

Prevalence of *Toxocara cati* and other intestinal helminths in stray cats in Shiraz, Iran

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Abstract. Toxocariasis is a parasitic zoonosis with worldwide distribution that affects both cats and dogs. Necropsy of 114 stray cats from Shiraz revealed that 106 (92.9%) stray cats were infected at least with one of the intestinal helminth species. The overall infection rates in stray cats infected with cestoda and nematoda were 105(99.1%) and 101(95.3%) respectively. The detected cestodes were *Joyeuxiella pasqualei* (34.3%), *Dipylidium caninum* (49.5%), *Taenia taeniaeformis* (12.3%), *Spirometra* sp. (3.8%) and the detected nematodes were *Physaloptera* sp. (44.6%), *Toxocara cati* (42.6%) and *Toxascaris leonina* (12.9%). The study revealed that *T. cati* was one of the most frequently detected intestinal helminths, which is an important source of zoonotic helminths.

INTRODUCTION

Cats and other felines act as definitive hosts for many intestinal parasites, some of which are responsible for several zoonotic diseases such as toxocariasis. It is caused by the ascarids of dogs and cats: *Toxocara canis* and *Toxocara cati*, respectively (Schantz, 1989; Despommier, 2003). The close association between cats and humans is responsible for the high endemicity of some of these zoonotic diseases (Overgaauw, 1997). The cestodes, nematodes and acanthocephalans have been identified in the intestine of stray and pet cats in various countries. Transmission of certain helminth parasites of carnivores to domestic animals and man causes economic problems and public health hazards (Dalimi & Mobedi, 1992). Therefore, the study of the parasite fauna of carnivores such as stray cats in various areas of countries is necessary for control of disease.

In Iran cats roam freely and can contaminate the environment by discharging

helminth eggs and protozoan cysts. In Shiraz, southern Iran, the intestinal helminthic fauna of cats and other felines has received little attention. So, this study was conducted to elucidate *T. cati* and the helminthic status of stray cats collected from different areas of Shiraz city, southern Iran.

MATERIALS AND METHODS

Samples collection

In a cross-sectional study from March 2005 to November 2006, a total of 114 stray cats were randomly collected from various residential areas of Shiraz, southern Iran.

Parasitological examination

Stray cats were caught and moved to an animal laboratory autopsy room for necropsy. After sedation and euthanasia with thiopental, the gastrointestinal tract from the pylorus to the caecum, was removed and collected in a glass dish. Each intestine was cut longitudinally and soaked in phosphate

Table 1. The association between the prevalence of gastrointestinal helminths and sex in stray cats

Sex	No. of cats examined	Cats infected (no)	Cats infected (%)	Statistical significance (χ^2)*
Female	66	63	95.5 ^a	a vs b; p>0.05
Male	48	43	89.6 ^b	
Total	114	106	92.9	

* Chi square test

buffered saline (pH 7.2) for ten minutes. The mucosa was scraped with a spatula into glass petri dish and the intestinal contents examined by naked eye and then by a dissecting microscope for helminths. Recovered helminths were fixed in 10% formalin. For staining of cestodes and nematodes, worms were removed from the fixative, washed several times with distilled water and subsequently stained using FAAL (Formalin, Alcohol ethylic, Azocarmine and Lactophenol) for 2-3 days. Identification of intestinal helminths was mainly based on keys described by Yamaguti (1953) and Schmidt (1970). Identification of various *Taenia* species was based on stained specimens and comparison of scolex and various types of proglottids as well as on morphologic measurements of small and large hooks of armed rostellum. Nematodes were identified based on cuticle, esophagus and spicule character.

Statistical analysis

Statistical evaluation was performed by χ^2 test and Statistical significance was defined as $p < 0.05$.

RESULTS

Of the 114 stray cats examined, 106 (92.9%) were positive for at least one of the parasites. Infection rate was marginally higher in female cats (95.5%) as compared to male cats (89.6%), but this difference was not significant ($p > 0.05$, Table 1).

In total, seven species of parasites were recovered. They were three species of nematoda (*T. cati*, *Physaloptera* sp. and *Toxascaris leonina*) and four species of cestoda (*Dipylidium caninum*, *Joyeuxiella pasqualei*, *Taenia taeniaeformis* and *Spirometra* sp.). Among the helminths, *D. caninum* (49.5%) was detected most frequently followed by *Spirometra* sp. and *J. pasqualei* (34.3%) (Table 2).

Toxocara cati was observed in both male and female stray cats (42.6%). There was a significant increase in the frequency of infection in the females as compared to the males ($p < 0.05$). Concurrent infection with two or more species was seen in most of the stray cats examined.

Table 2. Helminths found in stray cats in Shiraz

Species	No. of cats positive	Infection rate (%)
<i>Joyeuxiella pasqualei</i>	36	34.3
<i>Dipylidium caninum</i>	52	49.5
<i>Taenia taeniaeformis</i>	13	12.3
<i>Spirometra</i> sp.	4	3.8
<i>Toxocara cati</i>	26	42.6
<i>Physaloptera</i> sp.	45	44.6
<i>Toxascaris leonina</i>	4	12.9
Total *	106	92.9

* A total of 114 stray cats were examined

DISCUSSION

In this study we evaluated the prevalence of *T. cati* and other intestinal helminths in 114 stray cats in Shiraz city as such data was unavailable. A high prevalence of *T. cati* occurred in stray cats, a finding similar to that of a survey of stray cats in northern Iran (44%) (Sharif *et al.*, 2007). In an earlier report from Tehran area of Iran, it was stated that *T. cati* occurred in 31.4% of the domestic cats (Mirzayans, 1971). One study in Turkey showed that the prevalence of *T. cati* in cats examined was 62.5% (Yaman *et al.*, 2006), whereas, another study in Estonia reported an incidence of 48.2% in adult cats (Talvik *et al.*, 2006). The overall prevalence of *T. cati* in stray cats in our study (42.8%) is comparable to that of O'Loreain (1994) study in Dublin, Ireland (42%). Other findings in various parts of the world were reported by other researchers (Overgaauw, 1997; Robben *et al.*, 2004).

The sex of stray cats was not significantly associated with the prevalence of gastrointestinal helminths in this study despite the higher frequency in females (95.5%) compared with males (89.6%). A similar finding was reported by Malloy & Embil (1978).

Physaloptera sp., was recovered from the pyloric region of the cat's stomach, whereas other nematoda species were found in the small intestines. The prevalence of 44.6% for *Physaloptera* sp. found in this study was higher than that reported for wild cats in Khuzestan (4%) and in domestic cats in the Tehran (3.8%), area of Iran (Mirzayans, 1971; Farahnak *et al.*, 1998). Although there is no definite evidence implicating *T. leonina* as an aetiological agent in the human visceral larva migrans syndrome, several investigators have examined cats to look for this parasite. We found the parasite in 12.9% of stray cats. It is of interest to note that the data of Yamauchi *et al.* (1996) showed a high prevalence of this parasite in free roaming farm cats (82%). Labarthe *et al.* (2004) found *T. leonina* in 11.9% of cats studied in the metropolitan region of Rio de Janeiro, Brazil.

The prevalence of 49.5% for *D. caninum* in stray cats in this study is higher than that reported for cats from Germany (0.1%) and animal shelters of Netherlands (0.7%) (Barutzki & Schaper, 2003; Robben *et al.*, 2004). The prevalence of *J. pasqualei* in this study (34.3%) was less than what was reported by Yaman *et al.* (2006) in Hatay province, Turkey (50%) and Calvete *et al.* (1998) in stray cats from the mid-Ebro Valley, Spain (55.2%).

Spirometra mansonioides in wild cats was reported by Dalimi & Mobedi (1992) for the first time in Iran. In this study, the prevalence of *Spirometra* sp. in stray cats (4.8%) was lower than that found by Sohn & Chai (2005) in Republic of Korea or by Ugarte *et al.* (2005) in feral cat in Manawatu, New Zealand. This might be due to rapid disintegration of this cestoda, which makes it difficult to detect.

Taenia taeniaeformis prevalence in stray cats (12.3%) was greater than that found in the Netherlands (3%) by Robben *et al.* (2004) and by Umeche & Ima (1988) in Calabar, Nigeria (9.6%), but less than that reported by Vanparijs *et al.* (1991) for stray cats in Belgium (20%) or that reported by Schuster *et al.* (1997) for Germany (22%).

In conclusion, the high infection rate of *T. cati* and some gastrointestinal helminths in stray cats is considered to be critical from the viewpoint of public health importance, some of which are responsible for several zoonotic diseases such as visceral larva migrans and ocular larva migrans. Hence, it is imperative that appropriate control strategies and measures be implemented to prevent and control the infection of stray cats with helminths in Shiraz and elsewhere in Iran.

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