Prevalence of gastrointestinal parasites of stray dogs impounded by the Society for the Prevention of Cruelty to Animals (SPCA), Durban and Coast, South Africa

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ABSTRACT

Coprological examination was used to determine the prevalence and intensity of gastrointestinal parasites of stray dogs impounded by the Society for the Prevention of Cruelty to Animals (SPCA), Durban and Coast, South Africa. Helminth and protozoan parasites were found in faeces of 240 dogs with an overall prevalence of 82.5 % (helminth parasites 93.1 % and protozoan parasites 6.9 %). The following parasites and their prevalences were detected; *Ancylostoma* sp. (53.8 %), *Trichuris vulpis* (7.9 %), *Spirocerca lupi* (5.4 %), *Toxocara canis* (7.9 %), *Toxascaris leonina* (0.4 %) *Giardia intestinalis* (5.6 %) and *Isospora* sp. (1.3 %). Dogs harbouring a single parasite species were more common (41.7 %) than those harbouring 2 (15 %) or multiple (2.1 %) species. *Ancylostoma* sp., *Toxocara canis* and *Giardia intestinalis* have zoonotic potential and were detected in 66.7 % of the samples.

Keywords: Durban, gastrointestinal parasites, intensity, prevalence, SPCA, stray dogs, zoonosis.

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INTRODUCTION

Gastrointestinal (GI) parasites are common pathogens in stray dogs and some are reservoirs of parasitic infections of humans, particularly in urban areas and especially in informal urban areas. Some of the important zoonotic diseases include visceral larva migrans due to *Toxocara canis*, cutaneous larva migrans caused by *Ancylostoma caninum* and *A. braziliensis*, giardiosis, cryptosporidiosis and echinococcosis[8]. Transmission may occur from dogs to humans directly or indirectly.

The prevalence of GI parasites may vary due to several factors, including geographical region, level of veterinary care before straying and habits of the animal[7]. In most cities in developing countries control of stray dogs is practically non-existent, resulting in an increased risk of exposure to zoonoses transmitted by these animals[19].

Several studies have demonstrated that stray dogs have a high prevalence of gastrointestinal parasites[18,19]. In South Africa there are reports on prevalence of GI parasites in dogs from resource-limited communities[16,17] and a metropolitan population from Pretoria[20]. Minaar *et al.*[16] examined 106 dogs and found *Ancylostoma* spp. as the most common helminth parasite followed by *T. canis.*

Information on GI parasites of urban stray dogs is lacking in South Africa and the purpose of this study was to provide baseline information on GI parasite infection of stray dogs on a local scale in the Durban metropole, South Africa.

MATERIALS AND METHODS

Source of samples

In this study a stray dog is defined as any dog roaming in a public place without its owner or a person who is responsible for it and consequently impounded by the Society for the Prevention of Cruelty to Animals (SPCA). Between August 2008 and January 2009, faecal samples were collected in plastic containers from 240 male and female stray dogs of ages varying between 6 months and 6 years. The dogs had been impounded by the SPCA, Durban and Coast, Springfield Park, and were accommodated in individual kennels. The faecal samples were collected from each dog at the 1st day of impoundment. The dogs were of a variety of breeds from various suburbs in the Durban metropole, South Africa.

Parasitological procedures

Fresh faecal samples were processed individually and examined microscopically for helminth eggs and protozoan cysts and/or oocysts after concentration by the modified formol-ether technique[13].

Briefly, 1 g of faeces was added to 7 mℓ of 10 % formol-saline in a 15 mℓ test tube. The content was mixed thoroughly and strained through a 200-μm aperture sieve and collected into another test tube. The suspension was centrifuged at 2000 rpm (Sigma 204, swing-out, rotor diameter 12 cm, *g*-force 536.6) for 3 min and the supernatant fluid decanted. The procedure was repeated by adding formol-saline to the sediment to make up 12 mℓ and centrifuged and the supernatant decanted. Eight mℓ of buffered-alcohol (H_2PO_4) solution was added to the sediment and the solution stirred using a wooden applicator to break up the sediment followed by addition of 4 mℓ of ether. The solution was vigorously shaken and centrifuged at 1500 rpm for 1 min, and the supernatant fluid decanted. The remaining sediment was diluted with 3 mℓ of normal saline and strained through a 200 μ aperture sieve into a clean 15 mℓ centrifuge tube. The filtrate was left to settle for 15 min and the supernatant fluid decanted. The sediment was transferred to a glass slide using a Pasteur pipette and the tube was rinsed with a few drops of saline to remove the last bits of sediment and examined under a light microscope. The number of eggs/cysts/oocysts were identified[18,24] , counted and expressed as eggs/cysts/oocysts per gram of faeces.

Data analysis

Faecal samples were recorded as positive if 1 egg/cyst/oocyst was observed in the faecal analysis. The prevalence of infection for each parasite was calculated as

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Table 1: **Prevalence and intensity of infection of stray dogs with gastrointestinal parasites** (*n* = 240).

Parasite species	Intensity of infection (eggs/cysts/oocysts/gram of faeces)					Prevalence (%)
	50–500 (%)	501–1000 (%)	1001–2000 (%)	2001–5000 (%)	>5000 (%)	
Ancylostoma sp.	40. (16.7)	37. (15.4)	25. (10.4)	18. (7.5)	9. (3.7)	129. (53.8)
Trichuris vulpis	7. (2.9)	4. (1.7)	3. (1.3)	2. (0.8)	3. (1.3)	19. (7.9)
Spirocerca lupi	5. (2.1)	5. (2.1)	2. (0.8)	0.	1. (0.4)	13. (5.4)
Toxocara canis	8. (3.3)	4. (1.7)	5. (2.1)	0.	2. (0.8)	19. (7.9)
Toxascaris leonina	0.	1. (0.4)	0.	0.	0.	1. (0.4)
Taenia sp.	0.	0.	0.	0.	1. (0.4)	1. (0.4)
Giardia intestinalis	4. (1.7)	6. (2.5)	1. (0.4)	2. (0.8)	0.	13. (5.4)
Isospora sp.	0.	1. (0.4)	1. (0.4)	1. (0.4)	0.	3. (1.3)
Total	64 (26.7)	58 (24.2)	37 (15.4)	23 (9.6)	16 (6.7)	198 (82.5)

the number of positive samples divided by the total number of samples tested expressed as a percentage . Intensity of infection was quantified by the number of eggs/cysts/oocysts for each parasite in a gram of faeces. The infection status of each dog was classified into either no infection, single or multiple infection.

RESULTS

The prevalence of GI parasites in stray dogs is shown in Table 1 and indicates that 82.5 % of the dogs were infected by 8 genera and/or species. *Ancylostoma* sp. had the highest prevalence (53.8 %) followed by *T. canis* and *Trichuris vulpis* (both 7.9 %) and the lowest was *Toxascaris leonina* and *Taenia* sp. (both 0.4 %). Species of zoonotic potential represented by *Ancylostoma* sp., *T. canis* and *Giardia* sp. were detected in 66.7 % of the samples (Table 2).

The observed infection status of GI parasites and the intensity of infection are shown in Tables 1 and 2, respectively. Intensities of 50–500 eggs/cysyts/oocysts per gram of faeces were recorded in 26.4 % of the dogs with *Ancylostoma* sp.-infected dogs contributing the highest percentage (16.7 %). A small proportion of the dogs (6.7 %) had more than 5000 eggs/cysts/oocysts per gram of faeces with *Ancylostoma* sp.-infected dogs again contributing the highest percentage (3.7 %). No dogs infected with *T. leonina, Giardia intestinalis* or *Isospora* sp. had an intensity of infection >5000.

Infection with 1 species of parasite was more common (41.7 %) than double infection (15 %) and multiple infection (2.1 %) (Table 2). A single infection of *Ancylostoma* sp., *T. vulpis, T. canis* and *Giardia intestinalis* was recorded in 84 (35 %), 6 (2.5 %), 5 (2.1 %) and 5 (2.1 %) dogs respectively (Table 2).

DISCUSSION

Helminth parasites were more prevalent (6 species/groups) than protozoans (2 species/group). A large proportion of dogs had a low to medium intensity of infection by helminth parasites while the protozoan parasites had an evenly distributed intensity of infection and no dogs were recorded with intensity of infection >5000 oocysts/cysts per gram of faeces.

The overall prevalence of GIT parasites in stray dogs found in this study revealed a very high level of infection comparable with studies elsewhere[18]. Helminth infection predominated over protozoan infections in this study and this is similar to other studies[14]. The history of deworming of the dogs in our study was unknown and they might have been a mixture of dogs which were routinely dewormed before straying and those that were not dewormed. However, the increased helminth infection and reduced protozoan infection is most likely due to decreased routine use of anthelmintics in the stray dogs in contrast to what has been observed in other studies[3].

Ancylostoma sp. was the most prevalent parasite species and this is similar to findings from other studies[16,18,20,27]. The species of *Ancylostoma* are the most pathogenic in dogs and are also involved in human infection as the cause of cutaneous larva migrans[11]. The high prevalence suggests that the environmental conditions in Durban are conducive for the survival and transmission of the parasite, but reports on human infection are nonexistent. There is a possibility that *Ancylostoma* sp. might have developed resistance to the common anthelmintics[16] as some dogs from this study must have been regularly dewormed before straying.

Prevalence of *T. canis* observed in this study is comparable with that reported in Zimbabwe[18] but lower than what has been reported in dogs from resource-poor communities in South Africa[16]. The difference might have been due to the differences in the age distribution of dogs sampled as young dogs that acquire infection *via* congenital transmission tend to have a high prevalence compared with adults[24].

Trichuris vulpis is one of the common intestinal helminiths in dogs in Europe[1,5,6,21]. The prevalence of 7.9% from this study fell within the wide range of values that have been reported by the above authors. Surprisingly, the parasite was absent in the previous studies in South Africa[16,17] but reported in stray dogs in neighbouring Zimbabwe[18]. Human infections by *T. vulpis* have been reported[9,12,25] and have been attributed to humans being in continuous contact with environments contaminated by infected dogs.

The prevalence of *S. lupi* in dogs in some parts of South Africa has been reported and in urban stray dogs in Zimbabwe[15,17,18] with rates comparable to our study. However, the prevalence rate recorded from our study is on the lower side compared with what has been reported elsewhere[2,4,10]. Variation in prevalence of this parasite has been mainly attributed to high prevalence of intermediate and paratenic hosts and whether the dogs are stray, farm dogs or pets[26].

Giardia intestinalis was the most prevalent

Table 2: **Infection status of stray dogs with gastrointestinal parasites.**

Infection status	Number of samples	Prevalence (%)
1. No infection	94	39.2
2. Single infection	100	41.7
Ancylostoma sp.	84	35
Trichuris vulpis	6	2.5
Toxocara canis	5	2.1
Giardia intestinalis	5	2.1
3. Double infection	36	15
4. Multiple infection	5	2.1

protozoan recorded in this study, similar to what has been reported in other studies[3,11,22]. In a similar study in Zimbabwe[18], *Giardia* intestinalis was second in prevalence to *Cryptosporidium* sp., a protozoan which was surprisingly absent from our study despite the use of a sensitive technique[3]. High prevalence of *Giardia* in dogs in Australia has been attributed to the fact that most of the anthelmintics do not interfere in the development of the parasite and the ability to colonise niches previously occupied by parasites such as *T. canis* and *Dipylidium caninum*[3]. This does not seem to be the case for the recorded prevalence of *Giardia intestinalis* as the parasite was also recorded in dogs with multiple infections involving helminth parasites.

Isospora sp. was recovered with a prevalence of 1.3 % and has been reported as an important cause of diarrhoea, especially in puppies[23].

The results from this study serve as baseline information on the potential risk posed by stray dogs to urban environmental contamination by zoonotic parasites.

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