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Artigo Completo

LOW INTESTINAL PARASITES AS AN HEALTH INDICATOR IN A MUNICIPALITY OF SOUTHERN BRAZIL WITH INTENSIVE AGRICULTURAL MECHANIZATION

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ABSTRACT

In this study was verified the presence of intestinal parasites in children from a municipality with intense agricultural mechanization in the state of Paraná, southern Brazil. The parasitological stool examinations of 5,219 children from zero to 10 years that live in various districts of Campo Mourão were analyzed by the methods of Faust, Lutz and Baermann-Moraes, in 2004 and 2005. At least one parasite species was observed in 19.8% of children. *Entamoeba coli* (7.2%), *Giardia duodenalis* (5.2%) and *Endolimax nana* (2.7%) were the most frequent species. Area with rural characteristics and the peripheries of urban centers showed a higher percentage of parasites compared to central regions. Low intestinal parasites is probably due to mechanization of soil, migration from rural to urban areas, high use of antiparasitic and easy access to public health facilities.

Palavras-chave: *Intestinal Parasites; Health indicators; Agricultural Mechanization.*

BAIXO PARASITISMO INTESTINAL COMO INDICADOR DE SAÚDE EM MUNICÍPIO DO SUL DO BRASIL COM INTENSA MECANIZAÇÃO AGRÍCOLA

RESUMO

Neste estudo foi verificada a presença de parasitos intestinais em crianças de município com intensa mecanização agrícola do Estado do Paraná, Sul do Brasil. Os exames parasitológicos de fezes de 5.219 crianças de zero a 10 anos residentes em diversos bairros de Campo Mourão foram realizados pelos métodos de Faust, Lutz e Baermann-Moraes, em 2004 e 2005. Pelo menos uma espécie de parasito foi observada em 19.8% das crianças. *Entamoeba coli* (7.2%), *Giardia duodenalis* (5.2%) e *Endolimax nana* (2.7%) foram as mais freqüentes. A área com características rurais e de periferia de centros urbanos apresentou maior percentual de parasitoses quando comparado com as regiões mais centrais. O baixo parasitismo intestinal é provavelmente devido à mecanização do solo, a migração da área rural para urbana, o uso elevado de antiparasitário e o fácil acesso aos serviços de saúde pública.

Keywords: *Parasitos intestinais; Indicadores de saúde; Mecanização Agrícola.*

INTRODUÇÃO

Parasitic infections caused by intestinal protozoa and helminths are considered indicators of socio-economic development degree of a country (1). These infections carry out greater importance due to the frequency that they produce an organic deficit, with a delay in physical and intellectual development, particularly in younger groups (2). Factors that influence the development of these infections include poor sanitary conditions, unsafe water, malnutrition, limited host resistance, frequency of exposure, inadequate vector control, infection of reservoirs, increased migration, and globalization (3,4).

The Paraná state, although it is located in southern Brazil and therefore it is considered a prosperous region, still has innumerable communities with high prevalence of intestinal parasites (5,6,7,8,9). In the northeast region of the state there are several municipalities, including Campo Mourão, that are agricultural centers, structured in strong agricultural cooperatives, with mechanized farming of soy, corn, sugar cane and manioc, and cattle ranching. This municipality does not monitor the occurrence of intestinal parasites, but often patients are treated with anti-parasitic medicines without confirmation by laboratory diagnosis. Data obtained from the Municipal Department of Health in 2004 show that anti-parasitic medicines were largely dispensed by Health Centers, i.e., 86,042 tablets and 7,458 bottles of metronidazole and mebendazole suspensions. This study aimed to verify the presence of intestinal parasites in children of municipalities

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with intensive agricultural mechanization of Paraná state, southern Brazil.

MATERIALS AND METHODS

STUDY SITE AND LIVING CONDITIONS OF THE POPULATION

Campo Mourão has a population of 80,296(10), living mainly in urban area (92.9%), of whom 21,106 (26.4%) live in dwellings with sewage systems (10) and 73,283 (91.6%) have access to treated water(10). Its Human Development Index (HDI-M) is 0.7431, which is under the state index (0.82738) and poverty line. In the municipality there are 10 Health Service Centers (HSC). Public services offer education level and population coverage by the Family Health Program (Programa de Saúde da Família, PSF). The districts served by each HSC are listed in Table 1.

Table 1 - Access (%) to public goods and services in the area served by each Health Center in Campo Mourão, Paraná, Brazil.

Public goods and services	Alvorada*	CSU**	COHAPAR*	Damferi*	LAR PR*	Modelo *	Paulista *	Piquiri/ Guarujá*	Tropical	Urupês**
Water supply										
Public	99.05	96.71	98.21	99.18	99.91	97.97	99.57	57.50	99.86	91.38
Well or spring	0.91*	3.23**	1.67	0.82*	0.09*	2.03*	0.28*	42.50*	0.14*	8.56**
other	0.04*	0.06**	0.11*	0.00*	0.00*	0.00*	0.14*	0.00*	0.00*	0.06**
Waste disposal										
Public collection	99.78*	99.33**	97.80*	99.00*	99.91*	98.05*	99.53*	54.02*	99.88*	99.20**
Burning/burial	0.21*	0.67**	2.08*	0.55*	0.09*	1.53*	0.32*	44.54*	0.12*	0.78**
Open field	0.00*	0.00*	0.83*	0.45*	0.00*	0.42*	0.14*	1.44*	0.00*	0.02**
Fecal and urine disposal										
Sewage system	9.48*	37.00**	28.56*	12.50*	54.07*	2.37*	37.93*	0.36*	1.52*	34.60**
Septic or simple tank	90.28*	62.10**	69.06*	87.32*	45.93*	95.34*	61.85*	97.24*	98.14*	64.98**
Open field	0.24*	0.90**	2.37*	0.18*	0.00*	2.29*	0.22*	2.40*	0.33*	0.42**
Education level										
7 to 14 years of schooling	72.56*	97.30**	79.71*	92.72*	86.53*	73.63*	76.73*	81.11*	91.45*	96.36**
≥ 15 years of schooling	92.82*	95.31**	92.57*	94.09*	94.08*	87.98*	92.71*	89.14*	94.51*	94.19**
PSF coverage (%)	100.0*	0.00*	100.0*	100.0*	100.0*	100.0*	100.0*	100.0*	100.0*	0.00*

Sources:*Sistema de Informação de Atenção Básica (SIAB), Campo Mourão, Paraná state, Brazil, 2004; **IBGE - Instituto Brasileiro de Geografia e Estatística, 2000. PSF: Programa de Saúde da Família (Family Health Program); COHAPAR =Conjunto Habitacional Milton Luiz Pereira; CSU=Centro Social Urbano, LAR PR= Lar Paraná.

Alvorada HSC serves a rural settlement area. The district served by the COHAPAR HSC includes a slum and a housing development for families in a slum-clearance program and the Modelo HSC includes a developing slum. The Piquirí/Guarujá district comprises a rural area and a neighborhood that is relatively far from the main urban area and developed around an open trash dump.

The local climate is humid mesothermal subtropical. The annual temperature mean is 21°C; in warmest months temperature means are above 22°C, and in coolest months are under 18°C. Annual

precipitation mean averages from 1,400 to 1,500 mm, with more rainfall in summer. The predominant soil is red-clay latossol.

STUDY OF POPULATION AND FECAL PARASITOLOGICAL EXAMINATION

This transversal study was conducted from the results of 5,219 parasitological stools examinations of children from zero to 10 years, which corresponds to 30% of children in this age group, living in Campo Mourão, in 2004 and 2005. The examinations of children that live in different districts were conducted in municipal public health care clinical laboratories network by Faust(11), Lutz(12) and Baermann-Moraes methods. The population was composed of 58.7% females and 41.3% males. The study was approved by the ethical committee of Faculdade Integrado de Campo Mourão.

STATISTICAL ANALYSIS

The distribution of cases was analyzed by residential addresses, based on the area served by each HSC. Data were examined by SAS (Statistics Analysis System) version 8.2. Chi-square test, using a 5% significance level, was used to statistically compare the variables.

RESULTS AND DISCUSSION

The overall of intestinal parasites was 19.8%, with a predominance of protozoans (Table 2). *Entamoeba coli* (7.2%), *Giardia duodenalis* (5.2%) and *Endolimax nana* (2.7%) were the most prevalent species. Among parasitized children, *E. coli* was present in 36.4%, *G. duodenalis* in 26.2% and *E. nana* in 13.6% (Table 2). Helminths were the least frequently found.

Table 2 - Positivity of intestinal parasites in children stool examinations in Campo Mourão, state of Paraná, south of Brazil, 2004-2005

Species found	N	Overall positivity (%)	Positivity (%) in parasitized children
Protozoa			
Entamoeba coli	376	7.2	36.4
Giardia duodenalis	272	5.2	26.2
Endolimax nana	141	2.7	13.6
Iodamoeba butschlli	10	0.2	1.0
Helminths			
Enterobius vermicularis	52	1.0	5.0
Strongyloides stercoralis	52	1.0	5.0
Ascaris lumbricoides	42	0.8	4.1
Hymenolepis nana	31	0.6	3.0
Trichuris trichiuria	26	0.5	2.5
Ancylostoma duodenale	21	0.4	2.0
Taenia sp.	10	0.2	1.0
All infections	1,033	19.8	
No infection	4,186	80.2	

The highest positivity of intestinal parasites was observed in children residents in the Piquiri/Guarujá districts (p<0.0000), followed by children from COHAPAR, Tropical, and Damferi. The lowest positivity was found in children in CSU, Urupês, and Paulista districts (Table 3).

G. duodenalis was the most frequent specie observed (p<0.0001) in Piquiri/Guarujá, followed by *Endolimax nana* (12.2%) in Alvorada and *E. coli* (10.1%) in COHAPAR (Table 3). Most often, only a single species was found, independently of the area investigated.

Table 3 - Cases (%) of intestinal parasites in children according to district of residence in Campo Mourão, south of Brazil, 2004-2005

Species	Alvorada	COHAPAR	CSU	Damfer	LAR	Model	Paulist	Piquiri/	Tropical	Urupês
Protozoa										
Entamoeba coli	2.3	10.1	4.4	8.6	8.5	7.4	4.6	7.4	9.6	5.1
Giardia	2.7	6.2	2.6	6.2	7.0	5.6	4.1	22.2[b]	5.4	2.5
Endolimax nana	12.2	2.1	1.5	6.2	0.4	2.2	1.0	3.7	4.6	1.5
Iodamoeba	0.4	0.3	0.9	0.0	0.0	0.3	0.0	0.0	0.2	0.2
Helminths										
Enterobius	0.4	1.7	0.5	0.0	1.7	1.0	0.8	0.0	1.3	0.6
Strongyloides	0.4	0.8	0.4	2.5	0.8	0.3	1.2	3.7	1.5	1.1
Ascaris	0.0	1.1	0.4	0.0	0.6	2.3	0..3	5.6	0.7	0.0
Hymenolepis nana	0.0	0.8	0.0	0.0	0.6	0.3	0..3	5.6	0.4	0.4
Trichuris trichiura	0.0	0.6	0.9	0.0	0.9	0.7	0.2	1.8	0.5	0.0
Ancylostoma	1.4	0.7	0.4	0.0	0.2	0.3	0.1	0.0	0.4	0.2
Taenia sp.	0.0	0.4	0.0	0.0	0.0	0.2	0.2	0.0	0.3	0.2
Total occurrence	20.0	24.9	12.0	23.5	20.8	20.9	13.1	50.0[a]	24.9	12.0
Negative results	80.0	75.1	88.0	76.5	79.2	79.1	86.9	50.0	75.1	88.0

COHAPAR =Conjunto Habitacional Milton Luiz Pereira; CSU=Centro Social Urbano, LAR PR = Lar Paraná. [a]p<0,0000; [b]p<0,0001

Females were significantly more often infected (56.4%) with intestinal parasites than males (43.6%) (p<0.00005). Comparing the areas served, the positivity of intestinal parasites in females was significantly higher (p<0.05) only in COHAPAR district.

DISCUSSION

The low positivity of intestinal parasites observed in Campo Mourão, particularly pathogenic species, is proportional to the developmental characteristics of the municipality, which is an agricultural center, with a high degree of mechanization and industrialization, although its HDI under the norm for Paraná. However, the rate of positivity found in this study is within the range (14.3% to 46.9%) observed in studies in other municipalities of the state (5,7,9) that have higher HDIs (9). The easy access to public health services such as Health Service Centers, the Family Health Program, available in Campo Mourão, where often patients are treated with anti-parasitic medicines without confirmation by laboratory diagnosis, may have contributed to low percentage of intestinal parasites observed, particularly helminths, even in areas where the infrastructure is not adequate yet. Other factors that also may be related to these results are the educational and informational activities undertaken in schools and through the media and migration of population from rural to urban spaces. Other authors have also reported reduction of the prevalence of helminths and higher rate of parasitism by protozoa(13,14).

The highest positivity of parasites was found in children that live in Piquiri/Guarujá districts. Piquiri is located in a rural region of Campo Mourão, and Guarujá, developed around an open trash dump. The health service center for this area has less access to the public water supply, trash collection and sewage network, but not was observed large number of pathogenic enteroparasites.

G. duodenalis was the most frequent pathogenic species, even if there is proper treatment of water for the majority of the population. However, water is considered the principal source of contamination by *G. duodenalis*, because chlorination does not fully destroy cysts of this parasite (15,16, 17). A recent study shows that the 34.5% of protozoa prevalence is represented by 55% by *Giardia lamblia* and *Entamoeba coli* and this would be, at least in part, related to the mode of transmission, as the host eliminates infective cysts in the stool enabling an interpersonal contamination even in environments with sanitation (13). This parasitosis is spread throughout the world,

particularly in children (7,18) and may lead to chronic diarrhea with steatorrhea, weight loss, and problems associated with poor food absorption (19,20). *G. duodenalis* was significantly higher in Piquiri/Guarujá. This may be explained by local water quality, because this area has the lowest percentage of treated-water supplies. *E. coli*, *G. duodenalis* and *E. nana* were the most frequent species, as observed in other cities in south and southeast parts of the country (5,7,14,21). The presence of *E. coli* and *E. nana* in feces is a good indicator of local socio-sanitary conditions, and is related to limited education and low social level (22).

This study shows that there are differences in infection risk in various districts of the municipality, in accord with infrastructure conditions of each area. Example was the lowest positivity in CSU, Paulista and Urupês, located in the central part of the municipality. This result may be related to the better infrastructure, with an economically active and better-informed population and with the better socio-economic situation normally found in the central parts of municipalities, because access to goods and services does not differ much from the other health service centers.

Intestinal parasites were more observed in females in the municipality as a whole and in COHAPAR service center in particular. Other investigators (4,23) have also reported a high occurrence of parasitosis in females.

Monoparasitism was the most frequent finding, suggesting the transition descendant of parasite profile of the population of Campo Mourão. Because of their poor hygiene habits, children are normally more frequently infected by enteroparasites. The polyparasitism may be associated with poor sanitation and/or poor knowledge of hygiene (24,25).

The results of this study lead us to conclude that the mechanization of soil and, consequently rural exodus (26), may have contributed to the low positivity of intestinal parasites, mainly geohelminths. The proximity of HSC and the groups of PSF corroborated in assisting and in antiparasitic medication, contribute to the control of parasitism. *G. duodenalis* is the prevalent pathogenic species, probably by water supply. There are areas at greatest risk of infection because of the infrastructure, with rural characteristics and on the periphery of urban centers, such as Piquiri/Guarujá. The improvement in quality of life of this population depends on multidisciplinary approach with intersectoral activities covering education, housing, public works and community groups, based around the concept of increasing the level of knowledge within a community, in order to ensure sustainable development.

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