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## Concurrent infection of *Ehrlichia canis* and *Babesia gibsoni* in a German Sphered dog

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### Abstract

Vector-borne diseases of canines are common all over the globe and its prevalence is high in India due to the favorable hot and humid climatic conditions. Out of the prevailing vector borne diseases canine Ehrlichiosis, Babesiosis and Hepatozoonosis are commonly reported, followed by Anaplasmosis and Trypanosomiasis.

In this case study a ten month old German Sphered, male dog was admitted for disease investigation. The clinical investigation of the diseased dog revealed anorexia (for two months), congested mucus membrane, transient fever, and enlarged popliteal lymph node. Peripheral blood smear examination revealed a mixed infection *E. canis* and *B. gibsoni* infections and the other hematological and the biochemical parameters values were towards the infection status. Anemia and thrombocytopenia were the two major hematologic changes of *E. canis* and *B. gibsoni* infection observed in this case study along with severe reduction of hemoglobin values in the infected dog. In this case, a study of the involvement of single tick species *Rhipicephalus sanguineus* found out for causation of the combined infection of *E. canis* and *B. gibsoni* in a ten month old, male, German Sphered dog.

**Keywords:** Vector, *E. canis*, concurrent infection, canine

### Introduction

Vector-borne diseases of dogs are prevailing throughout the world and their prevalence is high in India due to favorable climatic conditions. Among vector-borne diseases, canine Ehrlichiosis, Babesiosis and Hepatozoonosis are mostly reported. (Allsopp, M.T.E.P. & Allsopp, B.A. 2006; Singla *et al.* 2011) <sup>[1, 16]</sup>.

**Vectors in Ehrlichia & Babesia infection:** Dogs, foxes and jackals are the reservoirs of infection (Neer 1998) <sup>[9]</sup> and its distribution is on the basis of vector population, the brown dog ticks *Rhipicephalus sanguineus* (Johnson *et al.* 1998) <sup>[8]</sup>.

Tick borne diseases are important causes of morbidity and mortality in dogs worldwide, and the *Rhipicephalus sanguineus* has been implicated as vectors of several pathogens (Dantas-Torres, 2008) <sup>[6]</sup>.

### Prevalence of multiple tick-borne pathogens

#### *Ehrlichia* spp. co-infection with *Babesia* spp. and *H. canis*

Patrick J. Kelly *et al.* (2013) <sup>[10]</sup> studied the evidence of dogs with *E. canis*, *Babesia* Spp. infection including *B. canis vogeli*, *B. gibsoni* and *H. canis*.

In endemic locations, infection with multiple ticks-borne pathogens could be possible in individual animals, especially secondary to a heavy tick infestation (Shaw *et al.* 2001) <sup>[15]</sup>. Dogs between one and twelve months were the most frequently infected with multiple agents (47.2%). (Toepp. A J. *et al.* 2017) <sup>[17]</sup>.

A single tick species can act as a vector for multiple pathogens and simultaneous infection with different pathogens is possible (Schouls *et al.* 1999; Shaw *et al.* 2001) <sup>[14, 15]</sup>.

Jeyabal *et al.* (2019) <sup>[7]</sup> reported a co-infection of *B. canis* along with *E. canis* by single species tick infestation the *Rhipicephalus sanguineus*. The prevalence of canine *Babesia* and *Ehrlichia* co-infection was reported as 2%. (Yoland Rautenbach *et al.* 2018) <sup>[18]</sup>.

#### Co-infection of *Babesia* spp. *Ehrlichia canis* and *Trypanosoma evansi* in dogs

Prevalence of *Babesia* spp. *Ehrlichia canis* and *Trypanosoma evansi* in dogs was reported by Azhahianambi Palavesam *et al.* (2018) <sup>[2]</sup>. Further, the blood samples were analyzed successfully by blood smear examination & multiplex PCR methods to rule out the concomitant infection of *Babesia* spp. *Ehrlichia canis* and *Trypanosoma evansi* in dogs.

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Chatanun Eamudomkarn *et al.* (2022) [4], studied the high prevalence of *Babesia spp.* and *E. canis* co-infection.

**Signs in *B. canis* combined with *E. canis***

Jeyabal *et al.* (2019) [7] narrated the clinical signs, i.e., the anemia, high temperature, debility, lymph node edema, and panting in one Labrador retriever dog. Many blood parasites showing similar signs such as fever, anemia, lymphadenopathy etc.

**Hematology in *B. canis* combined infection with *E. canis***

Schettters *et al.* (2009) [13] concluded that the anemia and the thrombocytopenia are the most common hematologic alterations of *B. canis* and *E. canis* associated infections.

Sainz *et al.* (2015) [12] observed a severe reduction of hemoglobin in canines infected with *Ehrlichiosis* and *Babesiosis*.

**Case history**

In this case report, a ten months old German Sphered male, presented with the clinical signs of anorexia (for two months), congested mucus membrane, transient fever, and enlarged popliteal lymph-node. The dog was treated in various clinics using antibiotics and other supportive drugs without success. The dog was in regular vaccination and deworming programs. On clinical examination of the body the ticks *Rhipicephalus sanguineus* (brown dog tick) infestations were identified. The hematological and the biochemical parameters were analyzed including the blood smear examination.

**Material and methods**

Blood samples, including wet films, were subjected for blood parasitic infections and for hematological and biochemical parameters.

Hemogram values of *E. canis* and *B. gibsoni* infected German Sphered dog.

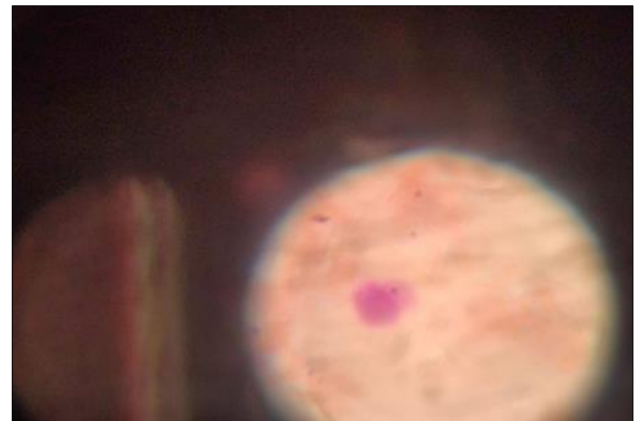
**Table 1:** Hemogram values of *E. canis* and *B. gibsoni* infected German Sphered dog

Parameters	Values
HB	6.6
RBC	6.12
PCV	23
TEC	3.5
Total WBC Count	Leucopenia (5400)
	Neutrophils-78
	Lymphocytes-08
	Monocytes- 02
	Eosinophil-02
	Basophils-00
Platelets counts	Thrombocytopenia (0.8)

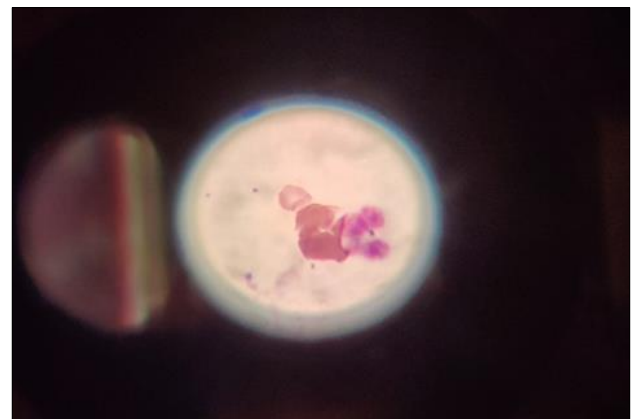
**Results and Discussion**

In this case study a ten months old male, German Sphered dog was admitted for its disease investigation. The dog was examined for its clinical signs. The clinical signs revealed were anorexia (for two months), congested mucus membrane, transient fever, and enlarged popliteal lymph node as part and part of investigation studies the blood smear examination, hematological and biochemical tests were carried out. Giemsa stained blood smear revealed mixed infection of *E. canis* with inclusions of developing Morulae of *Ehrlichia canis* in monocytes and *B. gibsoni* infected RBC with merozoites. On day zero day, i.e., on the reporting day of the dog, the

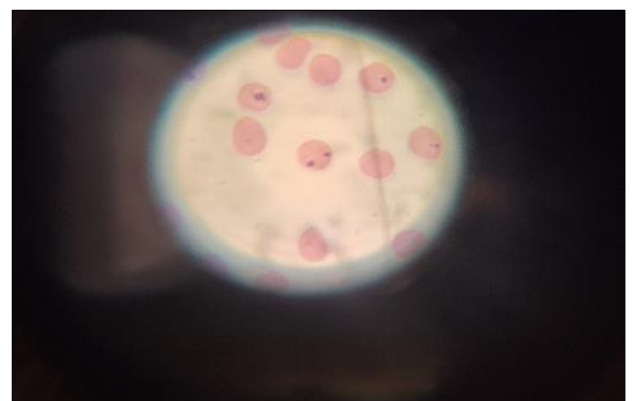
haemogram study revealed severe anemia and reduction of all blood values, i.e. hemoglobin (6.6 g/dl), PCV (23%), & total RBC count (3.48x10<sup>6</sup> uL) Relative leucopenia (4950/uL), thrombocytopenia (0.72 lakhs/ul), & monocytes (5%). Anemia and thrombocytopenia were the two major hematologic changes of *E. canis* and *B. gibsoni* infection which were observed in this case study. Toepp A J *et al* (2017) [17]. reported, the dogs between the age group of one to twelve months were more frequently infected with multiple agents which are in concurrence with this study. In this study the involvement of a single tick species the *Rhipicephalus sanguineus* was found out for causation of the combined infection of *E. canis* and *B. gibsoni*.



**Fig 1:** *E. canis* Morula in the monocyte



**Fig 2:** *B. gibsoni* infected RBC



**Fig 3:** Intraerythrocytic *B. gibsoni*

Vector borne diseases of canines are common all over the globe and its prevalence is high in India due to the favorable

hot and humid climatic conditions. In this study anemia, high temperature, lymphadenopathy and panting were observed as clinical signs. Rautenbach *et al.* (1991)<sup>[11]</sup> and Collect MG *et al.* (2000)<sup>[5]</sup> explained that the Canine *Ehrlichiosis* and canine *Babesiosis* are important tick-borne infections prevailing all over the world resulting in severe clinical signs as observed in this case. The same types of clinical signs were recorded by many authors in combined infection status of canine *E. canis* and canine *B. gibsoni* (Jeyabal *et al.* 2019)<sup>[7]</sup>. Anemia and thrombocytopenia are the two major hematologic changes of *E. canis* and *B. gibsoni* infection which were observed in this case study also which is in concurrence with the studies of Schettters *et al.* (2009)<sup>[13]</sup>. The severe reduction of hemogram values were correlating with the studies of Sainz *et al.* (2015)<sup>[12]</sup> & Jeyabal *et al.* (2019)<sup>[7]</sup>, whom observed the severe reduction of hemoglobin in canines infected with *Ehrlichiosis* and *Babesiosis*. Toepp A J *et al.* (2017)<sup>[17]</sup> reported, the dogs in the age group of one to twelve months were more frequently infected with multiple agents which is in concurrence with this study. A co-infection status of a German sphered dog with *E. canis* & *B. gibsoni* by a single tick species *Rhipicephalus sanguineus* was diagnosed by hematological and biochemical parameters which are in concurrence with the studies of Jeyabal *et al.* (2019)<sup>[7]</sup>.

### Conclusion

In this case study, ten months old male, German Sphered dog aged was presented with the clinical signs of anemia, high temperature, lymphadenopathy and panting. The dog was subjected to blood smear examination and hematological and biochemical reactions. Blood smear examination revealed the *E. canis* and *B. gibsoni* combined infection by their morphological studies. Anemia and thrombocytopenia were the two major hematologic changes observed in this case study. The severe reduction of hemogram values were observed along with severe reduction of hemoglobin. The age of the dog which suffered from the combined infection of *Ehrlichiosis* and *Babesiosis* was ten months old only. A co-infection status of a German Sphered dog with *E. canis* & *B. gibsoni* by a single tick species *Rhipicephalus sanguineus* was confirmed by this case study.

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