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Helminths parasites of stray dogs (*Canis lupus familiaris*) from Cuiabá, Midwestern of Brazil

Helmintofauna de cães errantes (*Canis lupus familiaris*) de Cuiabá, Centro-Oeste do Brasil

Dirceu Guilherme de Souza Ramos^{1*}; Bruna Karina Alexandria Zocco²; Mariana de Medeiros Torres¹; Ísis Assis Braga¹; Richard de Campos Pacheco³; Afonso Lodovico Sinkoc³

Abstract

Helminths cause respiratory and gastrointestinal infections in animals, especially in neonates and young animals. Some species of helminth parasites of domestic animals have zoonotic potential, becoming a public health problem, especially when combined with lack of information about the population of these zoonosis and lack of control over of their hosts. This study aimed to identify and quantify the species of helminths from dogs that are not domiciled in the region of Cuiabá, in the Midwest region of Brazil. A total of 100 animals, from the Center for Zoonosis Control of Cuiabá were euthanized and necropsied for helminth searching. Overall 8,217 helminths were found in 85 animals identified in six species: *Ancylostoma caninum*, *Ancylostoma braziliense*, *Trichuris vulpis*, *Toxocara canis*, *Dirofilaria immitis* and *Dipylidium caninum*. It was evidenced the wide distribution of helminths pathogenic to domestic dogs and especially with zoonotic potential as *A. caninum*, *T. canis*, *D. caninum* and *D. immitis*. The presence of *D. immitis* is an important finding, since it is a potentially zoonotic agent, however, this finding is considered sporadic.

Key words: Parasitism, *Ancylostoma*, *Larva migrans*, dirofilariasis, zoonosis

Resumo

Helmintos causam infecções respiratórias e gastrointestinais em animais, especialmente em neonatos e animais jovens. Algumas espécies de helmintos de animais domésticos possuem potencial zoonótico, se tornando um problema de saúde pública, especialmente quando adicionados a falta de informação da população sobre estas zoonoses e a falta de controle da população de hospedeiros. Este estudo objetivou identificar e quantificar as espécies de helmintos de cães não domiciliados na região de Cuiabá, Centro-Oeste do Brasil. Um total de 100 animais do Centro de Controle de Zoonoses de Cuiabá foram eutanasiados e necropsiados para a procura de helmintos. Ao todo 8.217 helmintos foram encontrados em 85 animais e identificados em seis espécies: *Ancylostoma caninum*, *Ancylostoma braziliense*, *Trichuris vulpis*, *Toxocara canis*, *Dirofilaria immitis* e *Dipylidium caninum*. Ficou evidente a alta distribuição de helmintos patogênicos para cães e especialmente com potencial zoonótico como *A. caninum*, *T. canis*, *D. caninum* e *D. immitis*. A presença de *D. immitis* é um achado importante, considerando o potencial zoonótico do agente, entretanto, o achado é considerado esporádico.

Palavras-chave: Parasitismo, *Ancylostoma*, *Larva migrans*, dirofilariose, zoonose

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Helminths may be responsible for respiratory and gastrointestinal infections, weight loss, developmental delay, progressing to cachexia and death, especially in neonates and young animal's age group that is more commonly affected (HOFFMANN et al., 1990).

Larva *migrans* syndromes, especially toxocariasis and hookworm infections are among the most prevalent zoonosis in the world, however these diseases are still unknown by the population (WELLS, 2007). These parasitic zoonosis are associated with the presence of dogs and cats in public places such as parks and squares (RUBINSKY-ELEFANT et al., 2010)

Non domiciled dogs are epidemiologically important in environmental contamination, as well as animals that not receive antiparasitic treatment routinely, and roads in public areas (PALMER et al., 2007). In Brazil has been reported contamination of soil in urban areas up to 60.3%, including areas reserved for human recreation (TIYO et al., 2008; RUBINSKY-ELEFANT et al., 2010). In European countries the soil contamination may reach around 87.1% as (RUBINSKY-ELEFANT et al., 2010).

Cuiabá has an estimated population of 50,143 dogs (CUIABÁ, 2010), of which 70% has access to public areas, thus the objective of this study was to collect, identify and calculate the mean intensity of parasitism (MIP) and mean abundance population (MAP) of the helminthes species found in dogs from Cuiabá, Mato Grosso State, Midwestern of Brazil.

During March 2007 to August 2008, 100 free-ranging dogs (*Canis lupus familiaris*) captured by the Zoonosis Control Centre of Cuiabá municipality (CCZ/Cuiabá) were necropsied. These animals were caught in public areas and euthanized according to the protocol of the American Veterinary Medical Association (AVMA), Guidelines on Euthanasia (AVMA, 2001) by CCZ/Cuiabá. This study was approved by the Ethics Committee on Animal Research of the Federal University of Mato Grosso (Protocol N°. 23108.027980/10-8).

During the necropsy, the esophagus, stomach, small intestine and large intestine were individually washed and filtered in 0.15 mm sieve, and examined in stereomicroscope under 10x magnification. The same procedure was used for the liver (gallbladder and bile ducts), pancreas, heart, kidneys, bladder and ureters. The lungs were opened by the bronchial tree for washing the content in the sieve, and later searched for parasites and/or injuries and, in these situations, fragments were subjected to histopathological examination stained by hematoxylin-eosin (UENO; GONÇALVES, 1998).

All parasitic worm found were collected and processed according to Hoffmann (1987). The identification was carried out following specific keys according to each taxonomic group: Anderson, Chabaud and Wilmott (2009), for nematodes, and Khalil, Jones and Bray (1994) for cestodes.

Prevalence, MIP and MAP were calculated according to Bush et al. (1997), using the software Quantitative Parasitology 3.0. Prevalence statistical analysis were performed using the methodology of generalized linear models (GLM) using a binomial distribution (presence or absence of the characteristic), with the aid of the logistic link function as a linear predictor.

On the whole 8,217 helminths was founded in 85 animals (85%), with 6 species identified as: *Ancylostoma caninum* (Ercolani, 1859), *Ancylostoma braziliense* (Faria, 1910), *Trichuris vulpis* (Froelich, 1789), *Toxocara canis* (Werner, 1782), *Dirofilaria immitis* (Leidy, 1856) and *Dipylidium caninum* (Linnaeus, 1758).

Ancylostoma caninum was the most prevalent specie (76% - $p < 0.05$), with higher mean intensity (87.34), and mean abundance (66.38). Although *A. braziliense* has shown high MIP, its prevalence and abundance were lower than *A. caninum*. Moreover, *D. immitis* showed the lowest values found for all variables. Prevalence, MIP and MAP for other helminths species are presented in Table 1. The most

absolute abundant specie was *A. caninum* followed by *T. vulpis* (Figure 1). There was no statistically significant difference between the other species ($p < 0.01$).

Table 1. Prevalence, mean intensity, mean abundance and range of helminths species of 100 dogs in Cuiabá, MT, Brazil, from 2007-2008.

Species	Prevalence % (p < 0.05)			Mean Intensity	Mean Abundance	Range
	Lower	Mean	Upper			
Nematodes						
<i>Ancylostoma caninum</i>	74.1	76	76.9	87.34	66.38	1-784
<i>Ancylostoma braziliense</i>	1.95	2	2.05	109.5	2.19	15-204
<i>Trichuris vulpis</i>	41.92	43	44.07	23.33	10.03	1-181
<i>Toxocara canis</i>	17.55	18	18.45	14.94	2.69	1-82
<i>Dirofilaria immitis</i>	0.97	1	1.02	6	0.06	6
Cestodes						
<i>Dipylidium caninum</i>	31.2	32	32.8	2.56	0.82	1-7

Source: Elaboration of the authors.

Ramos et al. (2013) investigated the helminth parasites of stray cats in metropolitan area of Cuiabá showed a prevalence of 60.96% for *Ancylostoma* spp., being the most prevalent and abundant species in cats, close to those observed in this study. Cutaneous larva *migrans* has been described as a public health problem in Cuiabá, and usually occurs by the negligence, and lack of knowledge of the population about this zoonotic disease, caused especially by the genus *Ancylostoma*, which has a high biotic potential, especially in months with more rainfall, and increases of environmental contamination (ALMEIDA; CÂNDIDO; SOUSA, 2010). Beyond, accidental sporadic cases of *A. caninum* has been described in humans (BOWMAN, 2009).

The prevalence (50.68%) described by Ramos et al. (2013) to *A. braziliense* in cats, demonstrated wide distribution and abundance of that species in the same region of this study. Despite *A. braziliense* mature in dogs and cats (BOWMAN, 2009), the low prevalence (1.95%) observed in dogs, showed the parasitic specificity of the helminthic species and their hosts. Beyond, *A. caninum* is much more

pathogenic for dogs than *A. braziliense*, because it causes much greater blood loss per worm (BOWMAN, 2009).

Trichuris vulpis has been commonly reported in dogs, causing bloody diarrhea, mainly due to their intense tissue penetration (BOWMAN, 2009). *T. canis* and *D. caninum* are zoonotic diseases and have also been described in cats in the region of Cuiabá (RAMOS et al., 2013). *D. caninum* is described mainly affecting children, who may ingest accidentally the intermediate host (fleas or lice). While *T. canis* is the agent responsible for visceral and ocular larva *migrans* (RUBINSKY-ELEFANT et al., 2010), and has been described being responsible for eosinophilic pneumonia in humans (DEMIRCI et al., 2012).

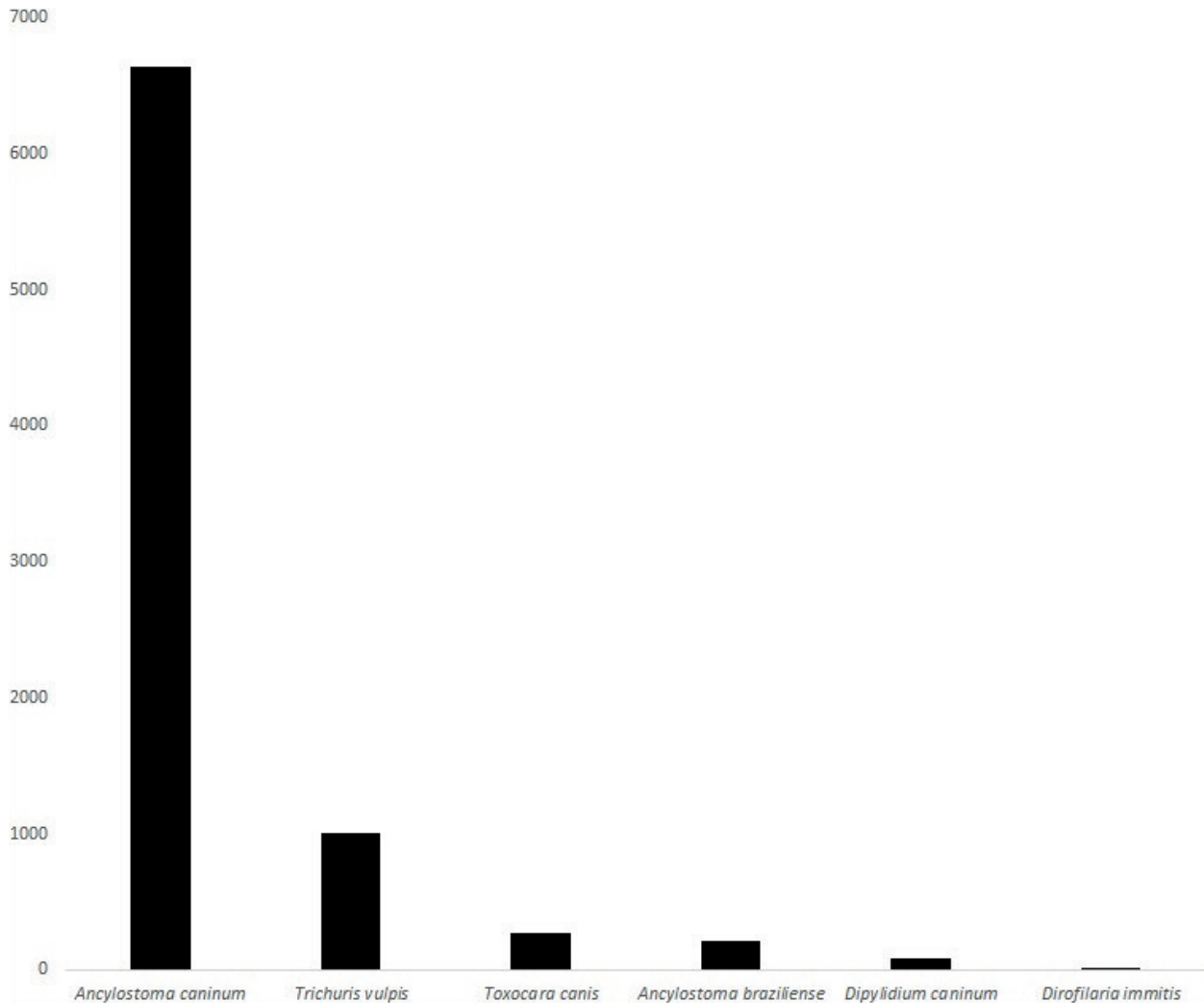
Dirofilaria immitis is a zoonotic parasitic disease mainly located in temperate, tropical, and subtropical areas of the world, using different species of culicid mosquitoes (*Culex* spp., *Aedes* spp., *Anopheles* spp.) as an intermediate host (BOWMAN, 2009). Despite its occurrence in just one dog (1%), Fernandes et al. (2000) described a seroprevalence of 11.81%

of *D. immitis* in dogs from Cuiabá using indirect methods, so being not effective in detecting the

parasite, only antibodies anti- *D. immitis* (SILVA; LANGONI, 2009).

Figure 1. Absolute abundance of helminths species of 100 dogs in Cuiabá, MT, Brazil, from 2007-2008.

Source: Elaboration of the authors.



It was evidenced the wide distribution of helminths pathogenic to domestic dogs, and especially with zoonotic potential as *A. caninum*, *T. canis*, *D. caninum* and *D. immitis*. However, further research is required to feature the real importance of *D. immitis* as a cause of heart disease in domestic dogs in the region.

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