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ORIGINAL ARTICLE

Prevalence of Gastrointestinal Helminthes eggs of Public Health importance in house-hold Dogs presented to the Veterinary Teaching Hospital Ahmadu Bello University, Zaria, Kaduna State

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SUMMARY

Dogs have a close association with humans providing companionship, security and a source of dietary protein. However, dogs are also potential carriers of zoonotic pathogens. To determine the prevalence of gastrointestinal helminths eggs in faeces of house-hold dogs presented to the Veterinary Teaching Hospital Ahmadu Bello University, Zaria, ninety-eight (98) faecal samples were collected and processed by formol-ether concentration technique and examined for helminths eggs. The overall prevalence of gastrointestinal helminths eggs in dogs presented was 22.4% (22/98). The Gastrointestinal helminths eggs observed from the study comprises of *Ancylostoma caninum* (4.1%), *Strongyloides stercoralis* (2.0%), *Toxocara canis* (8.2%) and *Dipylidium caninum* (8.2%). Higher prevalence of gastrointestinal helminths eggs was observed in male dogs (31.0%) than in female dogs (10.0%). Also, higher prevalence was observed in dogs less than six (6) months of age (23.1%) than in dogs of at least six (6) months (22.2%). The prevalence of gastrointestinal helminths eggs was 26.7% and 23.1% for local and exotic breeds of dogs respectively. Higher prevalence was observed in dogs with diarrhoeic faeces (25.0%) and in dogs non-confined (33.3%). This study has shown the presence of zoonotic gastrointestinal helminths eggs in dogs presented to the VTH ABU, Zaria which is of public health significance. Therefore, clinicians, pet owners, animal handlers and laboratory technicians need to be aware of the risk of contracting an infection in the course of handling dogs or their faecal samples.

Key words: Dogs, eggs, faeces, formol-ether, Gastrointestinal helminths, zoonotic helminths.

INTRODUCTION

Gastrointestinal parasitic helminths are among the most commonly encountered disease causing agents in dogs all over the world especially

regarding pathologies of the intestinal tract (Zelon, 2003). The parasites affects dogs of all ages, including both kernel and free-roam dogs. Sometimes, dogs could be infected without apparent evidence of the parasites' presence (Endrias *et al*., 2010).

Dogs are associated with more than 60 zoonotic diseases transmission including the helminth parasites which can pose serious public health concern worldwide (Rhindali *et al*., 2006). Some of these helminths are responsible for zoonotic diseases such as toxocariasis or visceral larva migrans, ancylostomiasis or cutaneous larva migrans, tungiasis, hydatid disease as well as emerging and re-emerging infections such as cryptosporidiosis and giardiasis (Akao and Ohta, 2007; Ugbomoiko *et al*., 2008). Zoonotic parasites can cause significant morbidity in all groups of the human population, with particular reference to vulnerable groups, such as children, the elderly, and the immunocompromised and migrating larvae of *Toxocara canis* can cause visceral larva migrants (VLM), ocular larva migrants (OLM) in humans (Dogan *et al*., 2007). Dogs in fact, are the definitive host for various intestinal parasites which can cause severe zoonotic diseases like hydatidosis caused by *Echinococcus granulosus*. The role of dogs as companion animals and the close relationship between human 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 man may occur, directly or indirectly via non-favourable environmental and human behavioural factors (Patz *et al.*, 2002). Human transmission occurs either directly through the infected dog or indirectly through consumption of contaminated foods and water. Furthermore, the low level of hygienic conditions, lack of sufficient veterinary attention and zoonotic disease awareness compounds the risk of transmission of these diseases to human (Traub *et al*., 2005). Helminths eggs in soil and faeces either in households or public areas are potential sources of infection. Young children with their habits of ground picking (pica) and poor hygiene practices are particularly likely to ingest *Toxocara canis*. Canine zoonotic helminths pose a public health risk through environmental faecal contamination (Habluetzel *et al*., 2003).

Several studies of gastrointestinal helminths of dogs have been reported in Nigeria (Sowemimo and Asaolu, 2008; Ugbomoiko *et al*., 2008; Sowemimo, 2009; Mahmuda *et al*., 2012). In Nigeria, gastrointestinal helminths parasites of dogs are currently endemic in 20 of the 36 States (Uwemedino *et al.,* 2014; Christopher *et al*., 2015). With the lack of veterinary care and poor nutrition, stray dogs suffer from many disease conditions. The ubiquitous problem of stray dogs in urban and rural areas worldwide emphasizes the need to diagnose, treat and prevent zoonoses including parasitic nematodes (Slater, 2001; Eva and Annamaria, 2012).

The aim of this study was to determine the prevalence of gastrointestinal helminths eggs of zoonotic importance in house-hold dogs presented to the Veterinary Teaching Hospital, ABU Zaria, Kaduna state. This will increase the awareness and knowledge of zoonotic gastrointestinal helminthic disease that could be contracted by dog owners, dog handlers and even veterinary personnel or laboratory technicians in the course of handling dogs or their faecal matter.

MATERIALS AND METHODS

Study Design

This was a cross sectional study in which dogs presented to Veterinary Teaching Hospital, Ahmadu Bello University, Zaria were selected using convenience sampling. For each dog sampled, age, sex, breed, consistency of faeces and management system were determined. Ninety eight (98) faecal samples were collected from dogs presented, over a period of two (2) months (August and September, 2018).

Sample Collection

About 10g of faeces were collected directly from the rectum of each dog using clean disposable polythene bag inverted over the index finger and

emptied into a wide-mouthed disposable plastic container. All samples were properly labelled and transported in ice packed cold box to the Helminthology Laboratory, Department of Veterinary Parasitology and Entomology, Ahmadu Bello University, Zaria.

Laboratory Procedure

Formol-ether concentration technique

Detection of helminths eggs was performed using formol-ether concentration technique as described by Arora and Briji (2010). Faecal specimen of about the size of a pea was taken with a swab stick and emulsify in 7 ml of formalin in centrifuge tube. It was sieved by pouring whole contents of tube through gauze into an evaporating basin. The tube was washed and the fluid in the evaporating basin returned to the centrifuge tube. Three (3) millilitres of ether was added and shake vigorously for 30 seconds. Mixture was centrifuged at 3,000 rpm for 60 seconds. A layer of debris accumulated at the interphase between the two liquids. It was loosened by passing a swab stick gently round the circumference of the tube. The whole content of the tube was poured down the sink, allowing only the last one or two drops to return to the bottom, where there will be a small deposit. The deposit was shaken and poured on to a clean glass slide, covered with a cover slip and examined under the microscope at x10 and x40. The eggs were identified on the basis of their morphological features as described by Urquhart *et al*. (2003).

Data Analysis

Data was analyzed with Statistical Package for Social Science (SPSS) version 20.0. Chi-square was used to determine association between gastrointestinal helminths eggs and factors such as age, sex, breed, consistency of faeces and management system. Odds ratio (OR) and 95% confidence interval was used on dichotomous variables to test the strength of association.

RESULTS

The overall prevalence of gastrointestinal helminths eggs in dogs presented to VTH ABU, Zaria was 22.4% (22/98). Gastrointestinal helminths eggs observed from the study comprise of *Ancylostoma caninum* (4.1%), *Strongyloides* spp. (2.0%), *Toxocara canis* (8.2%) and *Dipylidium caninum* (8.2%). No mixed infection was observed in the course of this study (Table I). Table II shows the prevalence of gastrointestinal helminths eggs in the dogs sampled in relation to age, sex, breed, nature of faeces and management system. Higher prevalence of gastrointestinal helminths eggs were observed in dogs less than six (6) months of age (23.1%) than in dogs of at least six (6) months (22.2%). There was no significant association ($p > 0.05$) between the prevalence of gastrointestinal helminths eggs and age of the dogs sampled. Also a higher prevalence of gastrointestinal helminths eggs was observed in male dogs (31.0%) than in female dogs (10.0%). Statistical analysis showed that there was significant association ($p = 0.012$) between the prevalence of gastrointestinal helminths eggs and sex of the dogs sampled.

The prevalence of gastrointestinal helminths eggs was 26.7% and 23.1% for local and exotic breeds of dogs respectively. No gastrointestinal helminths eggs were observed in cross-breed of dogs and there was no significant association ($p > 0.05$) between the prevalence of gastrointestinal helminths eggs and breed of the dogs sampled. Higher prevalence of gastrointestinal helminths eggs was observed in dogs with diarrhoeic faeces (25.0%) than in dogs with non-diarrhoeic faeces (22.0%), though there was no significant association ($p > 0.05$) between prevalence of gastrointestinal helminths eggs and the nature of

TABLE I: Distribution of Parasite Species among infected dogs presented to the Veterinary Teaching Hospital ABU, Zaria.

Parasite species	No. of dogs positive	Specific rate (%)
Ancylostoma caninum	4	4.1
***Strongyloides* spp.**	2	2.0
Toxocara canis	8	8.2
Dipylidium caninum	8	8.2
Total	22	22.4

TABLE II: Prevalence of Gastrointestinal Helminths in dogs presented to the Veterinary Teaching Hospital ABU, Zaria.

Factors		Number Examined	Number Infected (%)	Odds ratio (OR)	95% confidence interval on OR
Age*	**< 6**	26	6 (23.1)	1.05	0.36 - 3.06
(months)	**≥6 (ref)**	72	16 (22.2)	1.0	-
Sex**	**Male**	58	18 (31.0)	4.05	1.25 – 13.09
	Female (ref)	40	4 (10.0)	1.0	-
Breed***	**Local**	60	16 (26.7)	-	-
	Exotic	26	6 (23.1)	-	-
	Cross	12	0 (0)	-	-
Nature of feaces****	**Diarrhoeic**	16	4 (25.0)	1.19	0.34 – 4.12
	Non-diarrhoeic (ref)	82	18 (22.0)	1.0	-
Management system*****	**Confined**	86	18 (20.9)	0.53	0.14 – 1.96
	Not confined(ref)	12	4 (33.3)	1.0	-
	Total	98	22 (22.4)		

Ref: Reference category
*(X^2= 0.008; df= 1; p= 0.93)
**(X^2= 6.016; df= 1; p= 0.012)
***(X^2= 4.093; df= 2; p= 0.129)
****(X^2= 0.071; df= 1; p= 0.507)
*****(X^2= 0.931; df= 1; p= 0.265)

faeces of the dogs sampled. A higher prevalence of gastrointestinal helminths eggs was also observed in dogs not confined (33.3%) than in confined dogs (20.9%). There was no significant association (p >0.05) between prevalence of gastrointestinal helminths eggs and the system of management of the dogs sampled.

DISCUSSION

The gastrointestinal helminths eggs observed in this study have been reported in dogs and other canids in different studies and locations within Nigeria with a pronounced difference in the prevalence and intensity between regions (Chiejina and Ekwe, 1986; Anene *et al*., 1996; Sowemimo and Asaolu, 2008; Ugbomoiko *et al*., 2008). In this study, the overall prevalence of gastrointestinal helminths eggs (22.4%) was lower than 68% reported from different ecological zone in Nigeria (Ugbomoiko *et al*., 2008) and comparable with prevalence of 52.5% reported from Southeast Nigeria (Okoye *et al*., 2011).

Higher prevalence of gastrointestinal helminths eggs observed in dogs less than six (6) months of age than in dogs of at least six (6) months could be justified by the low level of immunity of young pups to plethora of infections including parasitic infections. In addition, the larvae of these parasites remain in a state of latency in the muscular layer of female pets and during pregnancy larvae are reactivated and capable of infecting the fetus through trans-placental route and puppies via trans-mammary route, whereas adult pets may develop immunity which decrease the establishment as well as the fecundity of the parasites. This result is consistent with previous studies which also reported a higher

prevalence in puppies (Sowemimo and Asaolu, 2008).

Investigation into sex related prevalence of dogs showed that males were significantly infected than the females. Male dogs usually move around in search of female dogs on heat thereby scavenging bushes and waste-bin increasing their chances of contracting more infection than female dogs. This may also be attributed to both immunological and hormonal factors inherent in the dogs. Olufemi and Bobade (1979) also reported a higher infection rate in 157 (63.6%) male dogs out of 247 dogs examined at Ibadan.

The prevalence of gastrointestinal helminths eggs was higher in local breed than the exotic and cross-breed dogs. This may be due to unhygienic habits exhibited by owners of local breed dog such as indiscriminate disposal of waste bin around the house which these breed of dogs scavenge on. This may also be attributed to the fact that the local dogs roam around freely exposing them to the infective stages of these helminths than the exotic breed and cross-breed that have little access to outside environment. This finding is in agreement with the report of Anene *et al*. (1996) who reported that prevalences and intensities of different parasite infections were significantly higher in local breeds than in exotic breeds.

Higher prevalence of gastrointestinal helminths eggs was observed in dogs not confined than in confined dogs. This could be due to limited care from their resource limited owners, therefore their scavenging habits exposes them to these parasitic infections. Higher prevalence of gastrointestinal helminths eggs was observed in dogs with diarrhoeic faeces than in dogs with non-diarrhoeic faeces, this could be as a result of the inflammation and destruction of absorptive epithelium caused by the helminth parasite in the gastrointestinal tract.

CONCLUSION

The presence of these helminths eggs in dogs from the study is of public health significance. Due to their zoonotic implications considering the high prevalence recorded in dogs and the close bond in which dogs live together with people. The risk of transmission of these parasites to humans seems to be very likely. This is because of the daily shedding of many thousands of eggs into the environment which may lead to environmental contamination and thereby exposing children to accidental ingestion of the eggs as a result of their play habit.

All the identified helminths parasite eggs from the study were of zoonotic importance. This study has shown the presence of zoonotic gastrointestinal helminth eggs in dogs presented to the Veterinary Teaching Hospital Ahmadu Bello University, Zaria. Therefore, public awareness should be created on the importance of deworming young dogs at the earliest possible age and also on the prevention and control methods.

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