ORIGINAL ARTICLE

PREVALENCE OF INTESTINAL PARASITES IN THE ELDERLY ENROLLED IN THE FAMILY HEALTH STRATEGY IN PORTO ALEGRE, BRAZIL

Prevalência de enteroparasitoses em idosos da Estratégia Saúde da Família de Porto Alegre, Brasil

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RESUMO

OBJETIVO: A prevalência de enteroparasitoses é pouco relatada em estudos com a população idosa. Sendo assim, esse estudo teve como objetivo identificar a prevalência de enteroparasitoses associada a fatores sociodemográficos e de saúde em idosos da Estratégia Saúde da Família (ESF). MÉTODOS: Estudo transversal, realizado com uma amostra aleatória de idosos da ESF do município de Porto Alegre. A coleta de dados foi realizada pelos agentes comunitários de saúde, que aplicaram um questionário geral de inquérito epidemiológico. A coleta de sangue e fezes foi realizada pelo projeto, na unidade de saúde onde o idoso estava cadastrado. RESULTADOS: Entre 581 idosos, a prevalência de enteroparasitoses foi de 10,8%. Os parasitos encontrados foram: Endolimax nana (42,7%), Entamoeba coli (33,8%), Giardia lamblia (8,8%), Ascaris lumbricoides (5,9%), Strongyloides stercoralis (4,4%), Trichuris trichiura (2,9%), e Iodamoeba bütschlii (1,5%). CONCLUSÃO: A prevalência de enteroparasitoses em idosos da ESF foi menor que a relatada em outros estudos. Os parasitos identificados foram predominantemente não patogênicos. Esses achados sugerem a possibilidade de transmissão interpessoal, contaminação ambiental ou mesmo a ingestão de alimentos ou água contaminados. Esses resultados ressaltam a importância da implementação de medidas relacionadas ao saneamento básico e programas contínuos de educação sanitária na comunidade estudada.

PALAVRAS-CHAVE: enteropatias parasitárias; idoso; saúde pública.

ABSTRACT

OBJECTIVE: There are few studies on intestinal parasitic infections in elderly populations. Therefore, this study aimed to determine the prevalence of intestinal parasites and identify the association between this prevalence and the sociodemographic, environmental, and health factors of the elderly attended by the Family Health Strategy (FHS). METHOD: This cross-sectional study involved the analysis of data collected from a random sample of elderly individuals. Community health workers drafted a general questionnaire to collect epidemiological data. The project team also collected blood and stool samples at the healthcare unit where each individual was enrolled. RESULTS: Among 581 elderly people, the prevalence of intestinal parasites was 10.8%. The parasites found were as follows: Endolimax nana (42.7%), Entamoeba coli (33.8%), Giardia lamblia (8.8%), Ascaris lumbricoides (5.9%), Strongyloides stercoralis (4.4%), Trichuris trichiura (2.9%), and Iodamoeba bütschlii (1.5%). CONCLUSION: The prevalence of intestinal parasites in elderly persons was lower than that reported in other studies, and the parasites identified were predominantly non-pathogenic. The findings suggest the possibility that interpersonal transmission, environmental contamination, or the ingestion of contaminated food or water is occurring in this population. These findings also highlight the importance of the ongoing implementation of sanitation and hygiene education programs in this community.

KEYWORDS: parasitic intestinal diseases; aged; public health.

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INTRODUCTION

Intestinal parasites in the human intestinal tract are responsible for symptoms such as diarrhea, malnutrition, anemia, and psychosocial changes, among others. Intestinal parasitic infections are common in children, and therefore, this population is the primary focus of prevention and treatment campaigns. In the elderly population, little is known about the influence of parasites on aging. It is believed that intestinal parasite infections can be more severe in the elderly due to the aging of the immune system. Three epidemiological factors are required for the occurrence of parasitic disease:

- suitable host conditions, including nutritional status;
- cultural and behavioral factors;
- the resistance of the parasite to the host immune system and the environment.

Few epidemiological studies examine only elderly populations. Previous studies have reported cases in certain areas where the prevalence of intestinal parasitic infections in elderly population ranges from 9.5% to 72.8%. To understand the reality and needs of each region, the Family Health Strategy (FHS) team, which is part of the Unified Health System in Brazil, implements health surveillance, promotion, prevention, and disease control activities. The use of epidemiological tools and the collection of survey data by Community Health Workers (CHW) regarding the social and environmental factors that may affect human health enable closer proximity of health services to the population.

Certain environmental factors may interfere with the disease process and increase the risk of contamination by intestinal parasites. Despite the development of new sanitation technologies, the health system in Brazil is not suitable, and deficiencies have been noted in the health education provided to the population, especially low-income individuals. Therefore, this study aimed to determine the prevalence of intestinal parasites and identify the association between this prevalence and the sociodemographic, environmental, and health factors of the FHS elderly residing in the city of Porto Alegre, RS, Brazil.

METHOD

This study is part of the “The multidimensional study of the elderly in the Family Health Strategy in Porto Alegre, Brazil (EMI-SUS)”, which occurred between March 2011 and December 2012. This prospective, randomized cross-sectional study was conducted on a sample of elderly individuals who were registered in the FHS in the municipality of Porto Alegre. To select the study participants, FHS teams were stratified by Health Districts (HD), and approximately 30% of the teams from each HD were selected; for the 30 FHS teams selected, 36 respondents were randomly selected from each FHS. The inclusion criteria for the study were as follows: older than 60 years of age and registered in the FHS. This project was approved by the Ethics Committees of PUCRS (protocol 10/04967) and of the Municipal Health Secretary of Porto Alegre (protocol 001.021434.10.7).

Data collection was performed in two steps. First, during home visits, the CHW invited the elderly to participate in the study, obtained their consent and prepared a general questionnaire to collect the epidemiological variables. At this time, the CHW also informed each participant about the required fecal sample collection. Second, the project team collected blood and stool samples at the healthcare unit where each elderly individual was registered. Blood samples were collected into a tube containing EDTA, and fecal samples were collected into a plastic pot with screw top and stored in a refrigerator for no more than three days.

Parasitological stool examinations (PSE) were conducted by the Biochemistry, Molecular Genetics and Parasitology Laboratory of the Institute of Geriatrics and Gerontology using the spontaneous sedimentation technique and the Baermann-Moraes method for all the samples. Hemograms were performed by the Clinical Pathology Laboratory of Hospital São Lucas by fluorescence flow cytometry. Anemia was defined using the WHO hemoglobin values (< 13 g/dL for men and < 12 g/dL for women). Eosinophilia was considered present when the blood eosinophil value was above 400/μL.

The following variables were used to test the correlation between the socioeconomic status of the 13 regions of Porto Alegre (Center, South, Center/South, Axis Baltazar, North, Humaitá/Navegantes, Restinga, East, Partenon, Lomba do Pinheiro, Glória, Cruzeiro and Northeast) with the prevalence of intestinal parasites: indicators of inadequate housing, water supply, sewage, and pavement. The georeferenced socioeconomic indicators, based on the 2010 Population Census of the Brazilian Institute of Geography and Statistics, were obtained from the Observatory of the City of Porto Alegre. The indicators for water supply and pavement, given originally as the number of houses with an adequate supply, were recalculated to show the number with an inadequate supply. The 30 FHS teams selected for the study were distributed across 13 of the 17 regions.

Statistical analysis was performed in SPSS version 17. The variables were described as frequencies, means, and standard deviations. The \( \chi^2 \) Pearson test was used to compare the frequencies of the different variables.
trend was used to compare ordinal variables. If variables in the Pearson test had one or more cells with an expected value of less than five, they were analyzed using Fisher’s exact test. The significance level was p < 0.05. The multivariate analysis used binary logistic regression; the entry criterion for all variables was p < 0.300. In the final model, the variables were maintained if the independent p values were less than 5%.

RESULTS

Of the 1,080 randomly selected elderly individuals, 764 answered the epidemiological questionnaire, 608 provided fecal samples, and 581 provided blood samples. Therefore, after applying the exclusion criteria, a total of 581 elderly individuals participated in this study. The mean age was 68.2 ± 7.0 years, and 376 of the participants were female (64.7%). The overall prevalence of intestinal protozoans and helminthes was 10.8% (95%CI 8.6 – 13.6), and the prevalence of pathogenic parasites was 2.8% (Giardia lamblia, n = 6; Ascaris lumbricoides, n = 4; Strongyloides stercoralis, n = 3; Trichuris trichiura, n = 2; Iodamoeba bütschlii, n = 1) (95%CI 1.7 – 4.4). Co-infection was observed in only five individuals (Endolimax nana + Entamoeba coli, n = 3; Entamoeba coli + Giardia lamblia, n = 1; Entamoeba coli + Iodamoeba bütschlii, n = 1). The prevalence of intestinal parasites is described in Table 1.

In the bivariate analysis, there were no statistically significant relationships between the prevalence of intestinal parasites and the socioeconomic and demographic variables (Table 2). Table 3 presents the hygienic and sanitary variables. The elderly who reported having other pets had a higher prevalence of intestinal parasites (27.8%) than those who had dogs and cats or who did not have pets (p = 0.041). The elderly who had animals that were bathed weekly showed a higher prevalence of intestinal parasites (16.0%) than those who were bathed less frequently (p = 0.024).

<table>
<thead>
<tr>
<th>Intestinal parasites</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endolimax nana</td>
<td>29</td>
<td>42.7</td>
</tr>
<tr>
<td>Entamoeba coli</td>
<td>23</td>
<td>33.8</td>
</tr>
<tr>
<td>Giardia lamblia</td>
<td>6</td>
<td>8.8</td>
</tr>
<tr>
<td>Ascaris lumbricoides</td>
<td>4</td>
<td>5.9</td>
</tr>
<tr>
<td>Strongyloides stercoralis</td>
<td>3</td>
<td>4.4</td>
</tr>
<tr>
<td>Trichuris trichiura</td>
<td>2</td>
<td>2.9</td>
</tr>
<tr>
<td>Iodamoeba bütschlii</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Population n (%)</th>
<th>Prevalence of intestinal parasites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>205 (35.3) 12.2 0.439</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>376 (64.7) 10.1 0.439</td>
</tr>
<tr>
<td>Race*</td>
<td>White</td>
<td>374 (65.2) 9.9 0.479*</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>108 (18.8) 14.8</td>
</tr>
<tr>
<td></td>
<td>Mulatto</td>
<td>77 (13.4) 9.1 0.479*</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>15 (2.6) 6.7</td>
</tr>
<tr>
<td>Marital status*</td>
<td>Married</td>
<td>226 (39.2) 13.7 0.230</td>
</tr>
<tr>
<td></td>
<td>Single</td>
<td>99 (17.2) 6.1 0.230</td>
</tr>
<tr>
<td></td>
<td>Separated</td>
<td>94 (16.3) 10.6</td>
</tr>
<tr>
<td></td>
<td>Widowed</td>
<td>157 (27.3) 10.2 0.230</td>
</tr>
<tr>
<td>Education*</td>
<td>Illiterate</td>
<td>73 (12.6) 9.6 0.695*</td>
</tr>
<tr>
<td></td>
<td>Incomplete primary school dropout</td>
<td>415 (71.6) 10.8 0.695*</td>
</tr>
<tr>
<td></td>
<td>Primary school</td>
<td>56 (9.7) 12.5</td>
</tr>
<tr>
<td></td>
<td>High school or above</td>
<td>36 (6.2) 11.1</td>
</tr>
<tr>
<td>Age group (years)</td>
<td>60–69</td>
<td>376 (64.7) 11.4 0.404*</td>
</tr>
<tr>
<td></td>
<td>70–79</td>
<td>159 (27.4) 10.7 0.404*</td>
</tr>
<tr>
<td></td>
<td>80 or above</td>
<td>46 (7.9) 6.5 0.404*</td>
</tr>
<tr>
<td>Income*</td>
<td>No income</td>
<td>45 (8.2) 6.7 0.572*</td>
</tr>
<tr>
<td></td>
<td>Up to 1 BS</td>
<td>309 (56.3) 11.3</td>
</tr>
<tr>
<td></td>
<td>More than 2 BS</td>
<td>195 (35.5) 11.3 0.572*</td>
</tr>
<tr>
<td>Cohabitants*</td>
<td>Spouse and family</td>
<td>159 (27.6) 13.8 0.264</td>
</tr>
<tr>
<td></td>
<td>No spouse; others</td>
<td>194 (33.7) 9.8</td>
</tr>
<tr>
<td></td>
<td>Only spouse</td>
<td>118 (20.5) 12.7</td>
</tr>
<tr>
<td></td>
<td>Lives alone</td>
<td>105 (18.2) 6.7 0.264</td>
</tr>
<tr>
<td>Own professional activity*</td>
<td>Yes</td>
<td>118 (20.6) 13.6 0.326</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>454 (79.4) 10.1 0.326</td>
</tr>
<tr>
<td>Total</td>
<td>581 (100.0)</td>
<td>10.8 95%CI 8.6 – 13.6</td>
</tr>
</tbody>
</table>

BS: basic salary (~$ 310.00)
*p value calculated by Fisher’s exact test.
*p value calculated by Fisher’s exact test for linear trend.
*Some individuals did not answer this question so were considered missing.
In the final multivariate analysis, the variables that were independently associated with seropositivity to intestinal parasites were the presence of animals other than dogs or cats (birds, chicken, sheep, and goats; OR = 0.208; p = 0.046) and having pets that were bathed weekly (OR = 11.31; p = 0.027).

Evaluating the association with other health variables (Table 4), we observed that the elderly who did not have hypertension (15.4%) or did not have mental diseases (depression, mood disorders, cognitive impairment, and dementia; 12.8%) had a higher prevalence of intestinal parasites than...
Prevalence of intestinal parasites in the elderly

Those with these diseases (p = 0.032 and p = 0.049, respectively). The same relationship was observed in the elderly without diabetes (12.6%) or heart disease (12.3%), but with a statistical trend (p = 0.080 and p = 0.060, respectively).

The prevalence of pathogenic parasites identified no significant association with the demographic, socioeconomic, hygienic, and sanitary variables. Regarding the health variables, the elderly individuals with eosinophilia had a higher prevalence of pathogenic parasites (7.3%; p = 0.009) — 83.3% helminthes (Strongyloides stercoralis, 49.9%; Trichuris trichiura, 16.7%; and Ascaris lumbricoides, 16.7%) and 16.7% protozoan (Giardia lamblia, 100%) — than those without eosinophilia (1.9%), and the elderly without mental illness also showed a higher prevalence of pathogenic parasites than those who did have this illness (p = 0.010).

The analysis of the prevalence of intestinal parasites by HD showed that the Northwest region/Humaitá/Navegantes/Islands had the highest prevalence (15.0%), followed by the Eastern region/Northeast region (13.0%), Glory/Cruzeiro/Crystal (12.0%), Southern region/South Central region (11.1%), Lomba do Pinheiro/Parthenon (9.4%), Northern region/Axis Báltazar (9.2%), Restinga/South Extreme (8.9%), and the Central region (3.0%).

The assessment of the correlation between the indicators of inadequate housing, water supply, sewage and pavement, and the prevalence of intestinal parasites by region, identified the Center as the region with the lowest prevalence of intestinal parasites (3.2%). The Center was also the region with the best-ranked indicators (lower left portion of the graphs). The highest prevalence rates were found in the Humaitá/Navegantes (20.0%), the East (18.2%) and the North (17.2%), but no significant relationship was found with the inadequacy indicators. Only inadequate housing showed a positive linear association with the prevalence of parasitic infection; this finding remained when using an average of the indicators, but the association was not statistically significant (Figure 1).

**DISCUSSION**

The prevalence of intestinal parasites in the elderly enrolled in the FHS in Porto Alegre was low (10.8%) compared to that found in other studies examining elderly populations. In 2005, Hurtado-Guerrero et al.10 found an intestinal parasite prevalence of 72.8% among the elderly people of the riverside population of Nova Olinda do Norte, Amazonas. Araújo & Correia, in 1997,7 found a prevalence of 55.1% in the elderly population of the city of João Pessoa, Paraíba. International studies have found a prevalence of 37.7% in the elderly who visited a medical center in Santiago, Chile,9 and 26.5% among elderly patients at a hospital in Costa Rica.11 However, more recent studies have identified a lower prevalence in the institutionalized elderly: 12.9% in Porto Alegre, Rio Grande do Sul,9 and 9.5% in Uberlândia, Minas Gerais.3 These differences in prevalence may occur due to the socioeconomic and environmental differences between the studied populations. Diverse ecological conditions favor the spread of intestinal parasites, constituting a serious public health problem in some regions of Latin America and Brazil.10

The parasites found in the elderly were, in most cases, non-pathogenic; the presence of *E. nana* and *E. coli* indicates exposure of the individual to fecal contamination. Other studies have also found a higher prevalence of these parasites in both the elderly and the general population.20-22 In 2008, Basso et al.23 reported that the prevalence of *E. coli* and *E. nana* has increased in recent decades compared to that of other intestinal parasites; the authors explained that this increase may be related to the transmission mode of infective cysts through stool, which facilitates interpersonal contamination, even in environments with good sanitary conditions. Another factor that must be considered is that the presence of protozoan cysts in human stool is usually not an indication for treatment,22 thus making interpersonal contamination more difficult to prevent. By contrast, the low prevalence of helminthes found in this study can be attributed to improvements in public health, sanitation, housing, and education.23

Unlike most studies involving parasites,17,21,24 no significant associations were found between the presence of intestinal parasites and the socioeconomic and demographic variables. For the hygienic and sanitary variables, only the presence of pets other than cats or dogs showed a significant association with intestinal parasites. This is a contradictory finding, since many studies relate the presence of parasites to cats or dogs,25,26 and not to other animals such as birds, chicken, sheep and goats. Individuals who own these types of animals generally have more frequent contact with the environment in which they live, which may be a source of contamination, although this type of exposure was not evaluated in the present study.

The elderly who bathed their pets more often, mostly dogs and cats, had a higher prevalence of intestinal parasites; bathing a pet more frequently is an indicator of greater contact with the animal. Frequent bathing is not a protective factor against parasites because cats and dogs, when taken for a walk on the street, can easily become contaminated and carry parasitic eggs or cysts in their fur.

A lower prevalence of intestinal parasites was observed in the elderly who reported having hypertension, diabetes,
Figure 1. Correlation between frequencies of inadequate habitation conditions, water supply, sewage and pavement, and the prevalence of intestinal parasites according to the municipal indicators of 13 regions of the municipality of Porto Alegre.

Regions: A = Center; B = South; C = Center/South I; D = Axis Baltazar; E = North; F = Humaitá/Navegantes; G = Restinga; H = East; I = Partenon; J = Lomba do Pinheiro; K = Glória; L = Cruzeiro; M = Northeast.
heart disease, and mental disease; a diagnosis of these diseases indicates, in general, that the individual cares about their health, seeks health services more frequently, and thus receives a higher level of healthcare. Anemia was not associated with significant intestinal parasites, in contrast to many studies. However, it should be noted that parasites that cause anemia, especially helminthes, were less prevalent in this study.

When the prevalence of pathogenic parasites was evaluated, the only confirmed association was with eosinophilia, confirming other studies reporting such an association, particularly in relation to helminthes.

When the HD regions were evaluated, the Northwestern region of Humaitá/Navegantes/Islands and the Eastern/Northeastern regions showed the highest prevalence, but no significant relationship was found between the HD and the socioeconomic, hygienic, and sanitary data collected in this study.

The analysis of the association between prevalence and the inadequacy indicators did not show any clear associations; however, this study was not designed to examine such an association. Nonetheless, the region with the best ranked indicators and the lowest prevalence was the Center region of Porto Alegre, suggesting that adequate sanitation reduces the occurrence of parasites, as reported in numerous studies.

A limitation of the study was a reduction in the sensitivity of the techniques used to identify larvae of *S. stercoralis*, because some samples needed refrigeration and were analyzed without the use of a preservative solution.

**CONCLUSION**

The prevalence of intestinal protozoans and helminthes in the elderly enrolled in the FHS of Porto Alegre was 10.8%; the parasites were predominantly non-pathogenic. While the study results show a low prevalence in this population compared to that of other studies, preventive and educational measures can still be implemented. Despite public health efforts to fight infectious parasitic diseases, such diseases are still a problem in this population because infected people are extremely active dissemination routes. The role played by the CHW in the community can include programs aimed at disseminating educational and preventive information about parasitic diseases. The study results emphasize the importance of establishing an active, representative, and multidisciplinary family health team to educate and promote health and wellness within the community.

**CONFLICT OF INTEREST**

The authors declare that there is no conflict of interest.

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