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SHORT COMMUNICATION

INTESTINAL PARASITES PRESENT IN CANINE FECAL SAMPLES COLLECTED IN RURAL AREAS OF MUNICIPALITIES IN THE MIDWEST OF SANTA CATARINA, BRAZIL

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ABSTRACT

The study of intestinal parasites that occur in dogs in rural areas of Brazil is most important since there is little data available on this subject. Dog fecal samples were collected in rural properties of some municipalities in the Midwest of the State of Santa Catarina. Fecal samples were processed and analyzed by Hoffman, Pons and Janer (HPJ) (spontaneous sedimentation) and by centrifugal flotation in sucrose solution. Positive results with the presence of at least one parasite corresponded to 56.0% of the samples, namely *Ancylostoma* sp., *Toxocara canis, Trichuris vulpis, Dipylidium caninum, Giardia* sp., *Cryptosporidium* sp. and *Taenia* sp. / *Echinococcus* sp. This data suggests that the environmental contamination of the countryside and, consequently, the infection levels of dogs in the area studied is high, thus the need for more effective public health measures. This work looks at the possible implications of these results.

KEY WORDS: Canids; intestinal parasitoses; zoonoses.

RESUMO

Parasitos intestinais presentes em material fecal de cães encontrados no solo de áreas rurais de municípios da região meio oeste de Santa Catarina, Brasil

O estudo das parasitoses intestinais que ocorrem em cães nas áreas rurais do Brasil assume grande importância ante a escassez de trabalhos sobre este assunto. Foram coletadas amostras fecais de cães encontradas no solo de propriedades rurais de alguns municípios da região meio oeste do estado de Santa Catarina. No laboratório, as amostras foram processadas e analisadas pelo método de Hoffman e por centrífugo-flutuação em solução de sacarose. Verificou-se a presença de pelo menos um parasito em 56,0% das amostras. Os seguintes parasitos foram

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encontrados: *Ancylostoma* sp., *Toxocara canis*, *Trichuris vulpis*, *Dipylidium caninum*, *Giardia* sp., *Cryptosporidium* sp. and *Taenia* sp. / *Echinococcus* sp. Estes resultados indicam um nível elevado de contaminação do ambiente rural por parasitos de cães; por conseguinte, os níveis de infecção de cães na área estudada foram também elevados. O quadro sugere a necessidade da adoção de medidas eficazes de saúde pública e remete à discussão das possíveis implicações de tais resultados.

DESCRITORES: Canídeos; parasitoses intestinais; zoonoses.

Dogs are responsible for the transmission of more than 60 infectious diseases to humans (Macpherson, 2005), including protozoa and helminthes (Dantas-Torres & Otranto, 2014; Geffray, 2007, Plant et al., 1996). The health improvement of the dog population is, therefore, very important to reduce the prevalence of infectious diseases in the human population (Katagiri & Oliveira-Sequeira, 2007). Intestinal parasites in dogs (*Canis lupus familiaris*) retard the development of these animals, especially the young. In Brazil, most studies with canine intestinal parasites are limited to populations of stray or domestic dogs in urban areas (Alves et al., 2005, Ferreira et al., 2013). Consequently, knowledge of the prevalence of intestinal parasites in canine populations in rural areas is limited. The aim of this qualitative study was, therefore, to evaluate the occurrence of intestinal parasites in fecal samples found in rural properties and evaluate the contamination of areas in some municipalities in the Midwest of Santa Catarina, Brazil.

From April to August 2013, fresh dog fecal material was collected from the ground near kennels in rural properties located in the municipalities of Capinzal, Joaçaba, Monte Carlo, Ouro and Zortea. Only one sample per kennel was collected totaling 50 fecal samples corresponding to 50 distinct rural properties (This methodology prevented the collection of more than one sample per animal). Feces samples were stored in plastic bottles and transported on ice to the Laboratory for Infectious and Parasitic Diseases at the Universidade do Oeste de Santa Catarina. The samples were processed and examined on the same day as collected. Parasitological stool examinations were carried out using two distinct parasitological methods: spontaneous sedimentation (Hoffman et al., 1934) and centrifugal flotation in sucrose solution (Faust et al., 1938). Two slides of each sample/method stained with lugol solution were examined using a light microscope with a 40x lens.

Most of the dogs are reared in kennels close to the main houses on the properties. They are let loose during the day and penned in at night. The main food source consists of scraps provided by the owners, but some of the dogs also hunt during the day. According to the owners, the main source of water is from artesian wells, which are also used by the humans, however some dogs also drink from reservoirs unprotected from wild or other domestic animals.

A total of 50 fecal samples were obtained: 13 from Capinzal, five from Joaçaba, six from Monte Carlo, 22 from Ouro and four from Zortea.

Regarding the presence of parasites, 22 samples (44.0%) were negative and 28 (56.0%) were positive. Seventeen of the positive samples (60.7%) presented monoparasitism and 11 (39.3%) polyparasitism. Lorenzini et al. (2007) noted that 26.6% of the dogs in Porto Alegre (Rio Grande do Sul, Brazil) tested positive for intestinal parasites, where 89.2% of these samples presented monoparasitism and only 10.8% polyparasitism. Vasconcellos et al. (2006) noted the occurrence of monoparasitism in 73.1% of the positive diagnoses for any intestinal parasites in stray dogs picked up by the municipal kennel in Rio de Janeiro-RJ.

Among the parasite species, *Ancylostoma* sp. 39.3% (11/28) were the most prevalent followed by *Toxocara canis* 28.6% (8/28), *Trichuris vulpis* 25.0% (7/28), *Dipylidium caninum* 21.4% (6/28), *Giardia* sp. 21.4% (6/28), *Cryptosporidium* sp. 7.1% (2/28) and *Taenia* sp./*Echinococcus* sp. 3.6% (1/28) (Table). In studies carried out with fecal material from dogs from urban areas, the parasites recorded usually occurred less frequently. Funada et al. (2007), find a 12.7% prevalence of *Ancylostoma* sp in dogs seen at a veterinary hospital in Sao Paulo-SP. Blazius et al. (2005), find a 14.5% prevalence of *Toxocara canis* and only 1.9% of *Dipylidium caninum* in a study conducted on stray dogs in Itapema-SC. Capuano & Rocha (2006), described a 10.2% prevalence of *Giardia* sp in public squares in Ribeirão Preto-SP. Lallo & Bondan (2006), by means of light microscopy, noted an 8.8% prevalence of *Cryptosporidium* sp in kenneled dogs in São Paulo-SP. Vasconcellos et al. (2006), noted a prevalence of 0.5% of *Taenia* sp. and *Echinococcus* sp in dogs kept in kennels.

Table. Comparative table among the parasite prevalence identified in the current study and in the literature.

PARASITES	In this study	Rural Area*	Urban Areas*
Ancylostoma sp.	39.3% (11/28)	0.7% (9/226) (7)	38.4% (15/90) (19)
Toxocara canis	28.6% (8/28)	1.7 % (22/226) (7)	28.2% (11/90) (19)
Trichuris vulpis	25,0% (7/28)	1.7 % (22/226) (7)	27.7% (10/90) (19)
Dipylidium caninum	21.4% (6/28)	1.3% (17/226) (7)	25.0 % (9/36) (20)
Giardia sp.	21.4% (6/28)	2.2% (29/226) (7)	20.5% (8/90) (19)
Cryptosporidium sp.	7,1% (2/28)	2.0% (26/226) (7)	14.7% (251/600) (24)
Taenia spp/ *Echinococcus* sp.	3.6% (1/28)	3.5% (45/226) *Taenia* spp. (7)	4.6% (4/60) *Taenia* spp. (2)

* Parasite prevalence (%) in the literature (Reference)

Among the possible explanations for the differences in dog contamination from rural and urban areas, is that the dogs from rural areas are often fed the remains of animals slaughtered on the property, with a higher probability of ingesting hosts with parasites. These dogs also have more contact with the bare soil which could increase the chances of infection by *Ancylostoma* larvae (Soriano et al., 2010). Finally, the higher prevalence of *Giardia* sp. and *Cryptosporidium* sp. in rural dogs than in urban dogs may be due to the fact that these dogs drink water from small rivers and lakes that are frequently more contaminated with parasites while the urban dogs usually receive water from their owners obtained from the city supply system (Dubná et al., 2007).

Regarding the parasites recorded in the current study area, the occurrence of *Ancylostoma* sp., *Toxocara canis*, *Cryptosporidium* sp. and *Giardia* sp. must be highlighted. Since these species infect not only dogs but also humans, they are considered zoonoses, and must be monitored and controlled (Dantas-Torres & Otranto, 2014, Katagiri & Oliveira-Sequeira, 2007).

The main species of *Ancylostoma* capable of infecting dogs are *Ancylostoma caninum, Ancylostoma braziliense* and *Ancylostoma ceylanicum*. These hookworms are considered an important public health problem, because these species are capable of producing skin irritations such as cutaneous larva migrans (CLM) in humans (Landmann & Provic, 2003). The high proportion of feces collected in kennels containing hookworm eggs would suggest a greater prevalence of humans, especially children, with CLM in this region.

Another serious health problem is the presence of *Toxocara canis* eggs in these samples, as the main infection source of this parasite is embryonated eggs present in soil or water (Santarem et al., 2011). The larvae of *Toxocara canis* cause human toxocariasis or visceral larva migrans (CLM) that may remain asymptomatic or lead to cases with severe symptoms such as high temperature, eosinophilia, hepatomegaly, ocular symptoms, pulmonary symptoms, cardiac symptoms, or cerebral lesions (Despommier, 2003). Since the environmental conditions are an important factor for increasing the prevalence of toxocariasis, especially in children, the presence of *Toxocara canis* eggs in this region indicated the environmental contamination with this parasite and the possible increase of this disease in children (Rubinsky-Elefant et al., 2008).

Giardiasis, caused by *Giardia* sp., is a common intestinal parasitic disease in children and one of the main causes of diarrhea, abdominal cramps, bloating, weight loss, and absorption problems (Feng & Xiao, 2011). As this parasite is found in domestic animals, including dogs and cats and also in wildlife, and the same *Giardia* genotype was found in humans and dogs in the area, this parasite is considered an important zoonotic disease (van Keulen et al., 2002). The presence of this parasite in the rural areas inspected in the

current study, therefore, emphasizes the possibility of a high prevalence of human infection in this area.

Compared to other studies that have examined dogs in urban areas (Alves et al., 2005; Azian et al., 2008; Blazius et al., 2005; Capuano et al., 2006; Ferreira et al., 2013; Funada et al., 2007; Macpherson, 2005; Lorenzini et al., 2007; Maestri et al., 2012; Mergener et al., 2013; Smith et al., 2014; Vasconcellos et al., 2006), the present study indicates the possibility of dogs from rural areas of municipalities in the Midwest of Santa Catarina presenting higher levels of intestinal parasitic infection than those found in urban areas. Moreover, the greater dog population combined with higher levels of environmental contamination by parasite-laden feces increases the transmission rate (Dubná et al., 2007). It is, therefore, suggested that effective public health measures be implemented, such as deworming dogs in the countryside areas in order to reduce the level of dog and human parasitemia.

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REFERENCES

1. Alves OF, Gomes AG, Silva AC. Ocorrência de enteroparasitos em cães do município de Goiânia, Goiás: comparação de técnicas de diagnóstico. *Ci Anim Bras 6*: 127-133, 2005.
2. Azian MY, Sakhone L, Hakim SL, Yusri MY, Nurulsyamzawaty Y, Zuhaizam AH, Rodi IM, Maslawaty MN. Detection of helminth infections in dogs and soil contamination in rural and urban areas. *Southeast Asian J Trop Med Public Health 39*: 205-2012, 2008.
3. Blazius RD, Emerick S, Prophiro JS, Romao PRT, Solva OS. Ocorrência de protozoários e helmintos em amostras de fezes de cães errantes da Cidade de Itapema, Santa Catarina. *Rev Soc Bras Med Trop 38*: 73-74, 2005.
4. Capuano DM, Rocha GM. Ocorrência de parasitas com potencial zoonótico em fezes de cães coletadas em áreas públicas do município de Ribeirão Preto, SP, Brasil. *Rev Bras Epidemiol 9*: 81-86, 2006.
5. Dantas-Torres F, Otranto D. Dogs, cats, parasites, and humans in Brazil: opening the black box. *Parasit Vectors 7*: 22, 2014.
6. Despommier D. Toxocariasis: clinical aspects, epidemiology, medical ecology, and molecular aspects. *Clin Microbiol Rev 16*: 265-272, 2003.
7. Dubná S, Langrová I, Nápravník J, Jankovská I, Vadlejch J, Pekár S, Fechtner J. The prevalence of intestinal parasites in dogs from Prague, rural areas, and shelters of the Czech Republic. *Vet Parasitol 145*: 120-128, 2007.
8. Faust EC, D'antoni JS, Odon V, Miller MJ, Peres C, Sawitz W, Thomen LF, Tobie J, Walker H. A critical study of clinical laboratory technics for the diagnosis of protozoan cysts and helminth eggs in feces. I. Preliminary communication. *Am J Trop Med 18*: 169-178, 1938.
9. Feng Y, Xiao L. Zoonotic potential and molecular epidemiology of *Giardia* species and giardiasis. *Clin Microbiol Rev: 24*: 110-140, 2011.

10. Ferreira FP, Dias RCF, Martins TA, Constantino C, Pasquali AKS, Vidotto O, Freire RL, Navarro IT. Frequência de parasitas gastrointestinais em cães e gatos do município de Londrina, PR, com enfoque em saúde pública. Semina: *Ci Agrárias 34*: 3851-3858, 2013.
11. Funada MR, Pena HFJ, Soares RM, Amaku M, Gennari SM. Frequência de parasitos gastrintestinais em cães e gatos atendidos em hospital-escola veterinário da cidade de São Paulo. *Arq Bras Med Vet Zootec 59*: 1338-1340, 2007.
12. Geffray L. Infections associated with pets. *Rev Med Interne 20*: 888-901, 1999.
13. Hoffman WA, Pons JA, Janer JL. Sedimentation concentration method in schistosomiasis mansoni. *PR J Public Health Trop Med 9*: 283-298, 1934.
14. Katagiri S, Oliveira-Sequeira TCG. Zoonozes causadas por parasitas intestinais de cães e o problema do diagnóstico. *Arq Inst Biol 74*: 175-184, 2007.
15. Lallo MA, Bondan EF. Prevalência de *Cryptosporidium* sp. em cães de instituições da cidade de São Paulo. *Rev Saúde Públ 40*: 120-125, 2006.
16. Landmann JK, Prociv P. Experimental human infection with the dog hookworm, *Ancylostoma caninum*. *Med J Aust 20*: 67-69, 2003.
17. Lorenzini G, Tasca T, De Carli GA. Prevalence of intestinal parasites in dogs and cats under veterinary care in Porto Alegre, Rio Grande do Sul, Brazil. *Braz J Vet Res An Sci 44*: 137-145, 2007.
18. Macpherson CNL. Human behavior and the epidemiology of parasitic zoonoses. *Int J Parasitol 35*: 319-331, 2005.
19. Maestri MCH, Tonelo LM, D'Agostini FM, Muller GA, Dallanora FJ, Wagner G. Prevalência de enteroparasitos em cães no município de Capinzal, Santa Catarina, Brasil. *Unoesc & Ciência – ACBS 3*: 183-190, 2012.
20. Mergener D, Caricimo A, Langer D, Klein D, Lima G, Verona J, Conte N, Wagner G, Muller, GA. Enteroparasitos de cães errantes da zona urbana dos municípios de Água Doce, Irani, Joaçaba, Ponte Serrada e Treze Tílias, Santa Catarina, Brasil. *Unoesc & Ciência- ACBS 4*: 127-134, 2013.
21. Plant M, Zimmerman EM, Goldstein RA. Health hazards to humans associated with domestic pets. *Annu Rev Public Health 17*: 221-245, 1996.
22. Rubinsky-Elefant G, Silva-Nunes M, Malafronte RS, Muniz PT, Ferreira MU. Human toxocariasis in rural Brazilian Amazonia: seroprevalence, risk factors, and spatial distribution. *Am J Trop Med Hyg 79*: 93-98, 2008
23. Santarem VA, Rubinsky-Elefant G, Ferreira MU. Soil-transmitted helminthic zoonoses in humans and associated risk factors. In Pascucci S. *Soil Contamination*. Rijeka, Croatia, 2011.
24. Smith AF, Semeniuk CA, Kutz SJ, Massolo A. Dog-walking behaviours affect gastrointestinal parasitism in park-attending dogs. *Parasit Vectors 7*: 429, 2014.
25. Soriano SV, Pierangeli NB, Roccia I, Bergagna HF, Lazzarini LE, Celescinco A, Saiz MS, Kossman A, Contreras PA, Arias C, Basualdo JA. A wide diversity of zoonotic intestinal parasites infects urban and rural dogs in Neuquén, Patagonia, Argentina. *Vet Parasitol 67*: 81-85, 2010.
26. van Keulen H, Macechko PT, Wade S, Schaaf S, Wallis P, Erlandsen S. Presence of human *Giardia* in domestic, farm and wild animals, and environmental samples suggest a zoonotic potential for giardiasis. *Vet Parasitol 108*: 97-107, 2002.
27. Vasconcellos MC, Barros JSL, Oliveira CS. Parasitas gastrointestinais em cães institucionalizados no Rio de Janeiro, RJ. *Rev Saude Publ 40*: 321-323, 2006.