Available online at www.sciencedirect.com
ScienceDirect
Veterinary Parasitology 152 (2008) 242–248
veterinary parasitology
www.elsevier.com/locate/vetpar

Survey of giardiosis in household and shelter dogs from metropolitan areas of Curitiba, Paraná state, Southern Brazil

Paola Meireles [a], Fabiano Montiani-Ferreira [b], Vanete Thomaz-Soccol [a,*]

[a] *Programa de Pós Graduação em Microbiologia, Parasitologia e Patologia, Universidade Federal do Paraná (UFPR), Centro Politécnico, Jardim das Américas, Curitiba, PR 81531-990, Brazil*

[b] *Departamento de Medicina Veterinária, UFPR, Rua dos Funcionários, 1540 Curitiba, Paraná, Brazil*

Received 31 August 2007; received in revised form 17 December 2007; accepted 17 December 2007

Abstract

Giardia duodenalis is a protozoan parasite that causes a broad range of clinical symptoms varying from none – in asymptomatic carriers – to mild recurring diarrhea consisting of soft, light-colored stools to acute severe diarrhea. In different parts of the world this parasite has raised increased interest due to its possible zoonotic transmission. Among domestic animals, dogs can play an important role in environmental contamination. As there is little information on the frequency of giardiosis in dogs from the Metropolitan Area of Curitiba—State of Paraná, Southern Brazil, the aim of the present work was to evaluate the prevalence of *G. duodenalis* in two dog populations (household and shelter). To attain the proposed aim, we collected fecal samples from 200 dogs and utilized three diagnostic techniques: Faust's technique (Faust et al. 1939), Benbrook's technique (1963) and polymerase chain reaction (PCR). Faust's technique presented the best results, as it was able to detect a larger number of *Giardia* cases. Taking Faust's technique as the standard, Benbrook's technique presented 66% sensitivity and PCR demonstrated 69% sensitivity. The shelter dog population showed a 24% occurrence of *G. duodenalis* while the household population showed a 9% occurrence. Other epidemiological aspects like age, sex, environmental conditions and methodological aspects are discussed in the present article.

Keywords: *Giardia duodenalis*; Giardiosis; *Canis familiaris*; Parana state; Southern Brazil

1. Introduction

Giardia spp. is a cosmopolitan protozoan that causes malabsorption syndrome in humans and animals (Adam, 2001). Among domestic animals, this protozoan can cause disease in dogs, cats, mice, sheep, cows, goats and horses; among wild animals, birds and various wild mammal species have been reported to have the parasite (Thompson et al., 2000).

This protozoan is gradually gaining importance in the scientific world due to the increasing number of cases of water-related epidemics worldwide (Appelbee et al., 2005). The significance of infected non-human hosts as sources of water contamination is still an unresolved issue, as is the role of zoonotic transmission in the epidemiology of infections by *G. duodenalis* in humans (Thompson, 2004).

In addition, giardiosis in dogs constitutes an intriguing disease for clinicians and parasitologists, mainly because the prevalence in these animals varies depending on the diagnostic technique used, on the area

* Corresponding author at: Centro Politécnico, Departamento de Patologia Básica, Setor de Ciências Biológicas- UFPR. Curitiba, PR 81540-970. Brazil. Tel.: +55 41 3361 1697; fax: +55 41 3266 2042.
E-mail address: vasoccol@ufpr.br (V. Thomaz-Soccol).

0304-4017/$ – see front matter
doi:10.1016/j.vetpar.2007.12.025

under study, and on the host's individual susceptibility (Meloni et al., 1993; Nolan and Smith, 1995; Capelli et al., 2003). Another issue underlying giardiosis is that its prevalence in dogs may be underestimated due to the presence of subclinical infections, the intermittent nature of cyst elimination, and the low sensitivity of diagnostic methods (McGlade et al., 2003).

Since the different diagnostic methodologies available have low sensitivity, we wondered whether conventional PCR is the best diagnostic tool for this parasite. Furthermore, epidemiological surveys on the prevalence of giardiosis and the major risk factors contributing to the occurrence of the disease in dogs from the Metropolitan Area of Curitiba are unknown or incomplete. Thus, the present work had three main objectives: the first was to evaluate the efficacy of three diagnostic techniques: two coproparasitologic tests based on a search for *Giardia* cysts by microscopy (Faust's and Benbrook's assays), and one based on molecular biology (PCR); the second was to determine the prevalence of giardiosis in dogs from Curitiba; and the third was to explore the potential risk factors favoring the infection (sex, age and environmental conditions). Finally, by associating the risk factor(s) with groups presenting high prevalence of the disease we suggest control measures for reducing the number of new cases in the future.

2. Material and methods

2.1. Dog population

The population studied in the present investigation consisted of 200 dogs. A questionnaire was filled out with information about each animal's origin, sex, age and the conditions of the loving environmental. The animals were classified into three age groups: the first consisted of animals less than 3 months of age, the second group contained three to 6 month-old animals, and the third group consisted of dogs older than 6 months of age (from 6 months to 10 years). The environmental information distinguished between animals living in homes and animals living in kennels. The samples collected for the present work were derived from 100 shelter dogs and 100 household dogs (private owners). Out of 100 shelter animals, 31 came from the Municipal Kennel of Curitiba and 69 came from the Zoonosis Center in São José dos Pinhais-PR. Regarding age groups, 14 animals were younger than 3 months of age, 21 were approximately 3–6 months old and 65 were older than 6 months of age (Table 1). The 100 household dogs were living in houses or apartments and came from different areas of Curitiba-PR, such as Ahú, Água Verde, Alto da Glória, Alto da XV, Bacacheri, Bairro Alto, Batel, Bigorrilho, Boa Vista, Bom Retiro, Cabral, Campina do Siqueira, Centro, Centro Cívico, Cristo Rei, Hugo Lange, Jardim das Américas, Jardim Social, Juvevê, Rebouças, Santa Cândida, Santa Felicidade, Tarumã, and Uberaba. A smaller population investigated consisted of dogs that were either from other miscellaneous quarters of Curitiba or were examined at the local Veterinary Teaching Hospital from the Federal University of Paraná. The reason for collecting data from shelters and households was that these areas have different sanitary conditions and we wanted to analyze whether these factors influence the occurrence of *G. duodenalis*. Out of the 100 household dogs included in the study, 10 were under 3 months of age, three were 3–6 months old, and 87 were above 6 months of age. Regarding sex, 66 were male and 34 were female (Table 1).

Table 1
Number and characteristics of dogs included in the present study

Place of capture	Total #	Age in months			Sex	
		<3	3–6	>6	Male	Female
Zoonosis center	69	04	15	50	29	40
Municipal Kennel	31	10	06	15	12	19
Household	100	10	03	87	34	66
Total	200	24	24	152	75	125

2.2. Collecting fecal material

After carrying out the correct identification of the animal and filling out the questionnaire about sex, age and environmental conditions, the animals were restrained and a laxative was administered. Fecal samples were collected immediately after defecation, placed into sterile containers, and kept under refrigeration (5 °C) until further examinations were carried out in the laboratory. Single samples were collected from each animal in three alternate days and a coprological exam was carried out within 4 h from the time they arrived at the laboratory.

2.3. Coproparasitologic analysis

Two coproparasitologic techniques were used for analysis in individual samples for 200 dogs. The first one was described by Faust et al. (1939) – hereafter referred to as 'Faust's technique' – and the second one