

Tick infestation of dogs in Makurdi metropolis, Benue State-Nigeria

A E.U., H R.S., O M.

Citation

A E.U., H R.S., O M.. *Tick infestation of dogs in Makurdi metropolis, Benue State-Nigeria*. The Internet Journal of Veterinary Medicine. 2009 Volume 7 Number 2.

Abstract

This study was conducted to identify tick species infesting domestic dogs, to compare the infestation rates between free roaming and kenneled dogs in Makurdi, capital of Benue State-Nigeria and to find out the predilection sites of attachment of tick species on dogs. A total of 72 (55.38%) dogs were infested with different species of ticks out of the 130 dogs examined. Using stereoscopic observation and standard taxonomic keys, 533 nymphs and adult ticks were identified with distribution as follows: *Rhipicephalus sanguineus* 429 (80.5%), *Boophilus annulatus* 78 (14.6%) and *Hyalomma truncatum* 26 (4.9%). No significant difference ($X^2 = 11.2$, $P > 0.05$) was observed between prevalence of single and multiple pattern of tick species found on the dogs. Predilection sites of attachment of the ticks were observed as follows: ears 176 (33.0%), interdigital space of limbs 148 (27.8%), head 23 (4.3%), belly 34 (6.3%), back 50 (9.3%), neck and chest 102 (19.1%). Out of the 108 free roaming dogs, 64 (59.2%) were infested while 8 (7.4%) of the kenneled dogs (22) were also infested. The difference observed between the free roaming and kenneled dogs was not significant ($X^2 = 5.32$, $P > 0.05$). The highest incidence of tick infestation was observed in June with no significant difference observed between the three months of study ($X^2 = 8.91$, $P > 0.05$). The main factors influencing the dogs' tick infestation in this study were probably the environment and degree of freedom. It is recommended that regular health checks be carried out by relevant agents on free roaming and kenneled dogs since both groups are susceptible to tick infestation. Enforcement of restriction may also go along way to prevent tick infestation and diseases transmitted by ticks.

INTRODUCTION

Ticks are arthropods belonging to the class Arachnida, which are generally obligate and temporary ectoparasites of vertebrates, feeding on blood and tissue fluids of their hosts. They are the second most important group next to insects of arthropod vectors of diseases transmissible to animals and human beings. Tickborne diseases commonly transmitted to human beings include Lyme disease, Ehrlichiosis, Babesiosis, Rocky Mountain spotted fever, Colorado tick fever, Tularaemia, Q fever, Tick paralysis, Spotted fever and Tick encephalitis. Ticks can be considered as zoonotic risk because, not only can they be found outdoors, but also in homes, where they may come in contact with human beings while searching for favourable environmental conditions to subsist^{1,2,3}. Knowing the possible link between dog ectoparasite and the transmission of zoonosis, this study became necessary in view of the recent trends observed on the increased number of free roaming and kenneled dogs in Makurdi. The increased number of dogs has been related to the increasing security problems in the metropolitan. Dogs are employed as watch agents in many households. Studies on the prevalence of ticks in dogs in Makurdi is scarce, there

are no available epidemiological information on ticks and disease transmission. The present study was aimed at identifying the tick species infesting domestic dogs and to compare the infestation rates between free-roaming and kenneled dogs and preferred sites of attachment of tick species found on dogs in Makurdi metropolis.

MATERIALS AND METHODS

STUDY AREA

The study was carried out between June and August 2005 in Makurdi, capital of Benue State-Nigeria. The area is located on latitude 7° 44' N and longitude 8° 35' E. and defined by a 26 km radius with the Benue River and its tributaries covering a substantial area of the town. Makurdi located at the heart land of the tropical guinea savanna zone of central Nigeria has an annual average 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 27.8°C to 28.2°C and a maximum of 30.1°C to 34.1°C (Meteorological 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 craftsmen.

STUDY POPULATION

The specimens were collected by the researchers from residential houses in Makurdi metropolis following standard procedures⁴. A total of 130 randomly selected dogs were examined, all the selected dogs were examined for ticks on the face, ears, neck, belly, back and limbs (interdigital spaces) and the number of ticks per region were recorded. Dogs on which at least one tick was found were considered positive.

LABORATORY ANALYSIS

Ticks collected were preserved in 70% alcohol and sent to the Advanced Biology Laboratory of the University of Agriculture Makurdi for examination under stereomicroscope and identification using standard taxonomic keys⁴.

STATISTICAL ANALYSIS

Prevalence values within each factor (location, tick species, months, and predilection sites of ticks on dogs) were compared by chi-squared test at $P < 0.05$, significance level.

RESULTS

Table 1 shows the prevalence of tick infestation in dogs in the selected areas in Makurdi. Out of 130 dogs examined, 72(55.4%) were infested with ticks. North Bank and Wurukum recorded the highest infestation rate with 84.6% and 55.4% respectively. The least infestation rate was observed at High Level, 27.7%. No significant difference was observed between the different locations and the prevalence of tick infestation ($X^2 = 5.32$, $P > 0.05$).

Figure 1

Table 1: Prevalence of tick infestation in dogs in Makurdi

Location	No of Dogs examined	No of Dogs examined (%)
North Bank	26	22(84.6)
Wadata	51	23(45.1)
High Level	18	5(27.8)
Ankpa ward	15	8(53.3)
Wurukum	20	14(70.0)
Total	130	72(55.4)

($X^2 = 5.32$, $P > 0.05$).

A total of 533 nymphs and adults ticks were collected with the following infestation rate: *Rhipicephalus sanguineus* 429 (80.5%), *Boophilus annulatus* 78 (14.6%) and *Hyalomma truncatum* 26 (4.9%). It was found that 176(33.0%) ticks had a predilection for the ear with *Rhipicephalus sanguineus* having 163 (30.5%), *Boophilus annulatus* 11(2.1%) and *Hyalomma truncatum* 2 (0.3%). Other predilection sites by ticks were the limbs (interdigital space), 148(27.7%), and neck and chest 102(19.1%). Summary of the results is shown in Table 2.

Figure 2

Table 2: Prevalence of different species of ticks and their predilection sites on dogs in Makurdi

Tick species	Predilection sites (%)						Total
	Ear	Head	limbs	Belly	Back	Neck&chest	
<i>R. sanguineus</i>	163(30.5)	16(3.0)	114(21.3)	17(3.1)	20(3.7)	90(16.8)	429(80.4)
<i>B. annulatus</i>	11(2.1)	5(0.9)	18(3.3)	15(2.8)	22(4.12)	7(1.3)	78(14.6)
<i>H. truncatum</i>	2(0.3)	1(0.18)	10(1.8)	2(0.37)	6(1.12)	5(0.9)	26(4.9)
Total	176(33.0)	23(4.3)	148(27.7)	34(6.3)	50(9.3)	102(19.1)	533

($X^2 = 5.32$, $P > 0.05$)

The comparison of tick infestation in free roaming and kenneled dogs is shown in Table 3. It was observed that out of 108 free roaming dogs, 64(59.6%) were found infested with the three species of ticks while of the 22 kenneled dogs only 8(7.4%) were found infested but with only two species of ticks; *B. annulatus* was completely absent in kenneled dogs. *R. sanguineus* (78.1%) was most prevalent in free roaming dogs followed by *B. annulatus* (16.42%) and *H. truncatum* (4.4%). There was no significant difference in

tick infestation between free roaming and kenneled dogs($X^2 = 5.32$, $P>0.05$).

Figure 3

Table 3: Comparison and degree of tick infestation between free ranging and kenneled dogs

	Number of dogs		Tick species (%)			
			Degree of infestation			Total
	Examined	Infested	<i>R.sanguineus</i>	<i>B. annulatus</i>	<i>H. truncatum</i>	
Kenneled dogs	22	8(7.4)	53(91.3)	0(0.0)	5(8.62)	58(10.8)
Free ranging dogs	108	64(59.2)	371(78.1)	78(16.42)	21(4.4)	475(89.1)
Total	130	72(55.3)	424(79.5)	78(14.63)	26(4.8)	533

($X^2 = 5.34$, $P>0.05$)

The monthly variation and prevalence of tick species is shown in Table 4. The highest number of ticks was recorded during the months of June (54.1%) followed by 25.0% in August and 20.8% in July. *Rhipicephalus sanguineus* (80.5%) species was known as the most prevailing tick during the three months of study. No significant difference was observed between the monthly variation and occurrence of tick species($X^2 = 8.91$, $P > 0.05$).

Figure 4

Table 4: Monthly variation and prevalence of tick species on dogs in Makurdi

Months	Number of dogs		Tick species (%)			
			Degree of infestation			Total
	Examined	Infested	<i>R.sanguineus</i>	<i>B. annulatus</i>	<i>H. truncatum</i>	
June	67	39(54.1)	280(65.2)	43(55.1)	9(34.6)	332(62.3)
July	34	15(20.8)	50(11.6)	8(10.2)	2(7.7)	60(11.2)
August	29	18(25.0)	99(23.0)	27(34.6)	15(57.6)	141(26.4)
Total	130	72(55.3)	429(80.5)	78(14.6)	26(4.9)	533

($X^2 = 8.91$, $P > 0.05$).

Table 5 shows the pattern of single and multiple tick infestation in dogs in Makurdi. 28 (38.8%) of dogs were found infested with the three species of ticks (*R. sanguineus*, *B.annulatus* and *H.truncatum*). However, double tick infestations found were those of *R. sanguineus* + *B. annulatus*, 24(33.3%) and *R.sanguineus* + *H. truncatum*, 4 (5.5%). There was no significant difference in the pattern of single and multiple tick infestation in dogs in Makurdi($X^2 = 11.2$, $P > 0.05$).

Figure 5

Table 5: Pattern of single and multiple tick infestation on dogs in Makurdi

Pattern of single and multiple infestation		Number of dogs infested (%)
Single		
<i>R. sanguineus</i>		16(22.2)
Double		
<i>R. sanguineus</i> + <i>B. annulatus</i>		24(33.3)
<i>R. sanguineus</i> + <i>H. truncatum</i>		4(5.5)
Triple		
<i>R. sanguineus</i> + <i>B. annulatus</i> + <i>H. truncatum</i>		28(38.8)
Total		72

($X^2 = 11.2$, $P > 0.05$)

DISCUSSION

The results of this study indicated that there was a relatively high prevalence of tick infestation in dogs in Makurdi. North-Bank and Wurukum which are known as slums had the highest number of infested dogs. These areas are densely populated mainly by farmers, fishermen, petty traders and craftsmen who keep dogs without proper care. The poor environmental sanitation prevailing in these areas, the common sights of garbage dumps where dogs frequently source for food and the presence of other susceptible animals (cattle, goats and sheep) in the communities could be major factors contributing to the survival and propagation of these ticks. The low prevalence of tick infestation observed in dogs at High Level could be attributed to the level of care and confinement of dogs by the owners.

The ears and interdigital spaces of limbs were found to be the most predilection sites for ticks on dogs in the study area. The presence of ticks in these sites could be probably due to their exposure to the questing ticks as the dogs roam about. Preference for the ears and interdigital spaces have been earlier reported on dogs in the USA and Mexico^{5,6}. These areas are hiding places for the ticks and are less accessible to the dog to remove them by its paws compared with locations such as the neck or the face. This also agrees with a previous report showing the ears and interdigital spaces as preferred sites of the ticks on dogs⁷. The low infestation observed on the head and the belly could be probably due to the exposure of these parts to environmental factors, or the fact that the ticks are often more easily seen and removed by the dog owners. Similar reasons proffered for association of ticks and locations above are likely responsible for the significant observation between kenneled dogs (10.9%) and free roaming dogs (89.1%). This is

because free roaming dogs are most common in North Bank and Wurukum; it is also possible that as these free roaming dogs were taken along to farm or for hunting they were further exposed. The free roaming dogs are owned by people who may not take dog bath seriously, the ticks therefore find suitable environment to aggregate and multiply on the dogs hence their abundance on the free roaming dogs. This high rate of infestation in the free roaming dogs agrees with an earlier study conducted in Jos, Plateau State-Nigeria⁸. The infestation observed in the kenneled dogs could be as a result of their release and interaction with free roaming dogs at night. It is also possible for these dogs to become infested from the household compounds. On the other hand, the low rate of infestation observed in the kenneled dogs in the study area may be due to their degree of restriction which shields them from infestation, also owners of kenneled dogs are better income earners that would care to bath the dogs and take them for clinics when necessary. Moreover, these dogs are closer to their owners who always care for them by removing any visible tick. This shows that in the study area, habitat and restriction are strong factors on tick infestation in dogs.

Variations in the observations of the monthly reports of tick on dogs in this study could be due to the climatic or ecological conditions. The highest rate of infestation recorded during the rainy month of June could be the result of the relatively high humidity, temperature and greenish environment observed in the area. The drastic decline in tick infestation during the month of July could be attributed to a short break of rainfall observed which lead to a reduced humidity and increase in temperature. Most engorged female ticks are known to drop off their hosts during the dry season when climatic conditions like temperature rises to the highest peak (34°C). Subsequently, they move into shelters, such as crevices in floors, walls, and shutters where they deposit enormous number of eggs which stop development until the onset of rains characterized with suitable moisture and decrease in temperature thus favouring the hatching of eggs. Earlier observations in Nigeria and other parts of the world have shown that peak population of ticks always related with climatic conditions of the area studied^{9,10,11,12}.

Although infestations with a single species of tick were recorded, most of the dogs examined had mixed infection with different tick species. A similar trend of tick infestation has been observed by different workers^{13,14}. However, variation in the rates of prevalence between single and mixed infestation exists, this could be attributed to the

exposure of the dogs or their innate resistance to some species of ticks¹⁵. The total absence of *B. annulatus* on kenneled dogs is not easily explained but further studies are required.

In summary, *Rhipicephalus sanguineus* has been identified as the major tick species attacking dogs in Makurdi metropolis. The need for proper current data on the epidemiology of diseases transmitted by ticks cannot be overemphasized. Thus, it is important to design preventive medicine programmes like fumigation campaigns to kill ticks, regular treatment of dogs with deworming drugs, acaricides, and public education related to risks of zoonotic transmission and tick prevention strategies.

ACKNOWLEDGEMENTS

The authors are grateful to the owners of dogs for the help rendered during collection of ticks.

References

1. Gaxiola, C.S.M., Obregón, I.F., Quintero, M.M.T., Cabrera, V.I.A., Rubio, R.M.C. Prevalencia de *Rhipicephalus sanguineus* en canidos de dos colonias de diferente nivel socio económico de Culiacán Sinaloa. Proceedings of the 13th Congreso Latinoamericano de parasitología. La Habana, Cuba, November 17-23. 1997, 320pp.
2. Cruz-Vazquez, C., Garcia-Vazquez, Z. Seasonal distribution of *Rhipicephalus sanguineus* ticks (Acari: Ixodidae) on dogs in an urban area of Morelos, Mexico. *Experimental and Applied Acarology* 1999, 23:277-280.
3. Quintero, M.T., Gaxiola, C.S., Castillo, M.A., Juárez, V.G. Algunas consideraciones sobre la presencia de garrapatas *Rhipicephalus sanguineus* (Acari: Ixodidae) sobre perros y su repercusión en salud. *Entomologia Mexicana* 2004, 3:86-88.
4. Soulsby, E. J. L. *Helminthes, Arthropods and Protozoa of domestic animals*. Bailliere, Tindall London, 1982.
5. Koch, H. G. Seasonal incidence and attachment sites of ticks (Acari: Ixodidae) on domestic dogs in Southern Okland and Noerthwest Arkansas, USA. *J. Med. Entomol* 1982, 19(3):293-297.
6. Tinoco-Gracia, L., Quiroz-Romero, H., Quintero-Martinez, M. T., Renteria-Evangelista, T. B., Gonzáles-Medina, Y. Barreras-Serrano, A., Hori-Oshima, S., Moro, M. H., Vinasco, J. prevalence of *Rhipicephalus sanguineus* ticks on dogs in a region on the Mexico-USA border. *The Veterinary Record* 2009, 164:59-61.
7. Papazahariadou, M. G., Thessaloniki, Saridomichelakis, M. N., Koutinas, A. F., Papadopoulos, E.G., Leontides, L. Tick infestation of dogs in Northern Greece. *Medical and Veterinary Entomology* 2003, 17:110-113.
8. Etim, S. E. Seasonal incidence of Ixodid ticks on dogs in Jos. M.Sc Thesis presented to the Department of Zoology, University of Jos, Jos- Nigeria. 1982.
9. Rivosecchi, L., Khoury, C., Lezzerini, Dell' Uomo, G. Osservazioni su *Rhipicephalus sanguineus* (Ixodidae) nella periferia di Roma. *Riv. Parasitol* 1980, 48:273-276.
10. Principato, M., Di-Giuseppe, S., Camerlengo, L., liottier, B. etude preliminaire sur la distribution saisonniere de certains ixodidae (Acarina, Ixodidae) d' intérêt sanitaire dans

la province de Perouse (Italie Centrale). Bull. Soc. Franc. Parasitolol 1989, 7: 269-276.

11. Dipeolu, O. O. Survey of blood parasites of domestic animals in Nigeria. Bull. Anim. Health Prod. in Africa 1978, 23(2):155-159

12. Iwuala, M. O., Okpala, I. Studies on the ectoparasitic fauna of Nigerian livestock. Its seasonal infestation rates. Bull. Anim. Health Prod. in Africa 1978, 23(2):175-182.

13. Drummond, R. O. Seasonal activity of ticks on cattle in South Western Texas. Ann. Ent. Soc. Amer. 1967,

60:439-447.

14. Iqbal, M. Studies on the ectoparasites of the livestock with special emphasis on the incidence, economic losses and chemotherapy. M.Sc Thesis, Univ. Agric. Faisalabad, Pakistan, 1971.

15. Daynes, P., Gutierrez, J. Seasonal variations in the parasitic activity of *Boophilus microphitus* in new Caledonia. Rev. Elev. Med. Vet. Pays. Trop. 1980, 33:305-310.

Author Information

Amuta E.U., PhD

Professor, Department of Biological Sciences, University of Agriculture

Houmsou R.S., M.Sc

Corresponding Author, Department of Biological Sciences, University of Mkar

Ogabiela M., B.Sc

Department of Biological Sciences, University of Agriculture