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Canine babesiosis: A case study

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Abstract

Tick borne haemoparasites pose a major health risk to animals worldwide. The present study reports the babesia infection in five dogs presented to Teaching Veterinary Clinical Complex, DSVCKV, Durg with signs of fever, pale conjunctival and oral mucus membranes, weakness and hemoglobinuria. The dogs showed marked anemia, hypoproteinemia and increased liver enzymes based on hematological and biochemical examinations, respectively. The microscopic examination revealed Babesia sp. as pyriform organism in red blood cells. The Real time PCR revealed that all the dogs were positive for *Babesia gibsoni*. The dogs were treated with Imidocarb @ 6.6 mg/kg BW and Doxycycline @ 5 mg/kg BW along with supportive therapy. All dogs recovered completely after 15 days of treatment. To conclude, canine Babesiosis is one of the most important diseases to be monitored due to its pathological effect on the health of the affected dogs, which may results in their death. Therefore, early diagnosis of the disease and appropriate treatment is necessary to save the life of animal.

Keywords: Dogs, hemoglobinuria, real time PCR, *Babesia gibsoni*, Imidocarb

Introduction

Babesiosis is a major tick-borne disease in dogs, with a global distribution that includes India. It is caused by various Babesia species, which parasitize dogs' red blood cells, causing their destruction and progressive anemia. The disease is characterized by fever, lethargy, hemolytic anemia, thrombocytopenia, lymphadenopathy and splenomegaly. (Teodorowski *et al.*, 2022) [10].

Canine babesia can be divided into two morphological categories: large and small. *Babesia canis*, *Babesia vogeli* and *Babesia rossi* are in the large form, measuring 2.5-5.0 µm, while *Babesia gibsoni* and *Babesia annae* are in the small form, measuring about 1.0-2.5 µm (Petra *et al.*, 2018) [8].

Dogs acquire infection when Babesia-infected ticks bite the dog and introduce sporozoites into the dog's blood. The sporozoites penetrate red blood cells, transform into trophozoites and start dividing, turning into merozoites that exit the red blood cells, leading to their destruction and further invading additional erythrocytes. Simultaneously, inside erythrocytes, some merozoites develop into pre-gametocytes (gamonts), which are consumed by the tick feeding on an infected host. In the tick gut, these pre-gametocytes develop into male and female gametes, subsequently undergo gametogony and combine to form a zygote. This zygote reaches the salivary gland and multiplies into sporozoites, which can infect the vertebrate host once the tick progresses to the next stage. Babesia can be transmitted from infected pregnant dogs to their fetuses and dogs can also spread the disease by biting other dogs (Petra *et al.*, 2018; Alsaad *et al.*, 2021) [8, 1]. This report was aimed to observe the clinical cases of babesia infection in dogs with clinical, biochemical and molecular examinations.

2. Case reports**2.1 Case Selection**

Five dogs were presented at the Teaching Veterinary Clinical Complex, DSVCKV, Durg with the history of weakness, inappetence and tick infestation. Details of the animals are given in Table 1.

2.2 Clinical examination

The clinical examination of the animals revealed fever, pale conjunctival and oral mucus membranes, weakness, lethargy and dehydration. Dog 5 also had seizures while dog 1 and dog 4 showed hemoglobinuria, at the time of presentation. Based on the clinical examination suggestive of haemoprotezoan parasite infection, thin blood smears were prepared from ear tip for parasitic examination. Blood samples were collected aseptically from the cephalic vein for hematological, biochemical and molecular analysis.

2.3 Blood smear examination

The Giemsa-stained blood smears revealed the *Babesia* spp as pyriform shaped parasite with in the RBCs. Sometimes, more than one organism were seen in a single RBC (Fig 1).

2.4 Haematological and biochemical analysis

Haematological analysis was done using automated hematology analyser (URIT 2900 Vet Plus) whereas biochemical analysis of serum was carried out in semiautomatic biochemistry analyser (microlab 300) using CliniQuant-FSR (Meril) Kit.

Examination of blood parameters indicated normocytic normochromic anemia (Table 2). Moreover, Biochemical changes revealed hypoproteinaemia and increased liver enzymes in diseased dogs (Table 3).

2.5 Molecular diagnosis

For molecular study, the whole blood in EDTA vials were sent to the Animal Health Pathology Lab, Kolkata (West Bengal), where the *Babesia* species was detected by Real time polymerase chain reaction (RT PCR or qPCR) on applied biosystem thermocycler using *Babesia gibsoni* real time PCR kit (IVD kit based on real time PCR, VetNat).

The results of Real time PCR revealed that all the samples were positive for *Babesia gibsoni* with CT value ranged between 30-38, indicating the samples were found Low Positive (Fig 2).

2.6 Treatment

All the dog were treated with inj. Imidocarb @ 6.6 mg/kg BW, intramuscular and then maintained on tab. Doxycycline @ 5 mg/kg BW orally, BID for 28 days. Additionally, fluid therapy and oral haematinics (Syp. Sharkoferrol 5ml OD) were administered to the dogs. Antipyretic drug analgin was administered on first 3 days when dogs showed fever. Owner was advised to come after one week for further investigation After 14 days, the intramuscular injection of imidocarb at a dose of 6.6 mg/kg BW was repeated.

3. Results and Discussion

After a week dogs (1, 2 and 3) showed maximum improvement whereas dogs 4 and 5 took 15 days to recover. Post-treatment, the peripheral blood smear tested negative for haemoprotezoan infection. The percentage of haemoglobin showed improvement. Appetite gradually came back. The owner was recommended to maintain the haematinics for one month.

In the current case study, dogs showed various clinical manifestations that are also observed in earlier reports with *Babesia gibsoni* infection. Moreover, anemia and hypoproteinaemia were also recorded (Jacobson, 2006; Chaudhary *et al.*, 2025) [5, 4]. In our study, we confirmed that the dogs were infected with *Babesia gibsoni* using

molecular method. Similar to our study, Jain *et al.* (2018) [6] also reported 26% *Babesia gibsoni* infection in dogs of Kerala using Multiplex PCR. Singh *et al.* (2016) [9] found 13 (7.9%) dogs out of 164 blood samples positive for *Babesia gibsoni* infection based on microscopic examination, 18S rRNA nested-PCR and sequencing of the PCR products. The rapid recovery with Imidocarb observed in the present study is consistent with earlier reports demonstrating that Imidocarb Dipropionate is one of the most common babesiacides used worldwide and is highly effective against *Babesia gibsoni* (Bhojne *et al.*, 2013; Karasova *et al.*, 2022) [2, 7].

Table 1: Details of dogs included in the present study

Case	Breed	Age	Sex	Body Weight (kg)
Dog 1	Labrador	1 year	Male	5.2
Dog 2	German shepherd	1.5 years	Male	6.7
Dog 3	Labrador	3 years	Female	6.8
Dog 4	Belgian shepherd	8 months	Male	4.6
Dog 5	German shepherd	10 months	Female	4.8

Table 2: Hematological parameters of the dog with *Babesia* infection

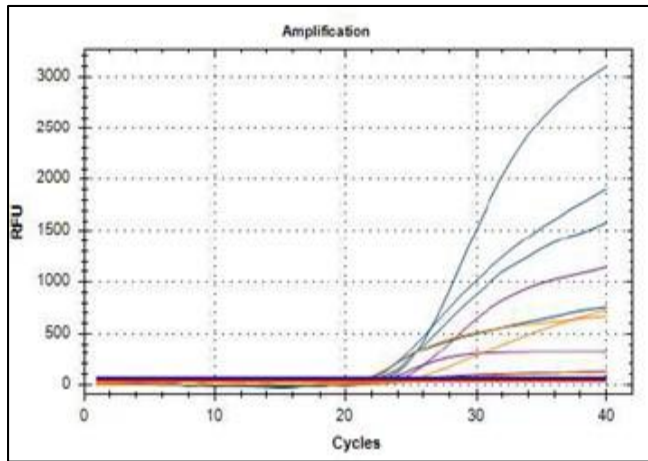
Parameters	Dog 1	Dog 2	Dog 3	Dog 4	Dog 5	Normal Range *
RBC x 10 ⁶ per µL	3.6	5.4	4.6	2.9	3.1	5.5-8.5
Hb g/dL	8.8	8.6	8.1	4.2	6.8	11-19
PCV%	25	34	27.4	18	21	39-56
MCV fl	65.7	62.7	66.9	62	67.7	62-72
MCHC%	35.2	25.2	29.5	23.3	32.3	30-38
MCH pg	24.4	15.8	19.7	14.4	21.9	20-25
WBC x 10 ³ per µL	12	9.5	8.2	17.5	15.3	6-17
Platelets x 10 ³ per µL	190	186	210	170	310	117-460
*Chauhan and Chandra (2007) [3]						

Table 3: Biochemical parameters of the dog with *Babesia* infection

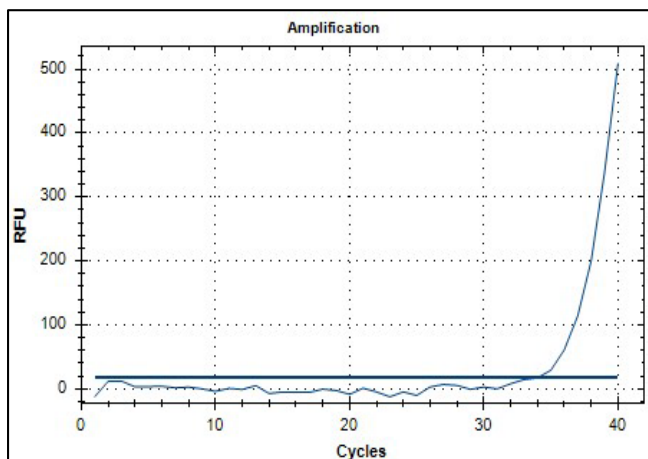
Parameters	Dog 1	Dog 2	Dog 3	Dog 4	Dog 5	Normal Range*
Total Protein (g/dL)	3.8	4.2	4.6	4.2	4.8	5.1-7.8
Albumin (g/dL)	0.83	2.1	0.88	1.17	2.28	3.1-4
SGPT/ALT (U/L)	204.20	167.25	222.59	136.21	102.73	5-107
*Chauhan and Chandra (2007) [3]						



Fig 1: Blood smear showing *Babesia* spp (arrow) inside the erythrocyte of the diseased dog. (Giemsa x1000)



Panel A



Panel B

Fig 2: Real time PCR results. Panel A shows amplification plot for positive control; Panel B depicts the typical amplification plot (fluorescence vs. cycle number) obtained in the real time PCR with blood sample from a *Babesia gibsoni* positive cases.

Conclusion

In the current research, *Babesia* infection was identified through both traditional (light microscopy) and molecular (real-time PCR) methods. The microscopic analysis is cost-effective and rapid, yet PCR is a more specific and sensitive method as it differentiates *Babesia* species that are challenging to identify morphologically via blood smear examination. PCR is capable of identifying parasitaemia, even when present in low amounts. This infection in dogs can be effectively managed using both specific and supportive strategies. Tick vector management is the sole effective approach to avert this illness. Moreover, it is important for owners to regularly check their dogs for tick infestations.

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