

Comparative distribution of ticks on dogs in the Calabar Metropolis, South-South Nigeria

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ABSTRACT

Tick infestation is highly significant in livestock production. The prevalence of tick infestation in residential and clinic attending dogs in the Calabar Metropolis was studied. A total of 150 dogs (75 females: 45males) of < 2 years – 6years was sampled between July and December, 2012. Three species of ticks *Rhipicephalus sanguineus*, *Heamaphysalis leachi* and *Boophilus decoloratus* were identified from the three sampled locations (Calabar South, Calabar Municipal and the National Veterinary Research Institute Zonal Laboratory, Calabar). Data was analyzed using student *t*-test and analysis of variance for significant differences. *Rhipicephalus sanguineus* was the most abundant. Tick attachment was more on the ears, neck and face (head), (50.0 ± 8.94) followed by the limbs/interdigital spaces and back (25.0 ± 4.12 and 16.67 ± 2.12) then the pelvic/anal region (8.33 ± 2.54). Young dogs had higher infestation (39.50 ± 7.69) followed by the adolescent (27.50 ± 6.47) whereas the adults had (18.0 ± 2.73). The female dogs were more infested than the males. Calabar South had highest infestation compared to the other locations. Dogs bathed with antiseptic soap had least tick infestation, compared to germicidal and bar soaps. Infestation was also reduced in dogs bathed more than once per week than those bathed once/month. The study on distribution of ticks on dogs is important in planning for the control strategy in Calabar.

Key words: *Rhipicephalus sanguineus*, *Heamaphysalis leachi*, *Boophilus decoloratus* and *Canis familiaris*

INTRODUCTION

Dogs (*Canis familiaris*) are the most widely kept working, hunting and companion animal in human history, they dogs provide assistance to individuals with physical or mental disabilities (Dalziel *et al.*, 2003) there are about four (4) million dogs in the world (Coppinger, 2001) they are trained and used to unravel criminal intelligence by law enforcement agents, while some of them are kept as pets due to their tremendous ability to contribute significantly to the security requirement of the increasing population of Nigeria (Arong *et al.*, 2011) though in Calabar it mostly serve as meat (Arong *et al.*, 2012). The playfulness of dogs and their ability to learn and fit into human household are the attributes which have earned them a unique relationship with humans. However, the negative outcome of this relationship has been the issue of disease transmission (Dagnone, 2003).

Ticks are ectoparasites of mammals, birds and reptiles specializing as obligate blood sucking permanent ectoparasitic arthropods (Durdeen, 2005). As vector of important haemo parasitic disease, tick surpasses all other arthropods, apart from mosquitoes as diseases agent (Pietzch, 2005) in livestock and lead to poor meat quality from livestock, thereby affecting animal husbandry (Bars, 2009). Ticks are responsible for rickettsial and viral disease of livestock (Zygyer *et al.*, 2009).

Ticks have evolved to become one of the most important groups of arthropods vectors of human pathogens (Anderson, 2002) one or more of the approximately 840 known species of ticks one found in most terrestrial regions of the earth. Two major families are known, ixodidae (hard bodies ticks) and Agrasidae (soft bodies ticks), with ixodidae been the largest and most important family (Scharlemann, *et al.*, 2008, Moret, 2009).

Besides their public health significance, ticks and tick-borne disease have in addition to other socio-economic parameters constituted a major set back to an economically viable livestock industry in Africa and other parts of the world. The increasing consumption of dog meat in Calabar has attracted increased dog supply from other parts of Nigeria by marketers. Some of these dogs are bought and kept as pets or guards with little or no sanitary attention. Information about the ticks infesting dogs is crucial for the banning and implementation of an effective tick control strategy. Hence there is need for proper education of dog keepers on the zoonotic consequences of ticks infestation on dogs. The aim of this research was to study the prevalence of tick infestation in residential and clinic attending dogs in the Calabar metropolis.

MATERIALS AND METHODS

COLLECTION OF SAMPLES

Tick collection was done twice weekly for four months (between July and December, 2012) sample locations were at the National Veterinary Research Institute, Zonal Laboratory, Calabar (which serves as collection point for veterinary services in Calabar) and two locations each in Calabar Municipal and Calabar South Local Government Areas. Thirty (30) dog keeping homes were randomly sampled for infested dogs from each location (that is, 120 homes in all). Infested dogs were grouped as Mongrels and Alsations (male or female, and young (≤ 2 years), adolescent (2-6 year) and adult (> 6 years). Also, dogs were assessed with questionnaires on numbers of baths and type of soaps used in bathing them. Infestation was determined by the number of ticks per dog and predilection sites on dogs.

SAMPLING METHOD

Ticks were gently removed from the bodies of the dogs by brushing their hair with fine comb as described by Ekanem *et al.*, (2010). And by smearing the area of tick's attachment on the dog's body with 70% ethanol to loosen the attachment of the ticks from the body surfaces as described by Kabir *et al.*, (2011). Ticks collected were transferred into labeled sample bottles, containing 70% alcohol, smaller ticks were cleared of debris in a test tube continually potassium hydroxide and rinsed with distilled water, all ticks were cleaned in Xylem and mounted in Canada Balsam.

Ticks were identified with keys and atlases produced by (Cable, 1967), (Cheng 1973), (Soulsby, 1982) and identification were based on features described by (Arong *et al.*, 2011 and Arong *et al.*, 2012).

STATISTICAL ANALYSIS

The experiment was conducted in Complete Block Randomised Design, data was analyzed using Student t-test and analysis of variance for significant difference between ticks infestation on dogs and prevalence.

RESULTS

PREVALENCE AND SPECIES COMPOSITION OF TICKS ON DOGS IN CALABAR

The results of the prevalence and species composition of ticks found on dogs in three (3) locations in Calabar are summarized in Table 1. Analysis of variance (ANOVA) indicates that there are marginal significant differences in prevalence of the ticks among dogs in the three locations sampled. Dogs in Calabar South had the highest mean value (126.67 ± 37.12) of ticks, which is significantly higher than the mean number (66.67 ± 12.02) of ticks found on dogs in the veterinary clinic. Dogs in Calabar municipality had a mean number of ticks of (90.0 ± 11.55).

Three species of ticks - *Rhipicephalus sanguineus*, *Haemaphysalis laechei* and *Boophylus decoloratus* were generally found on dogs in the studied locations. Of these species identified, analysis of variance test detected marginal differences in their prevalence (Table 1). *Rhipicephalus sanguineus* was the most prevalent with a mean of 133.33 ± 33.83 and significantly more common than *Boophylus decoloratus* with a mean of 66.67 ± 8.82 , while *Haemaphysalis laechei* had a mean prevalence of 83.33 ± 12.02 .

TABLE 1: Prevalence and species composition of ticks found on dogs in three locations in Calabar

Ticks	Calabar South	Calabar Municipality	Veterinary Clinic	Mean \pm SE
<i>Rhipicephalus sanguineus</i>	200	110	90	$133.33^a \pm 33.83$
<i>Haemaphysalis laechei</i>	100	90	60	$83.33^{ab} \pm 12.02$
<i>Boophylus decoloratus</i>	80	70	50	$66.67^b \pm 8.82$
Mean \pm SE	$126.0^a \pm 37.12$	$90.0^{ab} \pm 11.55$	$66.67^b \pm 12.02$	

*Means with different superscripts along each array differ significantly from one another

Prevalence of ticks on different predilection sites

Different tick predilection sites – Ears, Neck, Face and Head, Back, Pelvic/Anal Region and Limbs/Inter-digital Spaces were identified (Table 2). Of the predilection sites, analysis of variance indicated significant differences in the prevalence of ticks found therein. The ears had significantly higher mean number of ticks, (50.0 ± 8.94) than neck, face (head) (41.67 ± 7.49). Statistically, they did not differ significantly from each other but were significantly more than the rest of the predilection sites (Table 2). The mean number of ticks found in limbs/inter-digital and back (25.0 ± 4.12 and 16.67 ± 2.12 respectively) did not differ significantly from each other but higher than the pelvic/anal region which had the least number of ticks ($8.33^c \pm 2.54$).

TABLE 2: Mean distribution of ticks on different parts of the bodies of dogs (predilection sites) studied in three locations in Calabar

Predilection sites	Mean \pm SE
Ears	$50.0^a \pm 8.94$
Neck, Face and Head	$41.67^a \pm 7.49$
Back	$16.67^{bc} \pm 2.12$
Pelvic/ Anal Region	$8.33^c \pm 2.54$
Limbs/ Interdigital Spaces	$25.0^b \pm 4.12$

*Means with different superscripts differ significantly ($P < 0.01$) from one another

Distribution of Ticks on Dogs In Relation To Sex and Age

The results showing the mean distribution of ticks on dogs in Calabar in relation to sex and age are presented in Table 3. There are significant differences in the distribution of ticks on the male and female dogs. Results indicate that the female dogs generally have significantly more mean number of ticks (33.73 ± 5.79) than the male dogs (22.93 ± 4.46). With respect to age, analysis of variance also indicated significant differences in the distribution of ticks among the young, adolescent and adult dogs. Young dogs had the highest mean number of ticks ($39.50^a \pm 7.69$), which is significantly higher than the mean number of ticks found on adolescent dogs ($27.50^b \pm 6.47$). Adult dogs had the least mean number of ticks (18.0 ± 2.73) infestation. However, there was no interaction in infestation between age and sex of dogs (Fig.1).

TABLE 3: Mean distribution of ticks found on dogs in Calabar in relation to sex and age

Age	Male	Female	Mean \pm SE
Young	32.0	47.0	$39.50^a \pm 7.69$
Adolescent	21.6	33.4	$27.50^b \pm 6.47$
Adult	15.2	20.8	$18.0^c \pm 2.73$
Mean \pm SE	$22.93^b \pm 4.46$	$33.73^a \pm 5.79$	

*Mean with different superscripts along each array differ significantly ($p < 0.01$) from one another

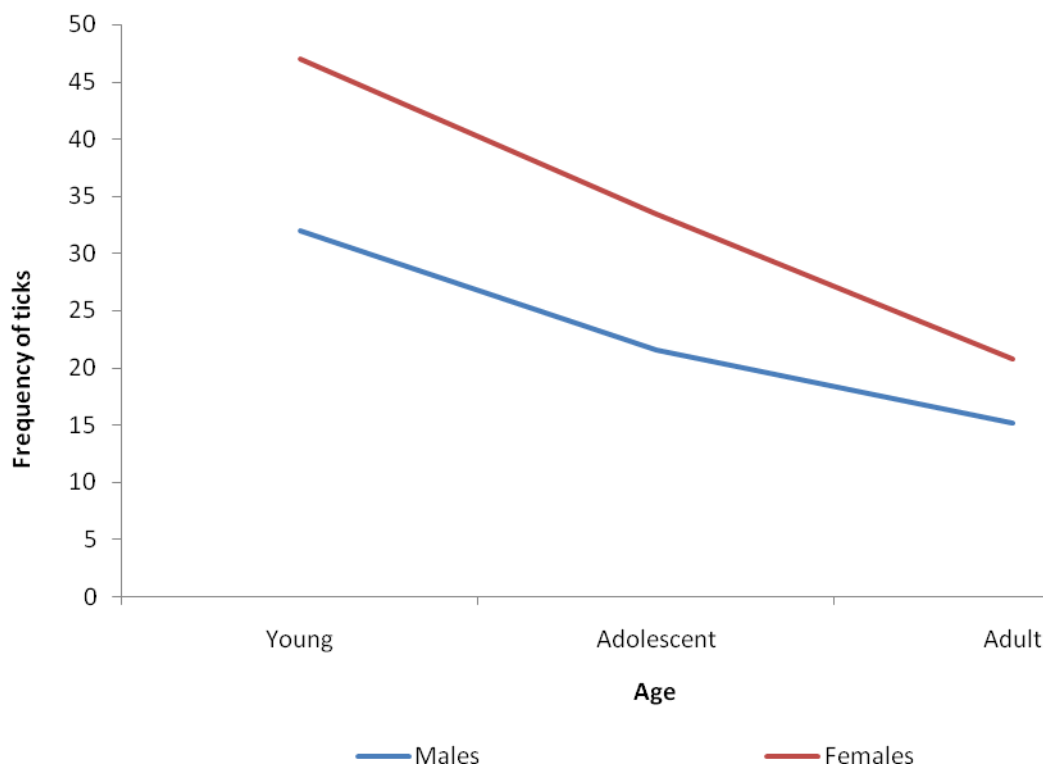


FIGURE 1: Interaction (differential response) of age and sex on the distribution of ticks

Influence of Frequency of Bath And Soap Type on Tick Infestation

Table 4 shows that significantly higher number of ticks was collected on dogs not bathed at all when compare to other dogs of higher number of bath. Similarly, bath with no soap had highest percent tick infestation than dogs bathed with soaps (Table 5) and Mongrels had higher tick infestation than Alsatian dogs (Table 6).

Table 4: Prevalence of ticks in relation to Frequency of bath

Frequency of Bath	Number of dogs	% Dog infestation
More than once/week	20	10
Once a week	40	15
Once a month	30	19
Rarely	20	28
Not at all	10	28

Table 5: Tick prevalence in relation to type of soap used

Type of Soap	Number of dogs	% Tick infestation
Antiseptic	43	11.8
Germicidal	26	19.3
Ordinary soap	51	37.5
No soap	30	31.4

Table 6: Tick prevalence by Dog type

Type of dog	Number of dogs	% Tick infestation
Mongrel	75	65
Alsatian	75	35

DISCUSSION

Three species of ticks *Rhipicephalus sanguineus*, *Boophilus decoloratus* and *Haemaphysalis leachi* were collected in the study; *R. sanguineus* was the most prevalent. This confirms the works of Etim *et al.*, 1996 and Arong *et al.*, (2012) which reported same species with highest prevalence of *R. sanguineus* in Calabar. Related studies in other parts of Nigeria (Ekanem *et al.*, 2010, Agbolade *et al.*, 2008, Etim *et al.*, 1996 and Arong *et al.*, 2011) also reported similar observation in tick prevalence in Nigeria.

Female dogs were more susceptible to ticks infestation than males due to their sedentary mode of life as they were mostly nursing mothers. This was also reported by Tanwia *et al.*, (1989). The reason for the low infestation in males was given by (Arong *et al.*, 2011) as due to their roaming habit. This roaming behaviour was particularly prominent in Calabar South areas where there was no restriction to movement of dogs.

Frequency of baths showed that dogs from Calabar Municipal had more than one bath per week thus had less tick infestation, whereas dogs from Calabar South were bathed once/month, rarely or not at all. This shows that higher frequency of baths reduces tick attachment on dogs and vice versa. This corroborates with work of Ekanem *et al.*, (2010) where dogs with irregular baths had higher infestation in Akwa Ibom State, Nigeria. Also, the finding of type of soap and bath is highly significant. This shows that the antiseptics and germicidals have more repellent properties than the ordinary bar soap. This corroborates (Agbolade *et al.*, 2008) that the type of chemical present in soaps or used in water treatment affects the infestation rate of ticks on bathed dogs.

Another significant observation was the tick preference in relation to predilection sites where the ears recorded the highest number of ticks, this is in agreement with the work of Ekanem *et al.* (2009) and Tinoco-Gracia *et al.*, (2003). Ticks have high preference for non-hairy regions of the body (Cruz-vagues *et al.*, (1999). Smith *et al.*, (2011) reported highest tick infestation in dogs with medium hair length. The ears however had fewer hair strands and thus harboured more ticks, which mainly clustered in the folding of the pinna while the pinna served as a shelter.

In relation to breed of dogs, the mongrel had higher infestation because they were mainly kept by locals who used them as home guards and thus gave less attention to their care and hygiene. This agrees with the work of Agbolade *et al.*, (2008). The Alsatians had less infestation as they were mainly kept as pets and also trained for security reasons by high income earners.

Of the three locations sampled, Calabar South had the highest tick infestation because dogs owners did not give adequate care to their dogs, sanitation and hygiene was poor in this location. Calabar Municipal kept more Alsatian dogs and they recorded highest attendance at the Veterinary Clinic. This contributed to the reduced tick infestation, they were received care from their keepers. Arong *et al.*, (2011) also reported similar prevalence in two locations (Jos North and Jos South) where Jos North had higher infestation.

Age variation indicated that the young had higher infestations compared to the adolescents and adults. This supports the work of Ekanem *et al.*, (2009) and Luis *et al.* (2007) where young dogs showed highest infestation. Easier penetration and attachment of ticks to soft and succulent skin than tougher skin was suggested as the reason by (Ekanem *et al.*, 2010).

The continuous influx of dogs in Calabar has culminated in the higher prevalence of ticks, to protect dogs against future risk of infestations; the need for monitoring and educating dog owners is essential.

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