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Temporal Distribution of Canine Babesiosis from 2010-19 in Chennai, India

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Abstract

Canine Babesiosis is the common vector-borne haemopprotozoan disease distributed all over the world. Two organisms are known to cause Canine Babesiosis in India: *Babesia gibsoni* and *Babesia canis*. The present work was based on retrospective study of 11,000 blood smears of dogs received over a period of nine years (2010 to 2019) in and around Chennai at Madras Veterinary College Teaching Hospital. On blood smear examination 3,840 blood smears were found to be positive for various Haemopprotozoan diseases. Among the recorded positive cases, 1187 (30.9%) cases were positive for Canine Babesiosis of which 837 cases (70.5%) were positive for *Babesia gibsoni* and 350 cases (29.5%) were positive for *Babesia canis*. The percentage change in occurrence of *Babesia gibsoni* in 2012 (-41.8%), 2013 (+36.9%), 2014 (-63.5%), 2015 (+34.8%), 2016 (+135.5%), 2017 (+87.7%), 2018 (+2.9%) and 2019 (73.1%). The percentage change in occurrence of *Babesia canis* in 2012 (-38.5%), 2013 (-12.5%), 2014 (+44%), 2015 (-20%), 2016 (-10%), 2017 (+172.2%), 2018 (+61.2%) and 2019 (30.4%). Season-wise occurrence of the disease recorded highest cases in winter (35%) followed by Monsoon (32.2%), Summer (21.6%) and Autumn (20.6%). The most frequent symptoms were fever, anorexia, apathy, abdominal pain, lymphadenopathy and dyspnoea. Regarding haematological alterations, 87.7% of the animals presented anaemia, 73.5% presented thrombocytopenia, 43.4% presented leucopenia and 31.3% presented pancytopenia. Based on clinical presentation, generalised form (89%), cerebral form (7%) and Ocular form (4%). The temporal distribution and symptom-wise study would help the veterinary physician to identify the trends in occurrence of disease and clinical pattern followed by the protozoa, which helps in treatment and control of Canine Babesiosis in dog population.

Keywords: Babesiosis, Temporal distribution, Percentage

1. Introduction

Dr. Victor Babes, a Romanian physician was the first to observed microorganisms in the erythrocytes of cattle and sheep with haemoglobinuria. These microorganisms were later named *Babesia bovis* and *Babesia ovis*, respectively, with the genus name *Babesia* after its discoverer [1]. Not long after these observations in ruminants came the first description of *Babesia* spp. infection in dogs, in Italy (1895) [2]. Now the organism is omnipresent, one of the important haemopprotozoan disease of dogs. *Babesia canis*, *B. vogeli*, *B. gibsoni*, and *B. microti*-like isolates also referred to as "*B. vulpes*" and "*Theileria annae*" infect dogs based on geographical distribution of the organisms. In Indian subcontinent, the species affecting the dogs were *Babesia canis* and *Babesia gibsoni*.

Materials and methods

The study was conducted on the basis blood smear of last nine years i.e. from 2010 to 2019 available in the department for evaluating epidemiology of haemopprotozoan conditions in dogs. The year-wise incidence, percentage increase year-wise, season-wise prevalence, clinical manifestation wise were recorded from the case reports. The collected data were entered into Excel sheets, which were imported and analyzed using Descriptive statistics (frequency and percentage) for *B. gibsoni* and *B. canis* separately.

Results

The present work was based on retrospective study of 11,000 blood smears of dogs received over a period of nine years (2010 to 2019) in and around Chennai at Madras Veterinary College Teaching Hospital. On blood smear examination 3,840 blood smears were found to be positive for various Haemopprotozoan diseases. Among the recorded positive cases, 1187 (30.9%) cases were positive for Canine Babesiosis of which 837 cases (70.5%) were positive for *Babesia gibsoni* and 350 cases (29.5%) were positive for *Babesia canis*. The percentage

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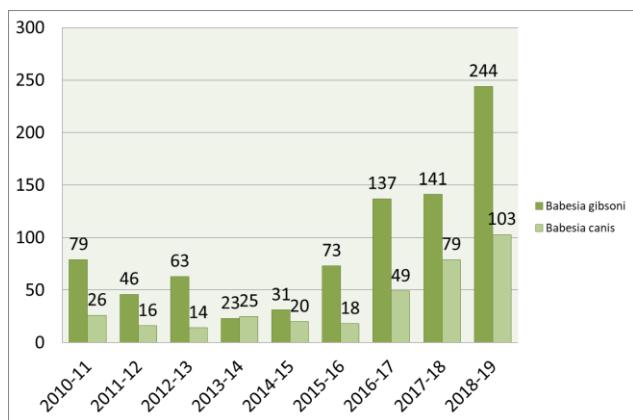


Fig 1: Temporal Distribution of Canine Babesiosis in Chennai

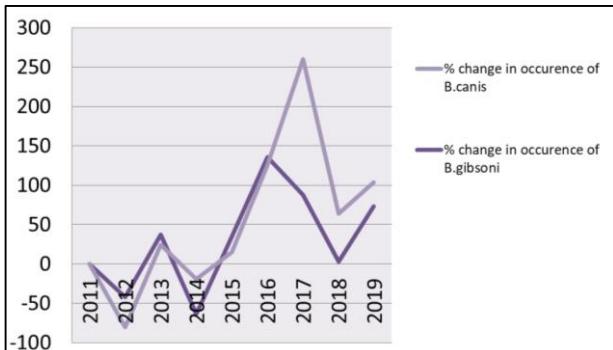


Fig 2: % Change in Occurrence of Canine Babesiosis in Chennai

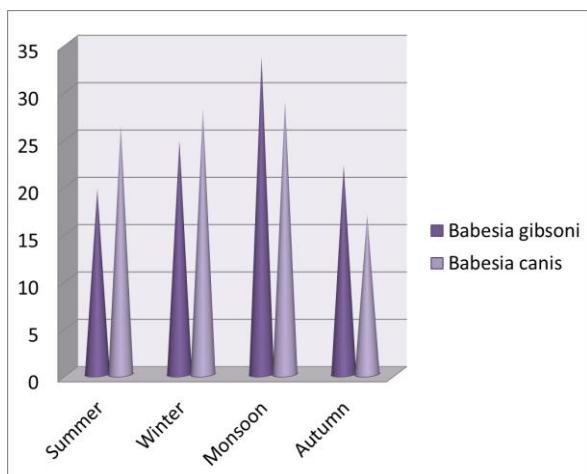


Fig 3: Season-wise Distribution of Canine Babesiosis

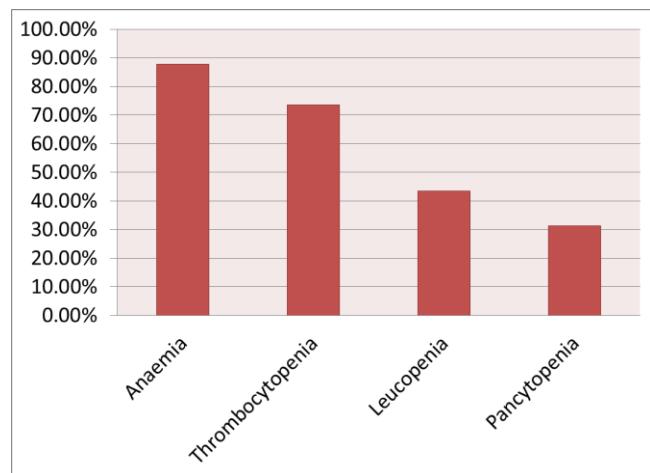


Fig 4: Haematological Alterations in Babesiosis

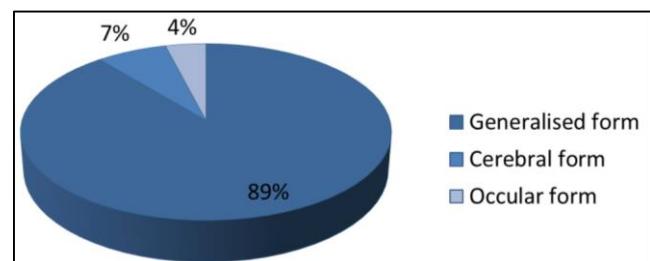


Fig 5: Clinical form wise Distribution

Discussions

The specific vector of *B. gibsoni* and *B. canis* infection is identified to be *Rhipicephalus sanguineus*, the brown dog tick [3]. Dogs become infected when ticks feed for 2 to 3 days and release sporozoites into the circulation [4]. Inside the host, the organisms attach to the red cell membrane and are engulfed by endocytosis. In the cytoplasm, binary fission occurs, resulting in merozoites. Ticks become infected with merozoites during feeding and may remain infective for many generations through trans-stadial and transovarial transmission [4]. In experimental infections derived from naturally infected dogs in Oklahoma, parasites were detected 1 to 5 weeks after inoculation [5]. Parasitemia peaked at 1.9% to 6% by 4 to 6 weeks after infection. Easily detectable parasitemia (>0.1%) was present for 3 to 4 weeks⁶. The severity of clinical signs was highly variable and developed approximately 1 to 2 weeks after infection [6]. After initial parasitemia, the immune system does not totally eradicate the infection, and a chronic carrier state remains. Relapses may occur months to years later, and long-term sequelae, such as glomerulonephritis or polyarthritis, may develop [7, 8].

The hemogram typically reveals macrocytic, hypochromic, and regenerative anemia. Coombs' test results may be positive in up to 90% of spontaneously infected symptomatic dogs⁹. The leukogram changes are nonspecific, although severe transient neutropenia (<1,000/ μ l) was noted in several dogs 1 week after experimental infection with *B. gibsoni* [6]. Marginal neutropenia persisted in some dogs for several weeks. Moderate to marked thrombocytopenia is very common. In experimental infections, thrombocytopenia developed sooner and persisted longer than parasitemia or anemia [6]. *B. gibsoni* infections upperhands the *B. canis* infection which is in accordance with many authors [10, 11, 12]. Analysis of the season-wise (Fig. 3) of babesiosis revealed peak infection during Monsoon. This could be attributed to the temperature and relative humidity variations which favour the vector survival and hence the transmission [13].

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