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The prevalence and intensity of gastrointestinal parasites of dogs in Ile-Ife, Nigeria

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Abstract

A study of gastrointestinal parasites in 269 faecal samples from dogs (*Canis familiaris*) collected from Ile-Ife, Nigeria between January and December 2004, revealed seven helminth species: *Toxocara canis* 33.8%, *Ancylostoma* sp. 34.6%, *Toxascaris leonina* 3.3%, *Trichuris vulpis* 3.7%, *Dipylidium caninum* 4.1%, *Uncinaria stenocephala* 0.7% and *Taenia* sp. 1.1%. The faecal egg intensities, determined as mean eggs per gram of faeces ($\pm$ SEM) were: *T. canis* 393.8 ± 83.4 , *Ancylostoma* sp. 101.5 ± 32.8 , *T. leonina* 14.3 ± 7.9 , *T. vulpis* 3.4 ± 1.5 , *D. caninum* 2.2 ± 0.8 , *U. stenocephala* 0.2 ± 0.2 . The prevalence of intestinal parasites was significantly higher ($P < 0.05$) in dogs of age 0–6 months than in older age groups. There was no significance difference in overall prevalence of intestinal helminth parasites between male (58.3%) and female (50.0%) dogs ($P > 0.05$). The prevalence of helminth parasites was significantly higher ($P < 0.05$) in free-ranging than in kennelled dogs. The prevalence of helminth parasites was also significantly higher ($P < 0.05$) in African shepherds than in Alsatians and other exotic breeds. Each helminth parasite had similar prevalences and intensities among both genders ($P > 0.05$) except in *T. vulpis*. The overall prevalence of intestinal parasites may continue to rise due to lack of functional veterinary clinics for dog care in Ile-Ife. Therefore, there is the need to establish a veterinary facility in Ile-Ife.

Introduction

Companion animals, such as dogs, frequently harbour intestinal parasites that can cause human infection. Although zoonotic parasites can cause significant morbidity in all groups of the human population, they are of particular importance in vulnerable groups, such as children, the elderly, and the immunocompromised (Robertson *et al.*, 2000; Irwin, 2002). Among a number of zoonotic parasites that infect dogs, *Toxocara canis* and *Ancylostoma* sp. are of particular importance to humans (Macpherson, 2005). Other zoonotic parasites include *Echinococcus granulosus* as well as emerging and re-emerging infections caused by *Cryptosporidium* spp. and *Giardia* spp. *Toxocara canis* does not normally establish intestinal infections in humans, but migrating larvae can cause visceral larva migrans (VLM), ocular larva migrans (OLM) or both. These can seriously

compromise the health of children (Vidal *et al.*, 2003). *Ancylostoma caninum* had been reported as a parasite of humans causing a disease called eosinophilic enteritis (Croese *et al.*, 1990; Prociv & Croese, 1990; Sanford & Prociv, 1991; Croese *et al.*, 1994).

The role of dogs as companion animals and the close relationship between humans and dogs, although offering significant benefits to many people, also represent a potential public health risk, since natural transmission of parasitic infections from dogs to humans may occur, directly or indirectly via environmental factors. All kinds of dogs (owned and stray dogs) are involved in transmission, even if the particular implication of each population is not clearly established (Eguia-Aguilar *et al.*, 2005).

Several studies of canine intestinal parasites have been reported in Nigeria and many other parts of the world (Ugochukwu & Ejimadu, 1985; Onyenwe & Ikpegbu, 2004; Ramirez-Barrios *et al.*, 2004; Martinez-Moreno *et al.*, 2007; Sowemimo & Asaolu, 2008). However, current information on prevalence and intensity is essential for development and modification of control measures in

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animal and public health. The aim of this investigation was to determine the prevalence and intensity of gastrointestinal parasites of dogs in Ile-Ife, a peri-urban community in south-western Nigeria.

Materials and methods

Faecal sampling

The study was carried out in Ile-Ife, which has been described in my earlier report (Sowemimo, 2007). Faecal samples were collected randomly from 269 dogs between January and December 2004. Information was obtained on the approximate age, sex, breed, and mode of life of each dog, as well as the occupation of the dog's owner. Samples were placed in clean 30 ml bottles. About 10 g of faeces from each dog were mixed thoroughly with 10% aqueous formaldehyde for preservation. Samples were examined for parasite eggs in the laboratory by means of the modified Kato–Katz procedure (Forrester & Scott, 1990). Each parasite egg was identified using established structural and morphometric criteria (Bowman, 1999). In addition to qualitative diagnosis, an indirect measure of parasite intensity was obtained by counting eggs, expressed as eggs per gram of faeces (epg).

Statistical analysis

Statistical tests were performed using SPSS 11.0 (SPSS Inc., Chicago, Illinois, USA). Chi-squared tests were used to study the relationship between parasite prevalence and host age, sex, breed and mode of life. Mann–Whitney *U* tests were used to explore the relationship between egg intensity and sex and mode of life, while Kruskal–Wallis tests were used for variables with more than two levels, i.e. the relationship between the egg intensity and host age and breed.

Results

The overall prevalence of infection with intestinal parasites was 55.0%. Eggs of five species of nematodes and two species of cestodes were identified. The nematodes included *Toxocara canis*, *Ancylostoma* sp., *Toxascaris leonina*, *Trichuris vulpis* and *Uncinaria stenocephala*, while the cestodes were *Dipylidium caninum* and *Taenia* sp. The most prevalent intestinal parasite was the hookworm, *Ancylostoma* sp. (34.6%), followed by the ascarid worm, *T. canis*, with a prevalence of 33.8%. The prevalences of other intestinal parasites were *T. leonina* 3.3%, *T. vulpis* 3.7%, *D. caninum* 4.1%, *U. stenocephala* 0.7% and *Taenia* sp. 1.1%.

The overall mean intensities ($\pm$ SEM) for the various intestinal parasites were *T. canis* 393.8 $\pm$ 83.4, *Ancylostoma* sp. 101.5 $\pm$ 32.8, *T. leonina* 14.3 $\pm$ 7.9, *T. vulpis* 3.4 $\pm$ 1.5, *U. stenocephala* 0.2 $\pm$ 0.2, *D. caninum* 2.2 $\pm$ 0.8 and *Taenia* sp. 5.4 $\pm$ 4.7.

The prevalence of intestinal parasites was significantly higher ($P < 0.05$) in dogs less than 6 months old compared to dogs of older age groups. However, there was no significant difference in prevalence between male and female dogs ($P > 0.05$) (table 1). The prevalence of intestinal parasites was also significantly higher ($P < 0.05$)

Table 1. Prevalence (%) of intestinal parasites relative to host age, gender, breed and mode of life.

Category	Number examined	Prevalence (%)
Age (months)		
0–6	72	77.8
7–12	67	50.7
13–18	34	56.8
19–24	36	44.4
25–36	30	30.0
37–48	9	33.3
>48	18	38.9
		$P < 0.05$
Gender		
Male	139	58.3
Female	130	50.0
		$P > 0.05$
Breed		
African shepherd	227	60.8
Alsatian	34	20.6
Other	8	12.5
		$P < 0.05$
Mode of life		
Free ranging	202	62.4
Kennelled	67	29.9
		$P < 0.05$

in free-ranging dogs (62.4%) than in kennelled dogs (29.9%). Similarly, the prevalence was significantly higher ($P < 0.05$) in African shepherd dogs (60.8%) than in Alsatis (20.6%) and other exotic breeds (12.5%) (table 1).

Prevalence and intensity of *Ancylostoma* sp

The prevalence of *Ancylostoma* sp. in dogs aged 0–6 months was comparable with that in dogs of age 13–18 months, but it was significantly higher ($P < 0.05$) than that in dogs of age 7–12 months and above 18 months. However, the intensity of infection was significantly higher ($P < 0.05$) among dogs of age 0–6 months than in older age groups (table 2). The prevalence of *Ancylostoma* sp. did not show any significant differences between male (34.5%) and female (34.6%) dogs ($P > 0.05$). Similarly, there was no significant difference in the intensity of infection between females (128.0 $\pm$ 61.6) and males (76.7 $\pm$ 26.9) ($P > 0.05$).

The prevalence and intensity of *Ancylostoma* sp. infection were significantly higher in African shepherd dogs than in Alsatian or other exotic breeds ($P < 0.05$) (table 2). Also, the prevalence and intensity of *Ancylostoma* sp. were significantly higher ($P < 0.05$) in free-ranging dogs than in kennelled dogs (table 2).

The prevalence and intensity of *Ancylostoma* sp. recorded in the different months for the period of study are shown in table 3. The pattern of prevalence was such that the prevalence of infection decreased from April until it reached the lowest level in July and then rose in August (this period corresponds to the rainy season, i.e. April–September). Similarly, the prevalence of infection also decreased between October and December and then rose from January to February (this period corresponds to the dry season,

Table 2. Prevalence (%) and intensity of *Ancylostoma* sp. relative to host age, gender, breed and mode of life.

Category	Number examined	Prevalence (%)	Intensity ($\pm$ SEM)
Age (months)			
0–6	72	54.2	313.6 $\pm$ 119.0
7–12	67	31.3	34.3 $\pm$ 9.8
13–18	37	43.2	39.5 $\pm$ 11.1
19–24	36	19.4	6.7 $\pm$ 2.5
25–36	30	20.0	18.0 $\pm$ 10.3
37–48	9	0.0	0.0
>48	18	22.2	10.0 $\pm$ 5.9
Gender			
Male	139	34.5	76.7 $\pm$ 26.9
Female	130	34.6	128.0 $\pm$ 61.6
Breed			
African shepherd	227	37.9	117.2 $\pm$ 38.8
Alsatian	34	20.6	20.6 $\pm$ 10.3
Other	8	0.0	0.0
Mode of life			
Free ranging	202	39.6	122.1 $\pm$ 43.3
Kennelled	67	19.4	39.4 $\pm$ 13.6

i.e. October–March). The overall prevalence during the rainy season ($N = 138$) was 33.3% while the overall prevalence during the dry season ($N = 131$) was 35.9%; however, there was no significant difference between the prevalences of the two seasons ($P > 0.05$).

The pattern of intensity was such that lower values were recorded between April and July while higher values were recorded between August and December and from January to March. The highest intensity was recorded in March (table 3). The seasonal differences in intensity between the dry and rainy seasons were also not significantly different ($P > 0.05$).

Prevalence and intensity of other intestinal parasites

The prevalence and intensity of *T. canis* relative to age, sex and season has been described earlier (Sowemimo, 2007). The prevalence and intensity of *Trichuris vulpis* were significantly higher ($P < 0.05$) in female than in male dogs, while there were no significant differences in

prevalences and intensities of other intestinal parasites between male and female dogs (table 4).

Discussion

The overall prevalence of intestinal parasites obtained in this study was 55.0%, revealing a high level of infection which may continue to rise over time due to the lack of functional veterinary clinics for dog care in Ile-Ife. The highest prevalence of intestinal parasites so far reported in Nigeria was 86.9% (Ugochukwu & Ejimadu, 1985). Studies in Nigeria and other parts of the world have shown lower prevalences of intestinal parasites in 'well-cared-for' dogs. In a recent study carried out in two veterinary clinics at Ibadan, Oyo State, Nigeria, Sowemimo & Asaolu (2008) reported an overall prevalence of 24.7% among 959 dogs examined, while in Venezuela, Ramirez-Barrios *et al.* (2004) reported an overall prevalence of 35.5% among 614 dogs.

The results of this study also showed that the prevalence of intestinal parasites in free-ranging dogs was higher than in kennelled dogs. This is in agreement with findings in previous studies in which higher prevalences were recorded among homeless dogs than housed dogs (Pandey *et al.*, 1987; Illesc-Gomez *et al.*, 1989; Minaar *et al.*, 2002; Martinez-Moreno *et al.*, 2007). The high prevalence recorded in free-ranging dogs may be due to lack of health control measures and also because of their scavenging habits which expose them to natural infection more than kennelled dogs.

The eggs of *Ancylostoma* sp. were the most prevalent out of all the eggs of intestinal parasites observed in this study. This finding is in agreement with previous studies in Nigeria and other parts of the world (Idowu *et al.*, 1977; Ugochukwu & Ejimadu, 1985; Blagburn, 2001; Ramirez-Barrios *et al.*, 2004; Sowemimo & Asaolu, 2008). It was also observed that dogs less than 6 months old had a higher prevalence of hookworms than dogs of older age groups. This is in agreement with findings of previous studies in Nigeria and other parts of the world (Idowu *et al.*, 1977; Blagburn, 2001; Sowemimo & Asaolu, 2008). It was suggested by previous investigators that dogs less than 6 months old might have acquired the infection prenatally from bitches. The intensity of hookworm was higher among dogs less than 6 months old than in dogs of older age groups. This is similar to the findings of a recent study in Ibadan, Nigeria (Sowemimo & Asaolu, 2008). The eggs of the ascarid worm *T. canis* were the next most prevalent in the present study; however, the public health importance of this has been discussed extensively in an earlier report (Sowemimo, 2007). *Uncinaria stenocephala* is another hookworm observed in this study, with a very low prevalence of 0.7%. A similar finding was reported in a recent study in Ibadan, Nigeria (Sowemimo & Asaolu, 2008), where a prevalence of 0.4% was reported for the parasite. The prevalence of *T. vulpis* (3.7%) recorded in this study was far below the range (13.9–56.7%) reported in previous studies in Nigeria (Dada *et al.*, 1979; Arene, 1984; Ugochukwu & Ejimadu, 1985). The seasonal variations in the prevalence and intensity of *Ancylostoma* sp. were not pronounced. It was observed in this study that there was no significance difference in the prevalence

Table 3. Monthly variation in the prevalence (%) and intensity of *Ancylostoma* sp. in 2004.

Months	Number examined	Prevalence (%)	Intensity
January	29	31.0	213.3
February	38	47.4	350.0
March	27	29.6	1537.5
April	31	54.8	36.5
May	30	40.0	85.0
June	31	25.8	30.0
July	19	5.3	40.0
August	15	40.0	336.7
September	12	16.7	180.0
October	14	42.9	213.3
November	10	40.0	235.0
December	13	15.4	130.0

Table 4. Prevalence (%), intensity (I) and range (R) of helminth eggs in the faeces of dogs of different sexes.

Helminth species	Male (N = 139)			Female (N = 130)			Both sexes		
	%	I	R	%	I	R	%	I	R
<i>Toxascaris leonina</i>	1.4	22.7 ± 11.4	40–1580	5.4	17.2 ± 10.9	20–1060	3.3	14.3 ± 6.9	20–1580
<i>Trichuris vulpis</i>	0.7	0.1 ± 0.1	20–20	6.9	6.8 ± 3.1	20–300	3.7	3.4 ± 1.5	20–300
<i>Dipylidium caninum</i>	5.0	1.6 ± 0.8	20–80	3.1	1.4 ± 0.9	20–120	4.1	2.2 ± 0.8	20–120
<i>Uncinaria stenocephala</i>	0.7	0.3 ± 0.3	40–40	0.8	0.2 ± 0.2	20–20	0.7	0.2 ± 0.2	20–40
<i>Taenia</i> species	1.4	9.8 ± 9.1	100–1260	0.8	0.6 ± 0.6	80–80	1.1	5.4 ± 4.7	80–1260

and intensity of *Ancylostoma* sp. between the rainy and dry seasons ($P > 0.05$). This is in contrast with the reports from previous studies where seasonal distribution differences for *Ancylostoma* sp. were established (Lightner *et al.*, 1978; Kirkpatrick, 1988).

Toxocara canis and *Ancylostoma* sp. are the main parasites that are likely to pose public health risks in Ile-Ife, because they are responsible for causing human disease such as visceral larva migrans (VLM) and cutaneous larva migrans (CLM) or eosinophilic enteritis, respectively. Therefore the high prevalences of these zoonotic parasites in Ile-Ife constitute a threat to the people living in the area. The prevalences of these parasites may continue to rise unless urgent steps are taken by the appropriate authorities to ensure provision of functional veterinary clinics for dog care in the Ile-Ife community.

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