
**ENTEROPARASITES AND COMMENSALS IN
STUDENTS AGED 7 TO 14 YEARS IN RURAL AND
URBAN AREAS OF CAMPOS NOVOS,
WEST OF SANTA CATARINA, BRAZIL**

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ABSTRACT

Intestinal diseases caused by parasites are a worldwide public health problem and contribute to social and economic problems, especially among low-income populations, which lack basic conditions and hygiene. This study aimed to evaluate the occurrence of intestinal parasites in students between 7 and 14 years of age from rural and urban areas of Campos Novos, Santa Catarina. A total of 109 fecal samples, stored in SAF solution, were analyzed by spontaneous sedimentation and centrifuge-fluctuation methods. Twenty-four (58.5%) and 21 (30.9%) samples were positive for the presence of parasites in the rural and urban areas, respectively, indicating a higher prevalence in rural areas. Among 8 distinct parasites identified in samples, *Ancylostomatidae* (hookworm) (35%) and *Ascaris lumbricoides* (28.3%) were the most abundant, followed by *Entamoeba coli* (25%), *Giardia lamblia* (5%), *Balantidium coli* (1.6%), *Iodamoeda* sp. (1.6%), *Isospora belli* (1.6%) and *Trichuris trichiura* (1.6%). Polyparasitism (hookworm and *A. lumbricoides*) was identified in one student from a rural area. Also, *B. coli* was identified in one sample and could indicate contamination of the human water supplies with pig manure. Moreover, the sanitary conditions in the rural and urban areas were very distinct, which may have contributed to the difference between the numbers of students infected with those parasites. In conclusion, these data suggest a higher prevalence of parasites in students from rural areas and that an improvement in sanitary conditions in rural areas is necessary in order to reduce parasitism in this population.

KEY WORDS: Parasitology; students; rural population.

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RESUMO

Enteroparasitos e comensais em estudantes entre 7 e 14 anos em áreas rurais e urbanas do município de Campos Novos, oeste de Santa Catarina, Brasil

Doenças intestinais causadas por parasitos são um problema de saúde pública mundial e têm contribuído nos problemas sociais e econômicos especialmente em populações de baixa renda, com falta de saneamento básico e higiene. Este trabalho procurou avaliar a ocorrência de parasitos intestinais em estudantes entre 7 a 14 anos de idade residentes de zonas rurais e urbanas do município de Campos Novos, Santa Catarina, Brasil. Um total de 109 amostras foram coletadas, armazenadas em solução SAF, e analisadas pelos métodos de sedimentação espontânea e centrifugo-flutuação. Vinte e quatro (58,5%) e 21 (30,9%) amostras de estudantes da zona rural e urbana, respectivamente, apresentaram parasitos, indicando uma elevada prevalência de parasitos na área rural. Entre os oito diferentes parasitos identificados, ancilostomatídeos (35%) e *Ascaris lumbricoides* (28,3%) foram os mais abundantes, seguidos de *Entamoeba coli* (25%), *Giardia lamblia* (5%), *Balantidium coli* (1,6%), *Iodamoeda* sp. (1,6%), *Isospora belli* (1,6%) e *Trichuris trichiura* (1,6%). Foi também identificado um caso de poliparasitismo (ancilostomatídeo e *A. lumbricoides*) em um estudante da zona rural. Também foi identificada uma amostra contendo *B. coli* que pode indicar a contaminação das fontes de água por dejetos de suíno. Além disso, as condições sanitárias entre as zonas rurais e urbanas são bastante distintas, o que pode estar contribuindo nas diferenças entre o número de estudantes infectados por estes parasitos. Como conclusão, estes dados sugerem uma prevalência mais elevada em estudantes da zona rural e o incremento das condições sanitárias nas áreas rurais se faz necessário para reduzir o parasitismo nesta população.

DESCRITORES: Parasitologia; estudantes; população rural.

Enteroparasites represent a significant public health problem in Brazil and are the most prevalent pathogens that infect school-aged children (1). Despite studies indicating similarities between the prevalence of enteroparasites in school-aged children located in rural and urban areas (8), differences in sanitary conditions and socio-economic status in these populations may influence the incidence of these pathogens. Thus, the aim of this study was to verify and compare the prevalence of enteroparasites or commensals in students from the rural and urban areas of Campos Novos, Santa Catarina, Brazil.

Campos Novos (27°24'07"S and 51°13'30"W) is a city located in the Midwest of Santa Catarina and 265 km from Florianópolis, the state capital. According to the Brazilian Institute of Geography and Statistics (IBGE), demographic census indicates that the population of 5 to 14 years was composed of 5603 people, (981 in rural areas and 4622 in urban areas) (6). Stool samples (109) were collected between November and December 2011 from students aged 7 to 14 years from two rural area schools and two urban area schools using universal collectors containing sodium acetate-acetic acid-formalin preservative solution. Samples were collected and analyzed at the Laboratory of Infectious and Parasitic Diseases of the Universidade do Oeste de Santa Catarina, using the spontaneous sedimentation (HPJ - Hoffman, Ponz and Janer) and centrifuge-fluctuation (Faust) methods, as described by De

Carli (2007). Also, information about the sanitary conditions of residences, such as water supply, was requested from students' parents. The Unesco Ethics and Research Committee approved this study (protocol number 170/2010). The statistical significance was determined using Fisher's exact test with 0.05 of significance level ($p < 0.05$).

A total of 41 samples were collected from students living in the rural area of the city and 68 from the urban area, totaling 109 samples. Among these, 45 samples (41.2%) were positive for at least one enteroparasite. These results are lower than those found by Teixeira et al. (2006) in another city of the west of Santa Catarina, where 73.3% of stool samples were positive for enteroparasites.

In the rural area, 24 (58.5%) samples were positive for the presence of cysts or eggs of at least one species of parasite or intestinal commensal, whereas only 21 (30.9%) samples collected from students in the urban area were positive (Table 1). This difference is statistically significant ($p = 0.004$) and indicates a relationship between positive samples and the geographic location where the students lived. Most of the students who reside in rural areas do not have a treated water supply (62%), contrasting to students from the urban area (86.3%), which could contribute to the higher level of parasites observed in the rural area than urban area. Mati et al. (2011) associated the difference in the parasites' prevalence in populations of rural and urban areas to the differences in infrastructure between these areas, such as proper sewage and water treatment, which were seen in most urban houses. Alternatively, in the countryside, water supply sources consist of boreholes or small water catchment areas that are not treated.

In the rural area, the majority of the infected students were female, while in the urban area, the majority of students were male (Table 2), but it was not possible to conclusively establish a correlation between sex and the sample. In another report that studied school-aged students in the city of Bonito, Mato Grosso do Sul, the prevalence of parasites or commensals was also not related to sex (5).

The majority of individuals were infected with a single parasite (66.6%); and this kind of infection was more prevalent in both the rural and urban areas (Table 1). However, no relationship was found between the number of parasite species or commensals infecting a student and the local residence of the children ($p = 0.998$). These results are similar to those reported in children from indigenous communities (rural areas) (2), as well as urban areas (4, 5, 8, 9, 10).

Eight taxa of parasites or commensals were identified in the study population: 5 taxa and 7 taxa were found in samples from the rural and urban areas, respectively. Ancylostomatidae and *Ascaris lumbricoides* were the most prevalent parasites; the first group was more prevalent in the rural area (24.7%) and the second group in the urban area (16.4%). *Balantidium coli* was found in

one sample collected from the rural population and three taxa, *Isospora belli*, *Iodamoeba* sp. and *Trichuris trichiura* were identified in students living in the urban area (Table 3).

Table 1. Distribution of parasitism (mono and polyparasitism) and negative samples by area.

Infection	Rural area		Urban area		Total	
	(n=41)		(n=68)		(n=109)	
	n	(%) ¹	n	(%) ¹	n	(%) ¹
Total of positive samples	24 ²	58.5	21 ²	30.9	45	41.3
Monoparasitism	16	39.0	14	20.6	30	27.5
Polyparasitism	8	19.5	7	10.3	15	13.8
Negative samples	17	41.5	47	69.1	64	58.7

¹ Percentage (%) were calculated using the numbers of collected samples by area or total

² p=0.004 (Statistically significant)

Table 2. Distribution of children infected by area and sex.

Sex	Rural area		Urban area		Total	
	(n=41)		(n=68)		(n=109)	
	n	(%) ¹	n	(%) ¹	n	(%) ¹
Female	13	31.7	10	14.7	23 ²	21.1
Male	11	26.8	11	16.2	22 ²	20.1
Total	24	58.5	21	30.9	45	41.3

¹ Percentage (%) were calculated using the numbers of collected samples by area or total

² p=0.768 (Statistically not significant)

Table 3. List of the enteroparasites identified in the student samples by living area.

Taxa	Rural area		Urban area		Total	
	n	(%)	n	(%)	n	(%)
Ancylostomatidae	15	24.7	6	9.8	21	34.5
<i>Ascaris lumbricoides</i>	8	13.1	10	16.4	18	29.5
<i>Entamoeba coli</i>	7	11.5	8	13.2	15	24.7
<i>Giardia lamblia</i>	1	1.6	2	3.3	3	4.9
<i>Balantidium coli</i>	1	1.6	0	0.0	1	1.6
<i>Isoospora belli</i>	0	0.0	1	1.6	1	1.6
<i>Iodamoeba</i> sp.	0	0.0	1	1.6	1	1.6
<i>Trichuris trichiura</i>	0	0.0	1	1.6	1	1.6
Total	32	52.5	29	47.5	61	100.0

Based on interviews with the *B. coli*-infected student family, the only available water supply is used by both humans and pigs and the water source is situated close to the pigsty. Another recent case of *B. coli* was reported in Concordia, Santa Catarina, Brazil from the same source of infection, suggesting that people from rural areas in the west of Santa Catarina are more vulnerable to this parasite because of the contamination of water supplies with pig manure (7).

As the sanitary conditions, like treated water supply, in the rural and urban areas are distinct between the two geographical areas examined in this study, this factor may have contributed to the difference between the numbers of infected children in each area. These results demonstrate the need to improve basic sanitation, like the treatment of the water supplies and better systems to dispose of pig manure, and to implement health education in schools, especially in rural areas, in order to reduce the prevalence of parasitism in the rural population.

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