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Short Communication

Soil Contamination with *Toxocara* Spp. Eggs in Public Parks of Mashhad and Khaf, North East of Iran

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Abstract

Background: Toxocariasis is an important disease caused by the larvae of parasitic worms such as *Toxocara canis* and *T. cati*. Public parks can be the source of toxocariasis for small children. This survey was conducted to determine the prevalence of *Toxocara* spp. ova in parks of Mashhad and Khaf northeastern Iran.

Methods: In this descriptive cross-sectional study, performed in November 2011 to June 2012, overall, 340 soil samples were collected from 39 parks of Mashhad and 29 parks in Khaf city. Flotation method and direct smear were used, and the samples were evaluated using a light microscope. The results were analyzed using SPSS version 19 and Chi-square test.

Results: In the evaluation of 195 and 145 soil samples, 18 (9.2%) and 16 cases (11.3%) of contamination with *Toxocara* spp. eggs were detected, respectively.

Conclusion: Although the prevalence of *Toxocara* eggs in soil samples was low, parks can be a source of *Toxocara* infection of children in these areas.

Introduction

Toxocariasis is a zoonotic parasitic disease. Humans are infected by ingesting infective eggs of dog or cat ascarid *Toxocara canis* or *T. cati*. Larvae can migrate to various body organs through blood circula-

tion and cause visceral and ocular larva migrans syndromes. When humans are infected by these parasites, different manifestations including skin lesion, urticaria, eczema, and itching are observed.

The most involved organs are brain, liver, lungs, and eyes. Symptoms of toxocariasis include fever, headache, cough, sneeze, stomach discomfort or pain, asthma, and pneumonia (1, 2). Most infections are probably asymptomatic or covert (2, 3).

Patients with toxocariasis whose symptoms do not resemble to visceral larva migrans or ocular larva migrans described as covert toxocariasis. The symptoms are nonspecific and include abdominal pain, anorexia, and behavior disturbances, cervical adenitis, wheezing, limb pains, and fever (3, 4).

Due to lack of fences around parks, soil is easily contaminated by the feces of dogs and cats, which contain the larvae of these parasites. People with frequent visits to parks (especially children) are more likely to develop this disease (5).

In Turkey, the prevalence of *Toxocara* species was 68.28% in parks without fences, whereas no contamination was reported in fenced parks (5). In addition, in Czech Republic, soil contamination with *Toxocara* eggs in urban (Prague) and rural areas was evaluated. The highest infection rate (45%) was related to backyards, which were home to feral cats (6).

In different studies in European, Asian, and Latin American countries, the existence of this parasite was reported in pet boarding facilities and visiting areas, which demonstrates the importance of infection prevention (7-12).

Mashhad City, as the most important pilgrimage destination in Iran, attracts millions of tourists every year. Many parks and playgrounds are located in this major city. Unfortunately, in Khorasan Province, particularly in Mashhad, and Khaf City, no reliable parasitological study on the prevalence of *Toxocara* eggs in public parks has been performed. Therefore, this study aimed to detect the prevalence of contamination public parks with *Toxocara* spp. eggs in these areas.

Materials and Methods

This descriptive, cross-sectional study was performed on 340 soil samples of Mashhad

(195 samples) and Khaf (145 samples) parks, using simple random method, between November 2011 June 2012. Khaf City is located in south east of Khorasan Razavi Province. Due to the large number of parks in Mashhad, the lists of parks in 13 regions of Mashhad and urban districts of Khaf were obtained, and three parks were randomly selected from each urban area of Mashhad. Sampling was performed in each selected park (39 parks). In Khaf City, sampling was also randomly performed in 29 parks.

After visiting the parks and identifying the geographical locations, the samples were obtained from each cardinal direction and the center of parks. First, the soil surface was removed by a metal spoon, and then 150 to 200 g of soil from 3 cm soil depth was transferred to a special container. Some water was poured into the container to keep the soil moist, and the samples were transferred to laboratory refrigerators.

After sieving the soil samples (using a simple sieve), they were transferred to the flask to be mixed with water. Then, this solution was filtered using 250 and 150 micron sieves, respectively. After 24 hours, the supernatant was poured out and the obtained sediment was used for testing by two methods of flotation with sheather's sugar solution and direct smear. Finally, the samples were examined using a light microscope (Olympus cx21 with a magnification of $\times 400$).

Results

In the evaluation of 195 soil samples of Mashhad parks, obtained by flotation method, 15 (7.7%) samples were positive, also, of 145 Khaf soil samples, 15 (10.3%) were positive for *Toxocara* spp. eggs. In addition, the results of direct method showed that 4 samples (2.1%) in Mashhad and 4 samples (2.8%) in Khaf were positive for *Toxocara* eggs. Prevalence of parasite eggs in soil samples of Khaf parks was higher, compared to Mashhad parks.

Discussion

In this investigation after the evaluation of soil samples using two methods of flotation and direct smear, soil contamination rates of Mashhad and Khaf parks were reported as 9.2% and 11.3%, respectively. In Iran, 10% of Tehran parks were contaminated by *Toxocara* eggs, which the results were quite similar to the results, related to Mashhad (13). Furthermore, Tavasoli et al. studied 102 soil samples of 26 parks in Urmia, Iran. Eight samples were reported positive in four parks (7.8%); which are lower than Mashhad and may be due to the climate of this city (14). The contamination rate of *Toxocara* spp. eggs in different parts of Iran has been reported, e.g., in Abadan (29.2%) (15), Khoramabad 22.2% (16), and Shiraz 6.3% (17).

Based on previously conducted studies, it is essential to mention regional climate including temperature, humidity, and dryness, as well as soil type, laboratory methods, people's attitudes toward pets. All these factors greatly influence the conclusions of study; therefore, comparison between the results of different studies is not logical, however, it should be noted that detection of *Toxocara* eggs in public places is necessary for controlling and preventing toxocariasis.

Conclusion

In spite of low number of eggs found in this investigation here are concerns regarding the spread of toxocariasis in humans and children may be at risk of visceral larva migrans due to direct contact with soil of playgrounds of parks. Therefore, the authorities of Mashhad and Khaf should pay considerable attention to disease control of these zoonotic infections. It can be achieved by increasing of hygiene education to people and pet owners and controlling the stray cat and dog.

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