

PREVALENCE AND ASSOCIATED RISK FACTORS FOR *Giardia lamblia* INFECTION AMONG CHILDREN HOSPITALIZED FOR DIARRHEA IN GOIÂNIA, GOIÁS STATE, BRAZIL

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SUMMARY

The objective of this study was to determine the prevalence and to identify risk factors associated with *Giardia lamblia* infection in diarrheic children hospitalized for diarrhea in Goiânia, State of Goiás, Brazil. A cross-sectional study was conducted and a comprehensive questionnaire was administered to the child's primary custodian. Fixed effects logistic regression was used to determine the association between infection status for *G. lamblia* and host, sociodemographic, environmental and zoonotic risk factors. A total of 445 fecal samples were collected and processed by the DFA methodology, and *G. lamblia* cysts were present in the feces of 44 diarrheic children (9.9%). A variety of factors were found to be associated with giardiasis in these population: age of children (OR, 1.18; 90% CI, 1.0 - 1.36; $p = 0.052$), number of children in the household (OR 1.45; 90% CI, 1.13 - 1.86; $p = 0.015$), number of cats in the household (OR, 1.26; 90% CI, 1.03 - 1.53; $p = 0.059$), food hygiene (OR, 2.9; 90% CI, 1.34 - 6.43; $p = 0.024$), day-care centers attendance (OR, 2.3; 90% CI, 1.20 - 4.36; $p = 0.034$), living on a rural farm within the past six months prior hospitalization (OR, 5.4; CI 90%, 1.5 - 20.1; $p = 0.03$) and the number of household adults (OR, 0.59; 90% CI, 0.42 - 0.83; $p = 0.012$). Such factors appropriately managed may help to reduce the annual incidence of this protozoal infection in the studied population.

KEYWORDS: *Giardia lamblia*; Epidemiology; Risk factors; Zoonosis; Children diarrhea; Brazil.

INTRODUCTION

Giardia lamblia, also known as *G. duodenalis* and *G. intestinalis*, is the most common protozoal parasite of the human intestine worldwide with rates of detection between 2-5% in the developed nations and 20-30% in the developing nations⁵. Giardiasis is associated with poor sanitary conditions, insufficient water treatment, day-care centers and with institutional facilities such as nursing homes. Infection occurs when infective cysts of *G. lamblia* are ingested by a susceptible host through contaminated water, food, by direct person-to-person or animal-to-person transmission. The World Health Organization reported that 200 million people in Asia, Africa and Latin America have symptoms of giardiasis with some 500,000 new cases a year, especially among children⁴⁴. The infection may produce severe acute diarrhea in children less than five years of age with chronic infections resulting in weight loss and growth retardation^{8,9,22}.

Reported prevalences of giardiasis in Brazilian children vary from up to 14.6% among diarrhea cases within a specific population to 78.3% among day-care and school settings^{3,15,24}. The level of endemicity of the disease can vary among different populations within this country. A study conducted in the city of São Paulo observed a decrease from 14.5% to 5.5% in the prevalence of giardiasis in children from newborn

to 59 months of age. The authors concluded that this decline in infection was due to improvement in maternal schooling, housing conditions and sanitation⁶. A prospective study of diarrheal illness in children living in Northeastern Brazil determined that lack of toilets and early weaning were risk factors for acquisition of diarrhea with *G. lamblia* was present in 6.7% of these cases¹⁰.

In Goiás, a Midwest state of Brazil, *G. lamblia* is routinely screened for in the population by using conventional tests. However, no substantial information about the medical ecology of this parasite is known for this area of the country. To address this deficiency, a cross-sectional epidemiologic study was conducted to determine the baseline prevalence of giardiasis and to identify risk factors associated with this parasitic infection in children hospitalized with diarrhea in this area of Brazil. Although this data was originally collected in 1998-1999 as part of a study on protozoal diseases in this area of Brazil, it is important because it (1) establishes a baseline prevalence of giardiasis for current and future work on this disease to be compared to, (2) allows public health researchers to determine if the occurrence of giardiasis has improved over the course of seven years, and (3) to determine if exposure to these various risk factors for childhood giardiasis has improved during this time.

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PATIENTS AND METHODS

Subjects. This cross-sectional study was conducted in six major pediatric hospitals located in Goiânia, capital of Goiás, Midwest Brazil, between the last week of August 1998 and the first week of May 1999. The study population was children ranging in age from two weeks to 10 years old that had been hospitalized primarily due to diarrhea and dehydration at hospital wards or medical units managed by the government national health system (Sistema Único de Saúde-SUS). Patients were admitted regardless of home of origin. Diarrhea was defined as loose or watery stools in the previous 24 hours and still present when the fecal specimen was collected at the hospital. Exclusion groups were patients that developed diarrhea after admission to the hospital wards and patients that were hospitalized with diarrhea but with a medical diagnose of food intolerance. HIV-positive children were also excluded from this study. A total of 445 cases were referred to this study by either the pediatrician or nurse responsible for the hospital wards or oral rehydration ward units. Because patients volunteered to be included in the study, our sample of patients should be considered a convenience rather than a random sample. As such, the results and conclusions from this study should be interpreted accordingly.

Information retrieval. To adhere to international standards for using human subjects in medical research, (1) all patients and/or their guardian(s) were informed of the project's objectives and goals, (2) signed consent forms, (3) a physician explained the patient's laboratory results and provided any and all necessary treatment, (4) the sponsoring hospital received the patients results, and (5) members of the project were available to further explain the project's findings to the patients, their guardians, and to the hospitals. A study nurse administered a comprehensive questionnaire to the child's primary custodian. The questionnaire included items on: (1) **Host factors:** age, sex and weight; (2) **Sociodemographic factors:** city of origin, type of dwelling, parent's occupation, number of household members stratified by age, number of household members stratified by age with gastrointestinal symptoms at the time of the survey or at most 30 days prior to the interview, household members sleeping arrangements, number of caretakers for the index child, day-care attendance including day-care size, number of hours and days child spent at day-care; (3) **Zoonotic factors:** number of pets owned by the household, occurrence of diarrhea among pets up to 30 days prior to the interview, contact with livestock, presence of a dairy farm within one km of dwelling and household member working at an animal agriculture facility; (4) **Environmental factors:** season, diet (consumption of raw salad items, consumption of non-peeled fruits, consumption of milk), food hygiene, source and treatment of drinking water, proximity of a body of raw water (e.g., river or lake) or sewage effluent canal near the dwelling and recent direct body contact with running (e.g., river) or standing water (e.g., lake or swimming pool).

Specimen collection and detection of *G. lamblia*. A single fecal sample was collected from each patient by parents or guardians and placed into a disposable plastic cup. Fecal characteristic was directly observed, classified and recorded by the study nurse as either loose stool with blood, loose stool with no blood, liquid stool with blood, or liquid stool with no blood. The sample was then preserved by adding 10% formalin to a 1:1 volume ratio. One gram of each diarrheic fecal sample was washed through four layers of surgical cotton gauze. Fecal

suspension was centrifuged at 1000×g for 10 minutes, supernatant aspirated and sediment resuspended 1:1 (v/v) with sterile distilled water. Using a disposable 10 L loop, fecal suspensions were smeared onto treated glass slides and dried overnight for immunofluorescent microscopy. Detection of *G. lamblia* cysts was performed using the direct immunofluorescent assay Merifluor *Cryptosporidium/Giardia* detection kit catalog number 250050 (Meridian Diagnostic, Inc., Cincinnati, Ohio). Briefly, one drop of the detection reagent (FITC labeled anti-*Cryptosporidium* and anti-*Giardia* monoclonal antibodies) followed by one drop of counterstain was placed in each well, gently mixed and the slide was incubated in a humidified chamber for 30 minutes at room temperature. Subsequently, the slide was washed with 1X wash buffer until excess detection reagent and counterstain was removed. One drop of mounting medium was placed to each well and a coverslip applied. The entire fecal smear was examined for *G. lamblia* cysts at ×200 magnification and the sample was recorded as positive if one or more oval-shaped organisms, 8-12 µm long stained bright green apple were detected, otherwise negative.

Statistical analysis. Fixed-effects logistic regression was used to test and quantify the association between the various putative risk factors (host, sociodemographic, zoonotic and environmental) and the odds of shedding *G. lamblia* among diarrheic children. Forward stepping algorithm was used, with the two-sided *p*-value of ≤ 0.10 for the inclusion of the factor in the model using the likelihood ratio test (LRT). The decision to use a *p*-value of ≤ 0.10 was made prior to data analysis. We chose this level of significance in order to identify all possible risk factors for *Giardia* infection among these hospitalized children. This is important so that public health efforts can reduce risk factors associated with giardiasis in children. Goodness-of-fit for the final model was calculated using the deviance with a χ^2 (chi-square) test performed on the appropriate degrees of freedom to determine *p*-values⁴.

RESULTS

Prevalence of *Giardia lamblia*. Based on the direct immunofluorescent assay, Merifluor *Cryptosporidium/Giardia* detection kit (Meridian Bioscience, Inc., Cincinnati, Ohio), the prevalence of *G. lamblia* among diarrheic children ten years of age or younger that had been taken to hospital wards or dehydration medical units in Goiânia, Brazil, was found to be 9.9% (44/445).

Host factors. Age of child was positively associated with the odds of *G. lamblia* infection, in that the odds of giardiasis increased about 1.18 for each additional year of age (OR, 1.18; 90% CI, 1.0 - 1.36; *p* = 0.052) (Table 1). The majority of infected children were between 24 - 48 months of age (19.7%) with infected children ranging in age from 116 days (< 4 months) to 120 months (Table 2). Giardiasis prevalence increased by 63% from the first year of life (≤ 12 months) to the second year of life (13 - 24 months) (Table 2). The host variables sex and weight were not found to be associated with giardiasis in this population (*p* > 0.10).

Sociodemographic factors. Being placed in a day-care center with other children during the past 30 days was associated with more than twice the odds of *G. lamblia* infection compared to children who did not attend day-care centers (OR, 2.3; 90% CI, 1.20 - 4.36; *p* = 0.034).

Table 1
Fixed effects logistic regression model for patent *G. lamblia* infection in children hospitalized with diarrhea in Goiânia, Midwest, Brazil

Factor	Prevalence of shedding <i>G. lamblia</i> No. positive/No. tested	Odds ratio(90% CI)	Likelihood ratio test (<i>p</i> -value) ^a
Age ^b	NA	1.18 (1.03-1.36)	0.052
Daycare attendance			
Yes	12/71 (16.90%)	2.3 (1.20-4.36)	0.034
No ^c	32/373 (8.58%)	1.0	
Number of household children ^b	NA	1.45 (1.13-1.86)	0.015
Number of household adult ^b	NA	0.59 (0.42-0.83)	0.012
Cats ^b	NA	1.26 (1.03-1.53)	0.059
Raw salad item (cabbage)			
Yes	10/43 (23.26%)	2.9 (1.34-6.43)	0.024
No ^c	34/397 (8.56%)	1.0	
Visited or lived on a farm within past six months of study			
Recently short-term visit	10/101 (9.90%)	0.95 (0.49-1.87)	0.91
Lived on a farm	3/12 (25.00%)	5.4 (1.5-20.1)	0.03
Neither ^c	31/329 (9.42%)	1.0	

^a Tests the null hypothesis that all logistic regression coefficients are simultaneously zero (odds ratio = 1) for the specific term, using asymptotic likelihood ratio test.

^b Continuous variable. ^c Referent category. NA = Not applicable

Table 2

Age specific distribution of patent *G. lamblia* infection in children hospitalized with diarrhea in Goiânia, Midwest, Brazil

Age in groups (months)	Prevalence of <i>G. lamblia</i> infection No. positive/No. tested (%)
< 6 months	3/80 (3.75%)
≥ 6-12 months	7/133 (5.26%)
> 12-24 months	15/117 (12.82%)
> 24-48 months	14/71 (19.72%)
> 48-120 months	5/41 (12.20%)

Table 3

Distribution of *G. lamblia* infection in children hospitalized with diarrhea in Goiânia, Midwest, Brazil, stratified by number of household children

No. of household children	Prevalence of <i>Giardia</i> cysts No. positive/No. tested (%)
0	11/139 (7.9%)
1	19/175 (10.9%)
2	9/86 (10.5%)
3	2/29 (6.5%)
≥ 4	3/16 (18.8%)

Number of days/week and hours/day spent at the day-care centers and day care size were not significant ($p > 0.10$). Children who lived in a family with other young children (< 10 years old) were at greater risk for *G. lamblia* infection compared to children in families without additional young children. For example, the odds of *G. lamblia* infection for the index child increased by about 50% for each additional household child (OR 1.45; 90% CI, 1.13 - 1.86; $p = 0.015$) (Table 1). Alternatively, the crude data from Table 3 shows a higher prevalence of giardiasis for households with four or more children compared to household with fewer children. For example, the overall prevalence of giardiasis in our sample of hospitalized children from households with fewer than four children was 9.6% compared and 18.8% for children with diarrhea from households with four or more children. The number of household adults was negatively associated with the odds of *G. lamblia*, in that the odds of *G. lamblia* infection declined by about 50% for each additional adult in the family (OR, 0.59; 90% CI, 0.42 - 0.83; $p = 0.012$). However, the number of household children and adults with diarrhea up to 30 days prior to the interview was not associated with the risk of *G. lamblia* infection ($p > 0.10$). Other sociodemographic

factors such as number of teenagers in the household, city of origin, parent's occupation, sleeping arrangements and number of caregivers attending the case (changing diapers) were not associated with the odds of *G. lamblia* infection in this study population. Ninety eight percent of the children in the study came from urban areas; 55% of the sample population lived in Goiânia, capital of Goiás, and 46% resided in other cities either within the state or from the neighborhood states of Mato Grosso, Pará, Tocantins and Bahia.

Environmental factors. Consumption of the raw salad item, cabbage, was associated with a 2.9 times greater odds of *G. lamblia* infection compared to the odds of infection for diarrheic children whose diet did not include this salad item (OR, 2.9; 90% CI, 1.34 - 6.43; $p = 0.024$). Season, consumption of milk, food hygiene, source and treatment of drinking water, proximity of a body of raw water (e.g., river or lake) or sewage effluent canal near the dwelling, presence or absence of sewage in the property and recent direct body contact with running (e.g., river) or standing water (e.g., lake or swimming pool) were not associated with the odds of *G. lamblia* infection ($p > 0.10$).

Diarrheic children of 0.05 - 1.7 years of age who had been breast-fed did not have a lower risk of *G. lamblia* infection (3/56 infected) compared to non-breast-fed diarrheic children within same age group (15/243 infected) (Fisher's exact test $p > 0.10$).

Zoonotic factors. Giardiasis was positively associated with the number of household cats such that the odds for infection increased by about 25% for each additional cat in the household (OR, 1.26; 90% CI, 1.03 - 1.53; $p = 0.059$). A total of 27% of the households in the study owned at least one cat. Interestingly, the presence of one or more dogs in the household was not associated with the odds of giardiasis ($p > 0.10$). The odds of giardiasis was about five and half times greater in diarrheic children who had lived on a farm within six months prior to visiting the hospital compared to diarrheic children who had not lived on a farm six months prior to the interview (OR, 5.4; CI 90%, 1.5 - 20.1; $p = 0.03$).

Goodness-of-fit for the multivariate logistic regression model: deviance = 253 on 411 df, $p = 1.0$.

DISCUSSION

Giardiasis is a common childhood infection worldwide with reported prevalence, sources and modes of transmission varying among children from different geographic locations. This study reports the prevalence and associated risk factors for *G. lamblia* among children hospitalized for diarrhea in Goiânia, Brazil, from August 1998 to May of 1999. *G. lamblia* was identified in 44 (9.9%) of 445 hospitalized diarrheic children. The prevalence of infection with *G. lamblia* in Brazil has ranged from 2.9% to 22.8% among children overall and over 78% among children who attend school or day-care centers^{6,10,17,26,30,36}. Furthermore, this parasite is frequently isolated from feces of children with persistent diarrhea and in conjunction with other enteropathogenic microorganisms that cause pediatric diarrhea¹⁴. The 9.9% prevalence of *G. lamblia* infection in this study population of diarrheic children was lower than the prevalence of 14.4% for *C. parvum* infection²⁵ given that both parasites were simultaneously tested for using the direct immunofluorescent assay. SCHNACK *et al.*³¹ reported a higher prevalence of *C. parvum* (85.1%) compared to *G. lamblia* (4.3%) among diarrheic children assisted by the Centro de Saúde Municipal (Municipal Health Center) in Criciúma, Santa Catarina State, Brazil. The lower prevalence for giardiasis compared to cryptosporidiosis found in our study population was not observed by NEWMAN *et al.*²² and FRASER *et al.*⁹ for cohorts of children living in north-east Brazil and from Beduin children living in Israel. *G. lamblia* was present in 23% and 21% of the cases whereas *C. parvum* was found in 7.4% and 2.3% of these cohorts of children, respectively. Differences in giardiasis and cryptosporidiosis prevalence can be attributed to different environmental conditions, asymptomatic carriers, length of diarrhea, type of epidemiological study and use of diagnostic tests of differing sensitivity and specificity compared to the direct immunofluorescent assay used in our study^{1,11,35}. The prevalence of joint infection with *G. lamblia* and *C. parvum* in our study population was 0.9% (4/445), considerably lower than the 7.3% reported for Egyptian children despite their use of similar diagnostic methods³⁵. Results from our analysis of risk factors for *C. parvum* infection in this sample of children have been reported previously²⁵. We did not include the analyses on giardiasis in our original manuscript regarding *C. parvum* infection in these

children due to the substantially different set of risk factors for each protozoal parasite, the different medical ecology of these two different parasites, and given the already lengthy manuscript regarding risk factors for *C. parvum* infection in these children.

The prevalence of *G. lamblia* infection was strongly associated with a variety of risk factors including host, sociodemographic, environmental and zoonotic. *G. lamblia* infection in our study was present in all age groups ranging from less than six months to 120 months, and infection increased after the first year of life reaching a maximum from 24 to 48 months of age. This age-associated pattern of increased infection after 12 months of life to the third or fourth year of life was similar to that found for the city of São Paulo⁶. Longitudinal and case-control studies carried out in Israel, Brazil and Kenia also reported higher risk of *G. lamblia* infection for children after the first year of life^{2,9,22}.

Attending day care centers within 30 days of becoming hospitalized for diarrhea was associated with a higher risk of giardiasis, consistent with previous studies in both developed and developing countries^{7,20,23,29,33,37}. Day care size was not found to be associated with *G. lamblia* infection as was observed in our previous study for the same population infected with *C. parvum*²⁵. Duration of attendance, time per week spent at a day care and family history of diarrhea are factors shown to be associated with a higher risk of acquiring infectious diseases in day-care centers²³. These risk factors were not found to be associated with giardiasis in our study population ($p > 0.10$). Reported prevalence among children attending schools and day-care centers from this community have identified *G. lamblia* as the second leading parasitic infection in this population³⁰. Urbanization and workforce social changes had resulted in young infants attending care outside family at a very early age³⁷. Private, government and philanthropic institutions have been caring for these children. In Goiás, Brazil, over 10,000 children are attending philanthropic day-care centers and 60% of these children (6,000) are attending day-care centers in Goiânia, the state capital ("Associação das Creches Filantrópicas do Estado de Goiás"). To date, there are no data addressing the risk factors for this parasite infection among these day-care centers in this area of Brazil. Additionally, children in child-care centers are likely to carry the infection to their homes and familial transmission of giardiasis is well documented³⁷. We found a positive association for *G. lamblia* infection among our study population and the number of children living with the index case in our multivariate logistic regression model (OR = 1.5, $p = 0.015$) and a negative association for number of adult in the household (OR = 0.6, $p = 0.012$). Alternatively, the crude prevalence of *G. lamblia* infection was 9.6% and 18.8% for diarrheic children from households with fewer than four or four or more children (Table 3), respectively, but no association was observed for diarrheic children and the number of household children with a history of diarrhea 30 days prior to visiting the hospital ($p > 0.10$). The negative association found in this study for number of adult in the family and odds of infection might be due to immunological resistance of adults compared to children.

Foodborne giardiasis has been documented through ingestion of contaminated food, with cysts of *G. lamblia* also isolated from a variety of raw fruits and vegetables²⁸. The practice of fertilizing fruit and vegetable crops with untreated human sewage and animal fecal wastes is done in many countries. It is likely that this source of fertilizer can

increase the risk of foodborne giardiasis given that many leafy vegetables are eaten raw or partially raw and some fruits do not need to be peeled prior of eating. We found an association of giardiasis among diarrheic children and consumption of a salad item, raw cabbage. A total of 10% of our study population consumed raw cabbage and infection with *G. lamblia* was present in 23.3% of this dietary cohort. *G. lamblia* cysts may contaminate food by way of direct contact with feces or through cross contamination such as unclean hands or kitchen utensils. Ninety-five percent of the households from our study population wash raw vegetables and fruits either with water or with an additional treatment such as soap or vinegar. No significant association was observed for diarrheic children infection and these different methods mode of food hygiene observed in this population ($p > 0.10$). The role of breast-feeding has been well documented for providing protection against enteric infection in young children. Several studies have shown that infants who were not breast-fed were at higher risk of giardiasis than infants who were breast fed^{16,21}. Among the 299 children in this study who were 20 months old or younger, 8.7% of them were breast-fed, 10% were exclusively breast-fed and 81.3% were non-breast-fed but received other sources of milk. Infection was not detected among exclusively breast-fed (0/30) compared to 11.5% (3/26) and 6% (15/243) of breast-fed and non breast-fed diarrheic children, respectively. Using a Fisher's exact test, the prevalence of giardiasis was not significantly different between the breast-fed/exclusively breast-fed and the non-breast fed exposure groups (two-sided $p = 0.25$). Our finding is similar to ISLAM *et al.*¹² where there was no association between breast-fed and non breast-fed Bangladeshi children and the prevalence of *Giardia* infection for infants younger than six months.

Companion animals have been reported to excrete *G. lamblia* cysts in their feces; however the potential for zoonotic transmission of *G. lamblia* cysts from animals to humans remains difficult to measure. Evidence of zoonotic transmission among humans and dogs living in the same community had been reported by TRAUB *et al.*⁴² by epidemiological data combined with molecular techniques. Although we did not test the feces from the companion animals in our study population, the odds for *G. lamblia* infection in our cohort of children was 1.26 greater for each additional cat in the household. The zoonotic importance of feline giardiasis is not well understood^{13,19,27,38,39}. Prevalence of *G. lamblia* infection among cats was 5.2% in New Zealand, 7.3% Central New York and 35% in the United Kingdom^{34,41,43}. To date there is little work done in Brazil to determine the frequency of these intestinal parasites in cats and *G. lamblia* was present in the feces of 6.1% of stray cats in Rio de Janeiro³². The greatest risk for zoonotic transmission of *G. lamblia* appears to be from companion animals such as dogs and cats, but how frequent such transmission occurs and under what circumstances has yet to be fully characterized⁴⁰. We did not use any molecular techniques to characterize our *G. lamblia* isolates to provide us with a molecular epidemiologic link to our observational study. Giardiasis was associated with diarrheic children who had lived or were living in a farm within six months prior to the interview compared to diarrheic children who had never visited or had briefly visited a farm six months prior to the study, suggesting that either zoonotic risk factors exist for this protozoal parasite or that other factors such hygiene or diet may be the casual factor.

In conclusion, efforts to reduce *G. lamblia* infection in children from Goiânia, Brazil, might benefit from closely examining the health

effects of out-of-home care given that increasing numbers of young children are expected to be exposed to this form of community caregiving. To date, most information regarding risk factors and management practices for infectious diseases in day-care centers come from the industrialized countries and less information is available from the developing nations. Epidemiological studies to address the risk factors and quality of care from these settings are important given that cultural, economic and social variation exists from place to place and from country to country. Wastewater reuse in agriculture irrigation and food production practices should take into account the potential transmission and spread of infectious agents to humans via ready-to-eat fresh fruits and vegetables. Clean irrigation water and microbiologically-safe fertilizers should be used in crops especially with leafy vegetables and fruits that are in close proximity in the soil surface (e.g. strawberries). Ultimately, to elucidate the potential zoonotic transmission of *Giardia*, it is necessary to study the interaction between companion animals and their owners and to also characterize the genetic relationship between *G. lamblia* strains isolated from humans and their companion animals.

RESUMO

Prevalência e fatores de risco associados à infecção por *Giardia lamblia* em crianças hospitalizadas com diarreia em Goiânia, Goiás, Brasil

O objetivo desse estudo foi estimar a prevalência e identificar fatores de risco associados à infecção por *Giardia lamblia* em crianças hospitalizadas com diarreia no município de Goiânia, Estado de Goiás, Brasil. Foi realizado um estudo transversal e um questionário estruturado foi administrado ao responsável pela criança. Análise multivariada foi realizada por meio de regressão logística para se determinar a associação entre infecção por *G. lamblia* e as variáveis sociodemográficas, ambientais e zoonóticas relacionadas ao hospedeiro. Das 445 amostras de fezes coletadas e processadas pelo método de imunofluorescência direta (DFA), 44 (9,9%) apresentaram cisto de *G. lamblia*. Uma variedade de fatores de risco foi encontrada associada à giardíase: idade da criança (OR, 1,18; 90% CI, 1,0 - 1,36; $p = 0,052$), número de crianças na família (OR, 1,45; 90% CI, 1,13 - 1,86; $p = 0,015$), número de gatos pertencentes à família (OR, 1,26; 90% CI, 1,03 - 1,53; $p = 0,059$), higiene alimentar (OR, 2,9; 90% CI, 1,34 - 6,43; $p = 0,024$), usuários de creches (OR, 2,3; 90% CI, 1,20 - 4,36; $p = 0,034$), ter residido em área rural seis meses precedendo à hospitalização (OR, 5,4; 90% CI, 1,5 - 20,1; $p = 0,03$) e número de adultos na família (OR, 0,59; 90% CI, 0,42 - 0,83; $p = 0,012$). Tais fatores, devidamente controlados podem contribuir para redução anual da incidência desta parasitose na população estudada.

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- Received: 16 March 2006
Accepted: 27 October 2006