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Full Length Research Paper

A survey on helminth parasites of dogs in Benin city, Edo State, Nigeria

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Dogs are the most common pet animals worldwide. A study of the gastrointestinal helminth parasites of dogs (*Canis familiaris*) in three veterinary clinics in Benin City, Nigeria, was conducted between June and December 2010. Faecal samples collected from 150 dogs were processed by floatation and direct faecal smear methods, and then examined for helminth eggs. Coprological examination revealed that 28.0% of the dogs examined were infected with different types of helminthes. Dogs harboring one-type of parasite eggs were more common (97%) than those harboring two (3%). The prevalence for the various helminth eggs observed were *Dipylidium caninum* (10.0%), *Mesostephanus* spp. (4.6%), *Trichuris vulpis* (4.0%), *Toxocara canis* (3.3%), *Capillaria aerophila* (2.0%), *Ancylostoma* spp. (1.3%), *Toxascaris leonina,* (0.7%), *Capillaria plica* (0.7%), *Capillaria* spp. (0.7%) and *Uncinaria stenocephala* (0.7%). There was no significant difference in prevalence of helminth parasites found between males (22.6%) and females (31.8%) dogs ($p>0.05$). However, the age of dog was found to be a significant factor with the prevalence of the infection ($p<0.05$) higher in young dogs.

Key words: Dogs, helminth parasites, Benin-City, Nigeria.

INTRODUCTION

Dogs are the most successful canids adapted to human habitation worldwide. They have contributed to the physical, social and emotional well-being of their owners, particularly children (Robertson et al., 2000). Close bonds of dogs and humans remain a major threat to public health, with dogs harboring a bewildering number of infective stages of parasites transmissible to man and other domestic animals (Robertson et al., 2000, McCarthy and Moore, 2000). Most exotic pet owners visit veterinary clinics, but majority of local dogs do not receive prophylactic anti-helminthics. Consequently, these dogs may have high parasite burdens and hence a high potential risk of zoonotic diseases. For low-income earners in the communities, treatments to eliminate these parasites, if done at all-are, often applied in advanced stages of diseases, causing distress on pets and their owners (Morrison, 2001).

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While the level of intestinal parasitism in Benin City is currently unknown, previous studies of other canine diseases prevalent in dogs have revealed that these dogs have many of the same pathogens as dogs in other countries of the world (Levy et al., 2008, Awoke et al., 2011). Previous reports from Nigeria include the studies of Umar (2009) and Ugwoke et al. (2011) in northern and Sowemimo (2009) in western Nigeria. This project was conducted therefore to investigate and to identify the parasites especially the helminth parasites affecting dogs visiting Veterinary Clinics in Benin City, Nigeria.

MATERIALS AND METHODS

Study area

This study was conducted between June and December 2010, to determine the prevalence of parasites in dogs in Benin City, the capital Edo State Nigeria. The City is located on latitude of 6°19° North and longitude of 5°36° East. The city covers a n area of about 38 square miles. Topography of Benin City is flat with laterite soil

which becomes flooded after rain fall; the city is located in Nigerian Southern region, with intense rain fall from April to October and temperature is between 23 and 37℃.

Study design

Random visits to private pet shops at Bendel Development Planning Authority housing Estate, Ugbowo, Hothir Animal Clinic, Adesogbe/ Plymouth Road and Vetcare Consult Veterinary Clinic at Vegetable market, 23 Airport Road, Benin City was done to collect faecal samples for this study. With the consent of the dog owners, information on the dog's age, sex and breed were obtained. Thereafter, pre-labeled specimen containers were distributed for collection of stool samples. A total number of one hundred and fifty dogs were examined for various parasites.

Sample collection

Fresh faecal samples were collected using disposable gloves in to plastic containers with lids. Each of the samples was clearly labeled with the animal's identification number, date of collection and place of collection. The samples were taken to the Departmental Parasitological Laboratory, Department of Animal and Environmental Biology, University of Benin, Benin City, Nigeria, for analysis.

Laboratory procedures

The simple faecal floatation and direct faecal smear methods were used for identifying the helminth eggs (Hansen and Perry, 1994; Thienpont et al., 1979).

Faecal floatation method

Approximately 5 g of faeces was placed in a beaker, then 50 ml of water was poured into it and the content was mixed thoroughly using a stirring rod. The faecal suspension was strained by pouring it through a tea strainer into another beaker which was left to stand for 10 min and decanted. The bottom sediment was transferred into a test tube and resuspended with the floatation fluid to the brim. Finally, the test tube was covered with a cover slip and the cover slip mounted on microscopic slide for examination (Thienpont et al., 1979).

Direct faecal smear

In the direct faecal smear, watery stools are smeared on a slide and viewed under the microscope while the formed stool was dissolved using distilled water, and then smeared on a slide viewed under the microscope (Hansen and Perry, 1994).

Statistical analysis

The data obtained were tabulated for easy assessment, with the table showing the total number of dogs examined, their sexes, number of parasites recovered and their percentages. A 2-way contingency test (Chi-square test) was performed to assay the prevalence of the parasites relative to host sex and age (Casella and Berger, 1990). In all cases, 95% confidence intervals were set for significance.

RESULTS

A total number of 150 dogs, consisting of 84 males and 66 females were examined. All the examined dogs live in Benin City. Overall, 16(10.67%), 7(4.67%) and 19(12.67%) were diagnosed as harboring cestodes, trematodes and nematodes eggs, respectively. The proportion of dogs harboring *Dipylidium caninum* was the highest (10.0%), other gastro-intestinal parasites encountered include *Mesostephanus* spp. (4.6%), *Toxocara canis* (3.3%), *Capillaria aerophila* (2.0%), *Trichuris vulpis* (4.0%), *Capillaria plica* (0.7%), *Toxascaris leonina* (0.7%), *Ancylostoma caninum* (1.3%), *Uncinaria stenocephala* (0.7%) and *Capillaria* spp. (0.7%).

Moreover, single parasite infections (97%) were more common than two parasites infections (3%). The prevalence of various gastro-intestinal parasites is shown in the Table 1. The significant factors influencing prevalence of gastro-intestinal parasitic infections are shown in Table 2. The prevalence of the helminth parasites in relation to sample location and breeds are shown in Tables 3 and 4, respectively. About 98% of the dog owners kept the dogs mainly as pets, while the remaining 2% kept dogs for security reasons. There was no significant difference in the prevalence of gastro-intestinal parasites between male (56.0%) and female (44.0%) dogs ($\chi^2 = 2.286$, df=1, $p>0.05$). However, the age of dog was found to be a significant factor with the prevalence of the infection higher in younger dogs ($\chi^2 = 4.709$, df = 1, $p<0.05$).

DISCUSSION

The overall prevalence of gastro-intestinal helminth parasites of dogs observed in this study (28.0%) differs from that reported by Umar (2009), who obtained a prevalence of 93.8% among 160 dogs killed for meat in Kaduna State. This may be attributed to the kind of dogs sampled because most dogs slaughtered for meat are local breeds and are usually reared free range with little or no care. Umar (2009) collected worms from gastro-intestinal tract of slaughtered dogs, while facecal samples were examined using flotation and direct smear methods in this study. The difference in results may be attributed to the breeds of dogs studied and the sampling techniques. The prevalence of parasites in stray dogs will be higher than in pet dogs brought to veterinary clinics. According to Morrison (2001), most exotic pet owners visit veterinary clinics, while majority of the local breeds do not receive prophylactic anti-helminthics.

Understanding the epidemiology of zoonotic parasitic infections is important for minimization of the risk to humans who accidentally ingest the infective stages (egg or larvae). Coprological examinations may not be able to detect the immature parasites, which have no eggs yet (Yacob et al., 2007). Most of the intestinal helminthes of

Table 1. Overall prevalence of intestinal helminthes recovered from dogs in Benin City, Nigeria.

Parasites	Number of Infected Dogs	Percentage of infected Dogs (%)
Toxocara canis	5	3.3
Mesostephanus spp	7	4.6
Capillaria aerophila	3	2.0
Dipylidium caninum	15	10.0
Trichuris vulpis	6	4.0
Capillaria plica	1	0.7
Toxascaris leonina	1	0.7
Ancylostoma caninum	2	1.3
Uncinaria stenocephala	1	0.7
Capillaria spp	1	0.7
Total	42	28.0

Table 2. Prevalence of helminth parasites in relation to sex and age.

Variable	Number of examined	Infected dogs	Percentage infected (%)	χ^2	p-value
Sex					
Male	84 (56.0)	19	22.6	2.286	3.85
Female	66 (44.0)	21	31.8		
Age					
Young	25 (16.6)	11	44.0	4.709	3.841
Adult	125 (83.3)	29	23.2		

Infection was not significantly linked with sex $p > 0.05$. Age was a significant factor with the prevalence of infection $p > 0.05$.

dogs identified in this study are found worldwide. (Richter and Elmarsdottir, 1997). Although, *U. stenocephala*, a hookworm observed in this study, occurred with a low prevalence (0.7%), it may be due to the fact that this parasite is best adapted to cold temperature climates (Gualazzi et al., 1986). A similar observation was reported from another tropical country, Kenya, where a lower prevalence was reported for the worm *U. stenocephala* (Kagira and Kanyari, 2000). The prevalence of the helminthes recorded in the dogs examined, may be an indication of the degree of environmental contamination as well as the extent of care given by their owners. Awoke et al. (2001) in Ethiopia observed 14.7% (48 out of 326) helminth parasite prevalence in dogs' faecal samples examined. The result obtained by Awoke et al. is lower than 28% observed in this study. Ugwoke et al. (2011) obtained a 90% prevalence rate for dogs using the same methods as Umar (2009). Both researches were done in Northern Nigeria. It therefore suggests that direct examination of dog's post-mortem yielded more parasites than faecal examination of infected dogs.

The presence of *D. caninum, T. canis* and *A. caninum* is of great importance since these parasites are well recognized zoonotic agents, which may constitute a significant public health risk mainly due to the frequent contact between humans and dogs (Ramirez – Barrios et al., 2004). *D. caninum* resulting from accidental ingestion of infected fleas (*Ctenocephalides canis*) can cause gastric disturbance, diarrhea and restlessness in children or those associated with dogs. *T. canis* and *Ancylostoma caninum* on the other hand are etiologic agents of visceral and cutaneous larva migrans, respectively. Man being an abnormal host, results in failure of the larval stage developing into an adult worm. The larva migrates through the tissues causing visceral larval migrans. Sometimes the larvae may migrate to the brain with serious consequences or find their way to the eyes (Smyth, 1994; Haywards, 2004). Neurological problems, such as epilepsy, neuropsychological deficits and ataxia have been observed clinically in humans (Akao et al., 2003).

Age appeared to be a significant factor in this study; younger dogs were more susceptible (44.0%) than older dogs (23.2%)($P<0.05$). This was in agreement with the work reported by Swai et al. (2010), with younger dogs having prevalence of 39.6% as against adults (19.4%). Moreover, there was a higher occurrence of nematodes, and this could be due to the mode of transmission of the parasite. Puppies could be infected transplacentally and

Table 3. Prevalence of helminth parasites in relation to sample location.

Location	Number examined	*Mesostephanus* spp.	*Toxocara canis*	*Capillaria aerophila*	*Dipylidium caninum*	*Trichuris vulpis*	*Capillaria plica*	*Toxascaris leonina*	*Ancylostoma* spp.	*Uncinaria stenocephala*	*Capillaria spp*
Hothir vet. Clinic	44	4(9.0)	3(6.8)	1(2.2)	4(9.0)	3(6.8)	1(2.2)	0(0.0)	1(2.2)	0(0.0)	0(0.0)
Vetcare consult	62	1(1.6)	2(3.2)	0(0.0)	6(9.6)	2(3.2)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(1.6)
Private pet shop	44	2(4.5)	0(0.0)	2(4.5)	5(11.3)	1(2.2)	0(0.0)	1(2.2)	1(2.2)	1(2.2)	0(0.0)
Total	150	7(4.6)	5(3.3)	3(2.0)	15(29.9)	6(4.0)	1(0.6)	1(0.6)	2(1.3)	1(0.6)	1(0.6)

Hothir Veterinary Clinic had the highest infection(17), while that at BDPA had the least number of infection (9).

Table 4. Prevalence of intestine helminth parasites in relation to breed.

Breeds	Number examined	*Mesostephanus* spp.	*Toxocara canis*	*Capillaria aerophila*	*Dipylidium caninum*	*Trichuris vulpis*	*Capillaria plica*	*Toxascaris leonine*	*Ancylostoma* spp.	*Uncinaria stenocephala*	*Capillaria spp*
Samoyed	7	1	-	-	1	1	-	-	-	-	-
Rottweiler	29	1	2	1	2	1	-	1	1	-	-
Alsatian	59	3	2	1	3	3	-	-	1	-	1
Terrier	2	1	-	--	-	-	-	-	-	-	-
Mixed	11	-	-	-	4	-	-	-	-	-	-
Mongrel	8	4	-	-	-	-	-	-	-	-	-
Mastiff	6	-	1	-	-	-	-	-	-	-	-
Doberman	1	-	-	-	-	-	-	-	-	-	-
Pit bull	2	-	-	-	-	-	-	-	-	-	-
Boar Bull	9	-	-	2	-	1	-	-	-	1	-
Caucasian	5	-	-	-	1	-	-	-	-	-	-

Alsatian had the highest infection(14), followed by Rottweiler which had (9). Doberman and Pit bull were not infected; this could be because Doberman and Pit bull were frequently dewormed.

transmammary in their first few days of life, which increases the occurrence of the parasite at an early age. Whereas, adult dogs may develop immunity which decreases the establishment as well as the fecundity of the parasite (Urquhart et al., 1996; Awoke, 2011). Higher nematodes prevalence in younger dogs was also observed. On the other hand, sex did not emerge a significant factor in this study. This was in agreement with the reports from Sowemimo (2009), Habluetzel et al. (2003) and Ugwoke (2011). They reported that there are no definite patterns of infections with regard to gender. However, female dogs were mostly infected with helminth parasites than their male counterparts; 31.8% for females as against 22.6% in males in this study. This may be due to the physiological peculiarities of the female dogs (Wakelin, 1984).

In addition, dog infections with single worm species were encountered more in this study, while multiple infections were less commonly detected. These results are in agreement with the findings of Sowemimo and Asaolu (2008) who reported single infections of *A. caninum* (17.9%), *T. canis* (9.0%), *T. leonina, T. vulpis* and *U. stenocephala* ranging from 0.2 to 0.6% as single infections. Data from this study were obtained from dogs visiting Veterinary Clinics and they may be dewormed regularly. As a consequence, studies based on veterinary clinics may

underestimate prevalence of parasitic infections when compared to local breeds of dogs. Awoke et al. (2011) and Umar (2009) observed mixed infections with cestodes and nematodes.

Considering the prevalence of zoonotic parasites in Nigerian dogs, intervention measures are necessary to reduce the risk of transmission of parasites from dogs to humans; these measures should focus on health education provided to dog owners particularly on the role of dogs in disease transmission especially in children.

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