Rev. Inst. Med. Trop. Sao Paulo
53(4):181-184, July-August, 2011
doi: 10.1590/S0036-46652011000400001

OCCURRENCE OF *Ancylostoma* IN DOGS, CATS AND PUBLIC PLACES FROM ANDRADINA CITY, SÃO PAULO STATE, BRAZIL

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SUMMARY

The aim of this study was to determine the frequency and intensity of *Ancylostoma* spp. in 33 dogs and 52 cats by means of coproparasitological examinations and parasitological necropsy, and assess the presence of contaminated feces with eggs of that parasite in public places of Andradina Municipality, São Paulo State, Brazil. Willis-Mollay and Sedimentation methods indicated *Ancylostoma* spp. eggs in 87.8% (29/33) dogs and 94.2% (49/52) cats. The species *A. caninum* and *A. braziliense* were found in 63.6% (21/33) and 30.3% (10/33) of dogs, respectively. Considering cats, 67.3% (35/52) were parasitized by *A. braziliense*, 21.1% (11/52) by *A. caninum*, and 9.6% (5/52) by *A. tubaeforme*. Forty-two canine fecal samples were collected from public environments, including 23 squares/gardens and 19 streets/sidewalks. Positive samples for *Ancylostoma* spp. accounted for 64.3% (27/42); squares/gardens had 60.9% (14/23) positive samples, and streets and sidewalks, 68.4% (13/19). No association was observed between the number of *Ancylostoma* spp parasites and age, sex and breed of the animals and also the ratio of EPG counts and the parasitic intensity observed at necropsy ($p > 0.05$). Based on the high occurrence of hookworm in dogs and cats in this study, the treatment with anti helminthics are needed even in those animals with negative stool tests, besides adopting control of the number of animals in public places, in order to decrease the likelihood of environmental contamination, since this parasite represents a potential hazard to human and animal health.

KEYWORDS: Ancylostomiasis; Cutaneous larva migrans; Helminths; Small animals; Zoonosis.

INTRODUCTION

The urban development and environmental changes caused by humans have increased the occurrence of parasitic zoonoses emerging and re-emerging[4]. Dogs[5,22,24] and cats[1,6,18] can act as reservoirs of evolutive parasitic forms that contaminate the environment with their feces, mainly with infective larvae of hookworms, representing a serious public health problem[14]. This fact is confirmed by the work of SANTARÉM *et al.* (2004), which detected the occurrence of Cutaneous Larva Migrans (CLM) in children from Taciba Municipality, São Paulo State, Brazil, due to their contact with sand in public parks where *Ancylostoma* spp. larvae were found.

Some species of *Ancylostoma* present zoonotic potential[8], as *Ancylostoma braziliense* and *Ancylostoma caninum*, who are the etiologic agents of the diseases known as cutaneous larva migrans[9] and eosinophilic enteritis[16].

The aim of this study was to determine the occurrence of *Ancylostoma* sp. in domestic dogs and cats by means of coproparasitological examinations and parasitological necropsy, and evaluate the occurrence of this parasite in public places of Andradina Municipality, São Paulo, Brazil.

MATERIAL AND METHODS

In this study 33 dogs and 52 cats were included. The animals were captured or delivered by their owners to the Center for Zoonosis Control (CZC) of Andradina Municipality, (20.8961º South, 51.37944º West and at 405 m altitude) for euthanasia. Of the dogs analyzed, 19 were females and 14 males being, 24 without defined breed (WDB) and nine with defined breed (DB). The group of cats consisted of 30 males and 22 females, with 47 WDB and five with DB.

The age of the animals was estimated according to the analysis of the dental arcade, being classified as young (until one year), adult (between one and seven years) and elderly (over seven years of age). Among the dogs, seven were young, 21 adults and five elderly. Of the cats, 18 were young, 30 adults and four elderly.

This procedure was previously approved by the Animal Experimentation Ethics Committee of the São Paulo State University

Financial support: The São Paulo State Research Foundation - FAPESP
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(FOA-UNESP), Araçatuba, protocol number 2007-003276.

Feces were collected directly from the rectum of each animal and later processed by flotation techniques in sodium chloride saturated solution with 1.182 density (Willis-Mollay Technique) and spontaneous sedimentation in water[12]. The fecal egg counts (EPG), according to GORDON & WHITLOCK (1939), was performed to associate the excretion of eggs and the intensity of *Ancylostoma* detected in necropsied animals.

To recover adult helminths, each animal was necropsied and the contents from their stomach, and small and large intestines were washed in tap water, sieved and stored in properly identified containers with formaldehyde 10% buffered solution. The contents were then placed onto Petri plates and observed under a stereomicroscope; helminths were collected with entomological stylets and later transferred to test tubes containing alcohol 70%.

Statistical analysis was performed using the Fisher Exact Test, considering the occurrence of *Ancylostoma* spp. The Chi-square test (χ^2) was used to associate sex, age, breed, level of EPG with the parasitic intensity observed in the necropsy, and the occurrence of single or mixed infections, considering as significant $p < 0.05$.

RESULTS

Ancylostoma species were identified based on the morphology of their buccal capsule and teeth under a phase contrast microscope (Olympus®, USA) at 400x magnification, after clarification with acetic acid 80%[29].

Forty-two fecal samples were also collected from public environments, including 23 squares/gardens and 19 streets/sidewalks. The samples were collected using disposable procedure gloves, and stored in polystyrene box with ice during the transportation to the laboratory.

The occurrence of *Ancylostoma* in dogs and cats are shown in Table 1. In the dogs and cats, respectively there was NO association between sex (χ^2 1.9775; p = 0.2882) and (χ^2 0.7739; p = 0.5670), age (χ^2 0.8128; p = 1.0000) and (χ^2 10.6122; p = 0.0232), and breed (χ^2 1.1853; p = 0.2952) and (χ^2 11.9233; p = 0.0217) with the presence of *Ancylostoma*, as well as the occurrence of single infections and co-infections by different species of *Ancylostoma* (χ^2 4.5455; p = 0.033) and (χ^2 1.1429; p = 0.2850). Likewise, the ratio of EPG counts and the parasitic intensity observed at necropsy in dogs (χ^2 2.0000; p = 0.1573) and cats (χ^2 2.4545; p = 0.1172), did not differ statistically.

Table 1
Occurrence of different species of *Ancylostoma* species in dogs and cats from Andradina Municipality, São Paulo State, Brazil

Ancylostoma specie	Dogs (n = 33)		Cats (n = 52)	
	Positive	%	Positive	%
A. caninum	21	63.6	35	67.3
A. braziliense	10	30.3	11	21.1
A. tubaeforme	0	0	5	9.6
A.caninum + *A. braziliense*[*]	7	21.2	9	17.3
Total	29	87.9	49	94.2

n = number of animals examined; [*] parasites observed simultaneously, included on lines of *A. caninum* and *A. braziliense*

DISCUSSION

Eggs of *Ancylostoma* spp. were detected in 64.2% (27/42) samples collected from the environment, and positivity percentages were similar (χ^2 0.5807; p = 0.7480) between feces from squares/gardens, 60.8% (14/23), and those from streets/sidewalks, 68.4% (13/19). Compared to our results, lower percentages of the genus *Ancylostoma* in dogs have been reported in Poland[3], Venezuela[23], United States[7] and other regions of Brazil[30].

Using parasitological necropsy, YACOB *et al.* (2007), in Ethiopia, and KLIMPEL *et al.* (2010), in Brazil, reported the occurrence of *A. caninum* in 70% (14/20) and 95.6% (44/46) respectively, in the examined dogs. These values are lower and higher, respectively, when compared with those observed in the present study for *Ancylostoma* species. In cats, also using the parasitological necropsy, ISHIZAKI *et al.* (2006) found 66.6% (40/60) of *A. braziliense* and 18.3% (11/60) of *A. tubaeforme*, corroborating with the findings of our study and those of OGASSAWARA *et al.* (1986) who found 37% (20/54) of *A. braziliense* and 25.9% (14/54) of *A.caninum/tubaeforme.* Similarly, the predominance of *A. braziliense* (70.9%) relative to *A. caninum* (36.7%) was observed in 196 cats from Ribeirão Preto Municipality, São Paulo State, Brazil, by ZAGO-FILHO *et al.* (1957). Unlike our study, MILLÁN & CASANOVA (2009), in Spain, observed that *A. tubaeforme* was the specie with the highest prevalence in cats. These differences are mostly due to the fact that *A. tubaeforme* is the dominant cat species in Europe (DUARTE *et al.,* 2010).

Although *A. caninum* is not considered as a common species in cats, similarly to our work, OGASSAWARA *et al.* (1986) showed a high occurrence of *A. caninum* in cats from São Paulo, Brazil, and BAKER *et al.* (1989) found 5.2% (78/1502) of occurrence of this specimen in young cats in Africa. These observations elucidate that, eventually, the cat can be considered as a host of *A. caninum*, as previously demonstrated by SCOTT (1928) and FOSTER & CORT (1937).

As for the agreement between the coproparasitological values and necropsy, our results differ from those obtained by SOUZA-DANTAS *et al.* (2007), who found a positive association between the numbers of eggs shedding and intensity of adult forms recovered at necropsy.

Animal feces contaminating the soil have been reported in several studies. Higher[25] and lower[21] percentages than those detected in the present study have been presented. Using Willis technique, SILVA FRANCISCO *et al.* (2008) evaluated 66 fecal samples of dogs and cats from public squares of Anápolis Municipality, Goiás State, Brazil, and observed *Ancylostoma* eggs and larvae in 46.9% (31/66) and 15.1% (10/66) samples, respectively.

Public squares particularly present a high level of contamination by enteroparasites, mainly *Ancylostoma*[19]. The occurrence of CLM in children from Taciba Municipality, São Paulo State, Brazil, was observed, due to their contact with sand in public parks where *Ancylostoma* spp. larvae were detected[27].

CONCLUSION

Based on the high occurrence of hookworm in dogs and cats in Andradina, the treatment with anti helminthics are needed even in those animals with negative stool tests, besides adopting control of the number of animals in public places, in order to decrease the likelihood of environmental contamination, since this parasite represents a potential hazard to human and animal health.

RESUMO

Ocorrência de *Ancylostoma* em cães, gatos e locais públicos da cidade de Andradina, São Paulo, Brasil

O objetivo deste estudo foi determinar a freqüência e intensidade parasitária de *Ancylostoma* spp. em 33 cães e 52 gatos por meio de exames coproparasitológicos e pela necropsia parasitológica, bem como avaliar a presença de fezes contaminadas com ovos deste parasito em locais públicos do município de Andradina/SP. Por meio das técnicas de Willis-Mollay e Sedimentação, ovos de *Ancylostoma* spp. foram observados em 87,9% (29/33) e 94,2% (49/52) dos cães e gatos, respectivamente. As espécies constatadas nos cães foram *A. caninum* em 63,6% (21/33) e *A. braziliense* em 30,3% (10/33). Dos gatos, 67,3% (35/52) estavam parasitados por *A. braziliense*, 21,1% (11/52) por *A. caninum* e 9,6% (5/52) por *A. tubaeforme*. Foram coletadas 42 amostras fecais caninas do ambiente público sendo, 23 de praças/jardins e 19 de ruas/calçadas. Positividade para *Ancylostoma* spp. foi observada em 64,3% (27/42) destas fezes sendo 60,9% (14/23) provenientes de praças/jardins e 68,4% (13/19) de ruas e calçadas. Não foi observada associação entre a presença do parasito e a idade, sexo e raça dos animais, bem como entre o número de parasitos observado na necropsia e o OPG ($p > 0.05$). Baseado na alta ocorrência de ancilostomídeos em cães e gatos neste estudo, o tratamento com anti-helmínticos faz-se necessário, mesmo nos animais com exames de fezes negativos, além da necessidade de adoção de controle do número de animais em locais públicos, a fim de diminuir a probabilidade de contaminação do meio ambiente, uma vez que este parasito representa um perigo potencial à saúde humana e animal.

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Received: 26 November 2010
Accepted: 16 June 2011