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Full Length Research Paper

Zoonotic Risks in Focus: Prevalence of Gastrointestinal Helminths in Dogs and Owner Perceptions in Hawassa Town, Ethiopia

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A cross sectional study was carried out between November, 2009 and March, 2010 in Hawassa town, Ethiopia with the aims of determining the prevalence of intestinal helminthes of dogs and evaluating owner's awareness about zoonotic dog parasites. A total of 455 dogs were sampled randomly and 58% (n=264) were positive for *Strongyloides stercorslis,* 49.2% (n=224), 40% (n=182), 25% (n=114), 6% (n=28) and 3.3% (n=15) were positive for *Ancylostoma caninum, Dipylidium caninum, Toxocara canis, Echinococcus granulosus* and *Trichuris vulpis,* respectively. Results from fecal examination showed that only 60 dogs were free of the above parasites (13.2%). From coprological examinations concurrent infections with one, two, three, four and five types of parasite were 19% (n=75), 33.9% (n=134), 32.2% (n=127), 13.6% (n=54) and 1.5% (n=6), respectively. There was statistically significant difference (P<0.05) in *A. caninum, T. canis* and *S. stercoralis* in the two age groups, but there was no statistically significant difference (P>0.05) in *D. caninum, E. granulosus* and *T. vulpis* in the two age groups. Questionnaire survey concerning owner's knowledge about zoonotic dog parasites showed that only 4.4% of the respondents know that dogs have zoonotic parasites, specifically, 95.6% have awareness about the zoonotic importance of rabies and only 7.3% have awareness about the availability of anthelmitics to treat dogs parasites. The high level of helminthiasis in dogs in the present study represent high rate of infection and immense public health risks. In line with this finding, it is recommended that owners who keep dogs should improve their hygienic standards. Besides, they should be able to regularly treat their dogs with the appropriate anthelementics and awareness should be created on the prevention and control methods of helminthiasis.

Key words: Prevalence, gastrointestinal helminthes, dogs, Hawassa Town, Ethiopia.

INTRODUCTION

Regardless of the availability of effective medications to treat parasites, most parasites of dogs have highly evolved life cycles that makes their elimination impossible. In addition, dogs are routinely infected with internal parasites, sometimes without apparent evidence of the infestation until it is too late. This means that a dog can have internal parasites even though the fecal sample is negative (Barutzki and Schaper, 2003).

Since dogs live in close proximity with human being, there are zoonotic diseases that can be transmitted to humans and cause serious consequences. The most common zoonotic helminth parasites of dogs are *Strongyloides stercorslis, Ancylostoma caninum,*

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Dipylidium caninum, Toxocara canis, Echinococcus granulosus and *Trichuris vulpis*. The transmission of zoonotic parasites could be through indirect contact with dogs secretions and excretions, infected water and food, and through direct contact with the dogs (Lappin, 2002).

In Ethiopia very little attention was given for diseases of dogs and the works done so far on the prevalence of the different gastrointestinal parasites of dogs are scanty (Muktar, 1988; Temesgen, 1990; Shihun, 1994; Eshetu et al., 2005; Yacob et al., 2007). Therefore, this study was designed with the aims of:

1. Estimating the prevalence of zoonotic helminth parasites of dogs in Hawassa town, Southern Ethiopia;
2. Assessing owner's awareness about zoonotic parasites that could be contracted from dogs.

MATERIALS AND METHODS

Study area

The study was conducted in Hawassa town, South Ethiopia. Hawassa lies between 4°27' and 8°30' N latitude, and 34°21' and 39°1'E longitude at an altitude of 1790 m above sea level (m.a.s.l). The area receives 800-1000 mm average annual rainfall of which 67% falls in the long rainy season, which extends from June to September. The total human population of Hawassa is estimated to be 150,000. Hawassa town covers an area of 50 km^2. The mean minimum and maximum temperature of the area is 20.1 and 30°C, respectively and mean relative humidity is 51.8% (CSA, 2008).

Study animals

Faecal samples were collected from 455 dogs brought to Hawassa town veterinary clinic and dogs kept at home in the town. These dogs were never exposed to any deworming before. The history and sex of dogs were recorded during examination and approximate age of dogs was estimated using criteria described by Tizard (1996). Those dogs less than one year were classified as young (n=150) and those over one year as adult (n=305). The numbers of male and female dogs were 358 and 97, respectively.

Study design

A cross-sectional study was carried out to determine the prevalence of major intestinal helminthes of dog in Hawassa town using sedimentation and flotation techniques. The study animals were selected by simple random sampling method.

Sampling method and determination of sampling size

Simple random sampling technique was used to determine the abundance of intestinal helminthes of dog in Hawassa town. To calculate the total sample size, the following parameters were used: 95% level of confidence (CL), 5% desired level of precision and with the assumption of 50% expected prevalence of zoonotic helmithiasis in dogs in the study area. The sample size was determined using the formula given in Thrusfield (2005):

$$n = \frac{1.96^2 * Pexp\ (1-Pexp)}{d^2}$$

n = required sample size, Pexp = expected prevalence, d = desired absolute precision.

Based on the aforementioned formula, the minimum sample size was about 384, but to increase the precision, 455 dogs were used for the study.

Sample collection and study procedure

The samples were collected directly from the rectum of the dogs and from top layers of fresh voided feces, examined macroscopically for proglottides, kept into labeled disposable container and transported immediately to Hawassa University Veterinary Parasitology laboratory. During collection each sample was labeled with the dog's number corresponding to owners name, date, age group, sex and place of collection. The presence of zoonotic helminth infections were confirmed by sedimentation and flotation techniques. After laboratory examination, the result was considered as positive when at least one parasite egg or cyst was observed in one of the employed technique (Lorenzini et al., 2007). Common salt was used as flotation fluid. The procedure given by Urquhart et al. (1996) was followed for the aforementioned parasitological methods. The eggs were identified using ova identification keys (Soulsby, 1982).

Age estimation

Age was conventionally classified as young (0-3) month, sub-adults (3 month to 1 year), adult (1-8) year and old (>8) years (Tizard, 1996), but in this study, age was classified into two category: young (0-1 year) and adult (>1 year).

Questionnaire survey

Sixty eight randomly selected dog owners were interviewed by a predesigned questionnaire. The questions were focused on determining the respondent awareness about their dog's habitat, possible transmission of diseases from dogs to humans, and availability of anthelmintics to treat dogs' parasites. The owners were also interviewed about tendency of cooking animals' products especially meat intended for dogs and awareness about the public health risks of keeping dogs with close intimacy.

Data management and analysis

The raw data that were recorded from this study were entered in to Microsoft excel data base system and computation of descriptive statistics was conducted using SPSS version 16.0. Descriptive statistics such as percentages, proportions and frequency distributions were applied to compute some of the data. The prevalence of the parasites was calculated by dividing the number of dogs harboring a given parasite by the number of dogs examined. Pearsons chi-square (χ^2) was used to measure association between prevalence of the parasite with the age and sex of dogs. In all the analysis, the confidence level was held at 95% and the results were considered significant when $P<0.05$.

RESULTS

Out of 455 dogs sampled, 395 (86.8%) of the dogs were found to be infected with *A. caninum* (49.9%), *S. stercoralis* (57.5%), *T. canis* (25.1%), *T. vulpis* (3.3%),

Table 1. Overall prevalence of zoonotic helminthes in dogs of Hawassa town.

Species	Positive	Prevalence (%)	95% CI
Ancylostoma caninum	229	49.9	30.9-55.8
Strongyloides stercoralis	264	57.5	48.8-95.75
Toxocara canis	115	25.1	15.89-45.64
Trichuris vulpis	15	3.3	7.50-22.49
Dipylidium caninum	183	39.9	27.98-63.92
Echinococcus granulosus	37	8.4	5.5-16.74

Table 2. Prevalence of mixed helminthes infection in dogs.

Infection with	Positive	Prevalence (%)
One helminth parasite	107	23.5
Two helminth parasites	167	36.7
Three helminth parasites	98	21.5
Four helminth parasites	17	3.7
Five helminth parasites	5	1.1
Six helminth parasites	0	0.0

Table 3. The prevalence of zoonotic helminth parasites of dogs by age and sex in Hawassa town.

Parasites	Age	Prevalence (%)	X^2	p-value	Sex	Prevalence (%)	χ2	p-value
A. caninum	Young Adult	73.5 36.7	55.6	0.00	Male Female	49.7 47.4	0.16	0.68
S. stercoralis	Young Adult	64.5 54.7	4.07	0.044	Male Female	58.4 56.7	0.08	0.76
T. canis	Young Adult	54.8 9.7	1.11	0.00	Male Female	23.5 30.9	2.26	0.13
T. vulpis	Young Adult	4.5 2.7	1.08	0.29	Male Female	3.1 4.2	0.28	0.59
D. caninum	Young Adult	41.3 39.3	0.16	0.66	Male Female	40.5 38.1	0.17	0.6
E. granulosus	Young Adult	7.8 5.3	3.05	0.21	Male Female	7.3 2.1	3.89	0.1

D. caninum (39.9%) and *E. granulosus* (8.4%) (Table 1).

Concurrent infections with two species of helminthes were more common (36.7%) than infection with one (23.5%), three (21.5%), four (3.7%), and five (1.1%) species of helminthes parasites and none of the dogs examined were positive for concurrent infections with the six species of the zoonotic helminthes investigated. Sixty dogs (13.2%) were found to be free of any of the parasites of our interest (Table 2).

Out of the six zoonotic helminthes parasites encountered in the study, *A. caninum, S. stercoralis* and *T. canis* showed a significant differences ($P<0.05$) between young and adult dogs, but there was no significant variation between sex ($p>0.05$) (Table 3).

Questionnaire survey

The result of questionnaire survey concerning owner's knowledge about zoonotic dog parasites showed that

Table 4. Summary of the questionnaire survey.

Awareness	Prevalence (%)
Presence of zoonotic dog parasites	4.4
Zoonotic importance of rabies	95.6
Availability of antihelminthics to treat dogs parasites	7.4
Public health risk of keeping dogs with close intimacy	8.8
Tendency of cooking meat intended to feed dogs	5.8
Necessary precaution while cleaning the kennels	55.8

only (4.4%) (n=3) of the respondents know that dogs have zoonotic parasites, specifically (95.6%) (n=65) have awareness about the zoonotic importance of rabies and only (7.3%) (n=5) have awareness about the availability of anthelementics to treat dogs parasites. Also the result of the questionnaire showed that (5.8%) (n=4) of the respondents have a tendency of cooking animals products especially meat that is intended to feed dogs and only (8.8%) (n=6) of the respondents have awareness about public health risk of keeping dogs with close intimacy (Table 4).

DISCUSSION

The coproscopical examinations revealed an overall prevalence of helminthes infection to be 86.6%. Coproscopical examination revealed that *S. stercoralis* (57.5%) and *A. caninum* (49.9%) were the dominant zoonotic helminth parasites of dogs of Hawassa town. The finding is in line with previous reports from African countries (Hassan, 1982; Ugochukwre and Ejimadu, 1985a).

The prevalence of *T. canis* (25.1%) was in agreement with the earlier reports of Ugochukwu and Ejimadu (1985a), Haralabidis et al. (1988), Vanparijs and Hermans (1991) and Totkova et al. (2006) who reported the prevalence of 24.3, 24.6, 25.4 and 25.8%, respectively. A Prevalence of *T. vulpis* (3.3%) in the current study was in line with the findings of Yacob et al. (2007), Haralabidis et al. (1988), Oliveria-Segueira et al. (2002) and Senlik et al. (2006).

The difference in the prevalence of the helminthes infection between countries could be attributed to the difference in climatic factors required for the biology of the parasites, veterinary facilities and public awareness to take care of the dogs. During the survey, it was noted that a large number of dogs scavenge at abattoirs and butcher shops and those kept indoors are also frequently fed uncooked offals that are not in good hygienic condition. It is also common to find animal cadaver thrown into street where dogs communally feed on, which could be a suitable media for transmission of the parasites.

The significantly higher prevalence of nematode infection, specifically with *A. caninum* and *T. canis* in young dogs as compared to adult is consistent with previous studies (Haralabidis et al., 1988; Overgaauw, 1997; Ugochukwu and Ejimadu, 1985b). The higher prevalence of these nematodes in younger dogs could be due to the mode of transmission of the parasites and puppies could be infected transplacentally and transmammary, which increase the occurrence of the parasites at an early age, whereas, adult dogs may develop immunity, which decrease the establishment, as well as the fecundity of the parasites (Soulsby, 1982; Urquhart et al., 1996).

The study showed that there was no significant difference (P>0.05) in frequency of intestinal helminthes of dogs between male and female dogs. The results are consistent with previous works (Yacob et al., 2007; Haralabides et al., 1988; Fontanarrosa et al., 2006). More than one species of GI helminthes in a single host were observed with prevalence of 63.3%. It might be due to the fact that the dogs act as scavenger and do not get regular veterinary care.

The presence of different helminth parasites species in a single host, as well as high prevalence of these parasites in the study area require serious attention due to pathogenic impact of the parasites and their zoonotic importance. Therefore, a strategic deworming of dogs using broad-spectrum anthelmintics and public education on the care and management of dogs to create awareness of the transmission and control of zoonotic diseases is of paramount importance.

Conclusion

This study revealed that helminth parasites occurring in Hawassa's dogs were largely *S. stercoralis, A. caninum, D. caninum, T. canis, E. granulosus* and *T. vulpis*. The predominant parasite was *S. stercoralis* followed by *A. caninum*, *D. caninum* and *T. canis.* The study confirmed that young dogs were found to be the most susceptible and severely infested compared to adult dogs. Sex has no significant differences in the level of infestation with helminthes parasites and concurrent infection with two helminthes parasite species was very common than infection with single species. It was concluded that age

was one of the important factors influencing the occurrence of zoonotic helminth parasites in dogs.

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