

Coproscopy survey of Gastrointestinal parasites in owned dogs of Kerman city, Iran

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Summary

A coproscopy survey was conducted on 100 owned dogs in Kerman city from July 2011 to July 2012 with the objective to assess the presence of Gastrointestinal parasites with zoonotic potential. Faecal samples from 100 dogs were examined for the presence of parasites. Samples (n=100) collected from dogs of different ages and genders were analysed using 5 techniques, i.e. centrifugal flotation in sucrose solution, centrifugal flotation in 33% Zinc sulphate solution, Ziehl-Neelsen staining, trichrome staining, and iodine staining. The overall proportion of Gastrointestinal parasitic infection was 16% (16/100). The most frequently observed parasites in this study were *Toxocara canis* (9%), followed by *Taeniidae* eggs (3%), *Cryptosporidium* spp. (3%), *Troglorema salmincola* (1%), *Toxascaris leonina* (1%) and *Isoospora canis* (1%). Most of the dogs (62%) included in the study were regularly dewormed and no significant association was found between parasitic infection and sex, age and breed of the dogs. It is noteworthy that this is the first report of *Troglorema salmincola* infection in Iran.

Indagine coproscopica per valutare la presenza di parassiti gastrointestinali in cani di proprietà nella città di Kerman in Iran

Parole chiave

Cani di proprietà,
Città di Kerman,
Coproscopia,
Iran,
Parassita
gastrointestinale,
Troglorema salmincola.

Riassunto

Lo studio riporta i dati relativi a un'indagine coproscopica condotta su 100 cani di proprietà nella città di Kerman, in Iran, nel periodo compreso tra luglio 2011 e luglio 2012. L'indagine è stata condotta con l'obiettivo di valutare la presenza di parassiti gastrointestinali capaci di indurre zoonosi. I campioni (n=100) raccolti da cani di diversa età e sesso sono stati analizzati usando 5 tecniche: flottazione in soluzione di saccarosio, flottazione in soluzione di solfato di zinco (33%), colorazione Ziehl-Neelsen, colorazione tricromica e colorazione con iodio. La percentuale di infezione da parassiti gastrointestinali è risultata pari al 16% (16/100). I parassiti osservati con più frequenza sono stati: *Toxocara canis* (9%), *Taeniidae* (3%), *Cryptosporidium* spp. (3%), *Troglorema salmincola* (1%), *Toxascaris leonina* (1%) e *Isoospora canis* (1%). È importante sottolineare che la maggior parte dei cani (62%) è stata regolarmente sverminata e che non è stata rilevata un'associazione significativa tra le infezioni da parassiti e il sesso, la razza e l'età dei cani. Lo studio è il primo rapporto sulle infezioni da *Troglorema salmincola* in Iran.

Domestic dogs (*Canis familiaris*) are generally regarded as the first domesticated mammal (3). Unfortunately, some of these animals are infected with parasites including parasitic worms and thus, at times, they can be a major source of infections causing mild to life threatening diseases in humans (10). In fact, dogs are associated with more than 60 zoonotic diseases among which parasites, helminthosis in particular, can cause serious health problems as well as significant economic impact from a veterinary standpoint (28, 36). The prevalence of parasites varies considerably from one region to another and also changes depending on the different diagnostic techniques employed (30). Visceral and ocular larva migrans caused by *Toxocara canis* and cutaneous larva migrans caused by *Ancylostoma brasiliense* are some zoonotic aspects related to helminth infections in dogs (34).

In Iran, the prevalence of parasites considerably varies from one region to another and among the different diagnostic techniques employed (30). Nonetheless, all the 4 categories of canids - feral or stray dogs - working sheepdogs, pet dogs and wild canids, such as foxes and jackals, constitute a threat to the public health (9, 14). Several epidemiological studies have been conducted to assess the situation of intestinal parasitic infections in dogs in many parts of the world (6, 10, 18, 19, 20, 25, 27, 29, 36, 37), but information on the Gastrointestinal parasites in owned dogs in Iran and specially in Kerman province is scanty (11, 22, 23). Hence, the main objective of the study was to assess the presence of Gastrointestinal parasites with zoonotic potential in owned dogs in Kerman city.



Figure 1. Map of Iran, location of Kerman city.

This is the most important town of the Kerman province, Iran. Kerman city is located at 30°17'13"N and 57°04'09"E South-East of Iran, at an altitude of about 1,755m above sea level. The city is close to the Kavir-e lut desert and the climate is hot and arid, with an average annual rainfall of 135mm. Vegetation types and agricultural systems may vary in Kerman area depending on climate, soil, and other geographical conditions (Figure 1).

From July 2011 to July 2012, faecal samples from 100 dogs were examined for the presence of parasites. Each faecal sample consisted of approximately 5g of fresh stool, collected from the rectum of the owned dogs. Samples were immediately processed in the parasitology diagnostic laboratory of the Veterinary School of Shahid Bahonar, University of Kerman. An aliquot of the specimens was concentrated by the formalin-ether sedimentation method. Smears were made from the sediment (20µL) and stained by the modified Ziehl-Neelson technique. The complete surface of the smear was examined for *Cryptosporidium* oocysts. Smears were prepared from the faeces and stained with trichrome and iodine in order to detect cysts or trophozoites of *Giardia* and *Entamoeba*. Centrifugal flotation in 33% Zinc sulphate solution was also used to investigate the presence of *Giardia* cysts and trophozoites (24).

Furthermore, faecal flotations in Sheathers sugar solution (500g of sugar, 320mL of water, 6.5g of phenol) with a specific density of 1.3g mL⁻¹ were examined by light microscopy for eggs of intestinal helminthes and oocysts of *Isoospora* spp. Each observed egg or cyst was identified according to morphological characteristics as previously described (33). A dog was classified as positive if at least one egg or cyst was observed. Data on gender, breed and age of the dogs were also collected from the owners. Information on faecal consistency and frequency of deworming treatment was also recorded. Chi square test (χ^2) was used to determine any significant association between infection and the observed variables. The significance level applied was $P < 0.05$.

Protozoa and helminth eggs were detected in the faeces of 100 dogs and their prevalence is presented in Table I. The overall prevalence of infection with Gastrointestinal parasites was 16% (16/100). Infections with multiple parasite species (2/16=12.5%) were less common than infections with a single parasite species (14/16=87.5%). The most frequently observed parasites in this study were *Toxocara canis* (9%), followed by *Taeniidae* eggs (3%), *Cryptosporidium* spp. (3%), *Troglostrongylus salminalis* (1%), *Toxoscaris leonina* (1%) and *Isoospora canis* (1%). *Troglostrongylus salminalis* was found only in one male dog, while *Isoospora canis* and

Table I. Prevalence of Gastrointestinal parasites in owned dogs in Kerman city according to sex, age, faecal consistency, and breed.

	Number of examined dogs	Infected dogs		Statistical significance (χ^2)*
		Number	(%)	
Sex				
Male	68	13	19.11 ^a	a vs b: P>0.05
Female	32	3	9.37 ^b	
Age				
< 6 months	56	11	19.64 ^a	a vs b: P>0.05
> 6 months	44	5	11.36 ^b	
Faecal consistency				
Diarrheic	24	12	50 ^a	a vs b: P>0.05
Non diarrheic	76	4	5.26 ^b	P=0.00001
Breed				
Mix	23	4	17.39 ^a	a vs b: P>0.05
Pure	77	12	15.58 ^b	

* Chi square test.

Toxoscaris leonina were found only in females. No significant difference (P>0.05) in overall prevalence of Gastrointestinal parasites was found in relation to sex, age and breed (Table I).

Faeces were also classified according to the consistency as diarrheic (24/100) and non diarrheic (76/100). A significant association was found between consistency of the faeces and presence of parasites, which were found more often (P<0.05) in diarrheic (50%) than in non-diarrheic (5.26%) samples (Table I).

This survey reported for the first time *Troglostrongylus salmincola* infection in Iran. In direct smear and formalin-ether sedimentation methods, the eggs were light brown, ovoid, and operculate at one end, with a small blunt projection at the other end. They measure 0.087mm to 0.097mm by 0.038mm to 0.057mm (n=5). Most of the dogs (62%) considered in our study were regularly dewormed and parasites were found only in two of them (Table II, P<0.05).

Several studies have been conducted on the general prevalence of Gastrointestinal parasites in dog population worldwide (6, 10, 19, 20, 21, 26, 28, 30, 38, 39). The prevalence values ranged from 7.14% to 89.15% depending on a number of factors, i.e. age, living conditions, diagnostic methodology employed, region studied and frequency of deworming treatment (23, 29, 3, 7, 27, 8, 19, 36, 17, 16, 6, 11, 1, 15, 10, 13). In this study, the overall proportion of Gastrointestinal parasitic infection (16%) was similar to the one found in 2009 in Iran (30) and in Ethiopia (3); it was twice higher than the proportion reported in a similar study carried out in Iran, but significantly lower than the one

Table II. Association between the prevalence of Gastrointestinal parasites and deworming in owned dogs.

Deworming	No of examined dogs	Infected dogs	
		No	(%)
Received	62	2	3.22 ^a
Non received	38	14	36.84 ^b
Total	100	16	16

P=0.00001 a vs b: P<0.05

found in stray dogs living in different regions of the world (1, 3, 6, 7, 8, 10, 11, 13, 14, 15, 16, 17, 19, 23, 27, 29, 36). These results can be explained because, in contrast to the dogs considered in this study, these surveys were carried out on stray dogs with no health control measure. In agreement with other comparable studies, single infection was the most common situation discovered in this survey (6, 18, 19, 35).

Similarly, in this study, *Toxocara canis* was the most commonly identified canine helminth (6, 11, 32, 23). Many studies reported that *Toxocara canis* infections are more common and higher in male dogs (18, 19, 25, 32), hormonal factors and sex associated behaviours, such as roaming, being the factors potentially involved (20). *Troglostrongylus salmincola* infects various mammals including humans, dogs, cats, raccoons, foxes, and three species of birds on the Pacific coast of North America and Canada, and Eastern Siberia (4, 21). *Troglostrongylus salmincola* is also endemic in the far-Eastern part of Russia including Amur and Ussuri valleys of Khabarovsk territory and North Sakhalin (31). Therefore, the Kerman dog could become infected by eating fresh and raw meat.

The absence of *Giardia* and *Entamoeba* positive samples may be due to the fact that only one sample was collected, while Bowman (5) and Decock (12) recommended to take samples on 2 or 3 successive days to detect this parasite. Based on the relatively high occurrence of *Toxocara canis* and *Cryptosporidium* spp. in dogs found in this study, treatment is needed in order to decrease the likelihood of environmental contamination, since this parasite represents a potential hazard to human and animal health.

In conclusion, ascertaining the presence of parasites and identifying them is pivotal for any possible recommendations that could be put forward concerning deworming strategies for the dog population. Deworming recommendations should be based on the prevalence, epidemiology, life cycles, pathogenicity and zoonotic potential of these parasites (26). The main reasons for routine deworming of pet dogs are to reduce the

risk of infection in dogs and to prevent human infections. The majority of dog owners are aware of the potential risk to human health from canine parasites. Nonetheless, only one-third of the pet owners are aware of the risk of transmission to

humans (2). Although animals, such as dogs and cats, are usually considered as 'members of the family', it is important to keep in mind that they can harbour intestinal parasites that may infect their owners.

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