expanding parasitological and clinical spectra, *Vet. Parasitol.,* 181:48-60
12. Spariosu K, Janjic F, Radakovic M, Francuski Andric J, Beletic A, Kovacevic Filipovic M (2021) Low serum levels of promatrix metalloproteinase-2 and -9 occur during acute Babesia canis infection in dogs, *Vet Parasitol.,* 300:109612
13. Teodorowski O, Kalinowski M, Skrzypczak M, Witt K, Madany J, Winiarczyk S, Adaszek Ł. (2020) Babesia gibsoni infection in dogs in Poland, *Pol J Vet Sci.,* 23(3):469-471

****