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Short communication

Prevalence of *Toxocara cati* in pet cats and it ' s zoonotic importance in Tabriz city, Iran

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Summary

Toxocara species are common Ascaridoid nematodes of cats and dogs. Notably, *Toxocara* is known as a common nematode of cats in various parts of Iran. Therefore, the present study was performed on *Toxocara cati* from pet cats in Tabriz, East-Azerbaijan Province, North-west Iran, based on morphological approaches, and also the prevalence rate of *Toxocara cati*. From February to November 2014, a total of 50 household cats were randomly selected from different geographic areas of Tabriz city, and fresh fecal samples were collected by owners or veterinarians that underwent clinical examination in three various veterinary clinics placed in the different regions of (north, south, east and west) the Tabriz city. Four out of 50 cats (8%) were found to be infected with *Toxocara* nematodes. All the species were approved as *T. cati* based on morphological characteristics. The intensity of infection ranged from one to a maximum of 29 eggs per cat. Importantly, the most prevalent ascaridoid nematode of the examined pet cats in the study area was *T. cati*. This issue has an important role in spreading of the eggs in the environment and impact on human toxocariasis.

Keywords: *Toxocara cati*, Pet cats, Prevalence, Tabriz, Iran.

Introduction

Toxocara species are known as the common Ascaridoid nematodes of cats and dogs worldwide. These parasites are causative agents of toxocariasis, a zoonotic parasitic disease in humans with worldwide distribution. In this regard, *T. canis* and *T. cati* has been reported as the most widespread species of *Toxocara* in dogs and cats, respectively (Aghamolaie et al., 2019). Humans are infected by the ingestion of *Toxocara* eggs from contaminated soil, raw

vegetables, or unwashed hands. The larvae appear in the intestine and migrate to muscle and neurological tissues, where they can remain for several years without development, or reproduction (Holland and Smith, 2006). Some peoples can be infected through consuming the larvae present in undercooked meat of infected paratenic hosts like chickens, cattle, sheep, or earthworms. The clinical signs of toxocariasis depend on where in the body infected. Several forms of toxocariasis are previously presented, namely visceral larva migrans, covert toxocariasis, ocular larva migrans, and neurotoxocariasis (Lötsch et al., 2017).

Recent epidemiological studies indicated the widespread prevalence of human infection with *Toxocara* globally (Choobineh et al., 2019). Of note, *Toxocara* in cats plays an important role in human health. The prevalence of *T. cati* in cats has been investigated to vary from 0.8 to 59.3% in various parts of the world (Yamamoto et al., 2009). In Iran, cats live freely in urban and rural areas, shedding *Toxocara* eggs in the environment, which are transmittable to humans. In this regards, growing evidence demonstrate the contamination of the soil in public places with *Toxocara* eggs in Iran (Motazedian et al., 2006). It was previously reported that the prevalence of *T. cati* in cats ranged from 8% to 52.8% in various regions of Iran (Sadjjadi et al., 2001).

Therefore, the present study was conducted on the prevalence of *Toxocara cati* from Pet cats in Tabriz, based on morphological approaches, and also the prevalence rate of *Toxocara cati*.

Materials and Methods

Sample collection

From February to November 2014, a total of 50 household cats were randomly selected from different geographic areas (north, south, east, and west) of Tabriz city, and fresh fecal samples were collected by owners or veterinarians that underwent a clinical examination in three different veterinary clinics located in the same areas. At clinical examination, data about individual features and management of animals were recorded by clinicians.

Fecal Examination

Feces were stored at 4°C and examined within 48 hours. A macroscopic examination was first performed. Subsequently, each fecal sample was divided into two groups. In the direct propagation method, a small amount of stool sample was mixed with a drop of physiological serum on a slide. After placing a slide on it, it was examined microscopically. In the

formalin-ether method, dissolve some of the feces in 10 ml of 10% formalin and shake 7 ml of the filtered suspension vigorously after adding ether to it and centrifuge at 2000 rpm for 2 minutes and then Logul was added to the lower sediment and examined under a microscope and McMaster technique that the parasite eggs were differentiated according to their morphologic characteristics. The criteria for measuring the severity of the parasite in cat feces was up to three egg in any microscopic field.

Statistical analysis

Statistical analyses were performed using SPSS 20.0. To check for statistic difference, chi-square tests were adapted. A p-value of < 0.05 was considered to be significant.

Results

The findings of this study presented that in general, four out of 50 pet cats (8 %) were found infected with *T. cati* (Table 1). The intensity of infection ranged from one to a maximum of 29 eggs per cat (Table 2 and Figure 1).

Table 1. The infection rate of *T. cati* in pet cats in Tabriz, Iran.

Animals	**Number**	**Percent**	**P < 0/05**
Infected cats	4	8	+
Non-infected cats	46	92	-
Total	50	100	-

Table 2. The intensity of *T. cati* infection in Pet cats in Tabriz, Iran**.**

Animals		**Statistic**	**P < 0/05**
No. of infected cats		4	_
No. of *Toxocara* in each cat	Minimum	1	-
	Maximum	29	+
	Mean	9.25	+
	SD	11.46	-

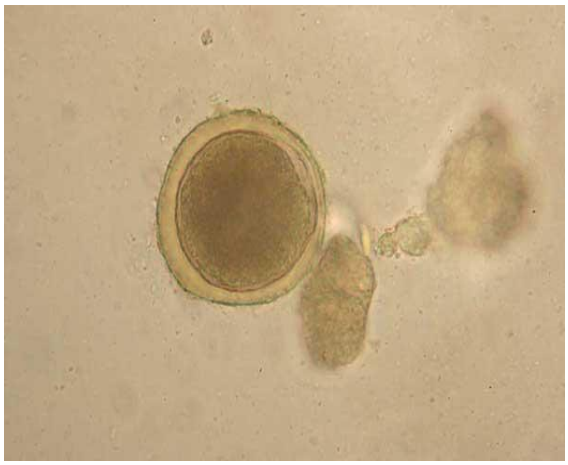

Fig. 1. *T. cati* egg in fecal smear (×400).

Discussion

In a similar study, a previous study indicated the prevalence of *T. cati* on 108 cats in Shiraz 52.8% (Sadjjadi et al., 2001). Another study recently determined that the infection rate of *T. cati* on 114 pet cats in Shiraz was 42.6% (Zibaei et al., 2017). According to the results of other studies from North (Sharif et al., 2007), Northwest, and Northeast of Iran (Borji et al., 2011), the prevalence of infection with *T. cati* was 8-44%, 8%, and 28.8%, respectively. Similar findings have been reported on the prevalence of *T. cati* in central parts of Iran; for example, in Kashan, 113 pet cats presented a prevalence of 13.3% (Arbabi and Hooshyar, 2009). Moreover, the prevalence of *T. cati* in Tehran was 9.4% (Pezeshki et al., 2012). One of the purpose of the current study was to determine the relationship between the prevalence of *Toxocara* with age and sex of the cats. Although, previous studies proposed that there was no remarkable difference in the prevalence of infection between male and female cats (Sadjjadi et al., 2001); and cats with less than six months old being more likely to be infected with *T. cati* than older cats (Borji et al., 2011). They also reported the prevalence of infection was higher in younger cats when compared to older animals; however, the difference was not considerable (Sadjjadi et al., 2001).

In the present study, the intensity of infection ranged from one to a maximum of 29 eggs per cat. In a similar report from Shiraz, the mean intensity of infection with *T. cati* was 6.52, with a range of 1 to 50 worms per cat (Sadjjadi et al., 2001). Another previous study indicated that the intensity of infection ranged from 1 to 32 worms per cat, with a mean of 7.3 (Sharif et al., 2007). In another study in pet cats from the north of Iran, the mean intensity of infection with *T. cati* in cats was an average of 3 *T. cati*

in each cat (Changizi et al., 2007). This issue is considerable to respect to the distribution of *T. cati* eggs in the environment because every female *Toxocara* discharge about 200000 eggs per day (Maleki et al., 2018; Berrett et al., 2017) that will have the potential of transmission to human and paratenic hosts after development in the soil.

Interestingly, the present findings are coincident with the previous studies in Iran (Sadjjadi et al., 2001; Choobineh et al., 2019), demonstrating that the infection of cats with *Toxocara* nematodes in this city is notable. The high infection rate of *T. cati* and high intensity of infection have a crucial role in the distribution of *Toxocara* eggs into the environment and also their transmission to humans.

Conclusion

The result of the present study points that *T. cati*, as the most prevalent ascaridoid nematode of cats in the study region, might have the most important role in human toxocariasis in that area, but further studies on human cases are essential, which will better clarify this issue.

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Conflict of interest statement

There is no conflict of interest.

Ethical approval

No applicable

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