

Prevalence and determining factors of gastrointestinal parasite infection in pet dogs in an urban area

Prevalência e fatores determinantes da infecção por parasitas gastrointestinais em cães em uma área urbana

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Abstract

The aim of present study was to evaluate the prevalence of gastrointestinal parasite infection and related factors that govern prevalence in pet dogs. Of 200 fecal samples screened, a prevalence of 39% was observed, in which *Toxocara canis* (37%) and coccidian (29%) were predominant. Factors that could be associated with an increase in the probability of parasite detection in fecal samples included time since the last deworming, sex, and breed. Pet dogs with > 6 months since the last deworming had a 1.5 times higher probability ($P < 0.05$) of gastrointestinal parasite infection, whereas purebred and males tended to have ($P < 0.10$) 0.9 and 0.8 times higher probability of gastrointestinal parasite infection than crossbreed and female dogs, respectively. In conclusion, results suggested that animals with > 6 months since last deworming, purebred, and male dogs exhibited a comparatively higher prevalence and probability of gastrointestinal parasite infection.

Keywords: breed, dogs, sex, deworming, gastrointestinal parasites.

Resumo

O objetivo do presente estudo foi avaliar a prevalência de infecção gastrointestinal parasita e fatores relacionados que atuam na prevalência em cães de estimação. De 200 amostras fecais selecionadas, foi observada uma prevalência de 39%, na qual *Toxocara canis* (37%) e coccídeos (29%) foram predominantes. Fatores que poderiam estar associados com um aumento da probabilidade de detecção do parasita em amostras fecais, incluindo o tempo desde a última desparasitação, sexo e raça. Cães com mais de seis meses desde a última desparasitação tiveram um 1,5 vezes maior a probabilidade ($P < 0,05$) de infecção por parasitas gastrointestinais que cães de raça pura e machos que tendem a ter 0,9 e 0,8 vezes mais probabilidade de infecção com parasitas gastrointestinais (valor $P < 0,10$) que cães mestiços e fêmeas, respectivamente. Em conclusão, os resultados sugerem que cães com mais de seis meses desde a última desparasitação, de raça pura e masculinos exibiram comparativamente maior prevalência e a probabilidade de infecção gastrointestinal por parasitas.

Palavras-chave: raça, cães, desparasitação, parasitas gastrointestinais.

Introduction

Parasites (primarily helminthes and protozoan) are the most common microorganisms causing gastrointestinal diseases in dogs (Rodríguez et al., 2001). These parasites induce anorexia, dull coat, vomit, diarrhea, inflammation, and bleeding of the intestinal mucosa, leading to anemia, and may even cause death (Martínez et al., 2008). Moreover, some dog parasites also possess significant zoonotic potential and, thus, may also affect human health (Neves et al., 2014). For example, *Toxocara canis* causes visceral larva migrans, and ocular larva migrans and covert toxocarosis (Fan et al., 2013), whereas *Ancylostoma braziliense*, *A. caninum* and *Uncinaria stenocephala* cause



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cutaneous larva migrans syndrome (Hendrix et al., 1996). For these reasons, it is important to implement preventive sanitary measures to avoid the transmission of canine parasites to humans.

Several studies investigating the prevalence of gastrointestinal parasite infection in dogs have been performed (Fernández & Cantó, 2002; Martínez et al., 2008; Romero et al., 2009; Encalada et al., 2011); however, factors governing the prevalence of parasite infection have not been evaluated. Thus, the aim of the present study was to evaluate the prevalence of gastrointestinal parasite infection and the factors governing this prevalence in pet dogs.

Material and methods

During a six-month period, a total of 200 fecal samples from canines brought to the veterinary clinic for consultation at the *Universidad Autónoma Metropolitana-Xochimilco* (Mexico City, Mexico) were examined. Fecal samples were collected directly from the rectum using a rectal spoon or clinical thermometer, and processed on the same day of collection according to animal welfare care protocols (Anim.023.18).

All fecal samples were examined using the direct and flotation method. For the direct method, 3 g of feces was dissolved in formaldehyde (10%), and a slide with 10 μL of sample dissolved in iodine was prepared. For the flotation method, another 3 g of feces was dissolved in a saturated sodium chloride solution (33%), and another slide was prepared (Soulsby 1982). Both slides were observed under an optical microscope using a 40 \times objective lens. Animals were considered to be positive when eggs of helminthes or protozoan were detected in the fecal samples. The age, breed, sex, and time since the last deworming of the dog were obtained from each owner and registered.

Statistical analysis

Comparisons of time since deworming, breed, sex, and age were performed using the chi-squared test, with $P < 0.05$ considered to be statistically significant, or $P < 0.10$ for tendencies. The results are expressed as frequency and prevalence with corresponding 95% confidence interval (CI). The effects of time since last deworming, breed, sex, and age on the incidence of gastrointestinal parasite infection were analyzed using logistic regression and odds ratios were calculated. All analyses were performed using JMP 13 (SAS Institute, USA).

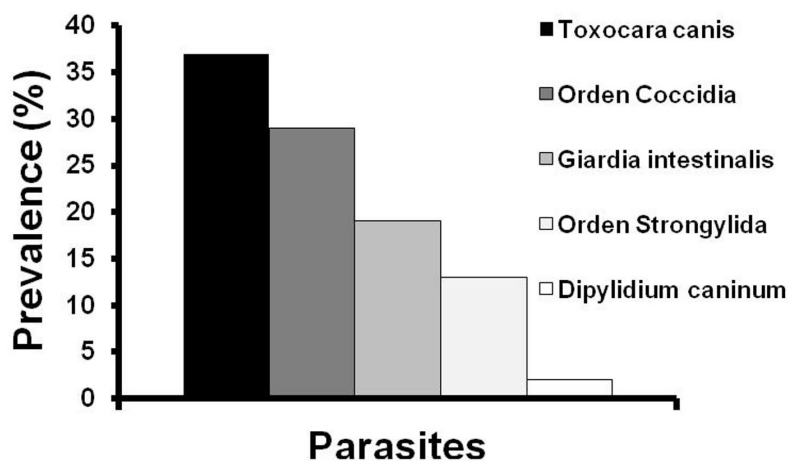


Figure 1. Prevalence of gastrointestinal parasites in owned dogs from urban area.

Table 1. Prevalence of gastrointestinal parasites according to deworming time, breed, sex and age in dogs.

	Total	Frequency	Prevalence (95% CI)	P value
Total	200	78	39 (32-46)	
Last deworming				
< 6 month	115	55	48 (39-57)	0.003
> 6 month	85	23	27 (16-37)	
Breed				
Purebred	150	64	43 (34-50)	0.066
Crossbred	50	14	28 (15-40)	
Sex				
Females	92	29	32 (21-41)	0.046
Males	108	49	45 (35-55)	
Age				
< 6 month	47	21	45 (30-59)	0.516
6-12 month	17	5	29 (5-53)	
> 12 month	136	52	38 (30-46)	

Results

Gastrointestinal parasite detection

Seventy eight of 200 (39%; 95% CI 32-46%) animals were positive for gastrointestinal parasites (Table 1). *Toxocara canis* exhibited the highest prevalence (37%), followed by coccidian oocysts (29%). Other gastrointestinal parasites included *Giardia intestinalis*, hookworms, and *Dipylidium caninum* (Figure 1).

Table 2. Risk factors for presence of gastrointestinal parasites in owned dogs from urban area.

	Risk Factors	Odd Ratio	IC al 95%	P value
Deworming time	< 6 month	1		
	> 6 month	2.5	1.4 - 4.6	0.003
Breed	Crossbred	1		
	Purebred	1.9	0.9 - 4.0	0.067
Sex	Females	1		
	Males	1.8	0.9 - 3.2	0.055
Age	< 6 month	1		
	6-12 month	0.5	0.1 - 2.0	0.34
	> 12 month	1.1	0.4 - 2.8	0.85

The prevalence of gastrointestinal parasites was higher ($P < 0.05$) in males and in animals with last deworming > 6 months (Table 1). Similarly, regression logistic analysis revealed that dogs dewormed > 6 months and males had higher probability ($P < 0.05$) of parasite infection (Table 2). With regard to breed and sex, purebred dogs and male dogs tended to have a higher prevalence of parasites ($P < 0.10$), and almost 100% higher probability of parasite occurrence than crossbred

dogs and females, respectively (Tables 1 and 2). Finally, the different ranges of age examined in the present study did not affect ($P>0.10$) either prevalence or probability of gastrointestinal parasite infection (Tables 1 and 2).

Discussion

Results of the present study revealed that time since last deworming, sex, and breed are factors that may be associated with gastrointestinal parasite infection in pet dogs.

In dogs with > 6 months since last deworming, the prevalence of gastrointestinal parasites was 77% higher and the odds ratios for parasite infection was 2.5 times higher compared with dogs that were dewormed < 6 months. Our results agree with those reported by Martínez-Barbabosa et al. (2011), who reported an increase in the prevalence of gastrointestinal parasites with increases in time since the last deworming. Palmer et al. (2010), reported that 85% of veterinaries recommended prophylactic deworming every 3 months as a good strategy for gastrointestinal parasite control. This recommendation is supported by evidence showing that the prevalence of helminthes increases 3 months after deworming (Sager et al., 2006). Based on our results and other similar reports in the literature, we suggest that deworming treatment should not exceed 6 months. This strategy may reduce the prevalence of gastrointestinal parasites in pet dogs and, thus, the probability of human infection.

In the present study, purebred dogs had a higher prevalence, and the odds of gastrointestinal parasite infection was higher compared with crossbred dogs. The effect of breed (purebred versus crossbred) on the prevalence of gastrointestinal parasites in dogs was evaluated previously and the results were contradictory. Mirzaei & Fooladi (2013) and Neves et al. (2014), did not find differences in the prevalence of gastrointestinal parasites between purebred and crossbred dogs, whereas our results agree with those of Llanos et al. (2010), who also reported a higher percentage of positive cases to gastrointestinal parasites in purebred dogs compared with crossbred animals. Moreover, purebred dogs are more susceptible to *Toxocara canis* (Quijada et al., 2008). Based on these results, it is likely that crossbred dogs have more resistance to parasites and, thus, lower prevalence and probability of infection.

With respect to sex, males had a higher prevalence and probability (odds 1.8) of gastrointestinal parasite infection than females. These results were in agreement with those reported by Sarmiento et al. (2009). However, some studies have reported that females are more susceptible to gastrointestinal parasites than males (Neves et al., 2014) or, in other cases, there was no sex effect on the prevalence of gastrointestinal parasites (Mirzaei & Fooladi, 2013).

The prevalence of gastrointestinal parasites has been evaluated worldwide using a coproscopy assay. In the present study, the prevalence of gastrointestinal parasites was 39%, which was higher than the prevalence reported in Colombia (22.2%) (Giraldo et al., 2005) but lower than those reported in Venezuela 58% (Quijada et al., 2008); and Chile 63% (López et al., 2006). These differences may be associated with different climatic conditions where each experiment was performed.

The parasites most frequently found were *Toxocara canis* (37%) and *Coccidia* (26%). The findings are consistent with those reported previously (Gorman et al., 2006). The presence of *Toxocara canis* may be due to biological factors associated with parasites, or hygiene and management of the owners. For example, *Toxocara canis* eggs have a very thick cover that provide superior resistance (Cuenca et al., 2012) by which these helminthes can remain viable up for to 5 years, and may spread on the ground and in pastures (Martínez et al. 2008).

In conclusion, the results of this study demonstrated that *Toxocara canis* was the most common parasite detected in fecal samples from pet dogs, and that animals dewormed > 6 months, purebred, and male were more susceptible to gastrointestinal parasite infection. Based on these results, we recommend that deworming should be performed at least every 6 months, especially in purebred and male dogs.

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