

Gastrointestinal parasites of cats in Brazil: frequency and zoonotic risk

Parasitas gastrointestinais em gatos no Brasil: frequência e risco zoonótico

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Abstract

Gastrointestinal helminths are considered to be the most common parasites affecting cats worldwide. Correct diagnosis of these parasites in animals living in urban areas is pivotal, especially considering the zoonotic potential of some species (e.g. *Ancylostoma* sp. and *Toxocara* sp.). In this study, a copromicroscopic survey was conducted using fecal samples (n = 173) from domestic cats living in the northeastern region of Brazil. Samples were examined through the FLOTAC technique and the overall results showed positivity of 65.31% (113/173) among the samples analyzed. Coinfections were observed in 46.01% (52/113) of the positive samples. The most common parasites detected were *Ancylostoma* sp., *Toxocara cati*, *Strongyloides stercoralis*, *Trichuris* sp., *Dipylidium caninum* and *Cystoisospora* sp. From an epidemiological point of view, these findings are important, especially considering that zoonotic parasites (e.g. *Ancylostoma* sp. and *Toxocara* sp.) were the nematodes most frequently diagnosed in this study. Therefore, the human population living in close contact with cats is at risk of infection caused by the zoonotic helminths of these animals. In addition, for the first time the FLOTAC has been used to diagnosing gastrointestinal parasites of cats in Brazil.

Keywords: Copromicroscopic diagnosis, helminth, protozoa, felines, zoonosis, FLOTAC.

Resumo

Helmintos gastrointestinais são considerados os mais frequentes parasitos que afetam gatos em todo o mundo. O correto diagnóstico desses parasitos, em animais que vivem em áreas urbanas, é crucial, especialmente quando considerado o potencial zoonótico de algumas espécies (ex. *Ancylostoma* sp. e *Toxocara* sp.). Neste estudo, uma pesquisa coproparasitológica foi realizada, utilizando-se amostras de fezes (n = 173) de gatos domésticos da região Nordeste do Brasil. As amostras foram examinadas através da técnica FLOTAC, e os resultados gerais mostraram uma positividade de 65,31% (113/173). Co-infecções foram observadas em 46,01% (52/113) das amostras positivas. Os parasitas mais comuns aqui detectados foram *Ancylostoma* sp., *Toxocara cati*, *Strongyloides stercoralis*, *Trichuris* sp., *Dipylidium caninum* e *Cystoisospora* sp. De um ponto de vista epidemiológico, esses resultados são importantes, especialmente considerando que os parasitos zoonóticos (ex. *Ancylostoma* sp. e *Toxocara* sp.) foram os mais frequentes nematódeos diagnosticados neste estudo. Portanto, a população humana, em estreito convívio com esses animais, apresenta risco de infecção por helmintos de caráter zoonótico. Além disso, pela primeira vez, a técnica de FLOTAC tem sido utilizada no diagnóstico de parasitos gastrointestinais em gatos no Brasil.

Palavras-chave: Diagnóstico coproparasitológico, helmintos, protozoários, felinos, zoonoses, FLOTAC.

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Introduction

Recently, gastrointestinal helminths of cats have been deemed to be major problem within the veterinary clinical medicine of pets (FUNADA et al., 2007). A wide range of intestinal parasites (e.g. *Ancylostoma* sp., *Toxocara cati*, *Trichuris* sp. and *Dipylidium caninum*) has been reported in domestic cats worldwide (TRAVERSA, 2011; WEI et al., 2014; RIBEIRO, 2015). Nevertheless, the nematode species *Ancylostoma* sp. and *Toxocara cati*, which are the causative agents of cutaneous and visceral larva migrans, respectively, are undoubtedly the ones most frequently reported (REY, 2008; RODRÍGUEZ et al., 2006).

Detection of these parasites in cats is generally based on copromicroscopic methods. Among the main diagnostic techniques, those based on flotation, sedimentation and centrifuge-flotation have been widely used because they present low cost and are easily performed (OLIVEIRA-SEQUEIRA et al., 2002; FISHER, 2003). However, these techniques present low sensitivity and it is believed that in many epidemiological surveys, the results have been underestimated. Recently, a reliable tool known as the FLOTAC technique has been used to diagnosing intestinal parasites of animals and humans (CRINGOLI et al., 2010; CRINGOLI et al., 2013). It has been demonstrated that this diagnostic method presents high sensitivity for detecting eggs and/or oocysts of parasites in several species of animals (RINALDI et al., 2011; LIMA et al., 2015).

Although correct diagnosis of these helminths in cats is pivotal for preventing spreading of the parasite and human infection, few studies have been conducted in Brazil, especially in urban areas. Therefore, the aim of this study was to detect the main gastrointestinal parasites affecting cats in an urban area in Brazil. In addition, the zoonotic risk presented by some nematode species (i.e. *Ancylostoma* sp. and *Toxocara* sp.) has been discussed.

Materials and Methods

Fecal samples (n=173) from domestic cats, aging from six months to eight years old, living in three different municipalities (Recife (n=154) 08°03'14" S and 34°52'52" W; Bezerros (n=7) 8°14'33" S and 35°47'7" W; and Limoeiro (n=12) 7°52'20" S and 35°26'23" W) in the state of Pernambuco were used in this study. All animals were domiciled cats, which had free access to the backyard (when present). In addition, all animals were ectoparasites (fleas and lice) free. All the samples were collected directly from the floor, put into plastic vials, identified and stored in isothermal boxes at 8 °C until laboratory processing, which occurred maximum six hours after collection. In order to avoid environmental contamination only the top of the fecal material was collected, while the material at the surface in contact with the floor was not taken into considered.

Samples were analyzed individually using the FLOTAC dual technique (CRINGOLI et al., 2010). FLOTAC was performed using two flotation solutions: saturated sodium chloride (1.200 s.g.) and zinc sulphate (1.350 s.g.). The method used here was performed in accordance with the instructions stated in the original description of the technique.

Results

Eggs and/or oocysts of gastrointestinal parasites were detected in 65.31% (113/173) of the samples analyzed. Helminth eggs (*Ancylostoma* sp., *Toxocara cati*, *Strongyloides stercoralis* and *Trichuris* sp., and ovigerous capsules of *Dipylidium caninum*) were detected in 100% (113/113) of the positive samples, whereas only in 25.6% (29/113) of the samples were observed oocysts of *Cystoisospora* sp.. It is important to highlight that *Ancylostoma* sp. and *Toxocara cati*, which are parasites with zoonotic potential, were the ones most frequently reported in this study, presenting positivity of 67.2% (76/113) and 40.7% (46/113), respectively (Table 1). Interestingly, all the samples were found to be negative for the presence of lungworm larvae.

Coinfections were detected in 46.01% (52/113) of the positive samples (Table 2), and double and triple coinfections were observed in 31.85% (36/113) and 13.27% (15/113) of the fecal samples. All eggs and oocysts were identified based on morphological features provided in Urquhart et al. (1991).

Discussion

This study assessed the frequency of gastrointestinal parasites in the feces of domestic cats living in urban areas in the northeastern region of Brazil. The overall frequency detected here (i.e. 65.31%) was higher than the levels previously reported in other studies, in which positivity of 53.8% (PEREIRA et al., 2012) and 43.91% (FERREIRA et al., 2013) was observed. Recently, a study conducted in the state of Mato Grosso detected gastrointestinal parasites in

Table 1. Absolute and relative frequencies of eggs of gastrointestinal parasites of cats detected through the FLOTAC technique.

Helminths	Absolute frequency (AF)	Relative frequency (RF) (%)
<i>Ancylostoma</i> sp.	76	67.2
<i>Toxocara cati</i>	46	40.7
<i>Strongyloides stercoralis</i>	24	21.23
<i>Trichuris</i> sp.	02	1.7
<i>Dipylidium caninum</i>	01	0.88

Table 2. Coinfections of gastrointestinal parasites of cats detected through the FLOTAC technique.

Helminths/Protozoa	Positivity (% /n)
<i>Ancylostoma</i> sp. + <i>Toxocara cati</i>	15.9% (18/113)
<i>Ancylostoma</i> sp. + <i>Strongyloides stercoralis</i>	7.0% (8/113)
<i>Ancylostoma</i> sp. + <i>Cystoisospora</i> sp.	4.4% (5/113)
<i>Ancylostoma</i> sp. + <i>Trichuris</i> sp.	1.7% (2/113)
<i>Strongyloides</i> sp. + <i>T. cati</i>	2.65% (3/113)
<i>Ancylostoma</i> sp. + <i>T. cati</i> + <i>S. stercoralis</i>	7.96% (9/113)
<i>Ancylostoma</i> sp. + <i>T. cati</i> + <i>Cystoisospora</i> sp.	4.4% (5/113)
<i>Ancylostoma</i> sp. + <i>Strongyloides</i> sp. + <i>Cystoisospora</i> sp.	0.88% (1/113)
<i>Ancylostoma</i> sp. + <i>T. cati</i> + <i>S. stercoralis</i> + <i>Cystoisospora</i> sp.	0.88% (1/113)

67.12% of the cats on which postmortem examinations were conducted (RAMOS et al., 2013). Differences between the frequencies observed here might be related to several factors such as the animals' ages, parasite load, sample conservation, environmental contamination and type of diagnostic test (VANDAMME & ELLIS, 2004). In the present survey, helminth eggs were more frequently detected than were oocysts of protozoa. It has already been demonstrated that this is a common finding because helminth eggs are more easily detected in the environment, which may be an important source of infection for cats (COELHO et al., 2009).

In previous copromicroscopic surveys using different techniques, *Ancylostoma* sp. was the most prevalent gastrointestinal parasite (SCHUSTER et al., 2009; MILLÁN & CASANOVA, 2009). In the present study, the high prevalence of infection due to this nematode was an expected finding, since it has been demonstrated that parasitism due to *Ancylostoma* sp. may occur throughout the animal's life (URQUHART et al., 1991). In fact, it is known that this nematode does not depend on the immunity acquired during the life of the animal (BOAG et al., 2003). Similarly, *Toxocara* sp. has been considered to be one of the most prevalent helminths in cats throughout the world, with prevalence rates ranging from 8% to 55.2% (ABU-MADI et al., 2008; CALVETE et al., 1998). Although it is most common in young animals (up to six months of age), toxocarid species have been also diagnosed in adult felines (OGASSAWARA et al., 1986). It is important to highlight that both species reported above present great importance with regard to public health, because they are causative agents of cutaneous and visceral larva migrans in the human population.

Albeit less frequently, infections by other gastrointestinal helminths were detected in this study. For instance, eggs of *Trichuris* sp. were detected in 1.7% (2/113) of the samples analyzed, these data are similar to others previously reported (STALLIVIERE et al., 2009; TESSEROLLI et al., 2005). On the other hand, ovigerous capsule of *D. caninum* were detected only in 1% (1/113) of the positive samples, thus indicating a low parasite burden in cats and consequently low transmission between these animals. Moreover, *Cystoisospora* sp. was the only protozoon detected here. The prevalence of coccidian species in pets may vary widely depending on the technique used. It is important to note that the present study used the FLOTAC technique, which is a tool that presents high sensitivity in relation to the classical methods (LIMA et al., 2015). The high percentage of positivity (i.e. 25.6%; 29/113) detected here, probably occurred due to the high sensitivity presented by this technique for detecting eggs, larvae and/or oocysts.

Occurrences of coinfections are common findings and might result from environmental contamination (COELHO et al., 2009; RAGOZO et al., 2002). Interestingly, to the best of the present authors' knowledge, our study provides the first report in the scientific literature of simultaneous infection by *Ancylostoma* sp., *T. cati* and *S. stercoralis*.

In conclusion, our data indicate that gastrointestinal parasites have high prevalence among domestic cats living in the northeastern region of Brazil. From an epidemiological point of view, these findings are important, especially considering that zoonotic parasites (e.g. *Ancylostoma* sp. and *Toxocara* sp.) were the nematodes most frequently diagnosed in this study. Therefore, the

human population living in close contact with cats is at risk of infection by the helminths of these animals. In addition, this is the first report of the use of the FLOTAC technique for diagnosing gastrointestinal parasites of cats in Brazil.

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