



INTESTINAL PARASITES PREVALENCE ASSESSMENT IN CENTRAL LABORATORY OF JUIZ DE FORA-MG FROM JULY 2014 TO JULY 2015

Fernanda Malafaia Monnerat de Carvalho¹, Joelma de Souza Coimbra Ishii², Kamilla Rocha Alhadas², João Carlos Marques Félix², Sandra Neves dos Santos¹, Yuri Carvalho Lyra³, Juliana Brovini Leite⁴ e Paula Rocha Chellini¹

ABSTRACT

Intestinal parasitosis are a severe public health problem and they are related to high morbidity. Analysis of intestinal parasites in the city of Juiz de Fora, Minas Gerais, was performed using patient samples sent from collection units to the Central Laboratory of City of Juiz de Fora from July 2014 to July 2015. In the present study the objective was determine the prevalence of intestinal parasitosis in the city of Juiz de Fora and relate it with sex, age and region of the collection units. For the analysis, it was used the method of spontaneous sedimentation of feces. 9262 samples were analyzed and 2.92% were positive for at least one parasite. *Entamoeba histolytica* (30.26%), *Giardia duodenalis* (29.15%), *Entamoeba coli* (14.02%), *Strongyloides stercoralis* (11.07%), *Enterobius vermicularis* (5.90%) and *Ascaris lumbricoides* (3.69%) were the most frequently found parasites. Of the positive samples, 52.39% were from female patients and 47.61% were from male patients. The region with most parasitic index was the North region (19.1%). After conducting a survey of intestinal parasites in the city of Juiz de Fora, it can be concluded that the prevalence of parasites is small. Besides the treatment of water and sewage services should be determined politics of health education and control of parasitic diseases in the city.

Keywords: Intestinal parasitosis; prevalence; feces examination.

¹ Departamento de Ciências Farmacêuticas, Faculdade de Farmácia, Universidade Federal de Juiz de Fora, Rua José Lourenço Kelmer, 36036-900, Juiz de Fora, MG, Brasil.

² Laboratório Central (LACEN) da Prefeitura de Juiz de Fora, Avenida Francisco Valadares, 1910, 36020-485, Juiz de Fora, MG, Brasil.

³ Biomédico, Mestre em Ciências Biomédicas. Instituto Brasileiro de Saúde Euclides Leite (IBSEL)

⁴ Farmacêutica bioquímica, Mestre em ciências da saúde, Doutora em saúde. IBSEL

**AVALIAÇÃO DA PREVALÊNCIA DE PARASITAS INTESTINAIS NO
LABORATÓRIO CENTRAL DE JUIZ DE FORA - MG DE JULHO DE 2014 A
JULHO DE 2015**

RESUMO

Parasitoses intestinais são um grave problema de saúde pública e estão relacionadas a alta morbidade. A análise das parasitoses intestinais na cidade de Juiz de Fora, Minas Gerais, foi realizada a partir de amostras de pacientes enviadas para as unidades de coleta do Laboratório Central da Cidade de Juiz de Fora no período de julho de 2014 a julho de 2015. O objetivo do presente estudo foi determinar a prevalência de parasitoses intestinais no município de Juiz de Fora e relacioná-la com sexo, idade e região das unidades de coleta. Para a análise, foi utilizado o método de sedimentação espontânea de fezes. Foram analisadas 9262 amostras e 2,92% foram positivas para pelo menos um parasita. *Entamoeba histolytica* (30,26%), *Giardia duodenalis* (29,15%), *Entamoeba coli* (14,02%), *Strongyloides stercoralis* (11,07%), *Enterobius vermicularis* (5,90%) e *Ascaris lumbricoides* (3,69%) foram os parasitas mais encontrados. Das amostras positivas, 52,39% eram de pacientes do sexo feminino e 47,61% do masculino. A região com maior índice parasitário foi a região Norte (19,1%). Após a realização de um levantamento de parasitoses intestinais no município de Juiz de Fora, pode-se concluir que a prevalência de parasitas é pequena. Além dos serviços de tratamento de água e esgoto, devem ser determinadas políticas de educação em saúde e controle de parasitoses no município.

Palavras-chave: Parasitose intestinal, prevalência, exame de fezes.

INTRODUCTION

Intestinal parasites such as protozoa and helminths are among the pathogens most often found in humans. Several factors can lead to an increased risk of infection, including poor sanitation, improper hygiene practices and poor housing conditions. There are also present host-related factors, such as nutritional status, immune system, age, medication use, or behavioral habit aspects, and related to the parasite, as number of copies, resistance to the host immune system, pathogenicity, location, size, among others. The parasitic disease is caused by an imbalance between the parasite action and host resistance capacity. (TEIXEIRA; HELLER, 2006; FREI; JUNCANSEN; RIBEIRO-PAES, 2008; NEVES, 2012; BUSATO et al., 2014)

The parasitic transmission forms include several mechanisms. Can occur by ingestion of food and water contaminated with protozoan cysts and/or helminths eggs,

by active skin penetration due to soil contaminated by helminths such as hookworms, or through vectors or intermediate hosts (NEVES, 2012).

Helminthiasis and protozoan infections range from asymptomatic and mild cases. Mild cases have nonspecific symptoms such as abdominal pain, diarrhea, nausea, vomiting, anorexia, irritability and sleep disturbances. Immunocompromised patients or more parasitic load may progress to severe malnutrition, which occurs by various mechanisms, such as mucosal injury, altered bile metabolism, food competition, intestinal exudation, among others (ANDRADE et al., 2010).

Intestinal parasitic infections are considered a public health problem. In Brazil, due to the lack of a deep health education policy, added to poor sanitary and cultural conditions and the scarcity of information on the prevalence of parasitic disease, the situation is alarming (TAVARES-DIAS; GRANDINI, 1999; MARQUES; BANDEIRA; QUADROS, 2005; MELO; FERRAZ; ALEIXO, 2010).

Some parasitic diseases such as ascariasis, trichiuriasis and hookworm infection are considered neglected diseases. They are concentrated in the poorest, and despite low mortality rate, they have high morbidity. In addition to morbidity, these diseases often cause organic deficits, compromising the physical and intellectual development and limiting the adults' production capacity. Thus, parasitosis produce, in its more severe forms, a large number of sick, that generate financial costs for families and for the government with medical and hospital care (ANDRADE et al., 2010; REY, 2001).

It is estimated that about 3.5 billion people in the world harbor some intestinal parasite, and 450 million have clinical manifestations. The Center for Disease Control and Prevention - CDC estimated that in 2013, between 807 million and 1.221 billion people in the world were parasitized by *Ascaris lumbricoides*, from 576 million to 740 million by hookworm and 604 to 795 million by *Trichuris trichiura*. Taking into account that many people are infected by more than one parasite at the same time (polyparasitism), these numbers may be even higher (ARANI et al., 2008; CDC, 2016).

A parasitic disease affecting mainly school children, due to poor hygiene, the lack of immunity and dependence on other people's care, harming the physical and intellectual normal development. Diarrhea caused by intestinal parasite infection in children is a big responsibility for malnutrition and impaired child development (SATUMINO; NUNES; SILVA, 2003; SILVA et al., 2011).

In this context, this study aimed to analyze the epidemiological profile of intestinal parasites in Juiz de Fora, Minas Gerais.

MATERIALS AND METHODS

The study was approved by Federal University Juiz de Fora Hospital Institutional Ethics Committee and was conducted in the city of Juiz de Fora, MG, that had in 2015 an estimated population of 555,284 inhabitants.

This study was a retrospective study using sampling data from Juiz de Fora population that had parasitological stool tests made at the Central Laboratory (LACEN) of Juiz de Fora maintained by the municipality. Patients served by the LACEN are from the city and nearby districts and are attended by the public health system. The samples were sent to LACEN from collection stations located neighborhoods in all city regions.

The parasitological feces examination was performed using the Hoffman, Pons and Janer (HPJ) or spontaneous feces sedimentation method and subsequent analysis of one sample blade.

The absolute and relative frequencies of each parasite were calculated by statistical methods. The positive results were related to sex, age and collection station region that patients delivered the fecal samples.

RESULTS

HPJ from 9262 stool samples were analyzed in the period of July 2014 to July 2015. Among the total samples, 271 were positive for at least one intestinal parasite, corresponding to 2.92%. Two samples presented polyparasitism (0.74%) the association occurred where one case of *S. stercoralis* and *E. histolytica* and another case of *Ascaris lumbricoides* and *E. histolytica*.

From the total samples, 5855 were from female patients (63.21%), of which 142 were positive, 3407 belonged to male patients (36.78%), and that 129 were positive. Through the Pearson's Chi-Square Test, we can observe that there is a statistically significant difference ($p = 0.0002$) between the prevalence of infected individuals as to gender, i.e., the proportion of infected men (3.79%) is higher than in women (2.43%).

By the relative risk calculation, it is observed that the probability of a male being infected is 1.56 times higher than the female risk.

It was possible to verify a predominance of protozoa against helminths infections, from the positive samples, 206 (76.01%) were protozoans and 65 (23.98%) were helminths.

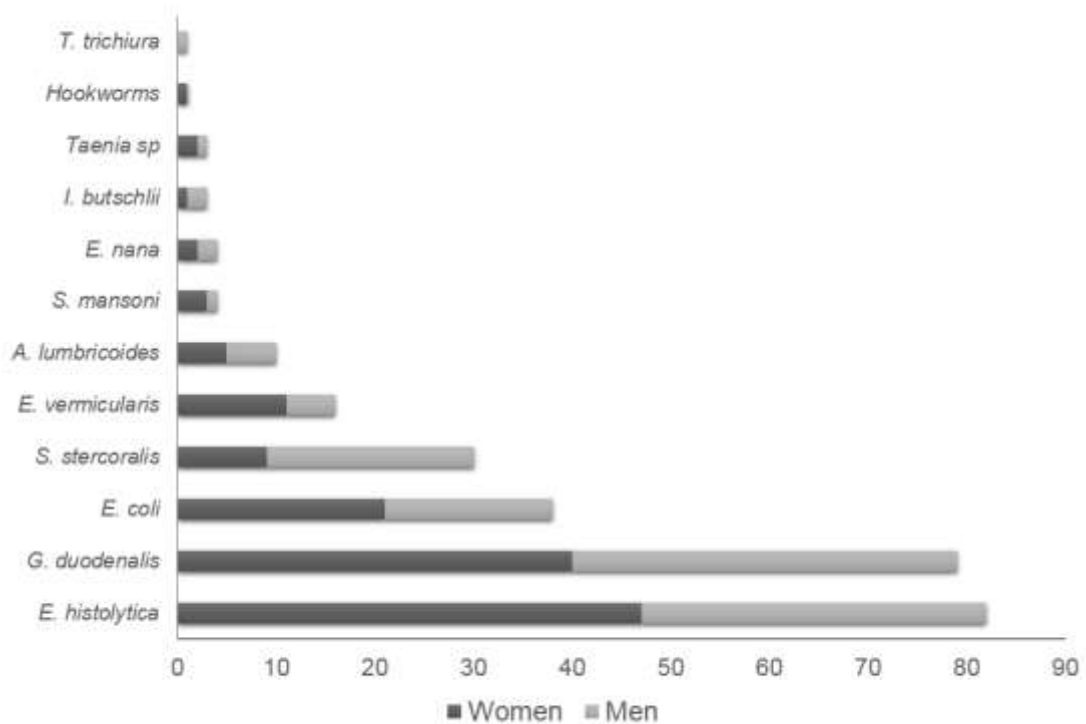
Parasites that had the highest occurrences were *E. histolytica* (30.26%), *G. lamblia* (29.15%), *E. coli* (14.02%), *S. stercoralis* (11.07%), *E. vermicularis* (5.90%) and *A. lumbricoides* (3.69%), as shown in Table 1.

Table 1- Absolute frequency, relative frequency and prevalence of parasites found in the feces from the studied population (July/2014-July/2015)

Parasites	Absolute frequency	Relative frequency (%)	Prevalence 100 thousand inhabitants
<i>Entamoeba histolytica</i>	82	30.3	885
<i>Giardia lamblia</i>	79	29.2	853
<i>Entamoeba coli</i>	38	14.0	410
<i>Strongyloides stercoralis</i>	30	11.1	324
<i>Enterobius vermicularis</i>	16	5.9	173
<i>Ascaris lumbricoides</i>	10	3.7	108
<i>Schistosoma mansoni</i>	4	1.5	43
<i>Endolimax nana</i>	4	1.5	43
<i>Iodamoeba butschlii</i>	3	1.1	32
<i>Taenia</i> sp.	3	1.1	32
Hookworms	1	0.4	11
<i>Trichuris trichiura</i>	1	0.4	11
Total	271	100.0	2926

Figure 1 shows the positive results in parasitological feces examination separated according to gender.

Figure 1 - Parasites occurrence in positive samples, separated by gender.

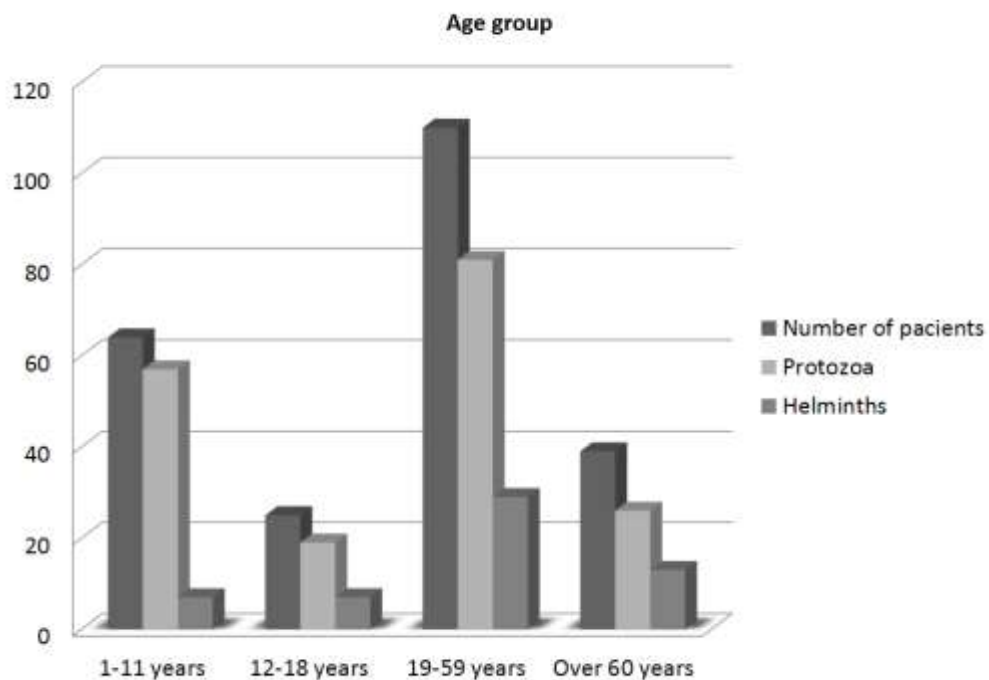


The prevalence of intestinal parasites and age were related, they were taken into consideration the following age groups: children (1-11 years), young people (12-18 years), adults (19-59 years) and elderly (above 60). This division is in accordance with the Children and Adolescent Statute (Law N° 8069, July 13, 1990) recommendation and Elderly Statute (Law N° 10741, October, 2003). The positivity rate among children was 26.9%, corresponding to 64 samples. Among young people, parasites were found in 25 samples, representing 10.5%. Among adults, the positivity was 46.22%, corresponding to 110 positive samples. Among elderly, 39 samples were infected, corresponding to 16.39%. From the positive samples, 33 samples there was no data about patient age or birth date. Data about age are listed in Table 2 and shown in Figure 2.

Table 2 - Parasitosis occurrence in the city of Juiz de Fora-MG according to age group

Age group	Number of patients	Occurrence (%)
Children (1-11 years)	64	26.90
Young (12 -18 years)	25	10.50
Adults (19 - 59 years)	110	46.22
Elderly (over 60 years)	39	16.39
Total	238	100.00

Figure 2 - Parasites occurrence in the city of Juiz de Fora-MG according to the age group



The parasite that had higher prevalence among children was *G. lamblia*, present in 34 samples (53.12%) followed by *E. histolytica* in 18 samples (28.12%). The protozoan *G.lamblia* was also more frequent in younger, present in nine samples

(36.00%), followed by *E. histolytica* present in seven samples (28.00%). In adults, the most prevalent parasite *E. histolytica* was present in 37 specimens (33.63%), followed by *E. coli*, present in 22 specimens (20.00%), *G. lamblia* in 19 samples (17.27%) and *S. stercoralis* in 14 specimens (12.72%). In elderly patients, the most common parasite *E. histolytica* was also present in 12 specimens (30.77%) followed by *S. stercoralis*, 10 specimens (25.64%).

The prevalence of intestinal parasitosis can be related to the city region of the collection station in which patients do the exams, as follows: North, Northeast, South, Southeast, East, West, Central and Districts as shown in Table 3.

Table 3 - Parasitosis occurred in Juiz de Fora-MG according to the collection station

City region	Cases number	Occurrence (%)
North	51	19.10
Northeast	11	4.12
South	25	9.36
Southeast	35	13.11
East	43	16.10
West	17	6.37
Central	74	27.72
Districts	11	4.12
Total	267	100.00

From the positive samples, four samples did not have any related data about the region of the collection station. The city region that had the highest occurrence of intestinal parasites was the Central region (27.72%). The Northern region also had high rates of parasite infection and 35.29% of the patients were infected by *G. lamblia* and 15.68% for *S. stercoralis*. The East region had 16.10% of the parasitic infections and the most frequent were *G. lamblia* and *E. histolytica* (30.23% each).

DISCUSSION

The prevalence of intestinal parasites is directly related to factors such as, the individual's exposure to the different stages of the parasite cycle (eggs, cysts and larvae), housing and sanitation conditions, hygiene practices and the purchasing power. In addition, health education leads to prevention and reduction of intestinal parasite cases (BASSO et al., 2008).

The data obtained in this study showed a low prevalence of intestinal parasites in the city of Juiz de Fora - MG. This result can be explained by the fact that the city counts on a basic sanitation services and water treatment, according to the Juiz de Fora Prefecture (PJF, 2015)

The highest prevalence of protozoa in relation to helminths was also observed in a study in Estiva Gerbi-SP, showing a trend of decreasing prevalence of helminth infections and increasing prevalence of protozoosis. Basic sanitation measures and health education are effective in reducing the incidence of helminth infections, but cannot originate the same result in the protozoosis incidence, since these protozoa resist the chlorine addition to the treated water and may be related to the public sewer system contamination (FERREIRA; ANDRADE, 2005)

The fact that the cysts are already infective when the feces are eliminated, can be related to the higher prevalence of giardiasis and amebiasis in the population. This condition allows the transmission of these protozoosis, and it can occur even in sanitized places (BAPTISTA et al., 2007). Moreover, the giardiasis frequency may reflect an underestimated rate, since the analysis was performed on only one sample from each patient, and it is known that the cysts elimination occurs intermittently. According to Basso and colleagues in 2008, three samples should be analyzed on interleaved days to increase the detection sensitivity. The *E. coli* is a commensal parasite and its prevalence was described because it has the same transmission mechanism of pathogenic parasites, configuring thus a social and health condition indicator, showing the contamination risk by microorganisms fecal-oral transmission.

The higher prevalence of *G. lamblia* in children is consistent with the literature. Chronic infections in children, even if asymptomatic, are concerned by the possibility of causing delay in growth and cognitive development due to malnutrition resulting from parasitism. The decrease in the incidence of giardiasis with increasing age is associated with acquired immune resistance caused by contact with the parasite and with the most effective hygiene habits (MACHADO et al., 2008).

The *S. stercoralis* prevalence in Juiz de Fora is a particularly worrying factor. The strongyloidiasis is an important factor to be considered as a health risk, because it could cause self-infection situations and worsening cases, which may result in death due to late diagnosis. The incidence of strongyloidiasis is concentrated in the groups 19-59 years and over 60 years, and its incidence was higher in the North region of the city. This may be related to housing and work conditions of these individuals. One patient underwent the stool test on two different dates and the result was positive for *S. stercoralis* in both cases, reflecting a lack of treatment, ineffective treatment or reinfection.

The central area of the city presented the highest incidence of intestinal parasites, which can be justified by the fact that residents of neighborhoods near the area and residents of areas with no collection station make the sample delivery in the central collection station, PAM Marechal. The higher incidence of parasitic diseases in the central region does not necessarily mean that residents of this region show higher rates of intestinal parasites.

Negative results can also be underestimated due to factors such as mild cases of parasitism, the features of the method used and biological peculiarities of the parasite's life cycle, as an intermittent release of protozoan cysts. The used method in this work was HPJ, which is performed for detection of heavy helminths eggs when sedimentation occurs about an hour, and light helminths eggs and protozoan cysts when sedimentation occurs for 24 hours. However, it is not a good method for detection of protozoan cysts and light helminths eggs as the sedimentation occurred for a period of 2 hours. Thus, in this case the best method to detect these parasites is the Faust method. The Faust method and the HPJ method are not appropriate methods for the detection of larvae and the Baermann-Moraes method is the best choice by the positive hydrotropism and thermotropism of the larvae and it can cause an underestimated number of strongyloidiasis.

Moreover, in the present study was analyzed only one blade for fecal sample, which may cause false negative results in cases of mild parasitism. To increase the sensitivity of the method, must be analyzed at least three blades and in addition to HPJ method, should be performed at least another method of analysis (TIBIRIÇÁ et al., 2009).

Another important factor is the lack of studies covering the population in general, since they include only a specific population, as studies by Basso and colleagues in 2008 and Ferreira & Andrade in 2005, on which only samples from children were analyzed.

CONCLUSION

In the city of Juiz de Fora, MG, the prevalence of intestinal parasites is low. Several factors can interfere in a result, such as water treatment and sewage services, the chosen method for the analysis and the number of analyzing blades. The prevalence of parasitic diseases is higher among men than among women and found a high prevalence of giardiasis among children, which was decreasing with the increasing patient age. The intestinal parasites rates can be reduced by prevention measures and drug treatment of infected individuals, allied to health education projects.

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