Canine toxocariasis in South East of Iran

Mohammad Mirzaei, Majid Fooladi

Shahid Bahonar University of Kerman, School of Veterinary Medicine, Pathobiology Department, Kerman, Iran.
Correspondence: Tel. 00989131973203, Fax 00983413222047, E-mail dr_mirzaie_mo@uk.ac.ir

Abstract. Toxocariasis is a parasitic zoonosis with worldwide distribution that affects both dogs and cats. A cross-sectional survey was undertaken to study the prevalence and intensity of infection with *Toxocara canis* in 100 owned dogs, from May to November 2011 in urban areas of Kerman, southeastern of Iran. A total of 100 fecal samples were evaluated by the fecal sedimentation method. A total of 10 dogs were found to be infected with *T. canis*. The prevalence of *T. canis* was 10% in owned dogs in Kerman. The age distribution of toxocariasis in dogs less than 6 months old had a higher overall prevalence than those dogs over 6 months of age (P<0.05). There was a significant difference in the prevalence between male (13.2%) and female (7%) dogs (P<0.05). The high prevalence of *T. canis* infections among canids and contamination of environment by eggs of *T. canis* may increase the risk of infection for native people. It is imperative to educate the dog-owning population of the potential risks associated with dog toxocariasis. This will allow for the more effective implementation of strategic control programs or minimize zoonotic transmission.

Keywords: *Toxocara canis*; Dogs; Prevalence; Kerman.

Introduction

*Toxocara canis* is the common roundworm of dogs, and is considered causative agent of human toxocariasis. It is an infection predominantly caused by migration of the roundworm *Toxocara canis* larvae to organs and tissues. The major clinical consequences of prolonged migration of *T. canis* larvae in humans are visceral larva migrants (VLM) and ocular toxocariasis (OT).

Humans acquire the infection as a result of the accidental ingestion of the eggs with the second stage larvae of *Toxocara canis*. Children are the social group most vulnerable to the infection because of their frequent contact with the soil. Moreover, between the ages of one and four years geophagy is not uncommon (Beaver, 1969; Schantz, 1989).

Toxocara spp. has a life cycle with stages outside the host, where environment and the presence of paratenic hosts play a fundamental role in the spatial and temporal dispersion of the parasite (Dubinsky et al., 1995). Undeveloped eggs are produced from the copulation of adults and are eliminated with the host’s faeces but are not infective in this first stage (Sprent, 1958). Time spent in the environment is necessary for them to develop to their infective forms. As this is a zoonotic
agent, the presence of *Toxocara* spp. eggs in the environment is a risk for both definite and paratenic hosts (Schantz and Glickman, 1981).

Few larvae are required to cause disease in humans and there are three recognized disease syndromes resulting from *T. canis* infection; visceral larva migrants, ocular larva migrants and covert toxocariasis (Taylor and Holland, 2001). Visceral larva migrants produce an inflammatory reaction with fever, bronchospasm, abdominal pain, anorexia and occasionally myocarditis or respiratory failure. Ocular larva migrants mainly occurs in older children and young adults, clinical manifestations include decreased vision, leucocoria, chorioretinitis and retinal fibrinosis, in addition unilateral or bilateral blindness may occur in a small number of those infected. Covert toxocariasis is the most common presentation of *T. canis*, which presents as febrile illness in children, symptoms, which include abdominal pain, cough and headaches, are usually mild (Macpherson, 2005; Taylor and Holland, 2001).

Numerous epidemiologic studies of *Toxocara canis* in canines have been reported worldwide (Dalimi et al., 2006; Eslami et al., 2010; Fontanarrosa et al., 2006; Lefkaditis et al., 2009; Martinez-Moreno et al., 2007; Papazahariadou et al., 2007; Ramirez-Barrios et al., 2004; Razmi, 2009; Umar, 2009). There are no data available concerning epidemiology and prevalence of *Toxocara canis* in owned dogs in the Kerman state of Iran. The main objective of this research was to determine the prevalence of *Toxocara canis* in owned dogs of Kerman city; Iran.

**Materials and methods**

Between May and November 2011, fecal samples from 100 dogs were examinated for the presence of parasites. All fecal samples were obtained randomly from privately owned dogs of Kerman city. The study was conducted in the Kerman area, Kerman province, Iran. Kerman is located at 30°17’13”N and 57°04’09”E southeast of Iran. The mean elevation of the city is about 1,755 m above sea level. Kerman city has a hot and arid climate, and the average annual rainfall is 135 mm.

Because it is located close to the Kavir-e lut, Kerman has hot summers. Based on climate, soil and other geographical conditions, Kerman has a different vegetation and agricultural type.

Fecal samples were collected directly from the dog’s rectum and were stored in 10% formalin neutral buffer solution until examination.

The coprological examinations were conducted by the direct smear method and the sedimentation methods which include formalin/ether.

The fecal samples were carefully examined using the ×10 objective, field by field covering the entire coverslip. Each observed egg or cyst was identified by using their morphological characteristics previously described (Soulsby, 1986). A dog was classified as positive if at least one egg was observed.

Data were analyzed by Chi square test analysis. The significance level was *P*<0.05.

**Results**

The overall prevalence of infection with *Toxocara canis* was 10%. Of the 100 dogs evaluated, 10 fecal samples were positive for eggs of *T. canis*.

When *T. canis* prevalence was analyzed by age, it was observed that dogs <6 months old had a higher overall prevalence than those dogs over 6 months of age. There were significant differences in the prevalence of infection between dogs <6 months old and dogs over 6 months old (*P*<0.05, table 1).

**Table 1.** Prevalence of *Toxocara canis* in owned dogs according to age in Kerman

<table>
<thead>
<tr>
<th>Age</th>
<th>NE</th>
<th>NI</th>
<th>Infected dogs (%)</th>
<th>S*</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6 months</td>
<td>33</td>
<td>8</td>
<td>24.2 a</td>
<td></td>
</tr>
<tr>
<td>&gt;6 months</td>
<td>67</td>
<td>2</td>
<td>3 b</td>
<td>a us b: <em>P</em>&lt;0.05</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NE = No. of examined dogs; NI = No. of infected dogs; S = Statistical significance (*x*²); a * Chi square test.

And also, a significant difference in prevalence of *T. canis* was found between male (13.2%) and female (7%) dogs aspect that indicates that
the infection with *T. canis* was higher in male dogs compared with females (P<0.05, table 2).

**Table 2.** The association between the prevalence of *Toxocara canis* and sex in owned dogs

<table>
<thead>
<tr>
<th>Sex</th>
<th>NE</th>
<th>NI</th>
<th>Infected dogs (%)</th>
<th>S*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>53</td>
<td>7</td>
<td>13.2 a</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>47</td>
<td>3</td>
<td>7 b</td>
<td>a vs b: p&lt;0.05</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

NE – No. of examined dogs; NI – No. of infected dogs; S – Statistical significance (x²); * Chi square test.

**Discussion**

The prevalence of *Toxocara canis* was found to be of 10%. So the report of this study agrees with researches conducted in Northern Greece (10.4%) by Lefkaditis et al. (2009), Argentina (11.6%) by Fantanarrosa et al. (2006) and Brazil (11.1%) by Mandarino-Pereira et al. (2010).

This value is found to be less compared to reports from Northern Greece (12.8%) by Papazahariadou et al. (2007), Spain (17.7%) by Martinez-Moreno et al. (2007), Khorasan Razavi, Iran (17.9%) by Razmi (2009), Semnan province, Iran (22%) by Eslami et al. (2010), Newfoundland (22.8%) by Bridger and Whitney (2009), Italy (33.6%) by Hlabuettel et al. (2003), Northwestern, Iran (43.5%) by Zare-Bidaki (2010) and Hunan province (45.2%) by Dai et al. (2009), but higher than reports from Ethiopia (3.06%) by Awoke et al. (2011), Sao Paulo state (5.5%) by Oliveria-Sequeira et al. (2002), Prague (6.2%) by Langrova et al. (2007), Western part of Iran (6.02) by Dalimi et al. (2006), Kaduna state, Nigeria (6.3%) by Umar (2009), Madrid, Spain (7.8%) by Miró et al. (2007), and Fortaleza, Brazil (8.7%) by Klimpel et al. (2010). This variation may due to differences in management systems, health care and degree of environmental contamination with infective stages.

The prevalence of *Toxocara canis* infection in this study in male and female dogs is 13.2% and 7%, respectively. There is statistically significant difference (P<0.05) between the two sex categories to which our result agrees with Romírez-Barrios et al. (2004) and Kirkpatrick et al. (1988) reports conducted in USA and Venezuela, respectively. Hormonal factors and sex associated behaviors such as roaming may be factors involved (Kirkpatrick, 1988).

In contrast, a study in Newfoundland indicated that female dogs were more likely of contracting *Toxocara canis* than male dogs (Bridger and Whitney, 2009).

In this study, the prevalence of *Toxocara canis* in dogs was higher in pups under 6 months of age than in dogs over 6 months old which coincides with other studies (Kirkpatrick, 1988; Papazahariadou et al., 2007; Romírez-Barrios et al., 2004).

All this suggests that in the case of *Toxocara canis* infection, specific immunity in dogs would develop with age, probably as consequence of one or more exposures.

The results of this study demonstrate that it is imperative to have current information regarding the prevalence of parasites and the risk factors associated with infection. Veterinarians are often the best and only source of information about zoonoses for pet owners, so it is imperative to educate the dog-owning population of the potential risks associated with dog parasites. This will allow for the more effective implementation of strategic-control programs or minimize zoonotic transmission.

Although companion animals such as dogs and cats are important members of many families and serve as sources of joy and companionship for their owners, they can harbor intestinal parasites that may infect their owners. The majority of dog owners are aware of the potential risk to human health from canine helminths, but only one-third of the pet owners are aware of the means of transmission to humans. A veterinarian’s management of parasitic diseases may require no further involvement than to routinely prescribe one of the broad-spectrum antiparasitic drugs that have been marked so effectively in recent years.

Undoubtedly all vermicide drugs reflect modern society's need for convenience, but
unfortunately veterinarians do little to educate pet owners about the value of strategic parasite control.

The significance of zoonotic diseases caused by intestinal helminths makes it necessary for us to know the infection status of domestic dogs and to take measures for further control.

It is concluded that veterinarians have an important role in educating dog owners of these potential risks and means for preventing or minimizing zoonotic transmission.

References


