# Prevalence of Rhipicephalus sanguineus infestation and Babesia canis infection in dogs with respect to breed type and degree of freedom in Makurdi, Benue State-Nigeria

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**Citation**

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**Abstract**

An investigation on the prevalence of Rhipicephalus sanguineus infestation and Babesia canis infection among domestic dogs in Makurdi metropolis was carried out. The blood samples were collected from the tip of the ear of randomly selected 108 dogs; thin blood smears were stained with Giemsa stain and then examined under the microscope. Stereoscopic examination was used for the identification of ticks collected. 11 (10.2%) dogs were found positive for babesiosis, male dogs recorded an infection rate of 13.8% while female had 6.0%. No significant difference was observed between male and female dogs($X^2$ =2.59, P > 0.05). A total of 89(82.4%) dogs were found to be infested with ticks mainly Rhipicephalus sanguineus. With regards to the degree of restriction, infection among free-roaming, semi-confined and confined dogs was significantly different ($X^2$ =1.32, p<.05) with the free- roaming dogs recording the highest prevalence 18.7%. Prevalence of Babesia canis among the breed was not significant ($X^2$ = 12.52, p<.05), with 6 (8.6%) local, 3 (18.7%) hybrid and 2 (9.1%) foreign dogs being positive. Generally, the most preferred predilection site for ticks (irrespective of breed or degree of restriction) was the paws/interdigital spaces (96.6%) and the back (92.1%). The relatively high prevalence of both tick infestation and babesiosis in Makurdi is of public health significance because of the possibility of zoonotic transmission. Since dogs are man's closest companions in the animal world, this relationship must be encouraged for obvious reasons. Thus curative and preventive measures such as regular deticking and bathing, clearing of bushes around houses, fumigating of kernels and surroundings, and administration of prophylactic treatments (Carbesia, Samorenil) are essential and should be enforced for the good health and benefits of dog services to man and prevention of zoonosis.

## INTRODUCTION

Babesiosis is an important tropical tick-borne protozoal infection of domestic and wild animals. The disease occurs in the southern USA, Central and South America, Africa, Asia and Southern Europe. Out of the hundred species, three Babesia species are known to cause natural infection to dogs. Babesia canis, Babesia gibsoni and Babesia vogeli [1]. The disease is transmitted by ticks among which, Dermacentor reticulatus in Europe, Rhipicephalus sanguineus in tropical and sub-tropical regions, Haemaphysalis leachi in South-Africa[2]. Once infected, the Babesia organisms multiply within erythrocytes. The infection has been associated with the "fading puppy syndrome". The infected erythrocytes are destroyed this causes acute onset anemia along with fever and lethargy. Although chronic infections occur, they are uncommon. Sudden death is a possible consequence of acute onset Babesia infection associated with low blood pressure shock and hypoxia. The wide variety of additional clinical signs depends on the tissues affected by the infection. Mild to severe pulmonary disease, diarrhea, vomiting, muscle pain, yellow-colored urine, rapid weight loss, eye discharge, and neurological signs are reported[3].

Dogs are common sight within Makurdi metropolis, where they are kept as guard dogs and pets (to a lesser degree). The climatic and topographic characteristics of the area are such that ectoparasites which harbor and transmit viral, bacterial and protozoan pathogens could thrive. Thus, in order that dogs function effectively and people enjoy the companionship derived from living with them, it is of utmost importance that their health is maintained optimally and that zoonotic transmissions are kept in check. As such, this study was carried out to determine the disease pattern of canine babesiosis in relation to various parameters (age, sex, breed of dogs and degree of restriction) for future prophylaxis and

to identify responsible vector species.

## MATERIALS AND METHODS

### STUDY AREA

The study was carried out in Makurdi, capital of Benue State-Nigeria. The area is located on latitude 7º 44' N and longitude 8º 35' E. the metropolis is defined by a 16 km radius, the Benue River and its tributaries covers a substantial area of the town. Makurdi is located at the heart land of guinea savanna zone of central Nigeria. The climate of the area is tropical and the vegetation characteristic is predominantly guinea savanna with an annual rainfall of 1090 mm. There are two distinct seasons, the rainy season and the dry season; the former lasts from April to October and the latter from November to March. Makurdi has a temperature range between a minimum of 27,38ºC to 28, 02ºC and a maximum of 30.10ºC to 34,09ºC (Meteolorgical Department, Nigerian Air Force Base Makurdi, Unpub. Data) The town is divided into zones: North Bank, Wurukum, High Level, Low level, Wadata, Fiidi ward and Ankpa ward mainly inhabited by civil servant, paramilitary, soldiers, traders, fishermen, farmers and craftmen.

### STUDY POPULATION

A total of 108 dogs (58 males and 50 females) were randomly selected from the State veterinary clinic and homes within the different zones. Ticks were collected from five parts of the dogs: the head (including the ears), neck, back, paws, and belly and tail. They were preserved in 70% alcohol.

### LABORATORY ANALYSIS

Ticks collected were properly examined by stereomicroscope following the standard procedures described[4]. Blood samples were obtained from the tip of the ear flaps of the dogs and used to prepare thin smears which were stained with Giemsa and examined microscopically for the presence of Babesia canis [5, 6].

### STATISTICAL ANALYSIS

All collated data were analyzed using the chi-squared analysis to determine significance of tick infestation and babesiosis at 5% significance level .

## RESULTS

The report showed that Rhipicephalus sanguineus was the most prevalent tick species on dogs despite the presence of an infested dog with the tropical bont tick Amblyomma variegatum. The preferred site of attachment is shown in Table 1. 89 dogs (82.41%) had tick infestation, distribution of ticks on dogs' body was not significantly different though most ticks preferred the paws (86 dogs, 96.3%) and the back (82 dogs, 92.1%).

**Figure 1**

Table 1: Preferred site of attachment of ticks on dogs in Makurdi

| | Number of dogs | |
|---|---|---|
| Preferred sites | Examined | Infested (%) |
| Head | 108 | 48(53.9) |
| Neck | 108 | 50(56.2) |
| Back | 108 | 82(92.1) |
| Paws | 108 | 86(96.6) |
| Belly and tail | 108 | 41(46.0) |
| Total | 108 | 89(82.1) |

($X^2 = 10.38$, $P > 0.05$)

A total of 11 dogs (10.2%) were positive for Babesia canis infection, out of which 8 (13.8 %) were males and 3 (6.0%) were females (Table 2). Prevalence of infection among sexes was not significantly different ($X^2 = 2.59$, $P > 0.05$).

**Figure 2**

Table 2: Prevalence of in relation to sex

| | Number of dogs | |
|---|---|---|
| Sex | Examined | Infected (%) |
| Male | 58 | 8(13.79) |
| Female | 50 | 3(6.0) |

($X^2 = 2.59$, $P > 0.05$)

Table 3 shows the occurrence of canine babesiosis with respect to degree of restriction. Dogs were grouped based on their degree of restriction (information obtained from interview with owners) as follows: free-roaming, semi-confined (restricted then released) and confined. Only free-roaming and semi-confined were found to be infected with babesiosis, (9.3%) and 18.2% respectively. A significant difference in infection was observed between the free-roaming, semi-confined and the confined dogs($X^2 = 1.32$, $P < 0.05$).

**Figure 3**

Table 3: Occurrence of canine babesiosis with respect to degree of restriction

| | Number of dogs | |
|---|---|---|
| Degree of restriction | Examined | Infected (%) |
| Confined | 11 | 0(0.0) |
| Semi-confined | 75 | 7(9.3) |
| Free-roaming | 22 | 4(18.9) |

($X^2 = 1.32$, $P < 0.05$)

The occurrence of canine babesiosis in relation to breed of dogs is given in Table 4. Three breeds of dogs were identified, these include foreign breed, local breed and hybrid/croosbred. The highest prevalence of babesiosis was found in the hybrid dogs 18.8%, followed by the foreign 9.1% and the local 8.6% respectively. No significant difference was observed in the occurrence of babesiosis between the breeds ($X^2 = 12.52$, $P > 0.05$).

**Figure 4**

Table 4: Occurrence of canine babesiosis in relation to breed of dogs

| | Number of dogs | |
|---|---|---|
| Breed of dogs | Examined | Infected (%) |
| Local | 70 | 6 (8.6) |
| Foreign | 22 | 2 (9.1) |
| Hybrid/Crossbred | 16 | 3(18.8) |

($X^2 = 12.52$, $P < 0.05$)

## DISCUSSION

The results show a relatively high prevalence of canine babesiosis and tick infestation in Makurdi. R. sanguineus was found to be the tick commonly infesting dogs, this corroborates with the findings of a study conducted on ectoparasites of dogs in Calabar, Nigeria[7]. This also agrees with a similar study performed in Mozambique where out of the 89 ticks collected from dogs, R. sanguineus recorded the highest rate of infestation among the two species of ticks that were observed[8]. Although, preferred sites of tick attachment to dogs' body differs according to the environment, in Makurdi ticks appear to prefer the paws, this could be due to the fact that these sites are less accessible compared with locations such as the neck and head. This disagrees with a study carried out in Mexico where the authors found the ears, interdigital spaces and back as preferred sites for ticks[9]. Free roaming dogs were more infected than semi-confined and confined dogs, this could be attributed to the non-development of immune responses due to continuous exposure to ticks. The result, however, contrasts the findings observed in other works[10,11]. However, the high rate of babesiosis observed among male dogs than their female counterparts could be the cause of their frequent roaming to look for mates and establishing territories thereby picking the ticks[12, 13, 7.] Based on breed, more local breeds were infected than foreign and hybrid, this must be due to the care free attitude of their owners. Such dogs are often not cared for, hardly ever washed and treated and even not immunized. Moreover, the fact that these dogs are exposed to all manners of environmental hazard, are easier to get contaminated by communicable diseases that could be easily transmitted to man, this observation was also reported in other works.[14, 15,9, 10]

Public health awareness on the care for dogs and dangers associated with their indiscriminate roaming is thus necessary to prevent and check the possibility of babesiosis and other zoonotic infections occurring in humans living in Makurdi and other such towns. Prevention and control can only be achieved through administration of prophylaxis, weekly bathing, monitoring and grooming of dogs, regular deticking of dogs, regulation of children and adults interaction with dogs, fumigation of kernels and houses and above all, provision of laws to enforce a high standard of public and veterinary health.

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