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Original article

Occurrence of endoparasites with zoonotic potential in the city of Uruguaiana-RS

Ocorrência de endoparasitos com potencial zoonótico no município de Uruguaiana- RS

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A B S T R A C T

The presence of feces of companion animals in public squares contaminated with endoparasite eggs with zoonotic potential plays a fundamental role in the transmission of diseases to the population. In this context, Cutaneous Larva Migrans and Visceral Larva Migrans are important zoonosis. In the city of Uruguaiana-RS, as well as in the national panorama, there is a shortage of data that contemplate the current contamination of public areas in order to map critical areas for the implementation of public policies to prevent these diseases. Thus, we evaluated the occurrence of endoparasites in the public squares of Uruguaiana-RS through the collection of feces in these places. A total of 87 fecal samples were collected, in which 23 were positive for endoparasite eggs with zoonotic potential. In the compilation of the data, we found higher prevalence of *Ancylostoma* spp. than *Toxocara* spp. in not fenced public squares. Compared with previous studies, a decrease in contamination of feces found and collected was observed. Thus, possible causes and suggested preventive measures were raised, as well as responsible ownership and health education to reduce environmental contamination of the city.

Palavras-chave:
Saúde Pública
Ancylostoma spp.
Toxocara spp.
Zoonoses
Parasitologia

R E S U M O

A presença de fezes de animais de companhia em praças públicas, contaminadas com ovos de endoparasitos com potencial zoonótico, tem papel fundamental na transmissão de doenças para a população. Neste contexto, Larva Migrans Cutânea e Larva Migrans Visceral são importantes zoonoses. No município de Uruguaiana-RS, assim como no panorama nacional, há escassez de dados que contemplem a atual contaminação de áreas públicas a fim de mapear áreas críticas para a implementação de políticas públicas de prevenção destas doenças. Desta forma, se avaliou a ocorrência de endoparasitos em praças do município de Uruguaiana-RS através da coleta de fezes nestes locais. Foram coletadas 87 amostras de fezes, sendo 23 positivas para ovos de endoparasitos com potencial zoonótico. Na compilação dos dados obteve-se maior prevalência de ovos de *Ancylostoma* spp. que *Toxocara* spp. nas praças não cercadas. Em comparação com estudos anteriores percebeu-se uma diminuição da contaminação das fezes encontradas e coletadas. Sendo assim, foram levantadas possíveis causas e sugeridas medidas preventivas, além da posse responsável e educação em saúde para reduzir a contaminação ambiental do munícipio.

INTRODUCTION

The growing population of stray dogs and cats in Brazilian cities has become a concern for public health due to the spread of and the maintenance of endoparasites in the urban environment (OSTERMANN et al., 2011). Besides these, companion animals can also contribute to soil contamination when attending public environment (JÚNIOR; ARAÚJO; MEDEIROS, 2015). The urban soils of public squares, parks and recreation areas

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are daily exposed to feces of these animals, which can present a high percentage of eggs and parasitic larvae (RESENDE et al., 2015).

The endoparasites with zoonotic potential are related to the direct contact of animals with humans and their circulation in public areas such as squares and parks (RIBEIRO et al., 2013). Its transmission is facilitated by the habits of hygiene and improper habits of humans (FERREIRA et al., 2013). It mainly affects children and adults in situations of vulnerability (PRESTES; JESKE; SANTOS, 2015; RIBEIRO, et al., 2013). Because zoonotic diseases are spread from animals to humans, control and prevention measures must be implemented by veterinarians and other health professionals (ARMELIN, CUNHA, 2016).

Children are the group with the highest risk and can present several health problems resulting from this exposure (RIBEIRO et al., 2013). Most of the times, the affected age group is from one to five year-olds, because they attend more public squares and parks at this age and their hygiene habits can be neglected (TORGERSON; MCPHERSON, 2011).

Studies carried out in the country show that public squares, parks and recreation places have a risk of transmitting diseases to the population (RIBEIRO, et al., 2013). In addition, the works carried out evaluating the occurrence of zoonotic endoparasites in soils emphasizes the prevalence of the agents *Ancylostoma* spp. and *Toxocara* spp. (GONÇALVES, PALUDO, 2018). Thus, diseases such as cutaneous and visceral larva migrans can be transmitted at these areas (RIBEIRO et al., 2013).

The cutaneous larva migrans disease is caused by the penetration of infective larvae of canine and feline hookworms into the human epidermis. The most common parasites are *Ancylostoma braziliense* and *Ancylostoma caninum*. The injuries cause intense pruritus and tortuous eruptions resulting from the penetration of the infective larvae into the human skin (REICHERT et al., 2016; REICHERT et al., 2018).

The visceral larva migrans disease is caused by *Toxocara canis* and *Toxocara cati* nematodes that infect dogs and cats, respectively (JÚNIOR; ARAÚJO; MEDEIROS, 2015). Humans may exhibit variable clinical signs such as: anorexia, weight loss, abdominal pain, headache, fever, rashes, cough and asthma (TORGERSON; MCPHERSON, 2011). Occasionally, they may manifest ophthalmic and neurological abnormalities (MOURA et al., 2013).

Currently, the city has no data on file about the number of domestic dogs and cats, soil contamination by endoparasites and affected humans by cutaneous and visceral larva migrans diseases. Due to the absence of recent data, as well as the current panorama of contamination in public areas, it is necessary to determine the occurrence of endoparasites with zoonotic potential in the city of Uruguaiana-RS.

MATERIALS AND METHODS

From October 2017 to July 2018, an exploratory search was carried out in the public squares located in the city of Uruguaiana-RS. These public squares were chosen due to the intense use of these areas by the population, the presence of dogs in the surroundings and feces in the ground. The samples were collected in six town's public squares. Three fenced squares: Árvore, Monteiro Lobato and Nova Esperança; and three not fenced ones: Argentina, Barão do Rio Branco and Duque de Caxias.

Stool collection occurred on alternate working days in the morning, being performed in a zigzag path in the environment. Samples were randomly selected, dried and fresh samples were included. After collection, they were identified, stored in plastic bags and kept at a temperature of 10°C for further evaluation in the laboratory of veterinary parasitology.

After this step, the coproparasitological test was performed using the technique by Willis Mollay (HOFFMANN, 1987) and the identification of eggs was performed by optical microscopy in a 10x objective on a zigzag path on the slide. The samples were grouped in positive, negative and percentages were determined.

Initially, the descriptive analysis of the data allocated the samples in two groups: fenced and not fenced public squares. The occurrence of infestation in both groups with Ancylostoma spp. and Toxocara spp. was analyzed using Generalized Estimating Equations (GEE) on IBM SPSS software version 22 (SPSS Inc. IBM Company, USA). This analysis for repeated measures used a unstructured working correlation matrix, a robust covariance matrix estimator (Bonferroni), a normally distributed sample and identity connection function. Data were expressed as mean and standard error of the mean (SEM), with significance at 95% ($p < 0.005$).

RESULTS

During the study period, 87 fecal samples were collected from six public squares in the city of Uruguaiana-RS, and 23 (26.44%) were positive for eggs of endoparasites. In not fenced public squares (Argentina, Barão do Rio Branco and Duque de Caxias), 76 samples were found, where 19 (25%) contained eggs of endoparasites with zoonotic potential. In fenced public squares (Árvore, Monteiro Lobato and Nova Esperança), 11 fecal samples were found, where four (36.36%) were positive.

The not fenced public squares had higher amount of feces, but among them, Argentina square presented the largest number of samples. In total, 57 feces were collected, where 16 (28%) were positive. Barão do Rio Branco square had the highest percentage of positive samples (50%), while Duque de Caxias square had only one positive sample (7.69%) (Table 1).

Table1 – Description of the data obtained from the collections carried out in six public squares of the city of Uruguaiana-RS.

Public square	Area (m^2)	Sample number	Negative	Positive	*Ancylostoma* spp. +	*Toxocara* spp. +
Argentina	503.691	57	41	16	9	7
Barão do Rio Branco	514.135	6	3	3	3	0
Duque de Caxias	263.011	13	12	1	1	0
Árvore	103.055	8	7	1	1	0
Monteiro Lobato	155.700	1	1	0	0	0
Nova Esperança	92.270	2	0	2	0	2
Total	1.631.862	87	64	23	14	9

The fenced public squares had the smallest amount of feces. At Nova Esperança square, only two samples were collected, but both were positive (100%), while at the Árvore square, eight samples were collected and one was positive (12.5%). At Monteiro Lobato square there were no positive samples.

In relation to the area (m^2) of the analyzed places, among not fenced public squares, Argentina square presented the largest area and also the highest number of feces collected, however, despite the greater number of positive samples, it was proportionally inferior to Barão do Rio Branco square. In the fenced public squares, even though Nova Esperança had the smallest area, it presented higher prevalence of positive samples than Árvore and Monteiro Lobato squares.

In the total of positive samples for endoparasites eggs, diagnosed by the Willis Mollay technique, there was a higher occurrence of *Ancylostoma* spp. (n = 14, 87%) and *Toxocara* spp. (n = 9, 39.13%) eggs.

Statistical analysis shows an interaction between the frequency of infection and the type of parasite ($p = 0.007$). When the type of parasites in each not fenced public square was analyzed, there was a higher occurrence ($p < 0.001$) of *Ancylostoma* spp. (4.33 ± 1.96) than *Toxocara* spp. (2.33 ± 1.9). When all public squares were considered, there was a trend of a higher frequency ($p = 0.053$) of Ancylostoma spp. (2.33 ± 0.99) than of *Toxocara* spp. (1.50 ± 0.99). When the frequencies of each endoparasite in the two groups were analyzed, the occurrence of *Ancylostoma* spp. was higher in not fenced squares (4.33 ± 1.96) than in fenced squares (0.33 ± 0.272) with $p = 0.044$.

DISCUSSION

Dogs and cats are frequent hosts for various parasitic diseases and can consistently eliminate eggs from parasites in the soil. In order to obtain environmental material collections, the epidemiological and public health importance for diseases is observed, since eggs of endoparasites with zoonotic potential are often found (RIBEIRO et al., 2013).

Public places such as public squares, parks and beaches, where dogs and cats are allowed, are prone to the development of parasites such as *Ancylostoma* spp. and *Toxocara* spp. In addition to contaminating the soil, these become a problem for public health, since the agents can be transmitted to humans and cause diseases such as cutaneous and visceral larva migrans (FERREIRA et al., 2013). In the present study, we found samples contaminated with eggs of these two endoparasites, where *Ancylostoma* spp. eggs have the highest occurrence in not fenced public squares. This demonstrates the current exposure of people who attend the town's public squares of Uruguaiana-RS.

The last study on this subject in Uruguaiana-RS occurred in 2008, where 33.34% of positive samples were obtained (n = 36), with the occurrence of eggs of *Ancylostoma* spp. of 100% (MORO et al., 2008). We compare with our study, with caution, since the public squares included in these studies partially concurred. What is observed in this 10-year interval between studies is a small decrease in the amount of feces in the environment, however the occurrence of environmental contamination over the years remains, which exposes the population who go to these places to zoonotic agents. This justifies the periodic evaluation of the public spaces of the city, which would allow the implementation of new prevention and control measures, as well as changes and/or adjustments in the methods already used.

Most of the times, school-age children (nursery and pre-school) who play in public squares and parks are more affected by endoparasites due to the direct contact with the soil and by the immunity and susceptibility factor (RESENDE et al., 2015). In this context, one can observe the risks that Argentina square poses to its users, since it is located in the central region of the city of Uruguaiana-RS and next to Tia Mercedes Municipal Primary School. Thus, the data obtained reinforce the need for additional preventive measures to minimize the exposure of students of this school and other users of this public square, to contaminated feces and possible diseases resulting from direct and/or indirect contact.

The data obtained suggest that the population that goes to the not fenced public squares in the city is more

exposed and susceptible to the development of cutaneous larva migrans disease. The city of Uruguaiana-RS has no epidemiological data on the disease, because this parasitic zoonosis is not subject to compulsory notice (BRASIL, 2002).

The presence of fences and enclosures in squares and recreation areas are important factors for preventing soil contamination (SPRENGER; GREEN; MOLENTO, 2014). According to Prestes; Jeske; Santos (2015), physical barriers that prevent access of animals are important measures to prevent zoonotic parasites. In the present study, there were positive samples of endoparasites with zoonotic potential in the fenced squares, demonstrating that even a fenced public square has risks to transmit parasitoses to the population. Among the possible failures of this method would be the permanence of an open gate, which would allow access of stray animals; holes/openings on the fences; as well as access of wild animals during the night. During the collection of stool samples, it was noticed that, although Árvore and Nova Esperança are fenced public squares, at times they were with the gates open allowing free access to stray animals.

Regarding not fenced public squares, in addition to the causes of contamination already mentioned above, it is important to highlight the lack of awareness of the population regarding collection of feces from their pets that go to public environments. During samples collection, it was noticed that owners who did not collect their dogs' feces after the walk, this observation was noticed at Argentina square, where the largest number of fecal samples was obtained.

Health education measures should be carried out in the communities, prioritizing awareness about responsible possession and care of animals, such as periodic vermifuge as well as spreading knowledge about endoparasites with zoonotic potential. These measures are fundamental to reduce soil contamination (RIBEIRO et al., 2013). Thus, actions that help reduce the rate of environmental contamination, such as distribution of educational material and posters at susceptible sites, should be encouraged (SPRENGER; GREEN; MOLENTO, 2014).

The measures mentioned above can be carried out in the city of Uruguaiana-RS and other cities. In addition, the importance of hygiene habits in the population (health education), the population control of animals and the role of the citizen in maintaining clean soils, through the collection of feces from their companion animals during walking, should be emphasized.

CONCLUSION

Endoparasites with zoonotic potential are related to the presence of feces of dogs and cats in public areas. In the present study, the highest occurrence of *Ancylostoma* spp. in the public squares with no physical barriers was observed. Despite the smaller amount of feces in the fenced public squares, positive samples with zoonotic potential were found in these places. Based on the data obtained, we noticed the need for prevention of the population of the city of Uruguaiana-RS through health education, as well as the implementation of methods of awareness about responsible ownership and the decrease in wandering domestic animals in the city.

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