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Prevalence of *Babesia* parasites infection of dogs in Gashua Metropolis, Yobe state, North-Eastern Nigeria

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Abstract
A survey of *Babesia* parasites of dogs in Gashua metropolis, Yobe State, north-eastern, Nigeria; was undertaken between January and April, 2019. The dogs were examined for *Babesia* parasites in relations to localities, sex and breed of dogs. Out of 125 dogs that were examined parasitologically, 79(63.2%) had *Babesia* parasites. The highest prevalence was observed in March, while the female dogs were most infected. The dogs examined at the Katuzu area of Gashua had the highest prevalence of *Babesia* parasites. The result has shown that exotic breeds of dogs were most infected compare to the local breed with stronger immunity against the parasites due to frequent exposure. The high prevalence of *Babesia* parasites observed in the present study suggests that dogs in Gashua metropolis harbours more brown dogticks which are potential source of zoonotic diseases in the area. A shift from curative to preventive measures involving the Elimination of the tick vectors is therefore recommended.

Keywords: prevalence, *Babesia*, dogs, Gashua, Nigeria

Introduction
Parasites of genus *Babesia* are classified within the phylum Apicomplexa, class Piroplasmea, order Piroplasmea and family Babesiidae. They normally exist in various forms, such as round, bigeminates (twins) and multigeminate (Irhke *et al.*, 1993); and are sometimes referred to as piroplasms on account of the pear-like shape of their merozoites (Smyth, 1996) [14]. Babesiosis is a dangerous, invasive disease of humans and animals. Probably the first described case of an epidemic caused by the genus *Babesia* was a cattle mortality described in the biblical Book of Exodus (Homer *et al.*, 2000). *Babesia* species are small intraerythrocytic parasites of many domestic and wild animal species and occasionally of genus *Boophilus* and other hard ticks such as *Dermacentor*, *Rhipicephalus* and *Ixodes* (Healy, 1989) [9].

It has been reported that the transovarial passage of the parasites from the parent tick to its offspring; thus passing the infection along to the next generations of ticks. It was also reported that Babesis parasites can be transmitted through blood transfusion, contaminated needles and instrument and Trans placental transmission, may occur as when an infected dog with oval abrasion bites a naïve dog (Cleveland *et al.*, 2002) [7]. Recently, it has been reported that several species of *Babesia* parasites infect both domesticated and wild animals; and serological surveys has shown that wild animals in a zoo were infected with babesiosis resulting from tick infestation (Mamman and Abdullahi, 1998) [11].

More than 70 species of *Babesia* have been described (Ruebush and Cassidy, 1977) and they are most strictly host specific (Healy, 1989). Cattle are being infected with *Babesia bigemina* and *B. bovis*, while *B. motasi* parasitize goats and sheep respectively. Dogs are susceptible to *B. canis* and B. gibsonii. Development in genetic technology has shown that three subspecies of *B. canis* exist; and they are *B. bovis. canis vogeli*, and *B. canis rossi* (Cleveland *et al.*, 2002) [7]. These Babesia species normally are the causative agents of babesiosis or piroplasmosis, common known as Tick fever, red water fever or Texas fever (Smyth, 1996) [14]. The span time between the transmission of the parasites and the onset of the disease depends on the host and parasite. For instance, an incubation period of 10-20 days is stated for babesiosis of dogs and horses (B. equi, *B. canis*) and about 8-15 days for Texas fever of cattle (*B. bigemina*) but the clinical signs vary greatly depending upon the stage of the disease, the age and immune status of the animal of the animal and the presence of other infections (Adame, 1996).

A few clinical signs that may be exhibited are loss of appetite, gradual weight loss, diarrhea, vomiting, constipation, oedema, weakness, abdominal swollen, enlarged lymph node and bleeding uner the skin or rashes etc. (Cleveland *et al.*, 2002, Adame, 1996 and Irhke *et al.*, 1993). Death rate with animal's age, species, breed and sex, for instance, death can occur among sheep with 10 days (Moore and William, 1979). Death may also be sudden as a result of frequent host passages depending on kind of tick, degree of tick infestation and increased pathogenicity of the parasites (Spielman, 1998) [15].

In Nigeria, the rearing of animals as pets or for food production has become common practice amongst most individuals. Most domestic animals could be infested by ticks, which are the primary vectors of these *Babesia* parasites. Babesiosis is an economically important disease, as it has major impact on the livestock industries in many countries in the sub Saharan Africa. The aim of the study is to ascertain the prevalence of canine babesiosis in relation to

age, sex, and breed of the dogs in Gashua Metropolis, Yobe State, Northeastern Nigeria.

Methodology

Study area

A survey was undertaken between January and April, 2019 in Gashua metropolis, which is the administrative headquarters of Bade Local Government Area of Yobe State, northeastern Nigeria. The Gashua community in Yobe State in northeastern Nigeria, on the Yobe River a few miles below the convergence of the Hadejia River and the Jama' are River. Average elevation is about 299m. Gashua town is located on the latitude coordinate 12^0 52¨ 5''N, 11^0 2, 47'' E and longitude 12.868060N, 11.046839^{0}E of the Greenwich meridian. It is bordered with Bursari Local Government Area to the South and East, Karasuwa Local Government Area to the West and Yusufari Local Government Area. The population in 2006 was about 125,000. The vegetation of the area is Sahel savanna with minimum temperature of about 21^{0}C during the harmattan period and temperature of about 41^{0}C to 46^{0}C during the month of June and July respectively (Wikipedia). Common plants found in this area are xerophytes and domestic animals found are camels, cattle, dogs, horses, donkey, sheep, goats and chickens. The information dates of collection, age, breed, sex, tick infestation, physical appearance and clinical signs such ocular discharge, body temperature and colour of the urine were also observed.

Collection and examination of samples

3 mls of blood samples was collected from each dogs through the cephalic vein using 5 mls syringes into bottles containing ethylene diethyl tetra-acetic acid (EDTA) and were conveyed to the laboratory and then chilled at a temperature of 10^{0}C to 15^{0}C before blood smears were prepared.

Thin blood smears for each dog were prepared on microscopic slides by placing a small drop of blood on the pre-cleaned labelled slides and then allowed to spread with the aid of another slide held at a 30^0-40^0 angle up to the drop. Staining with giemsa was done after spreading blood smears for 3- 5 minutes, thereafter the stained thin blood smears were allowed to dry before examining under the microscope (Smyth, 1996) [14].

The ordinary light microscope was used in the examination of blood smears and proper viewing was enhanced by the careful screening of smears at a magnification of X10 or X40 objectives lens which could best reveal the presence of *Babesia* parasites within the red blood cells. Parasites were identified based on their morphological characteristics as well as their general

Physical appearance (i.e. pear-shape) within red blood cells (Reiter and Weiland, 1989) [13].

Statistical analysis

Data obtained were analysed using descriptive statistics. The prevalence rates among localities, sex, age and breed of dogs were expressed as percentage. Chi-square test was used to evaluate association between the prevalence of infection and localities, sex, sex and breed of dogs.

Results

Out of 125 dogs (*Canis familiaris*) examined for Babesia parasites, 79(63.2%) were infected (Table 1). 17 (53.1%) sampled from Sabongari were positive, 28(74.2%) was recorded for Katuzu, Low cost had 20(62.5%) and 19(63.3%) for B/Kasuwa respectively (Table 2). A total of 72 male dogs were screened, out of which 45 (62.5%) were positive for Babesia, while 34(64.2%) females sampled were positive. Among the 35 dogs sampled within the age-group below one year 21 (60.0%) was positive for babesiosis. Within the age-group of 1-5 years, 23(54.7%) out of the 43 dogs screened were positive, while only 35 (72.9%) out of the 47 dogs above 5 years sampled were positive. There was no significant difference ($p>0.05$) between the age-groups (Table 2).

Table 1: Prevalence of canine babesiosis in Gashua metropolis, Yobe State.

	No examined	Prevalence (%)
Dogs	125	79(63.2%)

Table 2: Prevalence of canine babesiosis in Gashua, among localities, sexes and age-group

		No. of samples	No. of positives	Total samples	Prevalence (%)
Localities	Sabongari	32	17(53.1%)		
	Katuzu	31	23(74.2%)		
	Lowcost	32	20(62.5%)		
	B/Kasuwa	30	19(63.3%)	125	63.2
Sex	Female	72	45(62.5%)		
	Male	53	34(64.2%)		
Age-group	<1	35	21 (60.0%)		
	1-5	43	23 (54.7%)		
	>5	47	35 (72.9%)		

A total of 69 local breed of dogs were screened, out of which 36(28.8%) were positive for babesiosis, while 36 (28.8%) were positive out of 69 local breeds of dogs screened. (Table 3).

Table 3: Prevalence of canine babesiosis among breeds of dogs in Gashua metropolis

Breeds	No of Samples	No of positives	Prevalence (%)
Exotic	56	43(34.4%)	
Local	69	36(28.8%)	63.2

Discussion

The results of the study indicate that canine babesiosis is a common disease of dogs in Gashua Metropolis. This corroborates to the findings of Mamman and Abdullahi (1998) [11]. The traditional parasitological methods of diagnosis was used (Rehbein and Heindrich-Joswig, 1983; Abdullahi *et al.*, 1983 [11]; Dogo *et al.*, 2002) [8]. It was revealed that they were more infected male dogs than female dogs. Pages *et al.* (1990) also reported that male dogs were infected than female dogs, and this is attributed to the roaming nature of male dogs and their utilization as a hunting animal. The prevalence rate of disease was higher in local dogs when compared to exotic breed of dogs. This is attributed to the fact that most owners of this breed allow their dogs to roam with little or no care. The roaming nature of local dogs increase their rate of exposure to the vector such as *Rhipicephalus* and *Ixodes* species of ticks. Exotic dogs are not frequently exposed due to proper care given to them by their owners and they are mainly used as guard dogs and pet in which their activities are restricted with the home, thereby reducing their chances of coming in contact with the vectors. Abdullahi *et al.*, (1990) [11] also opined that local dogs are being used for hunting activities, thereby increasing their chances of coming in contact with the vector.

There is paucity of information on the epidemiology of canine babesisosis of dogs in Gashua. The growing population of dogs makes it very expedient to investigate the prevalence of *Babesia* parasites. This pioneer study has provided the preliminary information on the prevalence of canine babesiosis in Gashua metropolis Yobe State.

Conclusion

Canine babesiosis is an emerging and re-emerging disease of both public and veterinary health importance (Spielman, 1998), and also poses a serious threat to dogs in Gashua metropolis. Canine babesiosis could cause a lot of damages to host animals, thereby predisposing them to high mortality rate. The high prevalence of *Babesia* parasites observed in the present study suggests that dogs in Gashua metropolis harbours more brown dogticks which are potential source of zoonotic diseases in the area. A shift from curative to preventive measures involving the

Elimination of the tick vectors is therefore recommended.

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