

Prevalence of helminth ova in soil samples from public places in Shiraz

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معدل انتشار بيوض الديدان الطفيلية في عينات التربة المأخوذة من الأماكن العامة في Shiraz
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الخلاصة: تم أخذ 112 عينة من تربة 26 موقعاً في Shiraz في جنوب جمهورية إيران الإسلامية، بُعِيَة تحديد معدل انتشار بيوض الديدان الطفيلية في الأماكن العامة وملاعب الأطفال، وذلك خلال المدة من أيلول/سبتمبر 2002 حتى أيلول/سبتمبر 2003. فوجدت السهمية الهربية في 7 عينات (6.3%) وبيوض الصفر الخراطيني (الأسكاريس) في عينتين، ويرقات تشبه الاسطوانية البرازية مورفولوجياً في 3 عينات، كما لوحظ وجود أكرينات البيض المتكيسة في 4 عينات. ولم يلاحظ أي تلوث في موسم الجفاف.

ABSTRACT To determine the prevalence of helminth eggs in public places and children's playgrounds, 112 soil samples were collected in 26 sites in Shiraz, southern Islamic Republic of Iran, during September 2002–September 2003. *Toxocara cati* ova were found in 7 (6.3%) samples, 2 had *Ascaris lumbricoides* ova, 3 had larvae morphologically similar to *Strongyloides stercoralis*. *Coccidia* oocysts were also observed in 4 samples. No contamination was observed during the dry season.

Prévalence des œufs d'helminthes dans des échantillons de sol prélevés dans des lieux publics à Chiraz

RÉSUMÉ Afin de déterminer la prévalence des œufs d'helminthes dans des lieux publics et des aires de jeux pour enfants, 112 échantillons de sol ont été prélevés sur 26 sites à Chiraz (sud de la République islamique d'Iran) entre septembre 2002 et septembre 2003. Des œufs de *Toxocara cati* ont été trouvés dans 7 échantillons (6,3 %), 2 échantillons avaient des œufs d'*Ascaris lumbricoides*, 3 avaient des larves morphologiquement similaires à celles de *Strongyloides stercoralis*. Des oocytes de *coccidies* ont été également observés dans 4 échantillons. Aucune contamination n'a été notée pendant la saison sèche.

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Introduction

Toxocara cati and *T. canis* are cosmopolitan parasites of cats and dogs and have been most commonly incriminated as the cause of visceral larva migrans and ocular larva migrans [1–3]. Direct contact with animals that harbour adult *Toxocara* worms is unlikely to give rise to infection in humans; the ova must undergo a period of development in the environment before they can become infective [1].

Previous reports have noted the presence of *Toxocara* in stray cats, stray dogs and primary-school children in Shiraz [2–4]; in addition, *Toxoplasma* oocysts were found in stray cats and antibody response to *Toxoplasma* in primary-school children [5,6]. These findings indicate that contact with soil in public places is a potential source of contamination. Stray dogs and cats roam freely in residential areas and public places in Shiraz, and the soil in these places is easily contaminated with their faeces.

As there is a large population of stray dogs and cats in Shiraz and no studies have been made on the extent of contamination of the environment with helminth eggs, this study was undertaken to determine the prevalence of helminth eggs in public places and playgrounds.

Methods

From September 2002 to September 2003, 112 soil samples were collected by cluster random sampling from the uppermost centimetre (15 × 12 cm²) of soil in 26 public places and children's playgrounds in 4 regions of Shiraz, Southern Iran. Sampling was carried out in all 4 seasons of the year.

Selection of collecting areas was confined to 4 divisions, south-western

(region 1), north-western (region 4), south-eastern (region 3) and north-eastern (region 2) Shiraz. These are the divisions used by the Education and Culture Organization of Shiraz.

The samples were first washed with running tap water, using a set of 3 sieves of mesh width 250 µm, 120 µm and 30 µm. The residue remaining in the 30 µm sieve was flushed into a 250 mL graduated cylinder. The liquid was decanted after 15 minutes sedimentation then the sediment was transferred to a centrifuge tube, shaken with saline solution (specific gravity 1.19) and concentrated by zinc sulfate centrifugation–flotation (centrifugation for 5 minutes at 2500 rpm), and then identified microscopically. All samples were processed twice and recorded as positive if eggs or larvae were found at least once.

Results

Table 1 shows the distribution of soil samples from 26 sites in Shiraz. Helminth eggs were recovered from 12 of the 112 soil samples. The results during the whole year and the wet (autumn/winter) seasons are also summarized in Table 1. No contamination was observed during the dry season.

Eggs of *T. cati* were recovered from 7 samples (Table 1), *Ascaris lumbricoides* ova from 2 and larvae morphologically similar to *Strongyloides stercoralis* from 3. In addition, 4 samples contained oocysts of coccidia.

The burden of *T. cati* ova during the wet season and the whole year is shown in Table 1. The highest contamination rate was in downtown public places in the 3rd (22.2%) and the 4th (20.0%) regions. No contamination was observed during the dry season.

Table 1 Parasitic burden of *Toxocara cati* and helminth ova in the soil in public places in four regions of Shiraz during the whole year and the wet season, 2002

Region	No. of samples ^a	Contaminated with helminth ova				Contaminated with <i>Toxocara cati</i> ova			
		All year		Wet season ^b		All year		Wet season ^b	
		No.	%	No.	%	No.	%	No.	%
1	36	0	–	0	–	0	–	0	–
2	28	4	14.4	4	28.6	2	7.1	2	14.3
3	18	3	16.7	3	33.2	2	11.1	2	22.3
4	30	5	16.7	5	33.2	3	10.0	3	20.0
Total	112	12	10.7	12	21.4	7	6.3	7	12.5

^aNo. of samples varies in accordance with the area of the region.

^bWet season is autumn and winter. No contamination was found during the dry season.

Discussion

Toxocara cati eggs were recovered from 6.3% of soil samples tested. Earlier studies in Shiraz indicated an infection rate of 52.8% in stray cats [2] and 2.9% in stray dogs [4]; around 25% of sera samples from primary-school children were positive for *Toxocara* [5]. In other studies, 10.78% of stray cats were infected and seropositivity for *Toxoplasma gondii* was 23.39% in primary-school children [3,6].

Our findings indicate that there is a possibility of human infection from the environment in public places and playgrounds in Shiraz. Embryonated ova can remain viable for a considerable length of time in soil [1]. Small children are considered at risk from geohelminth contamination because of their lifestyle and their playing environment, especially those children with a history of pica [7]. Public parks, particularly playgrounds, may be an important source of contamination [8].

Our findings on the prevalence of *T. cati* eggs corroborate those of other researchers: contamination with *Toxocara* eggs is widespread in the soil in public places [9–11].

The high prevalence of *T. cati* ova in the soil samples from downtown parks in the 3rd and 4th regions of Shiraz is evidence that stray dogs and cats were infected and defecate in these areas. These findings are consistent with the parasite burden in children and stray cats in these areas [2,5]. The presence of *Toxocara* eggs and larvae in these places emphasizes the risk to children who play there of visceral larvae migrans. Similar findings have been reported previously from Iraq and Jordan [12,13].

As humans are the final host for *Ascaris lumbricoides*, the presence of this parasite probably reflects the lack of public latrines. The study demonstrates that the soil in public places and playgrounds in Shiraz is a potential source of contamination. Despite the high temperatures prevalent in Shiraz in summer, clearly identifiable ova were present in many of the specimens collected. The results are of public health importance for this area. Because of the mild temperatures in winter and spring, people often spend their time in public places, especially at night.

For this reason, preventive measures should be implemented. These could include health education of the public, hygienic waste disposal, good personal hygiene practices, control of stray dogs and cats and exclusion of dogs and cats from public places and children's playgrounds by fencing.

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