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Original Article

Intestinal Helminthoses in Dogs in Kaduna Metropolis, Kaduna State, Nigeria

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Abstract

Background: Intestinal helminths in dogs provide a potential source of infection in humans due to the close contact between humans and dogs. Due to the limited information on parasites infecting dogs in Kaduna State, Nigeria, a cross sectional study was conducted with the aim of determining the diversity and prevalence of intestinal helminths of dogs in the area.

Methods: During the survey, 160 gastrointestinal tracts of dogs killed for meat selected by simple sampling technique were collected and examined for helminths in Kaduna metropolis, latitude $10^0 50^I$ N and longitude $7^0 50^I$ E.

Results: Of the helminths found, *Dipylidium caninum* (75.0%), *Taenia hydatigena* (43.8%), *Diphyllobothrium latum* (6.3%), *Ancylostoma caninum* (6.3%) and *Toxocara canis* (6.3%) were the most common. Female dogs were more likely of contacting intestinal helminths than male dogs (RR = 1.125). Higher mean worm burden was recorded for dogs infected by *T. hydatigena* and *D. caninum* than dogs infected by *T. canis, D. latum* or *A. caninum*.

Conclusion: The presence of these parasites in dogs examined indicates a potential public health problem in Kaduna metropolis. Mass enlightenment of dog keepers on the need for periodic veterinary care and restriction of stray dogs through legislation formulation and enforcement are recommended as possible control measures.

Key words: *Prevalence, Dog, Intestinal helminths, Public health, Zoonoses, Nigeria*

Introduction

The domestic dog (*Canis familiaris*) is generally considered as the first domesticated mammal and has co-existed with man as a working partner and house pet in all eras and culture since the days of the cave dwellers (1, 2).

In Nigeria, in addition to the role of the dog as a companion animal, dogs serve to provide an important source of protein to man. Dog meat is a delicacy and highly sought for in many parts of the country.

However, dogs like many canines have been reported to harbor a variety of intestinal parasites, some of which can also infect livestock, wildlife and humans (3,4,5). Zoonotic disease such as visceral and ocular larval migrans caused by *Toxocara canis* and cutaneous larval migrans caused by *Ancylostoma brasiliense* are some zoonotic aspects of some intestinal helminth infections in dogs (6-8). In addition, dogs are reported to act as transport host of many roundworms of man when they ingest infected human faeces (9).

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The clinical signs of parasitic infections in dogs are varied and occasionally some infected animals may present no symptoms (10). These factors, coupled with inadequate information by dog keepers on the risks of disease transmission, control of zoonoses transmitted by domestic animals, control of stray dogs and poor level of hygiene has resulted in an increase risk of exposure to zoonoses transmitted by these animals (4,11).

Several epidemiological studies were conducted to asses the situation of intestinal parasitic infections in canines in Nigeria and other parts of the world (4,10,12,13), information on the prevalence of intestinal helminths in dogs in Kaduna State is scanty.

The main objective of the study was to determine the diversity and prevalence of intestinal helminths in dogs in Kaduna, Kaduna State, Nigeria and the potential public health consequences of these parasites.

Material and Methods

Sample collection

A cross sectional study was conducted between January and March 2008 to determine the prevalence of intestinal helminths in dogs in Kaduna metropolis, latitude 10^0 50^I N and longitude 7^0 50^I E. During the survey, gastrointestinal tracts of 160 dogs (African Shepherd) selected by simple sampling technique were collected from dogs killed for meat. Samples collected from dogs were transported in cool boxes to Biological Science Laboratory, Nigerian Defense Academy, Kaduna for parasitological analysis.

Parasitological Technique

Gastrointestinal tract of each dog was placed in a clean dissecting dish and the intestine run out free from the mesentery using a pair of scissors (14). Different segment of the gastrointestinal tract (stomach, duodenum, small intestine and large intestine) were cut and placed in separate dissecting dishes, and again cut into manageable lengths.

Each segment was cut open and washed with water from a running tap into a one-liter wide mouth container. The washed intestinal tract was scraped gently with scalpel blade to remove any worm adhering to the lining membrane. Worms were picked from the washings with forceps under a dissecting microscope.

Helminths from each segment of the GIT were collected in separate Petri dishes, fixed and preserved in 70% alcohol; and later identified (15). Each species present was counted and the process repeated for each Petri dish to obtain the total worm burden (16). Mean statistics was used to calculate mean worm burden while relative risk of male and female dogs were determined.

Results

Out of the 160 gastrointestinal tracts of dogs collected, 93.8% were found to harbor nematodes, cestodes or mixed infection.

Three species of cestodes and two of nematodes were the common helminths infecting dogs in the area. *Dipylidium caninum* had the highest prevalence of 75.0%, followed by *Taenia hydatigena* (43.8%), while *Diphyllobothrium latum*, *Ancylostoma caninum* and *Toxocara canis* had prevalence of 6.3% each (Table 1).

The prevalence of the various intestinal helminths recovered in relation to sex of dogs sampled is presented in Table 2. There was a significant difference in prevalence of intestinal helminths in male and female dogs ($P<0.05$). Female dogs were more likely of contacting intestinal helminths than male dogs (RR = 1.125).

However, the intensity of helminth infection irrespective of sex of dog as reflected by the mean worm burden shows that dogs infected by *T. hydatigena* or *D. caninum* had an average of 5 – 6 worms as compared to 2 - 4 worms for dogs infected by either *D. latum*, *A. caninum* or

T. canis (Table 3). In addition, *D. caninum* and *T. hydatigena* formed 55.2% and 37.9% of the total worms recovered from infected dogs during the study period while *D. latum*, *A. caninum* and *T. canis* put together formed less than 2%.

Table 1: Overall prevalence of intestinal helminths recovered from the gastrointestinal tracts of dogs in Kaduna metropolis, Kaduna State, Nigeria

Parasite	No. of infected dogs	Percentage of dogs infected
Cestodes		
Taenia hydatigena	70	43.8
Dipylidium caninum	120	75.0
Diphyllobothrium latum	10	6.3
Nematodes		
Ancylostoma caninum	10	6.3
Toxocara canis	10	6.3

Table 2: Prevalence of intestinal helminth infection in relation to sex of dogs killed for meat in Kaduna metropolis, Kaduna State, Nigeria

Sex	No. of examined dogs	No. of infected dogs	Percentage infected	Relative Risk (RR)
Male	90	80	88.9	
Female	70	70	100	1.125
Total	160	150	93.8	

Table 3: Intensity of intestinal helminth infection in dogs killed for meat in Kaduna metropolis, Kaduna State, Nigeria

Parasite	No. of infected dog	Total worms recovered	Mean worm Burden/ worm	Percentage of total worms recovered
Taenia hydatigena	70	440	6.3	37.9
Dipylidium caninum	120	640	5.3	55.2
Diphyllobothrium latum	10	20	2.0	0.7
Ancylostoma caninum	10	20	2.0	0.2
Toxocara canis	10	40	2.0	0.3

Discussion

Most of the dog intestinal helminths identified in the present study are cosmopolitan in their distribution (11,12). However, the high prevalence of these helminths recorded in dogs examined is an indication of the poor level of environmental hygiene, degree of environmental contamination with infective stages, availability

of intermediate host and favorable climatic conditions for the survival of infective stages outside the host. Other factors may include lack of adequate knowledge by dog owners on the role of dogs in disease transmission and the need for veterinary care.

Report has shown that dogs well cared for by their owners and given veterinary attention had lower incidence of intestinal helminths than dogs lacking such privileges (9).

Dogs killed for meat in Kaduna metropolis are mostly free ranging dogs of the local breed. These dogs scavenges in rubbish bins and are hardly dewormed or treated with acaricides by their owners thus exacerbating the risk of infection by helminths and ectoparasites.

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 significance public health risk mainly due to the frequent contact between humans and dogs (10).

D. caninum resulting from accidental ingestion of infected fleas (*Ctenocephalide canis*) can cause gastric disturbance, diarrhea and restlessness in children or those associated with dogs (6).

T. canis and *A. caninum* on the other hand are the etiologic agents of visceral and cutaneous larva migrans respectively. Toxocariasis in human occur when man ingest infective eggs of *T. canis*. Man being an abnormal host results in failure of the larval stage developing into an adult worm. The larvae migrate through the tissues causing visceral larval migrans. Sometimes the larvae may migrate to the brain with serious consequences or find their ways to the eyes resulting in blindness (7, 9).

Although the presence of *T. hydatigena* and *D. latum* in dogs examined does not pose any direct health risk to man, eggs of *T. hydatigena* passed with faeces of infected dogs may contaminate grazing fields and subsequently infect ruminants (16).

However, *D. latum* infections observed in dogs serve as an indicator of parasites in human food sources. *D. latum* is acquired by eating raw or undercooked fish infected with plerocercoid larva, proper disposal of fish waste will reduce the risk of infection in stray dogs and other animals scavenging in rubbish bins.

Of interest however, is the absence of *Echinococcus granulosus* in dogs examined in the area. *E. granulosus* is a cosmopolitan parasite of dogs and other canids while sheep, pigs, cattle, camels and wild ungulates serve as intermediate host (17). Humans are also infected when hydatid eggs are ingested with contaminated vegetables or when infected dogs are handled (18, 19). In dogs and other canids, infections occur when they feed on contaminated offal (17).

Several investigators have reported the occurrence of hydatid cysts in several species of livestock in some parts of Nigeria (20, 21). The absence of *E. granulosus* in dogs sampled could be due to inaccessibility of dogs to contaminated offal. Lungs and liver which are known to harbor large number of hydatid cysts when an animal is infected, are highly valued and priced in Nigeria and are therefore sold to unsuspecting customer instead of disposing such meat (18, 21). This attitude is aggravated with the collapse of meat inspection system in most of the abattoirs.

The transmission of parasites between humans and dogs is principally due to contamination with dog faeces. The possibility of acquiring parasitic infection transmitted by dogs could therefore be reduced if legislation on the restriction of stray dogs are formulated and enforced. In addition, relevant agencies should embark on mass enlightenment of dog keepers on the role of dogs in disease transmission and the need to take their dogs for periodic veterinary check up and treatment.

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