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RELATION BETWEEN PARASITES AND BASIC SANITATION

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ABSTRACT
Parasites affect different ages, parasite and environment characteristics are key to parasite installation in hosts. The aim of this study was to relate intestinal parasites prevalence in Brazilian public health system patients and sanitation condition. 1004 exams of fecal parasitological were analyzed in the City Clinical and Environmental Analysis Laboratory. Basic sanitation data was obtained from Information System of Basic Care. The quantitative analysis was performed with Excel and *Statistical Package for the Social Sciences programs*. Parasites prevalence found was 12.5% with 10.3% polyparasitism and greater contamination risk at 7.5 years old. *Entamoeba coli* (28.4%), *Endolimax nana* (24.8%) and *Giardia lamblia* (18.9%) were the most frequently observed. The least prevalence and risk to parasites in Family Health Centers had also best basic sanitation. Parasites positivity includes all ages, parasite contamination biggest risk at 7.5 years old. Within the study region the basic sanitation, make evident relation to parasites presence.

Keywords: Parasitic Diseases. Basic Sanitation. Unified Health System.

INTRODUCTION

In Brazil, the intestinal parasitism is still one of several public health problems, mainly by their correlation with the degree of malnutrition of populations, affecting especially the physical, psychosomatic and social development of students and population[1].

The triad for the occurrence of enteroparasitosis[2] depends on the conditions of the host (nutritional status, immune status, exposure to risk factors, behavioral and social aspects, etc.) of the parasite (the host's immune system resistance, pathogenicity, among others) and the environment (deficiency of sanitation, personal hygiene and the community and socioeconomic level of the place).

The consequences of these diseases cause serious damage to health and are, admittedly, associated with low school performance of children, inadequate productivity at work of adults and increased spending on medical care[3].

Intestinal parasites infections occur, usually by an ecological imbalance between parasite-host-environment. The improvement of living conditions through proper sanitation, combating malnutrition and early weaning, of the education for prevention and universal access to the health system are measures that effectively decrease the infection by parasites[4].

To make a program of combating enteroparasitosis is necessary to meet its distribution and, especially, what are the prevalent species in each region, as well as the accurate identification of the risk areas. The areas identified as high-risk and, therefore, introducing individuals with higher parasitic loads have therefore, the greatest potential for environmental contamination. This situation leads not only to a greater number of infected individuals, but also the maintenance of the natural adjustment process of the parasite, if there is no intervention[5].

Knowledge of the epidemiology of

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enteroparasitosis is crucial factor in the development of actions for improvement of sanitation and quality of life of the population of any place where there is no relevant socioeconomic differences, among other factors.

Before that, this study aimed to analyze the prevalence of intestinal parasitosis among patients of the Sistem Único de Saúde (SUS) in relation to the basic sanitation conditions.

MATERIAIS E MÉTODOS

This is a transversal and descriptive study that examined the test results of parasitological population of SUS in Chapecó (SC) carried out in the period of 2008 and 2009. Samples are coming daily of 36 Family Health Centers (FHC) and forwarded to the Municipal Laboratory of Clinical and Environmental Analyses. For this study the database files from the laboratory for the parasitological testing of feces were analyzed. The data were collected in the period from September 2009 to February 2010.

Of approximately 37 thousand parasitological test carried out during this period, 1004 (IC = 95%) were systematically selected to compose the sample of this study. The first test was chose and, from it, one every 25 tests were selected in the period of the research. The data were organized by day, month, year and provenance of unit tests. From the positive tests, patients were identified by age, type of parasite and FHC of origin.

The data relating to sanitation, corresponding to the origin of human consumption water, sewer and garbage's fate were obtained from the database of the Information System of the Basic Care (ISBC) of the Ministry of Health.

Considering the parasitic diseases are closely linked to the region's sanitation and hygiene factors, regions of higher incidence of parasitic diseases and basic sanitation conditions were identified.

To identify the age of greatest risk of contamination the *Roceiver Operating Characteristic (*ROC) curve was used and to the systematization and analysis of the data the programs Excel and SPSS version 17.0, and the *Student*'s test were used.

The project obtained science term and agreement of use of database of the Secretary of Health of Chapecó.

RESULTS AND DISCUSSION

From the parasitological tests analyzed in this study, 12.5% (n = 125; N = 1024) were positive for some kind of parasite.

The most common parasites were *Entamoeba coli* (28.4%; n = 39), *Endolimax nana* (24.8%; n = 34) and *Giardia lamblia* (18.9%; n = 26), present in all age groups, except the zero to two years, in which there was no occurrence of *Entamoeba coli*. The highest rates of positivity in the population aged between three and eight years old were evidenced, followed by the population between 15 and 24 years old and people over 50 years old (Table 1).

The relative risk was evaluated of the possibility of contamination between the population belonging to the territories of two FHS that presented the highest and two lowest prevalence of positive serology for parasitic diseases (Table 2). It was identified a polyparasitism rate of 10.3% (n = 13), having been observed from two to three parasites in the same individual.

Table 1 – Most common parasites identified in parasitological tests by age group of patients of SUS, Chapecó (SC), 2008 and 2009.

e Group	*E. coli*	*%*	*E. nana*	*%*	*G. lamblia*	*%*
0-2	0	0	2	5,8	5	19,2
3-8	10	25,6	4	11,7	6	23
9-14	5	12,8	2	5,8	5	19,2
15-24	7	17,9	8	23,5	6	23
25-36	5	12,8	6	17,6	1	3,8
37-50	6	15,4	7	20,5	1	3,8
>50	6	15,4	5	14,7	2	7,6
Total	39	100	34	100	26	100

Source: author's elaboration.

Table 2 - Relative risk of contamination for intestinal parasites in relation to localities with higher prevalence of parasitic infections

FHC	FHC	Relative Risk	Meaning
São Pedro	Leste	9,3 vezes	p=0,005
São Pedro	J. América	7,5 vezes	p=0,001
M. Bormann	Leste	8,0 vezes	p=0,035
M. Bormann	J. América	6,43 vezes	p=0,024

Source: author's elaboration.

Sanitation related aspects, regarding water, garbage and sewage, which may influence the presence of parasites, were systematized data spanning areas of the four FHC in which the prevalence of parasitic infections has been highest.

The prevalence of parasitic infections in the population sampled in this study whose examinations were performed by SUS was 12.5% (n = 125). The variation of registered prevalence by several studies is substantial, there is no study presenting data at the national level, as they have been made with specific groups such as students, populations of a municipality or through specific results obtained from public or private laboratories.

Considering that this study is of a specific population that seeks the public health service to conduct tests, it can be said that the index of positivity is low when compared with other population groups. The most frequent parasite species in this study were *Entamoeba coli* (28.4%; n = 39), followed by protozoa *Endolimax nana* (24.8%; n = 34) and *Giardia lamblia* (18.9%; n = 26).

The *Entamoeba coli* and *Endolimax nana* are protozoa not pathogenic, eaters of the human gut. These parasites are always associated with dirty places such as sewers, streams, ponds and streams contaminated because they can accumulate large amounts of waste and feces disposed by people with parasites, as well as the garbage that usually attract insects and rodents, which facilitates the proliferation of these parasites. However, *Giardia lamblia* has been recognized to cause enteric disease in humans, especially in developing countries ([6].

In this study, it was found the rate of 10.3% (n = 13) of polyparasitism of the total positive specimens. This finding indicates the worsening health conditions of the population exposed to these diseases. The human host can host different species of enteroparasites and the fact that the external environment provide high degrees of contamination increases the likelihood of infections with polyparasitism[7]. In a study with 421 students in seven public schools in the urban area of Cachoeiro do Itapemirim (ES)[8], nine samples (2.33%) of polyparasitism were found, representing 19.7% of positivity. In Minas Gerais (9) 3% polyparasites was found in a sample of 18.973 students.

In relation to parasites present in different age groups, it was evidenced higher prevalence of parasites among children aged three to eight years old and among young adults from 15 to 24 years old, with a percentage of 18.4% (n = 23) for both ages. In the evaluation of age, about the positivity for parasitic infections, from the ROC curve, it was identified that 7.5 years old are most at risk for contamination.

This result can be caused from clumps of children in schools and kindergartens, considering this is the first environment external that the child attends, becoming potential contamination environment. These situations[10] are accentuated due to the increased urbanization and increased female participation in the labor market, which leads to mothers let their children in schools and kindergartens. On the other hand, when it comes to age group covering infants and children up to two years old, there was a prevalence of 6.4% (n = 8) of the total number of positive samples, being the age group least affected.

In the analysis made in the relationship between the age and risk factor, it was observed that the age group that corresponds to the ages between 15 to 24 years old has a 2.7 times greater risk of being attacked by some parasite, compared the age group below two years oold (p = 0.026). The condition of the age group of 15 to 24 years old have a high prevalence, because the parasites tend to affect mainly the age range of children and youth. It can be inferred that individuals in this age group are more affected by parasites by not

seeking health service regularly or just pick it up when there are any symptoms evidenced.

Another fact to be highlighted is that this age group is usually is the one that is joining the labor market and among entering exams requested by employers, the parasitology of feces is currently asked. In the same direction, the prevalence of parasites was observed stratified according to age groups into two groups, being them 0 to 14 years old and over 14 years old, being that the latter has a risk, approximately 1.44 greater of contracting some kind of parasite (p = 0.042).

Analyzing the positive tests of the population over 50 years old, the prevalence was 17.6% (n = 22) of the total positive specimens. This prevalence was lower than at the age of three to eight and 15 to 24 years old, each of which has an index of 18.4%.

Studies on the occurrence of intestinal parasites in the elderly population are few, however data are reporting that a large part of this population presents parasitic diseases [11]. The elderly usually develop various household chores in their day to day, such as homemade vegetable cultivation, cleaning the yard, among others, which may promote contamination.

With respect to the basic sanitation conditions, one of the parameters used to assess the living conditions of the population is the realization of coproparasitologics research and the high prevalence of these parasites indicates the need of adopting measures of sanitation to the population[8]. The frequency of parasitic infections has close relationship with the basic sanitation conditions, socioeconomic status, educational level of mothers, age group and individuals' hygiene habits[10].

In the municipality studied, 88.2% of households registered do not have sewage system in the urban area households, 8.1% has no public collection of garbage and lack public supply system water to 18.9% of families. These conditions probably favored the appearance of parasitic infections identified in this study.

The FHC of São Pedro is characterized by encompass an area of low socioeconomic status. According to the Catarinense company of water and sanitation (Casan), that is territory does not have an efficient sewage system, with a large part of the waste is deposited in streams that cross the region. The data of the ISBC record that 85.4% of the population make use of septic tank. This index is above the national average, based on data from the national survey of basic sanitation, made by IBGE in the year 2008 [12], which found that 55.2% of the municipalities and 44 percent of Brazilian households do not have human waste collection networks, making use of rudimentary septic tanks or dumping them in rivers, compromising the quality of the water.

In the case of destiny, 98.7% of the families in the territory of the FHC of São Pedro have public collection of garbage and this aspect deserves greater prominence, given that the economy of a large part of the population of the neighborhood comes from recycled material collection, including the formation of cooperatives of these materials. So, some parts of the neighborhood are prone to contamination by parasites not only, but also for other diseases related to the accumulation of garbage in residential areas. Visiting the region, it is not uncommon to find places where there are large garbage accumulation, both organic and recyclable, often in the vicinity of the residences and near rivers and springs.

The FHC Marshal Bormann has a large number of artesian wells, reaching 45.7% of total water supplies in the region. In addition, the sewer system 1.37% of registered families serving in the FHC and approximately 23% of them do not have their garbage collected. These aspects can be contributors to high positivity found in tests that stemmed FHC. The South FHC of also features a low content of sewage system, with 1.84% and 20.8% water supply comes from artesian wells. The FHC Cristo Rei presents a sewer system even more deficient, represented by 0.84% of sewage network and with 98% of households making also use of septic tank.

On the other hand, the FHC East and Jardim América, which showed a lower prevalence of parasites, have an adequate sewage system. The FHC East presents 12.4%

of the population with access to sewage treatment network and 3.4% of the water supply is obtained from artesian wells. It was observed that the risk of contamination in the area is, on average, 9.3 times lower compared to the FHC São Pedro and eight times lower compared to the FHC Marechal Bormann.

Many studies pointed in the direction that the environmental and health problems are crucial in the emergence of endemic diseases, and go beyond, stating that increasing access to sanitation is closely linked to improving the health and hygiene conditions and the fall in the prevalence of intestinal parasitic infections[1].

To minimize the parasitic diseases, some measures are required as investment in health infrastructure, intervention and prevention actions by the population and guidance on care for the environment and health. Still, another measure is the community mobilization using health education in order to promote the intervention population in determining factors and constraints of the health-disease process [13].

There is no doubt that a community is exposed to the risk of parasitic infections due to the lack of basic sanitation [14]. However, in addition to access to adequate sanitation conditions, ingestion of treated water and boiled, are important for prevention measures such as personal hygiene and proper preparation and storage of food [15]. In addition, it is necessary to socio-economics conditions and improvements of health education [16], since "the parasitic infections are directly linked to questions of environmental hygiene and the individual, relating to factors and socio-economic and educational aspects" [17: 527].

Also, the participation of society is demanded, because "to the extent that better guide the development of strategies and the social control of public services" [18: 2588], provide the successful planning and implementation of sanitation policies; rupture with the authoritarian decisions paradigm, verticalized, centered and little participative of sanitation projects"[18: 2589] .

In this context, the existence of sanitation is fundamental in assessing the health of a population, because access to basic sanitation is essential for the control and reduction of diseases[19], in particular, of parasitic diseases.

CONCLUSION

The positivity of parasitic infections in the municipality of Chapecó hit all age groups, with the age of 7.5 years old is who suffers the greatest risk of contamination by parasites.

The FHCs which presented lower prevalences of parasitic infections are those with better sanitation conditions and the risk of people being contaminated by a parasite is 9.3 times lower in the FHC which has better sanitation conditions. This reinforces the hypothesis that, in the region of this study, the basic sanitation conditions are closely linked to the prevalence of parasitic infections.

RELAÇÃO ENTRE PARASITOSES E SANEAMENTO BÁSICO

RESUMO

As parasitoses afetam indivíduos em diversas faixas etárias, sendo fatores determinantes para a sua instalação as condições do hospedeiro e as características do parasito e do ambiente. O objetivo do estudo foi relacionar a prevalência de parasitoses intestinais em usuários do Sistema Único de Saúde e as condições de saneamento. Foram analisados 1004 exames parasitológicos de fezes realizados no Laboratório Municipal de Análises Clínicas e Ambientais. Os dados relativos ao saneamento básico foram obtidos do Sistema de Informação da Atenção Básica. A análise quantitativa foi realizada com os programas Excel e *Statistical Package for the Social Sciences*. A prevalência de parasitoses encontrada foi de 12,5%, com 10,3% de poliparasitismo e o maior risco de contaminação aos 7,5 anos de idade. *Entamoeba coli* (28,4%), *Endolimax nana* (24,8%) e *Giardia lamblia* (18,9%) foram os mais frequentes. Os Centros de Saúde da Família, com menor prevalência e menor risco de parasitoses, também possuem as melhores condições de saneamento. A positividade de parasitoses atingiu todas as faixas etárias, sendo que a idade de 7,5 anos é a que sofre o maior risco de contaminação por algum parasita. Na região do estudo, as condições de saneamento básico evidenciam a relação com a presença de parasitoses.

Palavras-chave: Doenças parasitárias. Saneamento básico. Sistema Único de Saúde.

RELACIÓN ENTRE PARASITOSIS Y SANEAMIENTO BÁSICO

RESUMEN

Las parasitosis afectan individuos en diferentes franjas de edad, siendo factores determinantes para su instalación las condiciones del hospedador, características del parásito y del ambiente. El objetivo de este estudio fue relacionar la prevalencia de parásitos intestinales en usuarios del Servicio Único de Salud y las condiciones de saneamiento. Fueron analizados 1004 exámenes parasicológicos de heces realizados en el Laboratorio Municipal de Análisis Clínicos y Ambientales. Los datos relativos al saneamiento básico fueron obtenidos del Sistema de Información de la Atención Básica. El análisis cuantitativo fue realizado con los programas Excel y el *Statistical Package for the Social Sciences*. La prevalencia de parasitosis encontrada fue de 12,5%, con 10,3% de poliparasitismo y el mayor riesgo de contaminación a los 7,5 años de edad. *Entamoeba coli* (28,4%), *Endolimax nana* (24,8%) y *Giardia lamblia* (18,9%) fueron los más frecuentes. Los Centros de Salud de la Familia con menor prevalencia y menor riesgo de parasitosis también tienen las mejores condiciones de saneamiento. La positividad de parasitosis llegó a todas las edades, siendo la edad de 7,5 años la que sufre el mayor riesgo de contaminación por algún parásito. En la región del estudio las condiciones de saneamiento básico evidencian la relación con la presencia de parasitosis.

Palabras clave: Enfermedades parasitarias. Saneamiento básico. Sistema Único de Salud.

REFERENCES

1. Ferreira GR, Andrade CF. Alguns aspectos socioeconômicos relacionados a parasitoses intestinais e avaliação de uma intervenção educativa em escolares de Estiva Gerbi. Rev Soc Bras Med Trop. 2005; 38(5):402-5.

2. Frei F, Juncansen C, Ribeiro-Paes JT. Levantamento epidemiológico das parasitoses intestinais: viés analítico decorrente do tratamento profilático. Cad saúde pública. 2008; 24(12):2919-2925.

3. Castiñeiras TMPP, Martins FSV. Infecções por helmintos e enteroprotozoários. Rio de Janeiro, Centro de Informações em Saúde para Viajantes. CIVES/UFRJ, 2000-2003. [citado 2011 set 20]. Disponível em: http://www.cives.ufrj.br/informes/helmintos/.

4. Melo MCB, Klem VGQ, Mota JAC, Penna, FJ. Parasitoses intestinais. Rev Méd Minas Gerais. 2004; 14(1 Supl. 1):S3-S12.

5. Tiago PV, Costa MS, Perassolo V, Souza EM, Gomes M. Prevalência de parasitoses intestinais em pacientes da Unidade de Saúde em Tangará da Serra, Mato Grosso, Brasil. Revista de Ciências Agro-Ambientais. 2005; 3:117-124.

6. Carvalho TTR. Estado atual do conhecimento de *Cryptosporidium* e *Giardia*. Rev Patol Trop. 2009; 38(1):1-16.

7. Santos AS, Merlini LS. Prevalência de enteroparasitoses na população do município de Maria Helena, Paraná. Ciênc saúde colet. 2010; 15(3):899-905.

8. Lodo M, Oliveira CGB, Fonseca ALF, Caputto LZ, Packer MLT, Vlenti VE, Fonseca FLA. Prevalência de enteroparasitas em município do interior paulista. J. Hum. Growth Dev. 2010; 20(3):769-777.

9. Carvalho OS, Guerra HL, Campos YR, Caldeira RL, Massara CL. Prevalência de helmintos intestinais em três mesorregiões do Estado de Minas Gerais. Rev Soc Bras Med Trop. 2002; 35(6):597-600.

10. Vasconcelos IAB, Oliveira JW, Cabral FRF, Coutinho HDM, Menezes IRA. Prevalência de parasitoses intestinais entre crianças de 4-12 anos no Crato, Estado do Ceará: um problema recorrente de saúde pública. Acta Scientiarum. Health Sciences. 2011; 33(1):35-41.

11. Furtado LFV, Melo ACFL. Prevalência e aspectos epidemiológicos de enteroparasitoses na população geronte de Parnaíba, Estado do Piauí. Rev Soc Bras Med Trop. 2011; 44(4):513-15.

12. IBGE. Pesquisa Nacional de Saneamento Básico. Brasília (DF); 2008.

13. Melo AGS, Melo CM, Oliveira CCC, Oliveira DS, Santos VB, Jeraldo VLS. Esquistossomose em área de transmissão rural-urbana: reflexões epidemiológicas. Ciên cuid saúde. 2011; 10(3):506-513.

14. Visser S, Giatti LL, Carvalho RAC, Guerreiro JCH. Estudo da associação entre fatores socioambientais e prevalência de parasitose intestinal em área periférica da cidade de Manaus (AM, Brasil). Ciênc saúde colet. 2011; 16(8):3481-3492.

15. Gomes AP, Antonio VE, Santos SS, Toledo-Monteverde D, Moraes-Martin G, Andrade CA, Viana LEO, Pinto RCT. Giardíase: aspectos gerais. Pediatr mod. 2009; 45(1):12-5.

16. Magalhães RF, Amaro PF, Soares EB, Lopes EA, Mafra RSCP, Alberti LR. Ocorrência de Enteroparasitoses em Crianças de Creches na Região do Vale do Aço – MG, Brasil. UNOPAR cient Ciênc biol saúde. 2013; 15(3):187-191.

17. Araujo Filho HB, Carmo-Rodrigues M, Mello CS, Melli LCFL, Tahan S, Morais MB. Parasitoses intestinais se associam a menores índices de peso e estatura em escolares de baixo estrato socioeconômico. Rev paul pediatr. 2011; 29(4):521-8.

18. Moisés M, Kligerman DC, Cohen SC, Monteiro SCF. A política federal de saneamento básico e as iniciativas de participação, mobilização, controle social, educação em saúde e ambiental nos programas governamentais de saneamento. Ciênc saúde colet. 2010; 15(5):2581-2591.

19. Busato MA, Antoniolli MA, Ferraz L. Interface saúde ambiente. In: Sá C, Ferretti F, Busato MA. Ensaios contemporâneos em saúde: uma perspective interdisciplinar. Chapecó: Argos; 2013. p. 47-62.

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