

Prevalence of *Babesia* and *Ehrlichia* in the Canine Population of North Gujarat Region

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ABSTRACT

The present study was executed to know the prevalence of *Babesia* and *Ehrlichia* infection in canines of the northern region of Gujarat, India. A total of 6936 dogs presented at the Veterinary Clinical Complex, Sardarkrushinagar and Deesa from 2017 to 2021 were screened using the microscopic method for haemoprotzoal diseases, viz., *Babesia* and *Ehrlichia*. The age, sex, and breed-wise prevalence were estimated for both the diseases. The overall 3.29% (228/6936) prevalence of haemoprotzoal diseases was observed during the study period. A higher prevalence of *Babesia* (2.65%; 184/6936) was observed compared to *Ehrlichia* (0.63%; 44/6936). No significant difference was observed between sex with respect to the prevalence of these infections. The prevalence of haemoprotzoan infections was significantly higher in dogs aged 1-5 years, followed by less than one year. Among all breeds, the prevalence of *Babesia* was significantly higher in German shepherd followed by non-descript breed and Labrador retriever dogs; whereas, *Ehrlichia* was significantly higher in Labrador retrievers followed by non-descript dogs.

Key words: *Babesia*, Canine, *Ehrlichia*, Prevalence, Retrospective analysis.

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INTRODUCTION

Haemoprotzoal infection in animals is a concern in current situations (Andersson *et al.*, 2017), with the potential to cause zoonoses, particularly in developing countries where scientific knowledge on the topic is minimal. The global loss due to haemoprotzoal infection has been estimated to be US dollar 498.7 million per annum (Minjauw and McLeod, 2003). Canine babesiosis is a widespread and clinically significant disease caused by the genus *Babesia*, distributed worldwide, including India. *Babesia* species, often known as piroplasms, are divided into two primary species depending on size, *B. canis* and *B. gibsoni* (Habibi *et al.*, 2020; Khanmohammadi *et al.*, 2021). Small form *B. gibsoni* is associated with infection of dogs in Asia, North America, northern and eastern Africa, and Europe (Bilwal *et al.*, 2017; Jain *et al.*, 2017). *Babesia* is a small parasite that commonly appears in individual ring forms or pyriform bodies ranging between 1.0 and 2.5 μ m in size. Various clinical signs have been reported by Chaudhuri and Varshney (2007).

The second critical disease condition in canines is Ehrlichiosis. In the Indian subcontinent, canine monocytic ehrlichiosis (CME) caused by the obligatory intracellular pleomorphic rickettsia, *E. canis*, is considered globally crucial in canines (Eamudomkarn *et al.*, 2022). Aggressive antibiotic therapy and transportation are predisposing factors for CME (Sato *et al.*, 2020). The detection of morulae of *E. canis* in stained blood smears is a valuable diagnostic tool for acute disease (Senthil *et al.*, 2020). Ticks are mainly responsible for the transmission of disease to healthy dogs (Ogbu *et al.*, 2018). Microscopic analysis of stained blood smears is a practical, cost-effective approach for diagnosing canine babesiosis and ehrlichiosis (Caccio *et al.*, 2002; Irwin, 2005;

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Senthil *et al.*, 2020). The status of these diseases in India, especially in Gujarat, is still unknown (Pawar and Gatne, 2005; Sarma *et al.*, 2019). Therefore, the present study was intended to estimate the prevalence of *Babesia* and *Ehrlichia* in different age groups, sex, and breeds of dogs of the North Gujarat region microscopically. By concentrating research on the epidemiology of haemoprotzoan diseases and improving diagnostics, it may be able to stem the growing threat these diseases pose.

MATERIALS AND METHODS

The present retrospective study was executed from January 2017 to December 2021 at Veterinary Clinical Complex, Deesa and Dantiwada, College of Veterinary Science and Animal

Husbandry, Kamdhenu University, Sardarkrushinagar, Gujarat (India). Six thousand nine hundred thirty six (6936) client-owned dogs were included and screened for Babesiosis and Ehrlichiosis. No ethical approval was required as the samples were collected from animals presented from the different areas of North Gujarat for treatment/regular check-up. Blood samples were collected and processed from canines to check the presence of *Babesia* and *Ehrlichia*, irrespective of clinical signs and disease conditions. Approximately two mL of blood was collected aseptically in K₃EDTA vials by cephalic or saphenous venipuncture. Thin blood smears were made, stained by EMB staining, and evaluated using an oil immersion objective lens under a light microscope. The haemoprotzoan was identified as per the morphological characters described by Soulsby (1982). Overall, the sex-wise, age-wise, and breed-wise prevalence of *Babesia* and *Ehrlichia* was calculated on microscopic examination. Data were statistically analyzed by chi-square test to see the association of breed, sex, and age with the occurrence of infection. GraphPadPrism software (V 8.0) was used for analysis, and the significance was set at a 95% confidence interval.

RESULTS AND DISCUSSION

Amongst 6936 blood samples of canines screened, 2.65% (184/6936) and 0.63% (44/6936) blood samples were found positive for *Babesia* and *Ehrlichia* infection, respectively (Table 1, Fig. 1 & 2). Canine *Babesia*, *Ehrlichia*, *Anaplasma*, and *Hepatozoon* infections are the reported diseases in India (Abd Rani *et al.*, 2011) and can be diagnosed by morphological observation of the microorganisms in stained blood smears (Irwin, 2005; Harrus and Waner, 2011).

In the present study, the overall year-wise 1.04%, 3.30%, 3.39%, 4.67%, and 3.53% prevalence of haemoprotzoan disease was observed in 2017, 2018, 2019, 2020, and 2021, respectively (Table 1). Similar findings have been reported by

Bhadesiya and Raval (2015), Bilwal *et al.* (2017), and Murabiya *et al.* (2018) from the Anand and Junagadh District of Gujarat. Abd Rani *et al.* (2011) reported the incidence of *E. canis* (20.6%) and *B. gibsoni* (0.2%) in four cities in India. Singh *et al.* (2012) reported 8.26% prevalence of *Babesia gibsoni* from Ludhiana by microscopic examination of Giemsa stained blood smears. Using a microscopic technique, Kumar *et al.* (2015) reported the incidence of *B. gibsoni* as 5.57% in Jalandhar, Punjab. Mittal *et al.* (2019) found 5.15% incidence of *B. gibsoni* among working dogs by microscopy and molecular evaluation. Jain *et al.* (2017), however, reported a higher prevalence of babesiosis from Kerala by the microscopic method (26.67%) and PCR (47.3%) technique.

Table 1: Overall prevalence of *Babesia* and *Ehrlichia* infection during the year 2017-2021

Year	Total cases	<i>Babesia</i>	<i>Ehrlichia</i>	Total
2017	1156	5	7	12 (1.04%)
2018	1515	42	8	50 (3.30%)
2019	944	27	5	32 (3.38%)
2020	1479	60	9	69 (4.67%)
2021	1842	50	15	65 (3.53%)
Total	6936	184 (2.65%)	44 (0.63%)	228 (3.29%)

Further, the data was segregated sex-wise, age-wise, and breed-wise to understand disease patterns (Table 2). Statistical analysis revealed no significant difference between males and females overall and even year-wise. However, female dogs were at higher risk of haemoprotzoan infection (4.45% vs. 1.95%). Singh *et al.* (2014) also reported similar observations. Kumar *et al.* (2015) reported a high incidence of Babesiosis in females (6.42%).

Babesia infection was significantly higher in canines aged 1-5 years, followed by less than one year of age group, overall and even in the last three years (2019-2021). *Ehrlichia* infection was significantly higher in 1-5 years age group dogs,

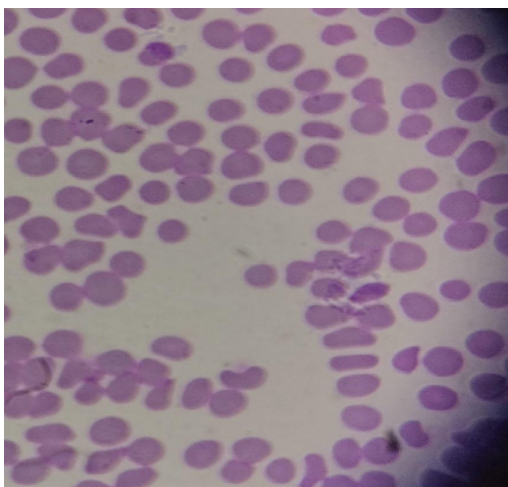


Fig. 1: RBCs showing *Babesia* infection

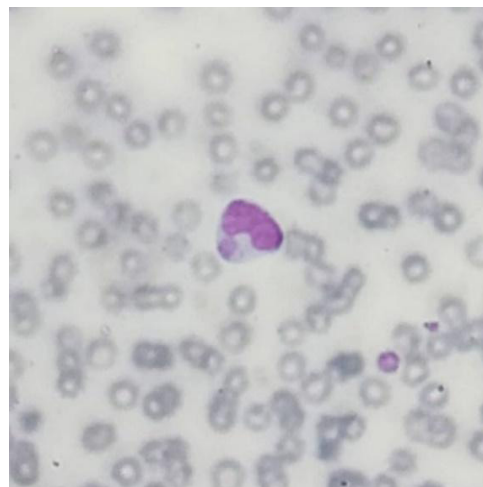


Fig. 2: Monocyte showing morula stage of *Ehrlichia*

Table 2: Overall age-, sex- and breed-wise prevalence of *Babesia* and *Ehrlichia* infection in canines of North Gujarat

Factor	Variable	No.	<i>Babesia</i>		<i>Ehrlichia</i>		
			χ^2	P value, df	No.	χ^2	P value, df
Age	0-1 Year (n=2580)	74			9		
	1-5 Year (n=2797)	79	86.91	<0.0001, 3	24	22.36	<0.0001, 3
	5-10 Year (n=1116)	27			8		
	>10 Year (n=443)	4			3		
Sex	Male (n=4981)	97			0.54		
Female (n=1955)	87	20					
Breed	German Shepherd (n=1387)	60	123.9	<0.0001, 6	9	38.09	<0.0001, 6
	Labrador (n=1432)	29			15		
	Rottweiler (n=355)	7			2		
	Doberman (n=152)	9			3		
	Pomeranian (n=565)	15			1		
	Non-Descript (n=2697)	57			14		
	Others (n=348)	7			0		

overall and in 2020 and 2021 (Table 2). The higher incidence of haemoprotozoan disease with an increase in age might be due to decreased immunity. Kumar *et al.* (2015) however reported a high incidence of Babesiosis in dogs with age <1 year (6.12%).

In the present study, babesia infection was higher in the German Shepherd breed, followed by the non-descript and Labrador retriever, overall and in 2018 and 2020; however, in the year 2021, it was more in non-descript dogs. Similar findings were also observed in dogs with *Ehrlichia* infection. The higher prevalence of *Ehrlichia* was observed in Labrador retrievers, followed by non-descript and German shepherd dog breeds. All breeds of dogs were susceptible to *Babesia* and *Ehrlichia* infections (Table 2).

CONCLUSION

Babesia and *Ehrlichia* are common haemoprotozoal infections in canines. Males and females both are at higher risk. Dogs between one to five years of age are more prone to haemoprotozoal infection. German shepherd, non-descript, and Labrador retrievers breeds are more susceptible to *Babesia* and *Ehrlichia* infection.

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