Prevalence of enteroparasitosis in the municipality of São Bernardo do Campo - SP

Prevalência das enteroparasitoses no município de São Bernardo do Campo - SP

Emerson Barbosa da Silva[1]
Camila dos Santos Chagas[2]
Yasmin Pezente Lossurdo[3]
Juliana Alves Garcia[4]
Maria Lúcia Tomanik Packer[5]
Rodrigo Pereira Barbosa[6]
Flávia de Sousa Gehrke[7]
Fernando Luiz Affonso Fonseca[8]

Abstract

Objective: *The objective of this study was to evaluate the prevalence of enteroparasitosis in stool samples from residents of São Bernardo do Campo - SP, who use the public health service through the Basic Health Unit (UBS), defining the most frequent enteroparasites by age. and district with the highest prevalence.* **Methods:** *For this retrospective study, 17,018 fecal examinations were performed from June to December 2017. The data came from the Parasitology Laboratory of the Centro Universitário Saúde ABC - FMABC, and the prevalence of enteroparasitosis by age and district was analyzed. The project was approved by the Research Ethics Committee of Universidade Paulista - UNIP, under nº 2.715.169.* **Results:** *The most common protozoan (33.86%) was* Giardia spp., *followed by* Entamoeba histolytica/dispar, *most common in young adults aged 18 to 40 years (9.16%).* Enterobius vermicularis *had a prevalence of 5.58%, being more frequent in children from 0 to 11 years old. In adults (41-65 years) and elderly (> 65 years), the most common helminth found in the samples was* Strongyloides stercoralis *(18%).* **Conclusion:** *It is concluded that* Giardia spp. *was the most frequent parasite and frequently observed in children (0-11 years), in the elderly was* Strongyloides stercoralis. *This study serves as a warning about the need to implement efficient public health, focused mainly on the prevention and control of these and other types of diseases.*

Keywords
Environment; public health; parasitoses; indicators

INTRODUCTION

Parasitic forms are observed in soils of several countries of the world, remembering that the parasites are not randomly distributed in different regions of the globe, there is a need for indispensable conditions required by the species for the survival of these parasites.[1-3]

Infections produced by protozoa and helminths are a major worldwide cause of human morbidity and mortality[2] and establish themselves very well in hosts exposed to poor sanitation conditions, inadequate hygiene habits and lack of information,[4] hosts that are susceptible to these diseases, genetic, biological, nutritional factors[1] or several other factors that may increase the risk of infection, such as water contaminated by streams near residences or contaminated food. However, all the factors intertwine when the absence of basic sanitation and the establishment of hygiene practices are not adequate, favoring the parasitosis in humans. These conditions are more significant than they are, since there is no serious and consolidated health education policy.[5]

The most prevalent enteroparasitosis on the outskirts of Manaus are *Ascariasis, Trichuriasis*, *Hookworm* and *Giardiasis*.[6] There are about 200 million cases recorded per year of Giardia spp. and a prevalence of more than 50% in developing countries. The parasitic diseases with the highest total number of symptomatic cases reported in 2010 attributed to contaminated food, according to the World Health Organization (WHO), are Toxoplasmosis

[1]*Professor Auxiliar da Disciplina de Parasitologia – Centro Universitário Saúde ABC - CUSABC. Santo André-SP, Brasil.*
[2]*Professora do curso de pós-graduação em Análises Clínicas – Centro Universitário Saúde ABC - CUSABC. Santo André-SP, Brasil.*
[3]*Biomédica do Laboratório de Análises Clínicas – Centro Universitário Saúde ABC - CUSABC. Santo André-SP, Brasil.*
[4]*Coordenadora auxiliar do curso de Biomedicina – Universidade Paulista (UNIP) – São Paulo. Santo André-SP, Brasil.*
[5]*Professora Adjunta da Disciplina de Parasitologia – Centro Universitário Saúde ABC - CUSABC. Santo André-SP, Brasil.*
[6]*Discente do curso de Enfermagem – Centro Universitário das Faculdades Metropolitanas Unidas (FMU). São Paulo-SP, Brasil.*
[7]*Professora Titular da Disciplina de Parasitologia – Centro Universitário Saúde ABC - CUSABC. Santo André-SP, Brasil.*
[8]*Professor Titular da Disciplina de Análises Clínicas – Centro Universitário Saúde ABC - CUSABC. Santo André-SP, Brasil.*

Instituição: Centro Universitário Saúde ABC – CUSABC. Santo André-SP, Brasil.

acquired and Ascaridiasis, caused by *Toxoplasma gondii* and *Ascaris lumbricoides*, respectively.[7]

In addition to these infections, amebiasis and its variables, which are present in all developing tropical countries, represent the third most important parasitic disease, causing approximately 80,000 deaths per year.[8,9] Studies estimate that 1.45 billion individuals are infected with soil-transmitted helminths (STH), which mainly comprise *Ascaris lumbricoides*, *Ancylostoma duodenale* and *Trichuris trichiura*.[10,11]

Generally, in parasitism, the parasite-host relationship is of pathogenic equilibrium and the host can be called an "assyomatic carrier", but, on certain occasions, a disease may develop.[12]

The intestinal parasitosis, when symptomatic, cause various organic changes in their hosts and may lead to acute abdominal clinical conditions, which may occur in immunocompromised or undernourished individuals, for example by spoliation or the possibility of impaired intestinal absorption.[13]

Enteroparasites can also lead to malnutrition, iron deficiency anemia, intestinal obstruction, diarrhea and low absorption, and clinical manifestations are usually proportional to the host's parasite burden.[14]

The World Health Organization (WHO) released a study in 2009 stating that about nine million children have the cause of death associated with diarrhea and die before they reach the age of five years.[7]

Despite the numerous pharmaceutical industries in the world, there are no considerable numbers of anthelmintic drugs on the market, since resistance to anthelmintic drugs by helminths transmitted by soil is a reality and little is known about it. Helminthiasis control and elimination committees, together with researchers, seek to develop drugs that are easily accessible to those most susceptible to diseases, such as children and the elderly, thus developing easily ingested drugs for this target public, such as chewable tablet forms. Combinations of already known drugs, such as Mebendazole, Albendazole, Ivermectin, among others, show a significant effect, and new forms of diagnosis are in focus, since there is a need for more sensitive techniques.[11]

The parasitosis suffer variations between the regions and within the region itself, since they have different sanitary, educational and social conditions. Incontestable factors such as the rate of agglomeration of people, contaminated water and food, conditions of use and contamination of the soil, and the evolution capacity of larvae and helminth eggs, of protozoan cysts, in each of these localities18, cite that climatic conditions, such as temperature and altitude, directly influence the development and transmission of these parasites.[1,18,19]

The sanitary and environmental conditions of the places studied should always be taken into account. The Ministé-rio da Saúde (MS) recommends that any child suffering from parasitic diseases should receive immediate treatment as a means of avoiding dissemination to the community, especially nurseries and schools.[20]

Therefore, intestinal parasitic diseases continue to represent a significant medical-sanitary problem and when the subject is prevention, maintenance and treatment of diseases in Brazil, the context is established in the economy, health conditions are defined as unfavorable and become a serious problem. Although there is a large literature on the importance of these infections, little attention has been paid to the subject.[14,18,21]

OBJECTIVE

Considering the high frequency of parasitosis in Brazil, this study aims to detect the prevalence of enteroparasitosis in stool samples from residents of. Defining, by species found and by age group, the most prevalent parasitic diseases among users of public health services in the city of São Bernardo do Campo - São Paulo, Brazil.

MATERIAL AND METHODS

Obtaining information

The project was approved by the Research Ethics Committee of Universidade Paulista-UNIP, under No. 2.715.169. and CAAE 90305218.8.0000.5512.

A retrospective study was carried out from the primary data collection, done through the private database (Matrix Diagnosis®) between June and December 2017.

We used the results of all samples that were admitted to the laboratory, originating in the period determined with medical request for the parasitological examination, according to good laboratory practices. Stool analysis was performed using the Hoffman method.[22]

Data were collected broadly without restrictions on age, gender, race or other variables. Data collection was performed according to the following steps: Selection of the UBS > selection of the examination (PPF)> selection of the dates of the chosen periods.

Analysis of results

For statistical analysis, the GraphPad Prism® program was used to perform the Chi-square test, and the statistical significance was accepted at the level of 5% or $p < 0,05$.

The analysis of prevalence, given by the total number of cases existing in a given population and at a given time point, or also by the proportion of existing cases in the population analyzed and a specific time.

RESULTS

A survey of 17.018 fecal exams was carried out from June to December 2017. Among the data collected, 980 samples (5,75%) were positive, of which 74,39% were commensal parasites, such as *E. coli* and *E. nana* 25,61% of pathogenic parasites analyzed (Table 1).

Table 1 - Quantitative evaluation of the analyzed samples, June to December 2017

Sample Characteristic	n	%
Negatives	16.038	94,25
Positive	980	5,75
Total Exams	17.018	100,00
Commensal	728	74,39
Pathological	251	25,61
Total Exams	**980**	**100,00**

Among the helminths, seven different species and/or genera were detecte, being *S. stercoralis* present in the largest number of samples, followed by *E. vermicular, A. lumbricoides, H. Nana*, *Taenia* spp. and *T. Trichiura*, according to Table 2.

Among the protozoan, the most frequent (p = 0,002) was *Giardia* spp. (53,78%), followed by *E. histolytica/dispar* (21,51%). Among the helminths, *S. stercoralis* presented a prevalence of 9,16%, followed by *E. vermicularis*, with 8,37% (Table 3).

Table 2 - Distribution of enteroparasitosis in the positive tests (n = 251), performed in the regions of São Bernardo do Campo-SP, from June to December 2017

Parasites	n	%
Helminths		
S. stercoralis	23	2,34
E. vermicularis	21	2,14
A. lumbricoides	12	1,22
H. nana	3	0,30
Taenia spp.	1	0,10
T. trichiura	1	0,10
Protozoa		
Giardia spp.	135	13,77
E. histolytica/dispar	55	5,61
Total	**251**	**100,00**

Table 3 shows the enteroparasites distributed by age. It is observed that in the total of positive tests for pathogenic parasites, childhood (0 to 11 years) was the age group with the highest number of infected patients (p <0,0001), 48,21%. This age, *Giardia* spp. was the most frequent parasite, with 33,86%.

E. vermicularis, *E. histolytica/dispar* and *A. lumbricoides* were the other intestinal parasites that were more frequent in children, with 5,58%, 3,98 and 3,59, respectively.

Table 3 - Distribution by age group, in percent, of pathogenic intestinal parasites (n = 251) found in the positive tests performed in the regions of São Bernardo do Campo - SP

Parasites/Age	0 - 11 Childhood	12 - 17 Adolescence	18 - 40 Young Adult	41 - 65 Adult	>65 Elderly	
Helminths						
Ancilostomideos	0,00	0,40	0,00	0,00	0,00	**0,40**
A. lumbricoides	3,59	0,40	0,80	0,00	0,00	**4,78**
E. vermicularis	5,58	1,20	1,20	0,40	0,00	**8,37**
H. nana	0,00	0,00	1,20	0,00	0,00	**1,20**
S. stercoralis	0,40	0,40	1,20	3,59	3,59	**9,16**
Taenia spp.	0,40	0,00	0,00	0,00	0,00	**0,40**
T. trichiura	0,40	0,00	0,00	0,00	0,00	**0,40**
Protozoa						
E histolytica/dispar	3,98	1,59	9,16	5,58	1,20	**21,51**
G. lamblia	33,86	4,38	11,55	3,59	0,40	**53,78**
Total	**48,21**	**8,37**	**25,11**	**13,16**	**5,19**	**100**

In analysis, the adolescents (12 to 17 years), *Giardia* spp. and *E. histolytica/dispar* were the most frequent parasites and protozoa, with 4,38% and 1,59%, respectively.

In observation, of the young adults (18 to 40 years), *Giardia* spp. and *E. histolytica/dispar* also remained in evidence, with 11,55% and 9,16%.

Therefore, it may be noted that *Giardia* spp. was the most frequent parasite in the age groups: Childhood (0-11 years), Adolescence (12-17 years) and Young Adult (18-40 years).

In adults (41 to 65 years), *E. histolytica/dispar* was the most frequent parasite with 5,58%, followed by *Giardia* spp. (3,59%) and *S. stercoralis* (3.59%).

In elderly (> 65 years) the parasite was the most frequent and the only recorded helminth was *S. stercoralis* with 3,59%, followed by the protozoan *E. histolytica/dispar* (1,20%).
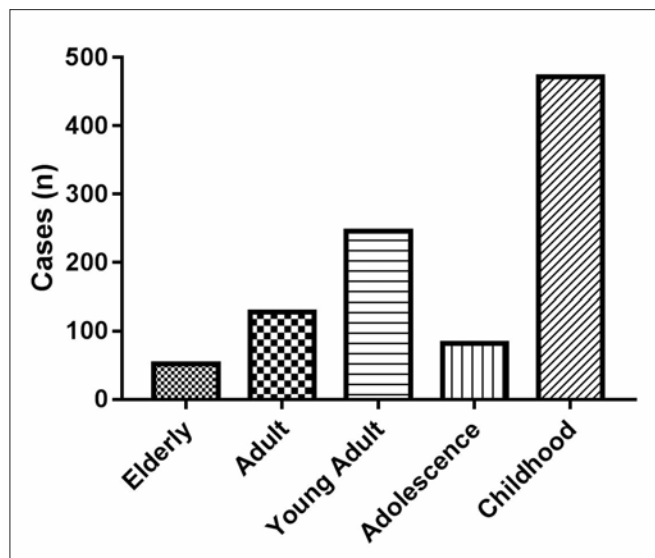
Figure 1. Prevalence of enteroparasitosis (n=980) distributed by age group. Chi-square p <0,0001.

The graph above, represented by Figure 1, shows the prevalence of enteroparasitosis distributed among the 5 age groups used in this study.

It is possible to observe that the "Childhood" age group had the highest prevalence of pathogenic parasites, that is, children from 0 to 11 years old presented the group with the highest infection by intestinal parasitosis in the city of São Bernardo do Campo - SP, presenting 251 exams positive samples from the 980 positive samples for some pathogenic parasite. The "Elderly" age group presented the lowest frequency of enteroparasitosis, but not less important, since it is a risk group with patients over 65 years of age.

In total, samples from 40 regions of the city of São Bernardo do Campo - SP were analyzed and the 10 most frequent areas of intestinal parasitosis are represented in the image. This is the date of the total number of parasites found and pathogenic (n = 980).

Table 4. Percentage and number of patients from the regions that presented the highest number of intestinal parasitosis of São Bernardo do Campo

Regions	Number of patients	Percentage
V São Pedro	78	15,69
Jd Ipe	77	15,49
Pq S. Bernardo	54	10,87
Jd Silvina	53	10,66
Alves Dias	46	9,26
Ferrazopolis	42	8,45
Vl União	39	7,85
Taboão	37	7,44
Alvarenga.	36	7,24
Riacho Grande	35	7,04
Total	**497**	**100**

DISCUSSION

Intestinal parasites establish very well in hosts exposed to poor sanitation conditions, inadequate hygiene and lack of information, hosts that are susceptible by biological, nutritional factors, water contaminated by streams near residences or contaminated food.[1,18]

It is important to highlight that the incidence and prevalence of intestinal parasites vary between countries and regions, as they present different health, education and sanitation conditions.[1,18]

This study determined the presence of enteroparasitosis in the regions of the city of São Bernardo do Campo - SP and had as prevalence, in the positive samples analyzed (n = 980), the parasites *Endolimax nana* (39.38%), *Entamoeba coli* and *Giardia* spp. with 32.90% and 13.77%, respectively. A study done in the metropolitan area of Fortaleza shows the presence of *E. nana* (55.14%), *E. coli* (21.33%) and *Giardia* spp. (13.95%) were also the most frequent parasites in the positive samples (n=840).[23]

There is an undeniable distinction between the State of São Paulo and the State of Ceará as regards temperature, altitude and biomes in general, and the adequate sanitary sewage of the cities in question also present differences. Although São Bernardo do Campo-SP has 91.9% of its area covered by adequate sanitation and Fortaleza-CE has a little more than 74%,[24] the number of positive samples in these studies show less than 15% difference. Thus, it is possible to compare this present study with the study carried out by Filho (2017), concluding that they present the same evidence of positivity.[23]

As already explained in the results of the positive samples (n = 980), *Giardia* spp. presented a prevalence of 13.77%. In the positive samples for pathogenic parasites (n = 251), the protozoan *Giardia* spp. (53.78%) presented a predominance considered high and similar to those found in other areas of our country.[25-27] This fact is due to the socioeconomic conditions of the studied population and mainly due to the easy water and interpersonal transmission, being responsible for most of the epidemic outbreaks of diarrhea in places such as nursery, asylums and prisons.[1]

The study showed that (n=474) that presented *Giardia* spp. with prevalence of 35.04%. However, these data were acquired from 1.433 samples collected between 2003 and 2005, much smaller data than the one performed in this present study that evaluated 17.018 samples in a period of six months. It is concluded that it was performed in the city of Santa Catarina state, presenting positivity for giardiasis considerably higher than the one presented in this study.[26]

We also observed that *Giardia* spp. was the most frequent parasite in children (0 to 11 years), a fact that is constantly reported in the literature,[26,28,29] as for example in Pagotti's study (2013), which carried out a study (n =

462), where it presented 57.5% of positive samples and states that the pathogenic protozoa found most frequently in this age group is *Giardia* spp. (50.8%), corroborating with data from this present study, which had a 33.86% occurrence.[27]

Table 3 shows that children aged 0 - 11 years (Childhood) are the most affected by infections caused by intestinal parasitosis, with 48.21% of a total of 5 age groups analyzed. A fact that is repeated in a study where more than half (57.5%) of the children analyzed (n = 462) presented positive samples for some parasite. Another study also presents the age group from 0 to 12 years old as the most affected by intestinal parasitosis, with 78.56%.[26] These data suggest that children at this age are more susceptible to infections, perhaps because they are more exposed to contamination through contaminated sites such as streams and streams, non-use of footwear, ignorance of basic hygiene principles, and especially the habit of carrying hands to the mouth after the manipulation of possibly contaminated objects.[30]

Another species of pathogenic parasite found in this study was *E. histolytica*, with a prevalence of 21.51% among samples positive for some pathogenic parasite (n=251). It is necessary to emphasize and remain alert because, although not very symptomatic in adults, their clinical and extra intestinal manifestations in children, such as acute diarrhea, abdominal pain, severe dehydration, high and persistent fever, may require hospitalization.[1,27]

Costa (2018) performed a cross-sectional study and analyzed 6,289 fecal samples, 942 of which were positive for some type of parasite, and among the 16 parasites found 36 samples (3.82%) were positive for *E. histolytica*, a lower result than that presented in this present study (5.61%, n = 980). This difference may be due to the hygiene and economic conditions of the study population and also the fact that the vast majority of the individuals used in the Costa study are adults aged 29 to 42 years, which may explain the findings in this study, since they were analyzed samples from 0 to 65 years of age.[30]

In the age group of adults (41-64 years) and elderly (>65 years), only two helminths were found in the analyzed samples, *E. vermicularis* with 0.40% and *S. stercoralis* with 7.18%. Therefore, the prevalence of the larvae of the helminth *S. stercoralis* becomes very significant, since it is a parasite that is easily transmitted, has a chronicity and autoinfection character, being able to evolve to severe forms of hyperinfection, including the possibility of increase in the number of parasites in immunosuppressed individuals, or with poor hygiene, such as elderly people who use diapers for a long time.[1]

The aggravating factors of the infection caused by *S. stercoralis* are that this nematode has the capacity to complete its life cycle inside the host. When this infection is associated with some immunocompromised patients, such as the elderly and patients with immunosuppressive diseases and treatments (HTLV-1), this autoinfection cycle may be a potentially fatal hyperinfection syndrome, which is characterized by an increase in larvae found mainly in feces and spit.[31]

It should be noted that in this study we also found *H. nana* with 1.20% prevalence and *Ancylostomidae*, *Taenia* spp. and *T. trichiura*, both with a prevalence of 0.40%. Due to the low prevalence and because they are isolated cases, these enteroparasites will not be the subject of discussion. Due to their low prevalence and being isolated cases, these enteroparasites will not be discussed. These findings can be explained by poor basic sanitation, which enables the contamination and proliferation of these parasites.[1]

CONCLUSION

We conclude that *Giardia* spp. was the most frequent and frequent frequency in children (0 to 11 years) and the areas of the city with the highest prevalence were those in the periphery, such as the Vila São Pedro neighborhood. This study serves as an alert on the need to implement public health prevention and control of these and others types of diseases.

Resumo

Objetivo: Este trabalho teve como objetivo avaliar a prevalência de enteroparasitoses em amostras de fezes de moradores de São Bernardo do Campo - SP que utilizam o serviço público de saúde por meio da Unidade Básica de Saúde (UBS), definindo as enteroparasitas mais frequentes, por idade e bairro com maior prevalência. **Métodos:** Para este estudo retrospectivo, foram realizados 17.018 exames fecais no período de junho a dezembro de 2017. Os dados foram provenientes do Laboratório de Parasitologia do Centro Universitário Saúde ABC - FMABC, sendo realizada a análise de prevalência das enteroparasitoses por idade e bairro. O projeto foi aprovado pelo Comitê de Ética em Pesquisa da Universidade Paulista - UNIP, sob o nº 2.715.169. **Resultados:** O protozoário mais frequente (33,86%) foi *Giardia* spp., seguido por *Entamoeba histolytica/dispar*, mais frequente em adultos jovens de 18 a 40 anos (9,16%). *Enterobius vermicularis* apresentou uma prevalência de 5,58%, sendo mais frequente em crianças de 0 a 11 anos de idade. Em adultos (41-65 anos) e idosos (> 65 anos), o helminto mais frequente encontrado nas amostras foi o *Strongyloides stercoralis* (18%). **Conclusão:** Concluímos que *Giardia* spp. foi o parasita mais frequente e frequentemente observado em crianças (0 a 11 anos), em idosos foi o *Strongyloides stercoralis*. Este estudo serve como um alerta sobre a necessidade de se implementar uma saúde pública eficiente, voltada principalmente à prevenção e controle desses e de outros tipos de doenças.

Palavras-chave
Meio ambiente; saúde pública; doenças parasitárias; indicadores

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Correspondence
Emerson Barbosa da Silva
Centro Universitário Saúde ABC – CUSABC
Av. Lauro Gomes, 2000 - Vila Sacadura Cabral
09060-870 – Santo André-SP, Brasil