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Vikram Punia

Department of Veterinary
Parasitology, College of Veterinary
Science and Animal Husbandry,
Jabalpur, Madhya Pradesh, India

G Das

Department of Veterinary
Parasitology, College of Veterinary
Science and Animal Husbandry,
Jabalpur, Madhya Pradesh, India

Suman Kumar

Department of Veterinary
Parasitology, College of Veterinary
Science and Animal Husbandry,
Jabalpur, Madhya Pradesh, India

AP Singh

Animal Biotechnology Centre, College
of Veterinary Science and Animal
Husbandry, Jabalpur, Madhya
Pradesh, India

Anju Nayak

Department of Veterinary
Microbiology, College of Veterinary
Science and Animal Husbandry,
Jabalpur, Madhya Pradesh, India

DK Gupta

Department of Veterinary Medicine,
College of Veterinary Science
and Animal Husbandry, Jabalpur,
Madhya Pradesh, India

Rupesh Verma

Department of Veterinary
Parasitology, College of Veterinary
Science and Animal Husbandry,
Jabalpur, Madhya Pradesh, India

Subhradal Nath

Department of Veterinary
Parasitology, College of Veterinary
Science and Animal Husbandry,
Jabalpur, Madhya Pradesh, India

Manoj Dhaka

Department of Veterinary Medicine,
College of Veterinary Science
and Animal Husbandry, Jabalpur,
Madhya Pradesh, India

Corresponding Author:

Vikram Punia

Department of Veterinary
Parasitology, College of Veterinary
Science and Animal Husbandry,
Jabalpur, Madhya Pradesh, India

Alteration in physiological parameters of dogs infected with *Babesia* species

Vikram Punia, G Das, Suman Kumar, AP Singh, Anju Nayak, DK Gupta, Rupesh Verma, Subhradal Nath and Manoj Dhaka

Abstract

The present study was conducted to record the clinical manifestations exhibited by dogs infected with *Babesia* spp. The study was conducted on a total of 606 dogs presented at VCC, College of Veterinary Science and Animal Husbandry, Jabalpur, from June 2022 to May 2022. Out of which, 31 dogs were confirmed for *Babesia* infection on the basis of clinical signs and microscopic examination. Among the confirmed cases, a maximum 96.77% dogs exhibited anorexia, followed by lymph node swelling in 83.87% dogs. The other clinical signs with milder frequency includes fever (48.38%), anemia (48.38%), congested mucous membrane (41.93%), dark yellow urine, (32.25%), vomition (29.03%) pale mucous membrane (29.03), emaciation (25.8%) and melana (19.35%). The tick species collected from the ailing dogs were identified as *Rhipicephalus sanguineus*.

Keywords: *Babesia gibsoni*, *Babesia vogeli*, blood smear examination

Introduction

Canine babesiosis is a clinically significant and geographically widespread haemoprotozoan disease of domesticated dogs (Irwin, 2010) [7]. The *Babesia gibsoni* and *B. vogeli* are two commonly known species to infect the dogs in India (Kundu *et al.*, 2012) [9]. The intra erythrocytic piroplasm of *Babesia* spp., is pear-shaped and often occurs in pairs (Homer *et al.*, 2000) [5]. *R. sanguineus* is the main global vector, though *D. reticulatus* may serve as a vector for *Babesia*. Other Ixodid ticks belonging to the genera, namely, *Dermacentor*, *Haemaphysalis* and *Hyalomma* are also capable of serving as vectors of *Babesia* spp. (Salem and Farag, 2014) [13]. Clinically, the illness is characterized by high fever, pale mucous membrane, anorexia, anemia, icterus, lymphadenopathy and splenomegaly (Breitschwerdt *et al.*, 1983; Boozer, and Macintire, 2003 and Alleman, 2006) [4, 2, 1]. Clinical signs are exceedingly variable; the classical presentation is a febrile illness with perceptible anemia (Schetters *et al.*, 2009) [14]. The severity of babesiosis varies from subclinical infection to extensive organ failure and death. The objectives of this study were to describe the clinical signs and detection of ticks in dogs affected with blood parasites.

Materials and Methods

The study was conducted on a total of 606 dogs presented at Veterinary Clinical Complex, College of Veterinary Science & A.H., Jabalpur (M.P.) for a period of 1 years i.e. from June 2022 to May 2023. Each suspected dog was subjected to physical and clinical examination and parameters including fever, anorexia, enlarged lymph nodes and pale mucus membrane etc. were recorded. The presence of ticks on the body coat of dogs were also observed and collected for their identification. Peripheral blood samples were collected from the dogs. Thin blood smears were prepared and stained using Giemsa's stains and observed under oil immersion for detection of *Babesia* spp.

Collection and mounting of ticks

Ticks were randomly collected from the ear, brisket, lower abdomen, inner side of thigh, perineal region and around the anus of the ailing dogs and were preserved in 70% alcohol. The mounting procedure was performed as per Kumar *et al.* (2022) [8]. In brief, the ticks were kept

in 10% KOH and heated intermittently for two minutes for liquefying the internal tissue. The posterior margins of the engorged female ticks were punctured to ensure effective penetration of KOH. Consequently, the specimens were removed from KOH and internal liquefied tissues were removed from the body by pressing the dorsal surface slowly with the help of a pinhead. Dehydration of specimens was done by keeping for at least one hrs. twice in each 30%, 50%, 70% and 90% and absolute alcohol and were cleared in cedar

wood oil at least for 24 hours and placed in xylene for 1 minute. The ticks were mounted in DPX on a glass slide.

Results and Discussion

Examination of stained blood smear under oil emersion revealed the presence of *B. gibsoni* and *B. vogeli*. The *Babesia gibsoni* appeared ring, round and oval forms whereas *B. vogeli* appear in pyriform in RBCs (Fig. 1).

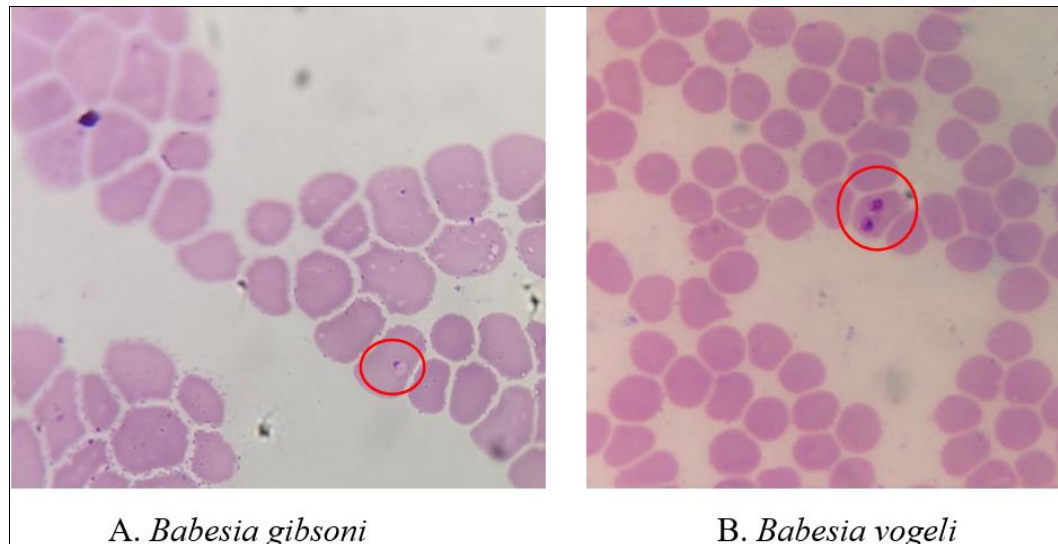


Fig 1: Blood smear showing *Babesia* spp. in RBCs (100x)

Different clinical signs and their frequency of distribution in dogs suffering from babesiosis were evaluated as percent frequency of each and every clinical signs. In the present study, all dogs that tested positive for *Babesia* spp. were infested with ticks. The clinical signs exhibited by ailing dogs with higher frequency include anorexia (96.77%) and lymph node swelling (83.87%). Other signs exhibited by ailing dogs with milder frequencies includes fever (48.38%), anemia

(48.38%), congested mucous membrane (41.93%), dark yellow urine (32.25%), vomition (29.03%) pale mucous membrane (29.03), emaciation (25.8%), melana (19.35%), haemoglobinuria (12.9%), icterus (12.9%), and neurological sign (12.9%). However, clinical sings with lower frequency includes respiratory distress (6.45%), epistaxis (3.22%), halitosis (3.22%), tachypnoea (3.22) (Table 1 and Fig. 2).

Table 1: Clinical manifestation recorded in canine babesiosis

Clinical sins	No. of positive case (n=31)	Frequency (%)
Ticks infestation	31	100
Anorexia	30	96.77
Lymph node swelling	26	83.87
Fever	15	48.38
Anemia	15	48.38
Congested mucous membrane	13	41.93
Dark yellow urine	10	32.25
Vomition	9	29.03
Pale mucous membrane	9	29.03
Emaciated	8	25.8
Melana	6	19.35
Haemoglobinuria	4	12.9
Ictreus	1	12.9
Neurological sign	4	12.9
Respiration distress	2	6.45
Epistaxis	1	3.22
Halitosis	1	3.22
Tachypnoea	1	3.22



Fig 2: Clinical signs observed in canine babesiosis (a) Tick Infestation (b) Lymph node swelling (c) Haemoglobinuria (d) Icterus

Similar findings were also reported by Lobetti *et al.* (2002)^[10], Sudhakara *et al.* (2016)^[17], Brahma *et al.* (2019)^[3] and Wang *et al.* (2019)^[18]. Tick infestation, anorexia, pale mucous membrane, fever, vomition, hematuria and lethargy etc.

The permanent mounts of ticks were examined and identified as per given Soulsby (1982)^[16] and Sen and Fletcher (1962)^[15]. On the morphological observations the tick species

identified was *R. sanguineus* (Fig. 3). *R. sanguineus* (Brown dog tick) are small and have elongated body shape and short rostrum. The mouthparts of *R. sanguineus* were short and basis capituli hexagonal. They are usually inornate and have short palps. Eyes and festoons are present. Spiracles were generally circular or oval. Coxa I is deeply cleft and spiracular plates are comma-shaped in males. Presence of anal groove and caudal process and adanal plates on median axis.



Fig 3: Morphological details of *Rhipicephalus sanguineus*

So, the present investigation is concluded that anorexia and lymph node swelling were the most predominant clinical signs of canine babesiosis. *R. sanguineus* found to be an important vector for transmission of canine babesiosis.

Conclusion

The examination of stained blood smears under oil emersion revealed the presence of *Babesia gibsoni* and *Babesia vogeli*, with *B. gibsoni* appearing as ring, round, and oval forms, while *B. vogeli* appeared pyriform in red blood cells (RBCs). Clinical evaluation of dogs afflicted with babesiosis indicated that all positive cases were infested with ticks. Anorexia and lymph node swelling were the most frequent clinical signs observed, followed by fever, anemia, and various other symptoms. These findings align with previous studies by Lobetti *et al.* (2002) [10], Sudhakara *et al.* (2016) [17], Brahma *et al.* (2019) [3], and Wang *et al.* (2019) [18], which also highlighted the significance of tick infestation and common clinical manifestations such as anorexia and pale mucous membrane in canine babesiosis. Morphological examination identified *Rhipicephalus sanguineus* (Brown dog tick) as a primary vector for transmitting the disease. In summary, this investigation underscores the prominence of anorexia and lymph node swelling as key clinical indicators of canine babesiosis, with *R. sanguineus* playing a crucial role in disease transmission.

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