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Prevalence of *Babesia gibsoni* in dogs: A hospital based study

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Abstract

Canine babesiosis is a significant tick-borne hemoprotozoan disease affecting dogs worldwide, with *Babesia gibsoni* being one of the most pathogenic species reported in India. The present study was conducted to determine the hospital prevalence of *B. gibsoni* in dogs and to evaluate its distribution based on age, breed, sex, and diagnostic methods. A total of 74 dogs exhibiting clinical signs suggestive of babesiosis were screened during May 2025 to January 2026. Diagnosis was carried out using Giemsa-stained blood smear examination and confirmed by polymerase chain reaction (PCR) targeting the 18S rRNA gene of *B. gibsoni*. Out of 74 dogs, 30 were confirmed positive, yielding an overall prevalence of 40.54%. Age-wise analysis revealed highest prevalence in dogs aged 1–3 years (46.66%), followed by dogs above 3 years (30%) and below 1 year (23.33%). Male dogs (70%) showed higher prevalence compared to females (30%). Breed-wise prevalence was highest in Labrador (30%) followed by German Shepherd (20%). PCR was found to be more sensitive and specific than blood smear examination. The study concludes that *B. gibsoni* infection is moderately prevalent and influenced by host factors, emphasizing the importance of molecular diagnostics and tick control strategies.

Keywords: *Babesia gibsoni*, dogs, prevalence, PCR, babesiosis, epidemiology

1. Introduction

Dogs (*Canis familiaris*) are among the most widely domesticated companion animals and play a crucial role in human society. With increasing pet ownership, the incidence of infectious diseases, particularly vector-borne diseases, has gained considerable attention.

Canine babesiosis is a tick-borne disease caused by intraerythrocytic protozoa of the genus *Babesia* (Birkenheuer *et al.*, 2004) [1]. Among the species infecting dogs, *Babesia gibsoni* is recognized as one of the most pathogenic, leading to significant morbidity and mortality (Irwin, 2009) [5]. In India, *B. gibsoni* is more prevalent than other species and is widely distributed due to favourable climatic conditions for tick vectors (Selvaraj *et al.*, 2010) [15].

The parasite is primarily transmitted by ticks such as *Rhipicephalus sanguineus* and *Haemaphysalis* spp. (Beugnet and Moreau, 2015). However, alternative transmission routes including dog bites, blood transfusion, contaminated instruments, and transplacental transmission have also been documented (Stegeman *et al.*, 2003; Fukumoto *et al.*, 2005) [20, 3].

Clinical manifestations of *B. gibsoni* infection range from mild to severe and include anemia, fever, lethargy, thrombocytopenia, splenomegaly, and in complicated cases, multi-organ dysfunction (Irwin, 2009) [5]. Chronic infections may remain subclinical, contributing to the persistence and spread of the disease.

The prevalence of *B. gibsoni* varies widely depending on geographic location, environmental factors, and diagnostic methods used (Singh *et al.*, 2014) [17]. Therefore, accurate epidemiological studies are essential for understanding disease dynamics and implementing control strategies.

The present study was undertaken to determine the prevalence of *Babesia gibsoni* in dogs and to evaluate the influence of age, breed, sex, and diagnostic methods on disease occurrence.

2. Materials and Methods

The study was conducted at Krantisinh Nana Patil College of Veterinary Science, Shirwal from May 2025 to January 2026. A total of 74 dogs showing clinical signs suggestive of babesiosis such as Fever, Anemia, Thrombocytopenia, Lethargy, Loss of appetite, Vomition, Diarrhea, Weight loss, Tick infestation, Hemoglobinuria, and Lymphadenopathy were included in the study. Detailed history including age, breed, and sex was recorded. Clinical examination included assessment of temperature, heart rate, respiratory rate, mucous membrane colour, and lymph node enlargement.

Blood sample was taken approximately 5 mL collected aseptically from each dog in K₂EDTA and clot activator vials. Approximately 3 mL was transferred into a K₂EDTA (ethylenediaminetetraacetic acid) vial for hematological analysis, blood smear examination, and genomic DNA extraction for polymerase chain reaction (PCR) testing to detect *B. gibsoni* DNA. The remaining 2 mL of blood, collected without anticoagulant, was placed in a separate vial for serum separation and subsequent biochemical analysis.

Thin blood smears were prepared, stained with Giemsa stain, and examined under oil immersion (100×) for detection of *Babesia gibsoni* as shown in plate no. 1. The identification of *Babesia gibsoni* was based on the detection of intraerythrocytic piroplasm exhibiting characteristic morphology as described by Soulsby (1982) [18].

Extracted DNA sample is used as template to amplify the fragment of *Babesia gibsoni* for 18S rRNA using the primers described by Inokuma *et al.* (2004) [4] showed in table no. 1.

Table 1: *Babesia gibsoni* primer Sequence

Sr. No.	Name	Primer Sequence	Product Size
1.	Gib 599	CTC GGC TAC TTG CCT TGT C	670 bp
2.	Gib 1270	GCC GAA ACT GAA ATA ACG GC	



Plate 1: Blood collection from Cephalic vein in dogs

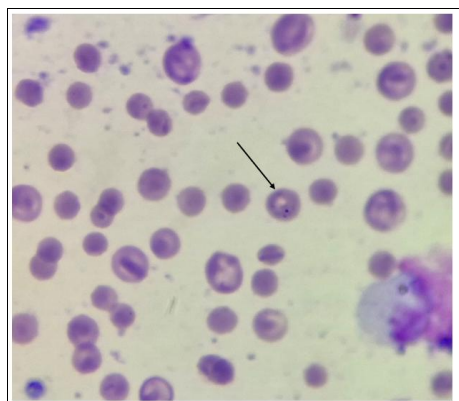
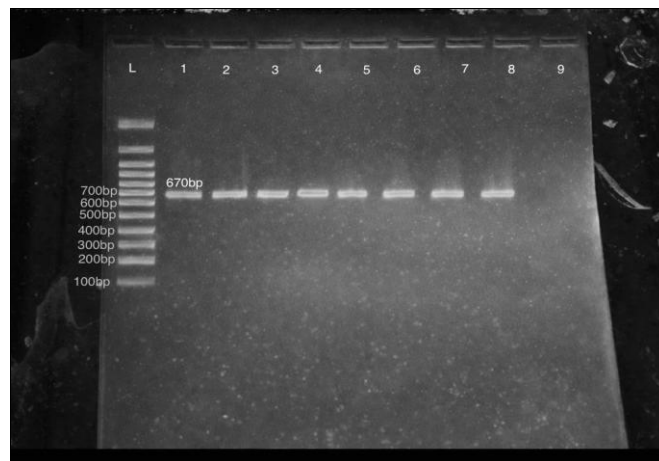


Plate 2: Blood smear showing intra-erythrocytic piroplasm of *Babesia gibsoni*



Lane L: 100bp DNA ladder

Lane 1 to 8: Positive samples

Lane 9: Negative sample

Plate 3: PCR amplification of *B. gibsoni* using 18s rRNA primers

3. Results and Discussion

3.1 Overall prevalence of *Babesia gibsoni*

Out of 74 dogs screened, 30 were confirmed positive, resulting in an overall prevalence of 40.54%.

The observed prevalence indicates a moderate level of infection and is higher as compared to the findings of Das *et al.* (2015) [2] (31.86%), Sahiti *et al.* (2024) (34.39%) and Kamdi *et al.* (2024) [6] (9.65%). However, it is lower than reports by Liu *et al.* (2022) [7] (66.66%) and Senthil (2023) [16] (70.5%).

Climatic conditions such as temperature and humidity, along with the abundance of tick vectors, dog population, management of tick population in an area play a crucial role in disease transmission.

3.2 Age-wise prevalence

The highest prevalence was recorded in dogs aged 1–3 years (46.66%), followed by dogs above 3 years (30%) and below 1 year (23.33%) as shown in table no. 2.

Table 2: Age wise prevalence of *Babesia gibsoni* in dogs

Sr. No.	Age	No. of positive Dogs	Percentage (%)
1.	Below 1 year	7	23.33
2.	1-3 Age	14	46.66
3.	Above 3 year age	9	30
No. of dogs positive for <i>B. gibsoni</i>		30	100

Adult dogs are more likely to be exposed to tick-infested environments due to increased outdoor activity. Similar findings were reported by Ravi *et al.* (2016) [12], Soundarya *et al.* (2023) [19] and Kamdi *et al.* (2024) [6]. Lower prevalence in younger dogs may be due to limited exposure and protective care by owners.

However, contrasting reports (Singh *et al.*, 2014) [17] and Sarma *et al.* (2019) [14] indicate higher prevalence in younger dogs, suggesting that immunity and environmental exposure both influence disease occurrence.

3.3 Breed-wise prevalence

Labrador dogs showed the highest prevalence (30%), followed by German Shepherd (20%) and Golden Retriever (13.33%) Rottweilers, Doberman and Pomerian each exhibited (10%). Non-descript breeds showed the lowest prevalence (6.6%) as shown in table no. 3.

Table 3: Breed Wise prevalence of *Babesia gibsoni* in dogs

Sr. No.	Breeds	No. of positive dogs	Percentage (%)
1.	Labradors	9	30
2.	German shepherd	6	20
3.	Golden Retrievers	4	13.33
4.	Rottweilers	3	10
5.	Doberman	3	10
6.	Pomerian	3	10
7.	ND	2	6.6
Total no. of dogs positive for <i>B. gibsoni</i> infection		30	100

Higher prevalence in exotic breeds may be attributed to genetic susceptibility and management practices. These findings are in agreement with Sarma *et al.* (2019) [14] Obeta *et al.* (2020) [11], Soundarya *et al.* (2023) [19]. Non-descript dogs may possess better adaptability and resistance to infections.

3.4 Sex-wise prevalence

Male dogs showed higher prevalence (70%) compared to females (30%) as shown in table no. 4.

Table 4: Gender wise prevalence of *Babesia gibsoni* in dogs

Sr. No.	Sex	No. of positive dogs	Percentage (%)
1.	Male	21	70%
2.	Female	9	30%
No. of dogs positive for <i>B. gibsoni</i>		30	100%

Higher incidence of *B. gibsoni* in male dogs as compared to female dogs supporting the previous findings of Liu *et al.* (2022) [7], Soundarya *et al.* (2023) [19], Nagarjuna *et al.* (2024) [10], Sahiti *et al.* (2024) but differ from the findings of Singh *et al.* (2014) [17], Kamdi *et al.* (2024) [6].

This may be due to the increased immune reactivity in females as estrogen helps to produce an effective resistance to infection (Taneja, 2018) [21] or due to the behavioral factors of male such as roaming, fighting, and increased exposure to ticks (Matsuu *et al.*, 2004) [8].

3.5 Prevalence based on blood smear examination and PCR.

In the present study 74 clinically suspected dogs were evaluated for *Babesia gibsoni* infection using blood smear examination and Polymerase Chain Reaction (PCR).

Out of 74 suspected dogs 26 were shown positive for *Babesia gibsoni* infection in Giemsa stained blood smear examination, showed overall prevalence of 35.13% while PCR showed 30 sample positives for *Babesia gibsoni* infection resulting in higher prevalence of 40.54%.

PCR confirmed all positive cases and demonstrated higher sensitivity and specificity compared to blood smear examination. Similar observations were reported by Singh *et al.* (2014) [17], Mittal *et al.* (2019) [9] and Teodorowski *et al.* (2020) [22]. PCR is especially useful in detecting chronic and subclinical infections.

4. Conclusion

The study revealed a moderate prevalence (40.54%) of *Babesia gibsoni* infection in dogs. Adult dogs, males, and exotic breeds were more susceptible. PCR proved to be a superior diagnostic tool compared to blood smear

examination.

The study emphasizes the need for early diagnosis, effective tick control, and use of molecular techniques for better disease management.

Conflict of Interest

Not available

Financial Support

Not available

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