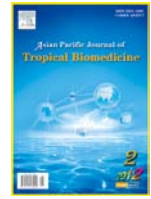


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# Contamination of soil and grass to *Toxocara* spp. eggs in public parks of Qazvin, Iran

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## ABSTRACT

**Objective:** To define contamination of parks to *Toxocara* eggs in Qazvin city which is the nearest province center to Tehran, capital of Iran. **Methods:** A total of 180 soil and grass samples were collected from three city parks and examined for *Toxocara* spp. eggs by sedimentation–flotation method. **Results:** Overall, 5.8% of samples were positive for *Toxocara* spp. eggs with contamination rate of 3.15% and 8.42% for soil and grass samples ( $P>0.05$ ), respectively. The frequency of egg numbers in positive samples was between 1 to 5 and all unembryonated. **Conclusions:** It seems that the low frequency of pet dogs is the main cause of low contamination by *Toxocara* spp. eggs in this city.

## 1. Introduction

*Toxocara canis* (*T. canis*) and *Toxocara cati* (*T. cati*) are cosmopolitan common intestinal nematodes in dogs and cats, respectively. Human infection is typically caused by ingestion of embryonated eggs with water, raw vegetables or hand to mouth transmission. Also, infection by the parasite may occur by ingestion of larvae in raw tissues of paratenic hosts. Having a dog as a pet, local food habits, abundance of stray dogs and cats, poor sanitation, low socioeconomic status, and playing in sandpits are considered as risk factors for toxocariasis. Human Toxocariasis is presented as visceral larva migrans, ocular larva migrans, covert toxocariasis, and common toxocariasis[1].

Public parks are more prone to contamination by eggs of intestinal roundworms of dogs and cats[2–5]. In Iran, tendency to spend leisure time in public parks has increased which is likely due to rapid expansion of apartment life within the 2–3 recent decades in the country. People who are going to these places for recreation may be at risk of infection by

intestinal parasites of animals. Regarding the lack of any study about the environmental contamination by *Toxocara* spp. eggs in the city of Qazvin, the present study was designed to define the contamination of soil and grass to *Toxocara* eggs in public parks of the city.

## 2. Materials and methods

This study was carried out in the city of Qazvin, located 150 km north–west of Tehran, Iran. The climate of the city is cold and snowy in winter and temperate in summer with a mean rainfall of 318 mm/year and a mean yearly temperature of 26 °C. Averagely, 107 days per year is glacial in the area with relative humidity of 49%–57%.

Grass and superficial layer of soil samples were collected from 3 public parks during November 2010 to June 2011. The parks were in 3 different zones including park 1 ( $n=30$ ) in south, park 2 ( $n=60$ ) in north, and park 3 ( $n=100$ ) in the central part of the city. Two samples of both soil and grass were collected from every 500 m<sup>2</sup> in each park; half of those grass and the other half soil samples. Thirty to 40 g of grass and 150–200 g of soil samples were taken from each site. Soil samples were taken at a depth 1 to 2 cm around the trees and flowers

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Each soil sample was dried for 2–5 days at room temperature and then sifted through a 150  $\mu$  m mesh sieve. Forty to 50 g of powdery soil was placed in a plastic beaker and suspended with 500 mL 0.05% Tween20 solution in water. After 5 minutes, the liquid was passed through a 2-layer unsterile gauze and transferred into a sedimentation beaker. Rinsing of soil was repeated twice as described above and a total of 1.5 L of liquid was transferred into the sedimentation beaker. After 24 h incubation at laboratory, the supernatant was drained and the sediment was transferred into three to four 15 mL centrifuge tubes and centrifuged at 2 000 rpm for 5 min. After decanting the liquid, a hyper saturated sugar solution was mixed with sediment and the tubes were filled with the solution. Later, a cover slip was left on the top of each tube for 15 min followed by microscopic examination for detection of *Toxocara* eggs at 100 $\times$  magnification. The sedimentation–flotation procedure used for grass samples was similar to soil samples except the lack of preliminary drying and sifting process for grass samples. No attempt was made to identify the species of the parasites.

Data were analyzed using Z–test.

### 3. Results

Out of 190 samples examined, 5.8% were positive for *Toxocara* spp. eggs. The contamination rate was 3.15% for soil and 8.42% for grass samples ( $P>0.05$ ). From 11 positive cases, 7 (63.6%) samples were found to have only one egg, 1 (9.1%) two eggs, 1 (9.1%) four eggs, and 2 (18.2%) five eggs. All eggs found in positive samples were unembryonated. The results of the soil and grass samples are shown in Tables 1.

**Table 1**  
Contamination of soil and grass by *Toxocara* spp. eggs in 3 public parks in Qazvin city, Iran.

Sample		Total (n)	Positive number (n)	Positive rate (%)
Soil	Park 1	15	0	0.0
	Park 2	30	2	6.6
	Park 3	50	1	2.0
Grass	Park 1	15	1	6.6
	Park 2	30	4	13.3
	Park 3	50	3	6.0

Also, larvae similar to strongylidae and small free living nematodes were observed in approximately 100% of grass samples and less than 10% of soil samples. Moreover, mites were present at least in one third of soil and grass samples. Identification of mites and larvae was not among the objectives of this study.

### 4. Discussion

In the present study, all three parks were contaminated

by *Toxocara* spp. eggs, however the density of eggs in both soil and grass samples was low. In general, parks are mainly contaminated by the eggs of parasites through excreted feces of dogs and cats[2–5]. In Iran, the stray dogs and cats are likely the main sources for contamination of parks by *Toxocara* spp. eggs, as the animals are frequently present all over the country and can freely enter the parks, especially those living around the cities.

Contamination of public parks by *Toxocara* spp. eggs was lower in Qazvin (5.8%) compared to Khorram Abad (63.3%) located in western part of Iran[6], however, it is almost similar to the results reported from Urumia (7.8%) in North–West of Iran and Shiraz (6.3%) in southern part of Iran[7,8]. Lower prevalence of parasitic eggs in Qazvin compared with Khorram Abad may be due to lower number of stray dogs and cats and also the lower prevalence of *Toxocara* spp. in the animals present in Qazvin. There is no data available regarding the prevalence of parasites in dogs and cats in Qazvin, but 60% of stray dogs in the city of Sari located in northern Iran[9], 13.3% of stray cats in the city of Kashan situated in central Iran[10], 42.6% of stray cats in Shiraz[11], and 8% of stray cats in Zanjan, north–west of Iran[12] are reported to be positive for *Toxocara* spp. eggs. In comparison with other countries, the contamination rate of parks by *Toxocara* eggs was lower in our study than in Brazil[13] and Venezuela[14] which is perhaps related to the frequency of pet dogs in parks. While walking with a dog in the cities is a usual hobby in most countries, the pet dogs are rarely seen in public parks of Iran. Although, there are many dogs in rural areas playing an important role as watchdog, especially in traditional livestock, however, most Iranian populations are Muslims and according to religious recommendations they avoid touching dog's body. The religious belief is a limiting factor for keeping dog as a pet among Muslims and this may be a possible reason for why the contamination rate by *Toxocara* spp. eggs is low in the parks investigated in the present study.

In the present study, contamination to *Toxocara* eggs of the grass samples were significantly higher than that of soil samples. It seems that the main cause for the difference to be related with the use of animal fertilizers. In Iran, fertilizers are frequently used for increasing the agricultural yields in traditional farming and also strengthening grass and flowers in gardens and public parks. The fertilizers accumulated outdoor may be secondarily contaminated by cats and dogs feces containing eggs of *Toxocara* spp.

It is also possible that the main source of public parks contamination to *Toxocara* spp. eggs to be associated with the free entree of cats and dogs into public parks leading to contamination of different places with the egg-containing feces of the animals. Studies have shown that contamination of parks by dogs and cats feces eventually leads to contamination of soil and grass. *Toxocara* spp. was identified in 16.7% of dog feces and 55% of soil samples in places like city squares and parks of Venezuela[14]; 4.9% of

fresh samples of dog feces and 4% of soil samples in city squares in Brazil[15]; and 7% of fecal samples on beaches and parks and 14% of grass samples of public parks in Costa Rica[2].

In our study, intact feces of animals were not found around the sampling areas. This is probably due to low frequency of animal entry into parks, defecation of animals in other places, and decomposing of feces at the time of sampling. These findings can explain the low prevalence and intensity of *Toxocara* spp. eggs within the public parks investigated through this work. Hence, it seems that the public parks could not be considered as important source for transmission of *Toxocara* to human in this county.

### Conflict of interest statement

We declare that we have no conflict of interest.

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