

## PARASITES IN STOOL SAMPLES IN THE ENVIRONMENT OF ILHA DA MARAMBAIA, RIO DE JANEIRO, BRAZIL: AN APPROACH IN PUBLIC HEALTH

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### SUMMARY

This research aimed to describe the frequency of parasites in stool samples in the environment of Ilha da Marambaia, Rio de Janeiro, Brazil. One hundred and five stool samples were collected and processed by the coproparasitological techniques ethyl acetate sedimentation and centrifuge-flotation using saturated sugar solution. Parasites were detected in 81.9% of the samples, hookworm being the most prevalent, followed by *Trichuris vulpis*. *Ascaris* sp. eggs were also found. A high level of evolutive forms of parasites with public health risk was found in stool samples of the environment studied. We propose that health education programs, allied to an improvement of human and animal health care, must be employed to reduce the environmental contamination.

**KEYWORDS:** Zoonotic parasites; Hookworms; Dogs; Soil.

### INTRODUCTION

Companion animals play a pivotal role in the transmission of some parasites to humans, acting as definitive or reservoir hosts for helminths and protozoa species. The free access of dogs to household surroundings, as well as to public areas, is an important factor of environmental contamination by feces containing intestinal parasites<sup>2</sup>. Additionally, some of these agents have zoonotic potential and remain viable in water and soil, until they infect a new host<sup>1</sup>.

Several studies performed worldwide, especially in tropical areas, have underscored the importance of dogs in the transmission of zoonotic parasites such as *Ancylostoma* sp. (hookworms), *Toxocara canis*, *Cryptosporidium* sp. and *Giardia* sp., as well as the high impact of these infections in public health<sup>4,9,12,13</sup>. Despite the large number of reports on zoonotic parasites in public parks, beaches and recreational areas, there is a lack of studies about these agents in restricted geographical areas, such as islands. Since the access to these areas is limited, their epidemiological conditions may be rather singular, thus demanding special attention.

The aim of this study was to investigate the frequency of parasites relevant to public health in stool samples collected in the environment of Ilha da Marambaia, Rio de Janeiro, Brazil.

### MATERIAL AND METHODS

This study was performed on Ilha da Marambaia (23°04'S,

43°53'W), district of Mangaratiba, located in the Southern region of the state of Rio de Janeiro, in Brazil. Measuring 81 Km<sup>2</sup> this area is like an island, but is connected to the continent by a barrier beach ("restinga" vegetation). Moreover, it is under the administration of the Brazilian Navy and does not provide pedestrians access to the continent. The access to the locality is only possible by boat and with the authorization of the military forces, with restrictions applying to both human and animals. The total population was estimated at 350 inhabitants in 2010, living in 95 households spread over six beaches. The region's inhabitants depend on subsistence economy, mainly fishery. It is also characterized by poor housing, precarious basic sanitation, as well as an inefficient garbage collection. Around 120 dogs were identified in inhabited areas. They are mostly unrestrained, with access to all areas surrounding households and passageways of inhabitants. In addition to the presence of animal feces in this area, there are accounts of people defecating on the soil of the region.

From September 2010 to April 2011, in six different visits, all fresh stools resembling dog feces were collected, chilled and transported to the laboratory. A total of 105 samples were collected from the environment. The sampling was equally made at sand stretches leading to the six beaches, in addition to the soil around households.

Stool samples were processed by ethyl acetate sedimentation<sup>16</sup> and centrifuge-flotation using saturated sugar solution<sup>7</sup> techniques. Each sample was microscopically examined with 100x and 400x microscope magnifications and the parasitic agents were identified based on

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morphological characteristics and measurement of structures, using ocular micrometer (Olympus SWH, Center Valley, PA, USA).

## RESULTS

Of the 105 samples, 81.9% (86) presented at least one parasitic species. Hookworms were the most frequent parasites, found in 91.9% of the positive samples. By the time of the microscopic examination, most hookworm eggs contained larvae. Multiple infections occurred in 41.9% of the positive samples and the most frequent association was detected between hookworms and *Trichuris vulpis* (32.6%). It is also worth noting that seven samples were positive for *Ascaris* sp. eggs. Results are shown in Table 1.

**Table 1**

Frequency of parasites in 105 stool samples collected in the environment of Ilha da Marambaia, Rio de Janeiro, Brazil, detected by ethyl acetate sedimentation and centrifuge-flotation using saturated sugar solution

Parasites	Positive samples	Prevalence (%)
Hookworm	79	91.9
<i>Trichuris vulpis</i>	31	36.0
<i>Ascaris</i> sp.	7	8.1
Nematode larvae	4	4.6
<i>Toxocara canis</i>	3	3.5
<i>Dipylidium caninum</i>	1	1.2

In these seven samples, two contained only *Ascaris* sp. eggs, three had hookworm and *Ascaris* sp. eggs, one had hookworm, *Ascaris* sp. and *Trichuris vulpis* eggs, and the last one had hookworm, *Ascaris* sp. and *Dipylidium caninum* eggs.

## DISCUSSION AND CONCLUSIONS

This study has found a high level of parasitism in the stool samples examined, mostly presenting parasitic forms that require further development in the soil, with favorable conditions, prior to infecting a new host.

Hookworms were the most frequent parasites observed and, to this extent, they were considered the most important infective agent in the environment studied. *Ancylostoma* sp. is considered the main intestinal parasite of dogs in Brazil, and *A. caninum* is regarded as the most pathogenic species for dogs. This parasite presents larvae and adults of different species involved in human infections<sup>8</sup>. The high prevalence of *Ancylostoma* sp. stands as a major concern for public health, not only due to cutaneous *larva migrans*, but also owing to human eosinophilic enteritis, which may occur when the larvae of this parasite are swallowed by humans<sup>11</sup>.

The dimensions of *Trichuris* sp. eggs (70.6 - 87.5 µm in length by 31.9 - 41.2 µm in diameter), found in 31 samples in this study, were compatible with *T. vulpis*, suggesting that these positive samples were from dogs. The frequency of this agent was higher than those reported in recent studies performed in public areas in Brazil<sup>8,10</sup>.

Other evolutive forms of the parasites found in this research, such as hookworms and *Ascaris* eggs, were classified in the genus level, since several eggs from different parasite species have the same morphometry, but different host species<sup>15</sup>.

The presence of Ascaridida eggs in fecal samples that contained only Ascaridida eggs (two samples) suggests that these feces could be from humans or swine, infected with *Ascaris lumbricoides* or *A. suum*, respectively. Although eggs of *Baylisascaris* genus have been described in both canine and human infections and are indistinguishable from *Ascaris* sp., this parasite has never been reported in Brazil<sup>6</sup>. Insofar as the inhabitants of the Ilha da Marambaia have the habit to defecate on the soil, this study suggests that a possible source of environmental contamination for the said parasite was probably humans infected with *A. lumbricoides*. Furthermore, MANDARINO-PEREIRA *et al.* (2010)<sup>10</sup> described a similar scenario in the public areas of the state of Rio de Janeiro.

In this study, two samples which had *Ascaris* sp. also revealed parasites commonly found in dogs, such as *T. vulpis* and *D. caninum*. Furthermore, a recent study performed in another tropical area reported the presence of *A. lumbricoides*, by polymerase chain reaction, in stool samples from dogs; this suggests the ingestion of human feces by these dogs<sup>14</sup>. Nevertheless, *T. vulpis* and *D. caninum* had also been described rarely in human infections<sup>5,9</sup>. Thus, based on the results presented, determining the source of environmental fecal contamination is not possible, since microscopic identification of eggs was the only survey method employed.

The behavior of dogs which roam freely in this region poses a risk to public health and promotes cyclical infections in the canine population. Moreover, the lack of veterinary assistance in the region studied may contribute to the high level of infection, mainly determined by the absence of diagnosis and treatment of parasitism in animal population.

It is also important to highlight that individuals walking barefoot was a typical picture observed in the region. In addition to this, there were accounts of the people's habit of defecating on the soil, which could represent an important factor in macro- and micro-epidemiology of parasitic zoonosis, as well as in human soil transmitted helminth infections<sup>3</sup>.

In spite of this, the scenario observed in this study is in keeping with the significant relationship between the high prevalence of parasites and the low social and economic status, including the poor sanitary conditions and lack of information about prevention of parasitosis<sup>3,4</sup>.

These results point to a high level of environmental contamination with stool samples containing evolutive forms of parasites, which suggests the possibility of transmission of parasites both to human and animal populations. Health education programs, allied to an improvement in attention of human and animal health care, must be furthered to reduce the environmental contamination on Ilha da Marambaia and, presumably, in other tropical areas.

## RESUMO

### Parasitos em amostras fecais de ambiente da Ilha da Marambaia, Rio de Janeiro, Brasil: uma abordagem em saúde pública

O objetivo deste estudo foi descrever a frequência de parasitos em

amostras fecais coletadas no ambiente da Ilha da Marambaia, Rio de Janeiro, Brasil. Cento e cinco amostras foram coletadas e processadas pelas técnicas coproparasitológicas de sedimentação em acetato de etila e centrifugo-flutuação em solução saturada de sacarose. Foi observada positividade em 81.9% das amostras, sendo ancilostomídeo o parasito mais frequente, seguido de *Trichuris vulpis*. Ovos de *Ascaris* sp. também foram detectados. Observou-se elevada frequência de parasitos com importância em saúde pública nas fezes recolhidas no ambiente. Programas de educação em saúde, aliados a atenção dos serviços das saúdes humana e animal, devem ser empregados para redução dos níveis de contaminação ambiental.

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#### CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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