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SURVEY ON ECTOPARASITES OF DOGS IN UYO METROPOLIS, AKWA IBOM STATE, NIGERIA

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ABSTRACT

This study was aimed at identifying ectoparasites, their intensities, species and prevalences on dogs in Uyo metropolis, Akwa Ibom state, Nigeria. One hundred and five dogs were examined for ectoparasites infestation. The dogs were grouped based on the age (from 1 month to > 5 years), sex, and infestation of ectoparasites on different body regions (head/ear, back/abdomen, pelvic/anal region and limbs/interdigital spaces), as well as regularity of treatment. Eighty-nine (84.76%) out of 105 dogs examined were infested with either single or mixed species of ectoparasites. Seventy-six (72.38%) out of 105 dogs were positive for single infestation with one species of ectoparasites. The most common ectoparasites was *Rhipicephalus sanguineus*, which were recorded on 44(49.44%) dogs. *Haemaphysalis leachii*, *Dermacentor andersoni* and *Demodex canis* were identified on 23(25.84%), 12(13.48%) and 10(11.24%) of the studied dogs respectively. Mixed infestation with two species of ectoparasites was identified on 13(12.38%) dogs. Prevalence was higher in male dogs (75%; 42 out of 56) than females (69.39%; 34 out of 49). *Rhipicephalus sanguineus* was statistically ($P<0.05$) the commonest and most prevalence ectoparasite species collected (276/586; 46.10%), followed by *H. leachii* (190/586; 32.42%), *D. andersoni* (62/586; 10.58%) and *D. canis* (58/586; 9.90%). Young dogs (puppies) of 1-6 months were the most significantly infested with *R. sanguineus* and *H. leachii* ($P<0.01$) while infestation with *D. andersoni* and *D. canis* among age groups were statistically significant ($P<0.05$). Untreated dogs were more significantly infested with different ectoparasites (460/586; 78.50%) than treated dogs (126/586; 21.50%). *R. sanguineus* and *D. canis* showed significant preferences ($P<0.001$) for the head region, while both *R. sanguineus* and *H. leachii* showed significant preferences ($P<0.05$) for the limbs/interdigital spaces. The study showed that there is high rate of prevalence of dog ectoparasites in Uyo metropolis.

INTRODUCTION

Dogs are among the most common pet animals and the most successful canis, adapted to human habitation worldwide (Ugbomoiko *et al.*, 2008). According to Dewey and Bhagat (2002), they are the most widely kept working, hunting and companion animal in human history. There are about 400 million dogs in the world (Coppinger, 2001). They perform many roles for man such as hunting, herding, protection, detective work, pulling loads, as pet and more recently aiding handicapped individuals (Ekanem *et al.*, 2010). They are domestic animals which are believed to have evolved from the wolves (Hall, 2005). The domestic dog (*Canis familiaris lupus*) is a subspecies of the gray wolf (*Canis lupus*), a member of the canidae family of the mammalian order carnivore (Dewey and Bhagat, 2002). However, like other animals kept by man as pet, domestic dogs are susceptible to major parasitic infections, the parasites remain a major threat to public health (Robertson *et al.*, 2000; Molyneux, 2004).

Ectoparasites are the major skin diseases on dogs (Obasaju *et al.*, 1981). These ectoparasites feed and live on the body surface of the dogs and they may occupy the host's immediate

environment and invade the body surface of the dog periodically (Fahmy *et al.*, 1981). According to Chukwu (1985), these ectoparasites that infest the domestic dogs are divided into two Arthropoda classes Arachnida (ticks and mites) and class Insecta (lice and fleas).

Ectoparasites; ticks, mites, lice and fleas have been incriminated as the vectors in the disease transmission (WHO, 1984; Shaw *et al.*, 2001; Dagnone *et al.*, 2003). They transmit infections from dogs to dogs through direct contact (Okoli, *et al.*, 2006) and from dogs to other animals (e.g. cats, hedgehogs) and human beings (Tinoco-Gracia *et al.*, 2009). In Nigeria, several studies have been undertaken on ectoparasites of dogs (Chukwu, 1985; Ugbachukwu and Nnadozie, 1985; James-Rugu and Iwuala, 2002; Agbolade *et al.*, 2008). However, there is paucity of information on ectoparasites of dogs in Uyo, Nigeria. Hence, this research aimed at identifying ectoparasites that infests dogs, its intensity and determine its prevalence in the study area. Dogs, if not kept under control can pose serious health problems to humans.

MATERIALS AND METHOD

Study Area

The study area, Uyo is the capital city of Akwa Ibom State, south-eastern Nigeria. It lies within the tropical rainforest belt between the latitude 4°52' and 5°05'N, and longitude of 7°45' and 8°05'E. Uyo has two distinct seasons, the rainy or wet season, and the dry season. The rainy season last for about 8 months (April – October) while the dry season lasts for about 4 months (November – March) with daily temperature of 32°C (Ekanem *et al.*, 2010).

Examination of dogs for ectoparasites infestation

One hundred and five dogs were randomly selected and examined for ectoparasites. Ectoparasites were collected from dogs with the assistance of dog owners. Ticks were collected using the hand picking and hair brushing method (James-Rugu and Iwuala, 2002). The entire body of the sampled animal was critically examined and brushed with special attention paid to the ear, the areas around the eyes and other anatomical areas of the dogs as prescribed by Shah-Fischer and Say (1989) and Bryson *et al.* (2000). Fleas, mites and lice were collected by combing and brushing the dog's entire body surface onto a white cloth dipped in formalin to prevent fleas from jumping and mite and lice from creeping away (Wentworth, 1988).

Preservation and Identification

Ectoparasites collected from each body region (head/ear, back/abdomen, pelvic/anal regions, limbs/interdigital spaces), were transferred to the laboratory in clearly labeled specimen bottles containing 70% ethanol where the ectoparasites were identified using the keys of Soulsby (1972); Cheng (1973); Shah-Fisher and Say (1989). Also, preserved specimens were counted and recorded according to body region and thereafter, specimens were examined under a microscope using 4 x 40 magnifications.

STATISTICAL ANALYSIS

Dogs were grouped by age and sex to determine whether these factors were associated with ectoparasite infestation, as well as the prevalence of ectoparasites on different body regions, and regularity of treatment, using Analysis of Variance (ANOVA) and t-test distribution. Age of dogs was correlated with the number of parasites. Differences were considered significant at $p < 0.05$ level.

RESULTS

Out of the 105 dogs examined (56 males, 49 females), 89 (84.76%) made up of 49 (46.67%) males, and 40 (38.09%) females, were infested, (Table 1). 76(72.38%) made up of 42(75%) males and 34(69.39%) females were positive for single species of ectoparasites infestation. *R. sanguineus* had the highest prevalence of infestation on the number of dogs; 44 (49.44%). A total of 586 ectoparasites were collected, 3 species of tick, *Rhipicephalus sanguineus*, *Haemaphysalis leachii*, *Dermacentor andersoni*, and a single species of mite, *Demodex canis* were recorded (Table 2). *R. sanguineus* recorded the highest prevalence of ectoparasites which

amounted to 276, while the least was the mite species, *D. canis* (follicle mite) which amounted to 58 (table 2). Mixed infestation with two species of ectoparasites was recorded on 12.38% (13 out of 105) of the dogs. *R. sanguineus* plus *h. leachii* infestation were the most common combinations (Table 3).

Table 1: Total number of dogs infested with ectoparasites in Uyo metropolis.

Ectoparasites	Number (%) Infestation	Sex of dogs	
		Male (%)	Female (%)
<i>R. sanguineus</i>	44 (49.44)	24(54.54)	20(45.45)
<i>H. leachii</i>	25 (25.84)	14(60.87)	9(39.13)
<i>D. andersoni</i>	12 (13.48)	7(58.33)	5(41.66)
<i>D. canis</i>	10 (11.24)	4(40.00)	6(60.00)
Total	89 (84.76)	49(46.67)	40 (38.09)

Table 2: Relative Abundance of ectoparasites from dogs in Uyo metropolis

Ectoparasites	Total found	no.	Sex of parasites collected from hosts	
			Male	Female
<i>R. sanguineus</i>	276		140	136
<i>H. leachii</i>	190		102	88
<i>D. andersoni</i>	62		33	29
<i>D. canis</i>	58		24	34
Total	586		299	287

Table 3: Mixed ectoparasite infestations on dogs in Uyo metropolis

Mixed-species infestation (Two species)	ectoparasite	Number (prevalence %)
<i>R. sanguineus</i> + <i>H. leachii</i>		6 (46.15)
<i>D. canis</i> + <i>R. sanguineus</i>		2 (15.385)
<i>D. andersoni</i> + <i>H. leachii</i>		2 (15.385)
<i>R. sanguineus</i> + <i>D. andersoni</i>		3 (23.07)
Total		13 (12.38)

Outogenetic variation in infestation showed a decrease in infestation with increase in age (Tables 4 and 5). There was a negative correlation ($r = -0.94$, $df = 18$, $p < 0.05$) between age and number of ectoparasites observed. Both tables shows that the puppies (young dogs) of 1 – 6 months were most significantly infested with ectoparasites ($P < 0.01$) as compared to the much older dogs. There was significant infestation of puppies 1 -6 months with *R. sanguineus* and it was highly significant ($P < 0.05$), while least infestation occurred on older dogs of 5 years and above. The pattern of ectoparasites infestation with *H. leachii* was similar to that of *R. sanguineus*, with increasing age of dogs, infestation decreased. Infestations with *D. andersoni* and *D. canis* showed statistically significant similar trends ($P < 0.05$) in the different age groups of dogs. Therefore infestation in relation to the age ranges of dogs as seen on table 4 and 5 at $F = 4.79^*$, with the graphical representation showing the age range infestation of ectoparasites on dogs in Uyo (Figure 1).

Table 4: Variation in the age of dogs and number of ectoparasites

Age of dogs	<i>R. sanguineus</i>	<i>H. leachii</i>	<i>D. andersoni</i>	<i>D. canis</i>
1 - 6 months	92 (33.33)	65 (34.31)	26 (41.94)	24 (41.38)
7– 12 months	40 (14.49)	48 (25.26)	19 (30.65)	18 (31.63)
1 – 2 years	61 (22.10)	29 (18.26)	8 (12.190)	9 (15.52)
2 – 3 years	54 (19.57)	24 (12.63)	5 (8.06)	5 (8.62)
3 – 4 years	15 (5.44)	13 (6.84)	3 (4.84)	2 (3.65)
4 – 5 years	10 (3.62)	8 (4.21)	1 (1.61)	-
Above 5 yrs	4 (1.45)	3 (1.58)	-	-
Total	276 (100%)	190 (100%)	62 (100%)	58 (100%)

Table 5: Number of dogs infested in relation to their age group

Age of dogs	<i>R. sanguineus</i>	<i>H. leachii</i>	<i>D. andersoni</i>	<i>D. canis</i>	Total	% Total
1-6 months	12	7	5	4	29	26.67
7-12 months	9	5	2	2	18	17.14
1 – 2 years	7	4	2	2	15	14.29
2 – 3 years	8	3	1	1	13	12.38
3 – 4 years	5	2	1	1	9	8.57
4 – 5 years	2	1	1	-	4	3.81
Above 5 yrs	1	1	-	-	2	1.91
No. of dogs infected (%)	44 (41.90)	23 (21.90)	12 (11.43)	10 (9.52)	89 (84.76%)	

F = 4.79*; p<0.05

Table 6 is a summary of the infestation of ectoparasites on treated and untreated dogs in Uyo. There was a notable difference between the ectoparasites infestation on treated and untreated dogs in Uyo metropolis at $t_{calc} = 1.989$; $P < 0.05$. The prevalence and intensity of infestation on untreated dogs is more than that of the treated dogs (Table 5).

Table 6: Ectoparasites infestation on treated and untreated dogs

Ectoparasites	No. treated	No. untreated	Total
<i>R. sanguineus</i>	67	209	276
<i>H. leachii</i>	38	152	190
<i>D. andersoni</i>	10	48	58
<i>D. canis</i>	11	51	62
Total	$\sum x_T = 126$	$\sum x_{UT} = 460$	586

$t_{Calc.} = 1.989$; $P < 0.05$; $t_{7(0.05)} = 1.895$

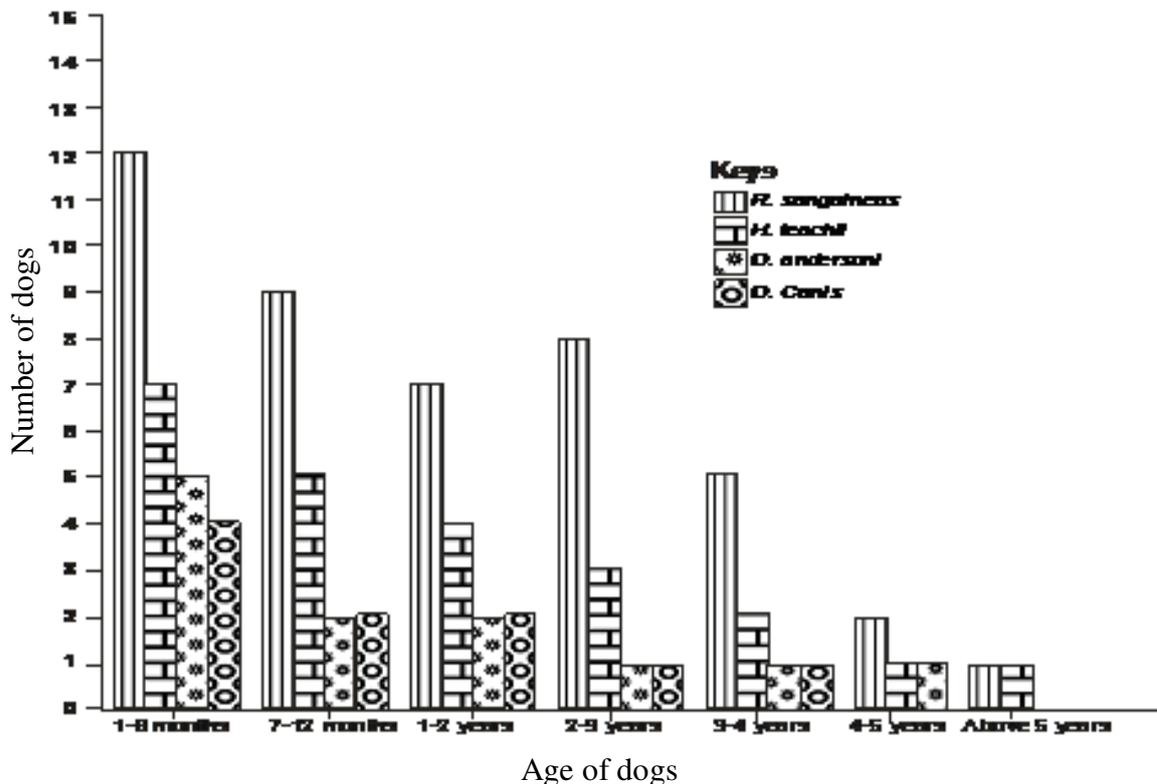


Figure 1: Age range infestation of ectoparasites in Uyo, Akwa Ibom State, Nigeria

The highest percentage of infestation was found on the head/ear regions while the lowest was the back and abdominal region (Trunk). The head/ear region was preferred site for *R. sanguineus* and *D. canis*. The limb/interdigital space was a preferred site for *R. sanguineus* and *H. leachii*. The back and abdominal region (Trunk) were significantly the most unattractive region ($P < 0.001$) for attachment of any of the four ectoparasites. The pelvic and anal region was preferred site for *H. leachii* and *D. andersoni* while *D. canis* showed no significant preference ($P > 0.05$) for any regions of the body except for the head/ear region (Table 7).

Table 7: Site preference and prevalence rate for attachment of ectoparasites on dogs in Uyo, Akwa Ibom State

Body regions	<i>R. sanguineus</i> No (%)	<i>H. leachii</i> (%)	No	<i>D. andersoni</i> No (%)	<i>D. canis</i> No (%)
Head/ear	114 (41.30)	30 (15.79)		15 (24.19)	48 (82.76)
Back/abdomen (trunk)	46 (16.67)	31 (15.95)		10(16.16)	2 (3.44)
Pelvic/anal region	54 (19.57)	57 (30.00)		24 (38.71)	3 (5.17)
Limbs/interdigital	62 (22.46)	72 (37.89)		13 (20.98)	5 (8.62)
Total	276	190		62	58

DISCUSSION

In this study, the result shows a high prevalence of ectoparasites on dogs (84.76%) in Uyo. This finding is of much concern in view of the established public health significance of the ectoparasites involved. *Rhipicephalus sanguineus* is reported as the commonest species in Uyo. This species is also reported to be the most prevalent from studies elsewhere in Nigeria. James-Rugu and Iwuala, 2002; Agbolade *et al.*, 2003; Ekanem *et al.* 2010 and other parts of the world such as Argentina (Gonzalez *et al.*, 2004), Thailand (Nithikathkul *et al.*, 2005), Korea (Jeong-Hyun *et al.*, 2008) and Albania (Xhaxhiu *et al.*, 2009). These differences could be attributed to the geographical location climatic condition, environmental hygiene and food type, at which each of these investigations was carried out.

However, it is observed that dogs less than 1 year old are more susceptible to ectoparasites infestation. It can be deduced that the high rate of infestation of ectoparasites around this age range is due to the easier penetration and attachment of ectoparasites to young skin than the tougher skin of older dogs, or to conditions in kennel. For instance, *Rhipicephalus sanguineus* is known to adapt to domiciliary environments and become established in doors in kennels and homes (Dame and Fasulo, 2002). Also, puppies with more limited movements, raised or breed in such infested environments are exposed to ectoparasites infestations than dogs that have free mobility.

The presence of ectoparasites on the treated dogs indicates that the dogs may not have been properly or sufficiently treated with the prescribed drugs or using the various appropriate control techniques and measures. However, management, routines of dogs also play significant role in the dog ectoparasite infestations.

Furthermore, it was observed that there was high prevalence rate of ectoparasites at the head/ear region than other part of the body of the dog. It could be due to the conducive state of hairs, in other words, the hairs provide a more suitable breeding site for ectoparasites, particularly *R. sanguineus* and *D. canis*. The next most prevalent site was the limbs and interdigital spaces. This is because; these regions first come into contact with infested surfaces such as vegetation, abdominal region of the nursing female dogs, and the ground.

In the course of this study, information obtained revealed that most dogs are used primarily for security purpose or as pets and secondarily, for consumption or commercial purposes. For this purpose, the treatment, control and prevention of these identified ectoparasites of dogs should not be undermined; as the parasite, if attached to human may cause skin irritation and body

unrest. Therefore, it is pertinent for every dog's owners to ensure that the living conditions of dogs in Uyo capital city are improved.

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