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Clinico diagnostic and therapeutic management of *Babesia gibsoni* infection in dogs

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Abstract

Babesiosis in dogs is endemic in tropical countries like India and its prevalence is well reported in south Indian states like Telangana, Andhra Pradesh and Tamil Nadu. As the presence of tick vectors is found throughout the year, the disease is seen in dogs all the year round. There is a paucity of information regarding the prevalence % of *Babesia gibsoni* infection in dogs. The present study was aimed to ascertain the prevalence of *Babesia gibsoni* in dogs. The clinical parameters were enumerated thoroughly and the diagnosis methodology of *Babesia gibsoni* infection was elucidated. The novel therapeutic protocol was analysed. In the present study 10 dogs which were presented to the Veterinary clinical complex, College of Veterinary Science, Rajendranagar referred from the private clinicians of Hyderabad having symptoms of fever, fatigue, anaemia, splenomegaly, haemoglobinuria, icteric mucous membranes and associated clinical signs were identified and further screened. Screening was performed with various clinical diagnostics like Rapid Antigen Test kit, thin blood smear film examination and RTPCR. The confirmed cases were subjected to a novel therapeutic regimen which aimed at treatment of *Babesia gibsoni* by reverting grave anaemia and other clinical signs of babesiosis.

Keywords: *Babesia gibsoni*, anemia, Telangana, Andhra Pradesh

Introduction

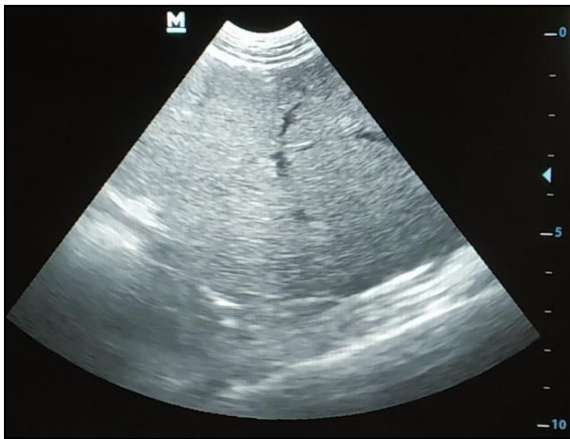
Canine babesiosis is one of the most widespread haemoprotozoan diseases of domesticated and wild canidae. The species of *Babesia canis* and *Babesia gibsoni* commonly infect dogs. Canine Babesiosis is a vector borne haemoprotozoal disease which is transmitted by arthropod tick vectors of Ixodes species. They are prevalent throughout Asia with *Babesia canis* being more predominant and *Babesia gibsoni* being the 2nd most prevalent. *Babesia gibsoni* is prevalent throughout the year, more in seasons when the vector population is more. Fighting dogs are considered a reservoir of infection (Karasová *et al* 2022). Canine babesiosis is clinically manifested by varied degrees of anaemia because this haemoprotozoan occurs as a single piroplasm in the infected erythrocytes and cause premature destruction of mature erythrocytes. Along with pronounced anaemia other clinical signs seen in Babesiosis are fever, pallor, jaundice, haemoglobinuria, splenomegaly and weakness. Canine babesiosis can be well diagnosed by demonstration of organism by means of making a thin blood film at the peak of pyrexia. Similarly the disease can be diagnosed by other advanced modalities which reduce the timelapse of confirmatory diagnosis like Rapid Antigen test and RTPCR. The primary aim of therapy for canine babesiosis is to reduce the grave anemia caused due to the destruction of erythrocytes. The therapy involves destruction and elimination of haemoprotozoan parasite from the body with the use of anti haemoprotozoan and specifically antibabesial drugs. The main aim of this article is to enlighten the accurate diagnosis, successful medical management of Babesiosis, specifically *Babesia gibsoni* infection in dogs.

Materials and Methods

10 cases were identified and investigated during this study. The 10 dogs which were showing clinical signs suggestive of canine babesiosis like profound anaemia, weakness, fatigue, haemoglobinuria, splenomegaly formed the clinical material for the study. Blood samples of these dogs were examined for identification of the haemoprotozoans in the blood smear. Blood smear of the suspected animals was stained with Giemsa stain and observed under oil

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immersion objective. In positive cases Babesial piroplasms were observed inside erythrocytes. Secondly, the same blood sample was subjected for complete blood picture examination by auto hematoanalyzer to enumerate and analyse the changes of various blood parameters in this infection and also to correlate the correction of these parameters towards healthy levels in response to the therapy. The Rapid Antigen Test is based on sandwich lateral flow immunochromatographic assay. Whole blood was centrifuged to get serum. 1 drop of prepared serum was added into the sample hole through a capillary dropper and then 3 drops of assay buffer was added into the sample hole and result was analysed after 5 minutes. Appearance of both C line and T line was considered positive for *Babesia gibsoni* infection.



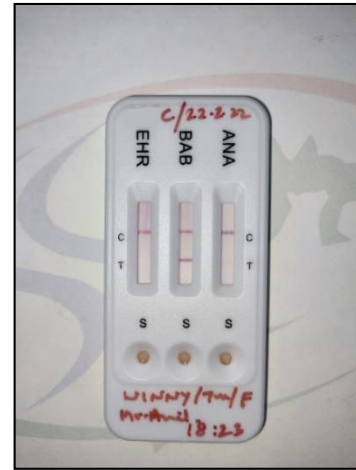
Ultrasonography revealing splenomegaly in a suspected dog.



Picture revealing bilirubinuria in a suspected dog.



Rapid Antigen Test Kit used for screening Babesia Gibsoni



RAT kit depicting positive for Babesia gibsoni infection

Further the animals tested positive for Babesiosis in Rapid Antigen Test, RTPCR were randomly divided into 2 groups. Diminazine aceturate @ 3.5 mg/kg body weight was administered as intramuscular injection on the first day, second dose was repeated after 48 hrs of the first dose in 5 dogs (Group-I) whereas dogs of the other group (Group-II) were treated with inj. Buparvaquone @ 5 mg/kg bodyweight intramuscularly in 2 doses with 48 hours apart starting on the first day and Tab Azithromycin @ 10 mg/kg b.wt perorally for ten consecutive days. In all these 10 dogs, oral haematinic suspension (Fecofol suspension) was given daily @ 10 ml SID for 10 days.

Diagnosis

Babesia gibsoni were found in RBCs in the blood smears of all the ten dogs. Intraerythrocytic merozoites of small *Babesia* spp. were microscopically detected in the blood smears of all dogs which were PCR-positive for piroplasms (Barbara *et al* 2021). They have also tested positive for Babesiosis in Rapid Antigen Test, RTPCR. Complete blood picture examination revealed significantly low levels of Hb, PCV, TEC and platelets counts.

Decrease in Hb levels were in agreement with reports of Andoni *et al.* [1, 2], Furlanello *et al.* [4], Shah *et al.* [9], Niwetpathomwat *et al.* [6], Selvaraj *et al.* [8], Wadhwa *et al.* [34], Reddy *et al.* [7], and Nalubamba *et al.* [5].

Decreased PCV levels in dogs with babesiosis were in agreement with reports of Andoni *et al.* [1, 2], Furlanello *et al.* [4], Shah *et al.* [9], Niwetpathomwat *et al.* [6], Selvaraj *et al.* [8], Wadhwa *et al.* [10], Reddy *et al.* [7], and Nalubamba *et al.* [5].

Decreased TEC levels were in accordance with reports of Andoni *et al.* [1, 2], Niwetpathomwat *et al.* [6], Shah *et al.* [9], Reddy *et al.* [7], and Nalubamba *et al.* [5].

Decreased platelet counts in babesiosis were in agreement with reports of Furlanello *et al.* [4], Niwetpathomwat *et al.* [6], Shah *et al.* [9], Wadhwa *et al.* [10], Andoni *et al.* [1, 2], Reddy *et al.* [7], Nalubamba *et al.* [5], and Vishnurahav *et al.* [11].

Serum biochemical profile of the 10 dogs revealed decrease in the levels of Albumin and A/G ratio.

These results were in accordance with Vishnurahav *et al.* [11], Yadav *et al.* [13] and Vijayalakshmi *et al.* [12].

Treatment

Diminazine aceturate (Berenil RTU) @ 3.5 mg/kg body weight was administered as intramuscular injection on the

first day, second dose was repeated after 48 hrs of the first dose in 5 dogs (Group-I) whereas dogs of the other group (Group-II) were treated with inj. Buparvaquone (Butalex) @ 5 mg/kg body weight intramuscularly in 2 doses with 48 hours apart starting on the first day in adjunct to Azithromycin (Azee) @ 10 mg/kg b.wt perorally for ten

consecutive days. In all these 10 dogs, oral haematinic suspension (Fecofol suspension) was given daily @10 ml SID for 10 days.

Results and Discussion

Haemogram of Group I dogs

Parameters	Healthy dog values	0 day values	5 th day values in Group I dogs	10 th day values in Group I dogs
Hemoglobin (g/dL)	12 – 18	7.7±1.24	10.6±1.23	13.2±0.34
PCV (%)	35 - 57	24±2.34	34±2.34	36±2.11
MCV (fl)	66 - 77	47.23±2.3	57±1.6	62.7±1.72
MCH (pg)	21 - 26	15.54±1.56	20±0.8	21.2±2.16
MCHC (g/dl)	320 - 363	232.1±32.72	291±34.1	311.1±27.53
TEC X 106/μL	5 – 8	3.5±1.42	4.6±1.12	5.3±1.02
TLC X 103/μL	5 – 14	5.42±1.5	7.4±1.3	9.84±1.6
Neutrophils (%)	58 - 85	81.72±02.04	45±2.9	52±2.73
Lymphocytes (%)	2-21	12.21±02.25	22±1.54	18±1.82
Monocytes (%)	2 – 10	02.06±00.23	2.7±0.17	3±0.47
Eosinophils (%)	2 – 9	7±0.18	3.76±0.2	3±0.36
Basophils (%)	0 – 1	00.00±00.00	00.00±00.00	00.00±00.00
Platelets/ μL	211000 - 621000	136000±1629	164000±1073	192000±1263
Albumin (g/dl)	01.72±00.14	02.37±00.20	02.04±00.29	01.82±00.27
Globulin (g/dl)	01.47±00.24	03.23±00.38	02.11±00.38	01.46±00.81
A:G (g/dl)	01.29±00.15	01.37±00.08	00.97±00.38	01.13±00.19

Haemogram of Group II dogs

Parameters	Healthy dog values	0 day values	5 th day values in Group I dogs	10 th day values in Group I dogs
Hemoglobin (g/dL)	12 – 18	7.7±1.24	11.2±1.28	13.4±0.29
PCV (%)	35 - 57	24±2.34	39±1.72	42±1.89
MCV (fl)	66 - 77	47.23±2.3	57±1.6	62.7±1.72
MCH (pg)	21 - 26	15.54±1.56	20±0.8	21.2±2.16
MCHC (g/dl)	320 - 363	232.1±32.72	291±34.1	311.1±27.53
TEC X 106/μL	5 – 8	3.5±1.42	4.9±1.03	5.8±1.17
TLC X 103/μL	5 – 14	5.42±1.5	7.34±1.1	10.31±1.9
Neutrophils (%)	58 - 85	81.72±02.04	45±2.9	52±2.73
Lymphocytes (%)	2-21	12.21±02.25	22±1.54	18±1.82
Monocytes (%)	2 – 10	02.06±00.23	2.7±0.17	3±0.47
Eosinophils (%)	2 – 9	7±0.18	3.76±0.2	3±0.36
Basophils (%)	0 – 1	00.00±00.00	0.0±0.0	0.0±0.0
Platelets/ μL	211000 - 621000	136000±1629	192000±2051	198000±1521
Albumin (g/dl)	01.72±00.14	02.37±00.20	02.04±00.29	01.82±00.27
Globulin (g/dl)	01.47±00.24	03.23±00.38	02.11±00.38	01.46±00.81
A:G (g/dl)	01.29±00.15	01.37±00.08	00.97±00.38	01.13±00.19

Complete blood picture examination revealed improvement in Haemoglobin, PCV (%), Total Erythrocyte Count ($10^6/\mu\text{L}$), Total Leucocyte Count ($10^6/\mu\text{L}$) and Platelet count following treatment. The improvement was marked in group II dogs especially on 5th day following therapy when compared to group I dogs.

It is evident from the results given in table that the time taken for correction of various blood parameters is less in group II dogs when compared with group I dogs. This study reveals that Buparvaquone @ 5 mg/kg body weight given in 2 doses with 48 hours gap in combination with Azithromycin @ 10 mg/kg for 10 days is effective in reducing anemia and regaining normalcy in dogs infected with *Babesia gibsoni*. The results were in agreement with Checa *et al.*, 2017^[3]

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