



Prevalence of ticks on indigenous breed of hunting dogs in Ogun State, Nigeria

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Abstract

Ticks are haematophagous arthropods that are important vectors of diseases of animals and humans, many of which are zoonotic, thus predisposing humans, including hunters to risk. The present study was conducted to assess the prevalence of tick infestation among hunting dogs with the aim of determining the danger which the presence of ticks portends, bearing in mind that hunting dogs are kept by the duo of rural and urban dwellers. A total of one hundred and nine (109) hunting dogs were sampled from nineteen (19) different locations in the State. The age, weight and sex of the dogs were noted and recorded as variables. The dogs were thoroughly examined for ticks and other ectoparasites which were collected into properly labelled plastic containers and were transported to the laboratory for identification. Chi-square test was used to compare the prevalence of tick infestation between recorded variables. Significance level was set at $p = 0.05$ or less. The overall prevalence of tick infestation in the 109 hunting dogs was 56%. The tick prevalence in the male dogs (66.7%) and that in the female dogs (51.9%) was not significantly ($p > 0.05$) different. Also, tick prevalence in young dogs (53.8%) and adult dogs (62.1%) was not significantly ($p > 0.05$) different. There was a significant difference in the prevalence of tick infestation from urban and rural locations ($p < 0.05$). Of the 352 ticks harvested from the hunting dogs, *Rhipicepalus sanguineus* constituted 68.2%, *Haemaphysalis leachi leachi*, 30.6%; and *Ambylomma variegatum*, 1.21%. The education of the hunters and other persons in close contact with dogs is required for the control of ectoparasites.

Keywords: Hunting dogs, Indigenous, Nigeria, Prevalence, Ticks

Introduction

Ticks as obligate haematophagous arthropods and have been said to be next in importance only to mosquitoes among arthropods as vectors of bacterial, viral, and protozoan disease agents (Opara & Maxwell, 2012). Ticks can parasitize every class of vertebrates in most regions of the world and occasionally bite humans (Parola & Raoult, 2001). Ticks attach to hosts for a substantial amount of

time, allowing sufficient opportunity for disease transmission (Parola & Raoult, 2001, Liyanaarachchi *et al.*, 2015). This make their presence a potential risk for disease spread (Salih *et al.*, 2015). Ticks are important vectors of diseases of dogs and humans, many of which are zoonotic (Otranto *et al.*, 2009; Singla *et al.*, 2016). Ticks have the potential to transmit a range of zoonotic pathogens among

which tick-borne encephalitis (TBE), Lyme disease, rickettsiosis, and ehrlichiosis are emerging as international human health threats (Hudson *et al.*, 2002; Sumbria *et al.*, 2016). These arthropods can also harbour blood parasites such as intra-erythrocytic *Babesia* spp, Rocky Mountain spotted fever, granulocytic anaplasmosis and tularaemia. Tick bites cause irritations, redness, swellings, itching and self-trauma. One of the most harmful impacts of tick bites is the release of neurotoxins from the tick saliva leading to tick paralysis, systemic illness and hypersensitive reactions (Taylor *et al.*, 2007). In general, different parasitic infestations including tick infestations are prevalent in stray and hunting dogs (Sahu *et al.*, 2013).

Many dimensions of tick development, behaviour and disease transmission are directly linked to environmental conditions (Singh *et al.*, 2000). Climatic conditions in the hot humid southwest Nigeria favour the growth and multiplication of parasites including arthropods. Higher temperatures yield faster development rates of larvae, nymphs, and adults, with the precise rate of development varying depending on stages and species. Diapause, or a period of rest between stages, has latitudinal relationships corresponding to photoperiod in the tropics and temperature-linked physiological aging in temperate regions (Randolph, 2004; Sumbria & Singla, 2017).

Among different species of ticks infesting dogs, the brown dog tick (*Rhipicephalus sanguineus*) is the most common worldwide (Agbolade *et al.*, 2008, Troyo *et al.*, 2009; Dantas-Torres, 2010). Other ixodid ticks infesting dogs include *Haemaphysalis*, *Ixodes*, *Boophilus*, *Dermacentor* and *Amblyomma* species and occur at varying level of prevalence in different parts of the world (James-Rugu & Jidayi, 2004, Ekanem *et al.*, 2010; Wells *et al.*, 2012). *Otobius megnini* is the only soft tick specie found in dogs (Soundararajan *et al.*, 2000).

Ticks infesting dogs can come in contact with human beings or other animals while in close proximity either during the hunting expedition which may last several days or on returning to the dwelling of owners where they may double as sentinels or pets. It has been said that hunters are at utmost risk of infection with ectoparasite on the body of the hunting dogs which may migrate to their body through companionship and as they are also the first contact with the dogs (Macpherson *et al.*, 2000). As this may serve as vectors for the spread of diseases, this present study was conducted to assess the prevalence of tick infestation among hunting dogs

with the aim of determining the danger which the presence of ticks portends, bearing in mind that hunting dogs are kept by the duo of rural and urban dwellers.

Materials and Methods

Study area

This study was carried out in nineteen different locations covering five local Government areas in Ogun State, Southwest Nigeria. A total of one hundred and nine (109) indigenous breed of hunting dogs were sampled from the nineteen (19) locations, classified as rural and urban based on the area where the owners are dwelling in the study area.

Sample collection

This study was carried out between May 2014 and March 2015. Dogs of willing hunters were sampled for this study. The weight, age and sex of the sampled dogs were recorded, with the age been classified as either young or adult, the young dogs sampled ranged from less than one year to a year while adult dogs were from greater than one year upwards (Leticia *et al.*, 2013). Each hunting dog was restrained with a mouth gag with the assistance of the owner or handler for thorough examination of the entire body for ticks and other ectoparasites. Ticks were collected and kept in properly labelled plastic containers for easy identification and were then transported to the Parasitology laboratory of the Department of Veterinary Microbiology and Parasitology, College of Veterinary Medicine, Federal University of Agriculture Abeokuta, Nigeria, for identification.

Identification: Harvested ticks were washed, sorted and transferred into plain plastic tubes containing 70% ethanol for preservation prior to identification. Harvested ticks were morphologically identified under the stereo microscope according to Soulsby (1982) and Walker *et al.* (1999). The stages of development, engorgement status and sex of the collected ticks were recorded.

Statistical analysis

Chi-square test was used to compare the prevalence of tick infestation between recorded variables using SPSS Version 17.A p-value of 0.05 or less was considered significant.

Results

Out of one-hundred and nine (109) hunting dogs examined, sixty-one (61) representing 56 % were infested with ticks (Table 1).

Three species of ixodid ticks (*Rhipicephalus sanguineus*, *Haemaphysalis laechei* and *Amblyomma variegatum*) were observed during this investigation (Table 2). Infestations involving more than one species of ticks were common in the rural areas compared to the urban areas.

In this study, among these three species, *Rhipicephalus sanguineus* (68.2%) was found to have the highest prevalence followed by *Haemaphysalis laechei* (30.6%) and *Amblyomma variegatum* (1.2%). In the hunting dogs studied, tick prevalence was found to be higher among males (66.7%) than in females (51.9%), but the difference was not significant ($\chi^2 = 1.924$). The prevalence of tick infestation in young dogs (53.8%) was slightly less ($p > 0.05$) than that of adult dogs (62.1%).

The prevalence of tick infestation was found to be higher in the urban locations (75%) than the rural locations (49.4%) and this variation was significant ($p < 0.05$).

Discussion

The prevalence of ticks on dogs in this study is like those of studies on tick prevalence on dogs in India (Singh & Chhabra, 1973; Rani *et al.*, 2011), Nigeria (Ekanem *et al.*, 2010), Pakistan (Jafri & Rabbani,

1999) and Bhubaneswar (Sahu *et al.*, 2013) having prevalence of 45.00, 55.3, 52.3, 53 and 46.39 %, respectively. The present findings were thus in general agreement with the above reports. The relatively high prevalence of tick infestation in this study may be due to inadequate knowledge of the hunters about tick infestation and the need for its control. Earlier studies have documented the three species of ticks recorded in this study in dogs (Agbolade *et al.*, 2008; Dantas Torres, 2010). A higher prevalence of tick infestation in male dogs has also been recorded by earlier workers (Moghaddar *et al.*, 2001; Silveira *et al.*, 2009). Conversely, some other workers (James-Rugu & Jidayi, 2004; Arong *et al.*, 2011) reported higher prevalence of tick infestation among females than males. Yet in other studies, no sex differences were observed (Jittapalapong *et al.*, 2006; Agbo *et al.*, 2007; Dantas-torres *et al.*, 2009; Ul-Hasan *et al.*, 2012). Thus, there seems to be no clear-cut evidence on the effect of sex on the prevalence of tick infestation.

In this study, among these three species of ticks recorded, *Rhipicephalus sanguineus* (68.2%) was found to have the highest prevalence followed by *Haemaphysalis laechei* (30.6%) and *Amblyomma*

Table 1: Prevalence of ticks on indigenous breed of hunting dogs in Ogun state, Nigeria

Parameters studied	No. of dogs examined for ticks			Chi-Square
	Infested (Prevalence %)	Non-infested (Prevalence %)	Total	
Sex	Males	20(66.7)	10(33.3)	1.924
	Females	41(51.9)	38(48.1)	
Age	Young	43(53.8)	37(46.2)	0.598
	Adult	18(62.1)	11(37.9)	
Location	Urban	21(75.0)	7(25.0)	5.541*
	Rural	40(49.4)	41(50.6)	
Overall prevalence 61/109=56%				

*significant

Table 2: Species of ticks harvested from indigenous hunting breed of dogs in Nigeria

Parameters		No. (%) of ticks by species			Total No. (%)
		<i>Amblyomma variegatum</i>	<i>Haemaphysalis laechei</i>	<i>Rhipicephalus sanguineus</i>	
Sex	Female	4 (1.2)	23 (22.8)	103 (45.8)	130 (39.4)
	Male	0 (0)	78 (77.2)	122 (54.2)	
Engorgement status	Engorged	2 (50)	100 (97.1)	190 (77.6)	292 (83)
	Not engorged	2 (50)	3 (2.9)	55 (22.4)	
Developmental stage	Adult	4 (1.1)	100 (97.1)	226(92.2)	330 (93.7)
	Nymph	0 (0)	3 (2.9)	18 (7.3)	
	Larva	0 (0)	0 (0)	1 (0.5)	

variegatum (1.2%), a finding that agrees with those of Misra & Mohapatra (1972) and Sahu *et al.* (2013) who also recorded highest incidence of *Rhipicephalus sanguineus* followed by *Haemaphysalis* spp. and *Boophilus* spp. but no *Amblyomma* spp in Bhubaneswar (India). Several previous workers (Kaul *et al.*, 1979, Agbolade *et al.*, 2008; Dantas-torres, 2009; Troyo *et al.*, 2009; Ekanem *et al.*, 2010) have similarly reported highest prevalence of ticks with *Rhipicephalus* spp. in dogs. The occurrence of some other tick species in dogs elsewhere (Foldvari & Farkas, 2005; Smith *et al.*, 2011) which were not detected during this investigation might be due to variation in climate which influence the proliferation of different types of tick.

The detection of *Amblyomma* spp. in this study is in accordance with reports that dogs in rural areas that live together with other domestic and wild hosts can be infested by ticks of *Amblyomma* genus (Labruna *et al.*, 2000; Labruna *et al.*, 2001, Oyafuso *et al.*, 2002), In this study, the two locations where *Amblyomma* spp were found were rural areas which lends credence to the interaction with the wild and other domestic animals.

The prevalence of tick infestation in young dogs that was slightly less than that of adult dog's contrast findings from earlier studies in India (Raut *et al.*, 2006), and Iran (Moghaddar *et al.*, 2001), where higher incidence was seen in younger dogs. The higher prevalence recorded in this study might be due to neglect of the adult dogs in terms of control of dog ticks.

The higher prevalence of tick infestation observed in urban areas might be due to absence of tick control measures in hunting dogs whereas some of the rural dog owners said that they always use some form of local treatment to manage the ticks on the body of their dogs after each hunting episode.

In conclusion, a high prevalence of tick infestation in hunting dogs was recorded in this study with a significantly higher rate in urban areas compared to rural areas. The findings suggest the need for education of hunters and other dog owners on the importance of control of ectoparasites of dogs, especially as ticks known to be vectors of pathogenic zoonotic infectious agents.

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