

Occurrence of enteroparasitosis in schoolchildren of the municipal district of Jataizinho, State of Paraná, Brazil

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ABSTRACT. The enteroparasitoses are responsible for high death rates, mainly in developing countries where population growth is not followed by improvement in the population's standard of living. The aim of this study was to determine the occurrence of and the factors associated with enteroparasitosis in schoolchildren from Jataizinho, State of Paraná, Brazil. 264 fecal samples were analyzed by sedimentation in water, direct technique and Kato-Katz methods. The general prevalence of enteroparasitosis was of 68.2% (180/264). The most frequent protozoans were *Endolimax nana* (47.5%) and *Entamoeba coli* (23.1%). Already among the helminthes were *Ascaris lumbricoides* (10.2%) and *Trichuris trichiura* (6.1%). There was a predominance of poliparasitism cases (50.5%) in relation to the monoparasitism (49.5%). *Schistosoma mansoni* eggs were found in four (1.5%) of the analyzed samples. The main factor associated with intestinal parasitosis was related to the habit of bathing in rivers, streams or lakes (OR = 2.78; IC 95%; 1.32 – 5.92). According to the results obtained, sanitary education measures should be urgently implemented, emphasizing the risk of the habit of bathing in rivers and lakes, better personal hygiene habits and hygiene procedures for food.

Key words: enteroparasitosis, schoolchildren, epidemiology.

RESUMO. Ocorrência de enteroparasitoses em escolares do município de Jataizinho, Estado do Paraná, Brasil. As enteroparasitoses são responsáveis por altos índices de morbidade principalmente nos países em desenvolvimento, onde o crescimento populacional não é acompanhado de melhoria das condições de vida da população. O objetivo deste estudo foi determinar a ocorrência e os fatores associados às enteroparasitoses em escolares de Jataizinho, Estado do Paraná, Brasil. Foram avaliadas 264 amostras de fezes pelos métodos de sedimentação espontânea, método direto e Kato-Katz. A prevalência geral de enteroparasitoses foi de 68,2% (180/264). Os protozoários de maior prevalência foram a *Endolimax nana* (47,5%) e a *Entamoeba coli* (23,5%). Já entre os helmintos foram o *Ascaris lumbricoides* (10,2%) e o *Trichuris trichiura* (6,1%). Houve predominância de casos de poliparasitismo (50,5%) em relação aos de monoparasitismo (49,5%). Ovos de *Schistosoma mansoni* foram encontrados em quatro (1,5%) amostras analisadas. O principal fator associado às parasitoses intestinais foi o hábito de freqüentar rio, riacho ou lagoa (OR = 2,78; IC 95%; 1,32 – 5,92). De acordo com os resultados encontrados, medidas de educação sanitária devem ser implantadas com urgência, enfatizando o risco de freqüentar rios ou lagos, melhores hábitos de higiene pessoal e higienização dos alimentos.

Palavras-chave: enteroparasitoses, escolares, epidemiologia.

Introduction

Surveys to determine population sanitary profile are fundamental to define and/or redefine health policies. Among these populations, children are the

ones who lack real and reliable information, being those most susceptible to infect-contagious and parasitary diseases.

In tropical countries, the climate, in addition to lack of information and bad sanitary conditions,

favors enteroparasitosis widespread. Besides becoming a problem of public health, it characterizes bad hygiene conditions, economic difficulties, lack of information on preventive actions, under-nutrition, and lack of actions from authorities on public health (Costa-Gurgel *et al.*, 1992). The enteroparasitoses are responsible for high death rates, mainly in developing countries where population growth is not followed by improvement in the population's standard of living.

In Brazil, enteroparasitoses are among the main public health problems and, still, parasitary investigations have been thoroughly neglected in the country (Ferreira and Marçal Júnior, 1997). The different Brazilian regions present a range of economic and social developments, therefore, it is possible to notice that poorer states show higher parasite infection rates. The poorer regions, North and Northeast, are the holders of the highest mortality rates by infect-contagious and parasitary illnesses (Paes and Silva, 1999). A study conducted in Aracaju (SE) has revealed a prevalence of 51.5% enteroparasitoses in children between one and 5 years of age (Gurgel *et al.*, 2005). In children and adolescents between one and 14 years of age from the city of Guaçuí (ES), the prevalence of enteroparasitoses were of 88.6% (Barreto, 2006). In Cascavel (PR), studies indicate a prevalence of 11.02% intestinal parasitosis in children in school age in a resettlement (Ferreira *et al.*, 2004), and in the city of Londrina (PR), the prevalence revealed in the analysis of people living in poor neighborhoods was of 54.8% (Mizuma *et al.*, 2006).

In addition to the direct pathogenic effects of these parasites on health, the parasitic infections exert important influence on the nutritional status, growth and cognitive functions of school-age children (Ferreira *et al.*, 2004). Therefore, sanitary actions together with therapeutic measures are necessary for an effective control of these infirmities (Barreto, 2006).

The aim of this study was to research the occurrence of enteroparasitosis in children from a fundamental level school from the municipal system of Jataizinho, Paraná State, Brazil, and co-relate risk factors with the epidemiology of the disease studied.

Material and methods

Population studied: 264 feces samples were voluntarily collected from children between 4 and 11 years old from a fundamental level school from the municipal system of Jataizinho, Paraná State, Brazil.

Material collection: Two feces samples were collected from each child, with interval of at least

seven days between collections, in clean containers with screw-on lids, correctly identified, kept under refrigeration until processing.

Epidemiological Questionnaire: Factors associated with enteroparasitoses in the group studied were determined through the use of an epidemiological questionnaire to the parents of the children. The following analyzed variables were: gender, age group, schooling, contact with animals, whether the animal has access to vegetable gardens, whether the house is served with treated water, sewage destination, garbage destination, whether the animal has access to garbage, presence of derelict land near the residence, presence of garbage in derelict land, presence of river/stream near the residence, presence of rats in residence, habit of bathing in river, habit of playing in sand, ingestion of raw/badly cooked meat and habit of washing food.

Exams performed: As for the coproparasitological exams, samples were submitted to sedimentation in water and direct technique (Pessoa and Martins, 1982) and Kato-Katz (Katz and Peixoto, 2000) methods.

Statistical analysis: The results obtained after the study of the variables were submitted to statistical analysis by chi-square test (χ^2) corrected by Yates or Fisher Test, using Epi6 version 6.04 (CDC-Atlanta) statistic program, adopting 95% confidence interval (CI) (Dean *et al.*, 1994).

Ethics committee: The present paper was approved by the Ethics in Research Committee from the Hospital Universitário Regional do Norte do Paraná – Decision CEP 142/03.

Results and discussion

Enteroparasitoses prevalence was of 68.2% (180/264), out of which samples of poliparasitism were verified in 50.5% (91/180). The most prevalent protozoan was *Endolimax nana* (47.5%) followed by *Entamoeba coli* (23.5%) (Table 1) and the most prevalent helminth was *Ascaris lumbricoides* followed by *Trichuris trichiura* (6.1%). *Schistosoma mansoni* eggs were found in four (1.5%) of the analyzed samples (Table 2).

Table 1. Occurrence of intestinal protozoan according to gender in schoolchildren at the Fundamental Level from the municipal system of Jataizinho, State of Paraná, Brazil, 2004.

		Intestinal protozoans									
		En		Ec		Gd		Eh		Ib	
	Total	n	%	N	%	n	%	N	%	n	%
Masculine	140	59	42.1	41	29.3	24	17.1	5	3.6	2	1.4
Feminine	124	66	53.2	21	16.9	14	11.3	4	3.2	3	2.4
Total	264	125	47.3	62	23.5	38	14.4	9	3.4	5	1.9

En: *Endolimax nana*; Ec: *Entamoeba coli*; Gd: *Giardia lamblia*; Eh: *Entamoeba histolytica/dispar*; Ib: *Iodamoeba butschlii*.

Table 2. Occurrence of intestinal helminthes, according to gender, in schoolchildren at the Fundamental Level from the municipal system of Jataizinho, State of Paraná, Brazil, 2004.

	Total	Intestinal helminthes															
		Al		Tt		Ev		Hn		Ad		Sm		Ss		Ta	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
Masculine	140	15	10.7	11	7.9	5	3.6	7	5.0	5	3.6	3	2.1	3	2.1	2	1.4
Feminine	124	12	9.7	5	4.0	5	4.0	2	1.6	4	3.2	1	0.8	0	0.0	1	0.8
Total	264	27	10.2	16	6.1	10	3.8	9	3.4	9	3.4	4	1.5	3	1.1	3	1.1

Al: *Ascaris lumbricoides*; Tt: *Trichuris trichiura*; Ev: *Enterobius vermicularis*; Hn: *Hymenolepis nana*; Ad: *Ancylostomid*; Sm: *Schistosoma mansoni*; Ss: *Strongyloides stercoralis*; Ta: *Taenia* sp.

There were no significant differences regarding gender among the infected and the main factor associated with the acquisition of intestinal parasitoses was the habit of bathing in rivers, streams or lakes (OR = 2.78; 1.32 – 5.92) (Table 3).

Table 3. Main variables associate with the infection for enteroparasites in schoolchildren at the Fundamental Level from the municipal system of Jataizinho, State of Paraná, Brazil, 2004.

Variables	Positive (%)	Negative (%)	p	χ^2	OR (CI 95%)
Gender					0.96
Feminine	84 (67.7)	40 (32.3)	0.99	0.00	(0.55 – 1.67)
Masculine	96 (68.6)	44 (31.4)			
Habit of bathing in rivers, Streams or lakes					2.78
Yes	62 (80.5)	15 (19.5)	0.00	56.767	(1.32 – 5.92)
No	58 (59.8)	39 (40.2)			
Presence of garbage in derelict land					1.10
Yes	35 (70.0)	15 (30.0)	1.0	0.00	(0.43 – 2.79)
No	34 (68.0)	16 (32.0)			
House with sewage system public service deposited in strip of land					1.05**
Yes	130 (67.7)	62 (32.3)	1.0	*	
No	2 (66.7)	1 (33.3)			
Presence of vegetable gardens in house					0.99
Yes	36 (66.7)	18 (33.3)	0.88	98.02	(0.48 – 2.04)
No	91 (66.9)	45 (33.1)			

* Fisher Exact Test; ** CI inaccurate.

The 68.2% enteroparasitoses prevalence observed in children from the city of Jataizinho shows that these parasites are widely distributed in this community. This result is higher than those found by authors which evaluated daycare school children (15.2%) and children from the first to fourth year of schooling (52.5%) from the municipal system of Rolândia (PR) (Giraldi *et al.*, 2001) and which evaluated students in the fifth year (55.4%) of a school in Campina Grande do Sul, Paraná State, (Ogliari and Passos, 2002). Minor results were also found in Cascavel (PR) where the prevalence of intestinal parasitosis in school-age children in a resettlement was of 11.02% (Ferreira *et al.*, 2004). Data published in the International Health Congress have shown an enteroparasitosis prevalence of 35.9% in the population from the outskirts of Londrina, Paraná State (Miglioranza *et al.*, 2005). Also in Londrina (PR), in analyzing the population of devoid quarters, a prevalence of 54.8% (Mizuma *et al.*, 2006) was observed.

There was a predominance of poliparasitism (50.5%) in relation to the monoparasitism (49.5%). This result differs from that found by Tashima and Simões (2004) where the authors observed a predominance of monoparasitism (78.8%) in relation to the poliparasitism (21.2%) and the results found by Barreto (2006) (monoparasitism: 31.43% and poliparasitism: 57.14%).

The most prevalent protozoan was *Endolimax nana* (47.7%) followed by *Entamoeba coli* (23.5%) which, although non-pathogenic, shows there was fecal contamination of water and/or food, indicating a low quality of water consumed and/or problems in the treatment of water served to the population. Transport, family storage of water and fecal contamination of irrigation water are other possible sources of infection, and have the same transmission way of *Giardia lamblia* (third most prevalent protozoan -14.4%) (Rocha *et al.*, 2000).

Machado *et al.* (1999) concluded that age, cultural and socioeconomic levels are related with giardiasis, what reflects on basic hygiene procedures. Most part of the studied children received treated water from the public network of health facilities in their houses, and the occurrence of giardiasis (14.4%) agrees with other studies stating that chlorination does not adequately destroy the parasite's cysts (La Via, 1994). Another important means of giardiasis transmission is the direct transmission, mainly in children attending schools and daycare centers, where person-to-person contact is frequent, especially because these children have not yet developed adequate hygiene habits. Moreover, it is difficult to implement hygienic measures in these environments due to their collective characteristics (Pupulin *et al.*, 2004).

Despite the occurrence of low intensity infection by intestinal helminthes in the population, a reasonable prevalence of *Ascaris lumbricoides* (10.2%) was observed, indicating not only important peridomicilar contamination, but also precarious sanitary education towards food and personal hygiene (Anaruma Filho, 2002).

The prevalence rate of *Enterobius vermicularis* found in the present study (3.8%) meets the values found in coproparasitological surveys performed in several areas in Brazil, where these varied from 1.4 to 4.0% (Ferreira and Marçal Júnior, 1997; De Carli and Tasca, 2001; Giraldi *et al.*, 2001; Silva and Santos, 2001).

Chieffi *et al.* (1988) observed occurrence of Ancylostomid in only 1.3% of the samples assessed in the city of Guarulhos (SP), while Tashima and Simões (2004) observed only two children (3.4%)

with Ancylostomid. This fact was attributed to the urbanization and improvement of general life conditions in the last decades. In this study, in fact, only nine children (3.4%) with Ancylostomid were observed.

Rocha et al. (2000) states that the occurrence of schistosomiasis is low in children in school age. In fact, in this study, only four children with *Schistosoma mansoni* (1.5%) were observed, although the main factor associated with the acquisition of intestinal parasitosis in our statistical analysis was the habit of bathing in rivers, streams or lakes (OR = 2.78; 1.32 – 5.92).

In relation to the other variables associated with the presence of the analyzed enteroparasitoses, no statistically significant differences were found (gender, presence of garbage in derelict land, house with sewage system, presence of vegetable gardens in house).

Conclusion

General prevalence of enteroparasitoses was of 68.2% and the main factor associated with acquisition of enteroparasitoses is related to the habit of bathing in rivers, streams or lakes.

According to the results obtained, sanitary education measures should be urgently implemented, emphasizing better personal hygiene habits, food treatment and water storage, aiming at improving life quality of the studied population. As the region presents good conditions of environmental sanitation, sanitary educational measures should be implemented urgently, emphasizing hygiene procedures for food and water to be consumed by the population studied.

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