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Case Report

A CASE OF CANINE BABESIOSIS IN A 3-YEAR-OLD GERMAN SHEPHERD DOG

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ABSTRACT

This case report highlights the management of a clinical case of canine babesiosis in a 3-year-old male German shepherd dog. The dog was presented with a history of weakness, anorexia, and yellowish urine. Clinical examinations revealed tick infestation, pale mucous membranes, dry muzzle, rough and loose hair coat, lethargy, enlarged superficial lymph nodes and red wine-colored urine. Laboratory tests confirmed *Babesia canis*. Observed clinical pathology showed macrocytic normochromic anemia, leukocytosis due to neutrophilia, lymphocytosis, eosinophilia with a regenerative left shift and hypoproteinemia. The dog was successfully managed with diminazene aceturate and ivermectin, with supportive care. This case highlights the importance of proper hygiene of pet animals and prompt report of abnormalities to a Veterinarian.

Keywords: *Babesia*, Clinical management, German Shepherd, *Rhipicephalus sanguineus*

INTRODUCTION

Babesiosis is a tick-borne disease caused by intra erythrocytic protozoan parasite of the genera *Babesia* that infects a wide range of domestic animals and occasionally, humans (Uilenberg, 2006). It is a significant health concern in dogs worldwide, particularly in tropical and subtropical regions. Canine babesiosis is one of the most important tick-borne diseases in Nigeria (James-Rugu & Iwuala, 1988; Bodade *et al*., 1989; Abdullahi *et al*., 1990; Mamman & Abdullahi, 1998).

The climatic and topographic characteristics of Zaria are such that favor all year-round propagation of ectoparasites which harbor and transmit parasitic pathogens from one susceptible host to another (Natala *et al*., 2009). Recovered dogs remain subclinically infected and may suffer a relapse of disease in future or serve as point source for further spread of the disease in a given area (Cleveland & Coles, 2005).

Dogs are important household pets mostly kept for various other reasons which include security purposes (personal and military), sheep herding, protection against predators, hunting and leading of the blind. There has been increased interest in keeping dogs in Nigeria for security or pets and for food (Kamani *et al*., 2011).

The roaming nature of dogs exposes them to parasitism, which is one of the most serious health hazards in canine practice and the affected dog may harbor parasites (Adejoke, 2005). In Zaria, dogs are kept mainly as household guards and are allowed to roam freely. A few of these numbers are restricted during the daytime. The clinical and pathological consequences of this infestation and the resultant diseases transmitted by these ectoparasites have been widely documented in Nigeria and elsewhere (James-Rugu & Iwuala, 1988; Etim *et al*., 1996; Ripberger, 1999; Bryson *et al*., 2000; Wilson & Bram, 2003).

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Ticks from dogs also occasionally bite humans with the potential of transmitting tick-borne diseases. Cases of human babesiosis have been reported (Wentworth, 1988; Carter, 2001; CDC, 2023). These findings pose a major concern to pet owners and clinicians.

CASE HISTORY

A male German shepherd dog aged three years weighing 24kg was presented to the Small Animal Clinic of the Veterinary Teaching Hospital, Ahmadu Bello University, Zaria with the history of lethargy, dark yellowish urine and anorexia. The dog had been previously managed for tick infestation but did not return for the second ivermectin dose. The dog's medical history included an up-to-date ARV (anti-rabies vaccine) record but was due for DHLPP (distemper, hepatitis, leptospirosis, parainfluenza, and parvovirus) vaccine.

CLINICAL EXAMINATION AND DIAGNOSIS

Physical examination revealed that the dog was lethargic with pale mucous membranes (Figure I), capillary refill time of 6 seconds, dry muzzle, tick infestations in the outer ear, inter digital space and on the dorsum (Figures IIa & IIb), rough and loose hair coat (epilation), enlarged superficial lymph nodes and a red wine-colored urine which was collected at mid-stream. Blood was collected from the cephalic vein for blood parasite detection and full blood counts, faecal sample was analyzed for helminths ova and oocyst using simple flotation method as described by Dryden *et al*. (2005) and Pouillevet *et al*. (2017). The ticks on the body were collected and identified using the method as described by Soulsby (1982) and Walker *et al*. (2013) using a stereomicroscope.

RESULTS

Haemogram showed macrocytic normochromic anemia, leukocytosis due to neutrophilia, lymphocytosis, eosinophilia with a regenerative left shift and hypoproteinemia. (Table II).

The diagnosis of canine babesiosis was made based on the dog's clinical presentation, laboratory test results, and the presence of ticks. Freshly prepared Giemsa-stained thin blood smear as described by Wentworth (1988)and Ripberger (1999) revealed multiple merozoites in red blood cells (RBC) under the microscope confirming *Babesia canis* diagnosis (Figures Va & Vb). The tick samples were identified under a stereomicroscope as *Rhipicephalus sanguineus* ticks (Figures III & IV). The faecal sample yielded no parasite.

Figure I: Pale ocular mucous membranes. Magnification: x1000

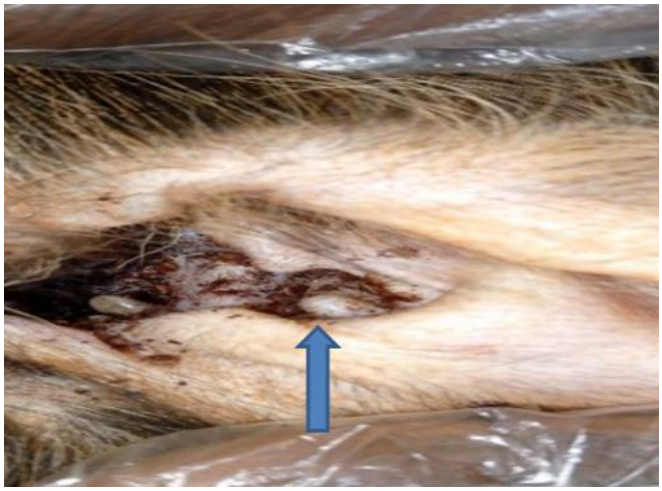


Figure IIa: Tick infestation in the ear

TABLE I: VITAL PARAMETERS

Parameters	Patient's values	Reference values
Resp. rate (cycles/min)	23	20-30
Pulse rate (beats/min)	78	70-90
Temperature (ºC)	38.8	38.5-39.4

Figure IIb: Tick infestation on the dorsum. Magnification: x1000

TABLE II: HAEMOGRAM

Parameters	Patient's values	Reference values
PCV (%)	10	37-55
Hb (g/dl)	3.45	12-18
RBC (10^{12}/L)	1.31	5.5-8.5
MCV (g/dl)	76.3	60-72
MCHC (g/dl)	34.5	34-38
TWBC (x10^9/L)	45.8	6-17
Bands (x10^9/L)	0.9	0.0-0.3
Neutrophils (x10^9/L)	15.1	3.6-13.1
Lymphocytes (x10^9/L)	26.7	0.72-5.1
Eosinophils (x10^9/L)	3.2	0.18-1.7
Monocytes (x10^9/L)	0	0.12-1.7
Basophils (x10^9/L)	0	Rare
Total protein (g/dl)	4.4	5.5-7.7

The dog was managed and treated with 4% diminazene aceturate at a dose of 4mg/kg intramuscularly (IM) as a single dose, 1% ivermectin at a dose of 0.4mg/kg subcutaneously (SC) also as a single dose to be repeated after 2 weeks. Supportive treatment in the form of vitamin B complex (Neurobion®) at 0.1ml/kg IM for 3 days and glucose in drinking water were instituted.

The dog owner was advised to spray the dog house and surroundings with cypermethrin® acaricides under supervision and apply topical cypermethrin®.

OUTCOME AND FOLLOW-UP

Vital parameters taken on day 2 of presentation showed improvement in the patient's values (Table III) and a capillary refill time of 4 seconds.

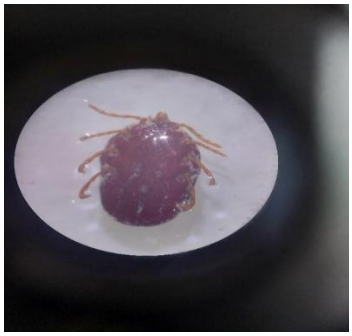
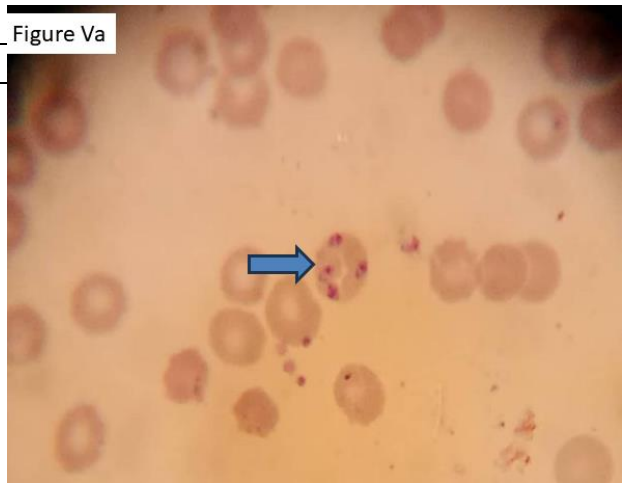
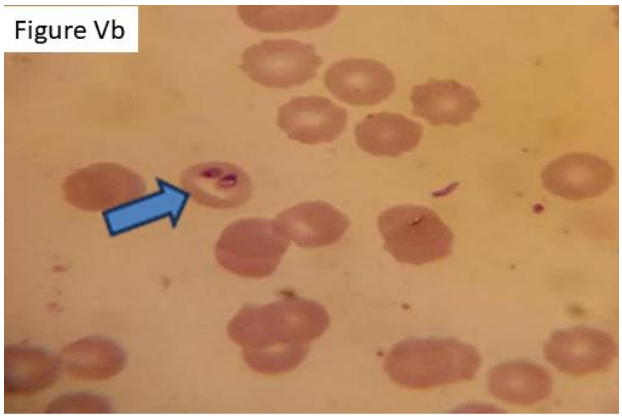


Figure III: Female *Rhipicephalus sanguineus* ticks

Figure IV: Male





Figures Va & Vb: Giemsa-stained thin blood smears showing red blood cells containing merozoites. Mag.: x1000

TABLE III: VITAL PARAMETERS

Parameters	Patient's values	Reference values
Respiratory rate (cycles/min)	44	20-30
Pulse rate (beats/min)	83	70-90
Temperature (ºC)	39.2	38.5-39.4

The dog was visited 10 days after presentation and treatment. The animal responded well as the appetite had greatly improved and the dog had become more alert and active. The vital parameters taken showed moderate anemia with lymphocytic leukocytosis and 2 seconds capillary refill time (Tables IV & V). The prognosis of this case was good as the disease was diagnosed on time, treated appropriately and the animal responded to treatment.

TABLE IV: VITAL PARAMETERS

Parameters	Patient's values	Reference values
Respiratory rate (cycles/min)	23	20-30
Pulse rate (beats/min)	78	70-90
Temperature (ºC)	38.8	38.5-39.4

TABLE V: HAEMOGRAM

Parameters	Patient's values	Reference values
PCV (%)	28	37-55
Hb (g/dL)	12.3	12-18
TWBC ($x10^9$/L)	18.6	6-17
Bands ($x10^9$/L)	0.0	0.0-0.3
Neutrophils ($x10^9$/L)	9.3	3.6-13.1
Lymphocytes ($x10^9$/L)	7.8	0.72-5.1
Eosinophils ($x10^9$/L)	0.37	0.18-1.7
Monocytes ($x10^9$/L)	0.93	0.12-1.7
Basophils ($x10^9$/L)	0	Rare
Total protein (g/dL)	7.5	5.5-7.7

DISCUSSION

Babesia canis is one of the most widely distributed haemo parasite of dogs occurring in almost anywhere their tick vector *Rhipicephalus sanguineus* are found (Taylor *et al*, 2007). It is highly pathogenic and is the major cause of haemolytic anaemia in dogs in the tropics (Kamani *et al*, 2011). The clinical and epidemiological implications of babesiosis in infected dogs and those at risk cannot be overemphasized as this could influence their nutritional, physiological and behavioral well-being (Mamman & Abdullahi, 1998; Jacobson *et al*., 2000; Carter, 2001).

The infestation of the dog by tick species encountered suggests a wide distribution of *Rhipicephalus sanguineus* as Babesia vectors in Nigeria. This is in agreement with other findings reported in some parts of Nigeria like Plateau, Calabar & Anambra states (James-Rugu & Iwuala, 1988; Umeche & Chianama, 1995; Etim *et al*., 1996; James-Rugu, 2000) and in South Africa & United States (Bryson *et al*., 2000; Wilson & Bram, 2003). Ticks from dogs and other livestock have been reported to occasionally bite humans and transmit Lyme disease, tick paralysis, human babesiosis and relapsing fever in parts of North America, Africa and Australia (Wentworth, 1988; Carter, 2001; CDC, 2023). The large population of roaming dogs as well as those restricted within residential homes reduces hygienic standards and increase the risk of acquiring arthropod borne zoonotic infections.

Prevalence of ticks and disease in an area and season are contributory factors for diagnosis of Babesia specifically in countries like Nigeria where advanced testing is not affordable. Different types of drugs are available and used as a treatment for babesiosis. Imidocarb dipropionate and diminazine aceturate are antiprotozoal drugs mostly used for babesiosis and prescribed with either doxycycline or enrofloxacin (Mosqueda *et al*., 2012). Metronidazole is another drug of choice. The symptoms observed in the present study like lethargy, haemolytic anaemia and lymphadenopathy were in correlation with the findings of Conrad *et al*., (1991). The clinical signs are the result of tissue hypoxia following the anaemia and a concomitant systemic inflammatory response syndrome caused by marked cytokine release (Lobetti, 2006). Haemolytic anemia causes immune-mediated destruction (intra- and extravascular), direct parasitic injury, and subsequent oxidative stress (Cicco & Birkenheuer, 2012).

In general, Babesia is transmitted by ticks after 3 days of bite and enters into blood. In blood, they attach with RBCs and enter RBCs through endocytosis. Intravascular and extravascular hemolysis leads to hemolytic anemia and hypotensive shock. Clinically babesiosis is manifested with anorexia fever, tachycardia, tachypnoea haemoglobinuria, pale mucous membrane, and splenomegaly. Paraplegia is also a rarely reported sign of canine babesiosis (Baloch *et.al*., 2021). Proteinuria with concentrated urine is also seen (Yousaf *et.al*., 2021).

The disease is not fatal if diagnosed and treated in the early stage of the disease; prognosis becomes poor if case becomes complicated. Immunosuppression and splenectomy are also conditions that can be risk factors for canine babesiosis. Supportive therapy with blood transfusion and fluid therapy is recommended in the management of critical case of babesiosis. In this case report, a single shot of diminazene dipropionate 4mg/kg injectable along with subcutaneously administered ivermectin were prescribed. Supportive therapy with vitamin B complex (Neurobion®) and glucose in water were also prescribed.

The owner was advised to check his pet for ticks daily and provide them with hygienic conditions and report cases promptly to a Veterinary hospital. Also, the immediate environments and surroundings were to be cleared and sprayed with cypermethrin® acaricide under supervision.

CONCLUSION

Canine babesiosis is a significant health concern in dogs, particularly in tropical and subtropical regions. Clinical babesiosis can be treated with diminazene aceturate and ivermectin. Regular tick control measures and routine monitoring of dogs in endemic areas are recommended to keep the disease in check.

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