
ENTEROPARASITES AND OSTOMIZED INDIVIDUALS

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ABSTRACT

This study aimed to investigate the presence of infectious intestinal parasites in individuals undergoing enterectomy and enrolled in the Ostomy Program of the Department of Health Management, Health System (SUS), in the municipality of Pelotas, Brazil. An epidemiological questionnaire was applied to 71 individuals who participated in the survey, to assess demographic, social, and cultural effects on basic knowledge concerning enteroparasites. They also underwent fecal examinations by the Faust, Ritchie and Baermann-Moraes methods. The prevalence of monoparasitism carriers was 5.6%: *Enterobius vermicularis* larvae and eggs, *Taenia* sp. eggs and *Strongyloides stercoralis* larvae were diagnosed. As for knowledge about parasites, 69% of interviewees had general knowledge of the subject and 56.3% knew of the importance of hygiene for hands and food. However, 33.8% of respondents did not know of the necessary precautions for preventing intestinal parasites, and 50.7% of the respondents did not understand the real importance of the subject. There were no signs or symptoms that would indicate the presence of parasites in the patients. The results indicated the presence of helminths in individuals undergoing intestinal ostomy.

KEYWORDS: Ostomy; helminths; nematodes.

RESUMO

Enteroparasitos e indivíduos estomizados

Este estudo teve como objetivo investigar a presença de agentes infecciosos de natureza enteroparasitária em indivíduos estomizados e cadastrados no Programa de Ostomizados do Departamento de Gestão de Saúde, Sistema Único de Saúde (SUS), no município de Pelotas (RS), Brasil. Foi aplicado um

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Received for publication: 27/5/2013. Reviewed: 12/12/2013. Accepted: 20/3/2014.

questionário epidemiológico a 71 indivíduos que aceitaram participar da pesquisa, para avaliar as variáveis demográficas, sociais e culturais, além dos conhecimentos básicos sobre enteroparasitos. Também foram submetidos a exames coproparasitológicos por meio dos métodos de Faust, Ritchie e Baermann-Moraes. A prevalência de portadores foi de 5,6%, predominando o monoparasitismo. Foram diagnosticadas larvas e ovos de *Enterobius vermicularis*, ovos de *Taenia* sp. e larvas de *Strongyloides stercoralis*. Em relação ao conhecimento sobre os parasitos, 69% dos entrevistados tinham conhecimento geral acerca do assunto, 56,3% evidenciaram a importância da higiene das mãos e alimentos. No entanto, 33,8% dos entrevistados não sabiam das precauções necessárias para prevenir as parasitoses intestinais e, ainda assim, 50,7% dos entrevistados afirmaram não sentirem falta de maiores explicações, não compreendendo a real importância do assunto. Relata-se, ainda, que não havia sinais ou sintomas que indicassem a presença de parasitos nos pacientes, o que permite que estas condições persistam, com transmissão dos parasitos a outros indivíduos. Os resultados indicaram também a presença de helmintos em indivíduos submetidos à ostomia intestinal.

DESCRITORES: Estomia; helmintos; nematódeos.

INTRODUCTION

Enteroparasitosis is still considered a public health problem in developing countries. To prevent infections it is necessary to evaluate the host, the parasite, and the environmental conditions, determining the epidemiological triad of parasite diseases (3, 4).

The distribution and spread of many parasites throughout the world has largely been a result of human activity. About 150,000 years ago the species *Homo sapiens* emerged in East Africa and spread around the world. At the end of the Ice Age (15,000 years ago) humans already inhabited the entire face of the earth, carrying parasites and acquiring others along the way (5). It is clear that human behavior is able to intervene in the various forms of parasite transmission, and in the study of infectious diseases, investigations of culture, attitudes, and human behavior are crucial for the creation and implementation of effective transmission minimization strategies (18).

In the parasitic cycle, in at least one stage, most parasites inhabit the digestive system causing a wide spectrum of diseases with manifestations that may well be asymptomatic, yet non-specific symptoms such as irritability, sleep disturbance, general malaise, nausea, vomiting, abdominal pain and diarrhea are common. When the disease becomes severe, (common among malnourished and immunocompromised patients), mucosal lesions, altered metabolism, exudation intestinal enterorrhagia, opportunistic bacterial infections, sepsis and in extreme cases, death may occur (4, 6, 16).

Several studies have reported the prevalence and incidence of parasites in children, teenagers, food handlers, health centers, and people with diseases that lead to immune suppression (15, 21, 22). However, there are no studies about parasitic infections in patients with intestinal stoma.

Intestinal stoma is an artificial opening made between the intestines and skin, to divert feces and flatus to the exterior, where it may be collected in an external

appliance. Effluent is usually solid. Ileostomy is when the deviation is performed in the small intestine and colostomy when the deviation is performed in the large intestine (10, 13, 23).

The usual conditions leading an individual to ostomy are problems with the functioning of the intestinal tract, cancers (colon or rectal), familial adenomatous polyposis, inflammatory bowel disease (ulcerative colitis, Crohn's disease), intestinal obstruction (Hirschsprung's disease), abdominal injuries and intestinal fistulae, among other conditions (29). It is important to remember that these conditions may also cause malnutrition due to difficulties with digestion and nutrient absorption caused by disruption of the intestinal tract, which may in turn result in immunosuppression and therefore parasitic infections becoming potentially more serious (22, 26).

Prophylaxis of endemic intestinal parasites (while associated with ecological factors, the parasite's genetic profile, human behavior and relative health) requires public education, and awareness of hygiene and health through the development and implementation of campaigns for parasite control and elimination (2, 28).

The current study was aimed to investigate the presence of infectious intestinal parasites in individuals undergoing enterectomy and enrolled in the Ostomy Program of the Department of Health Management, Unified Health System (SUS), in the municipality of Pelotas, south of Brazil.

MATERIALS AND METHODS

Study population

The study was performed in a Center of Reference for ostomized individuals (Ostomy Program, Secretary of Health) in Pelotas municipality, RS, Brazil. In the period from March to November 2010, 120 patients were followed at the Reference Center and were invited to participate in the study. Of these a total of 71 (non-probabilistic sample) individuals agreed to participate in the study, all of whom were registered with the Ostomy Association of Pelotas city. Fecal samples from all individuals were collected using sterile flasks. The general knowledge, perceptions and prevention concepts of patients regarding intestinal parasitism were tested using a structured questionnaire. Furthermore, socioeconomic and demographic information was assessed and evaluated during the interview.

Parasitological analysis

After an explanation about how to collect and store the fecal samples (that would be collected on three days with an interval of at least one day), three sterile flasks, each containing a conservative solution MIF (Chromium-Mercury 0.1% and

formaldehyde and iodine 5%), were given to the participants. These samples were processed by three methods to detect intestinal parasites: the Faust, Ritchie and Baermann-Moraes methods (6, 14, 19). All the samples were assessed in duplicate.

Statistical analysis

Epi Info 3.5.1. (CDC) was used to evaluate the questionnaire data; standard deviations and means were calculated for the quantitative variable, for the categorical variables we used frequency, absolute and relative (prevalence).

Ethical considerations

The participants signed a consent form based on the Professional Nursing Code of Ethics and Resolution nr. 196/96 of the National Health Ministry directive for research involving humans. The Project was submitted to the Committee for Ethics in Research with humans of the Medicine College of UFPel, and was approved and registered under number 03/10.

RESULTS

A total of 71 patients were investigated in our study. Of them, 50.7% were male. The mean female age was 59.4 years old (SD 14.9), and for males it was 60.4 years old (SD 15.0). We collected 198 samples (around three per individual) however, nine individuals died due to complications of the disease, but provided at least one sample that was analyzed and included in the study.

The prevalence of intestinal parasites was 5.6% (four cases) and all cases were of monoparasitism. We identified *Enterobius vermicularis* larvae, *Taenia* sp. eggs, *E. vermicularis* eggs, and *Strongyloides stercoralis* larvae. In ileostomy subjects we found *E. vermicularis* and *S. stercoralis*, while for colostomy individuals we found eggs of *Taenia* sp. (Table 1). All individuals diagnosed as positive for parasites were treated appropriately. Among the four infected individuals, three reported having general knowledge of parasites, and also mentioned preventive measures such as hygiene, hand washing and proper cooking of food. However, they could not explain signs and/or symptoms of a human parasite.

Table 1. Prevalence of parasitic infections related to the type of ostomy of patients in a Reference Center for Ostomy in Pelotas, RS, Brazil, 2010.

Parasites	Ileostomy		Colostomy	
	Yes	No	Yes	No
<i>Enterobius vermicularis</i>	02	15	-	54
(%)	11.8	88.2	-	100.0
<i>Taenia</i> sp.	-	17	01	53
(%)	-	100.0	1.9	98.1
<i>Strongyloides stercoralis</i>	01	16	-	54
(%)	5.9	94.1	-	100.0

The questionnaire data indicated that all the respective residences had adequate sanitary facilities including a water network, garbage collection service, and both public and private toilets with proper sewage systems. A total of 93.0% lived in the urban center, for 94.4% the residence was constructed of masonry, 41.8% had completed pavements in the peridomicile, while for 34.3% the peridomicile was mixed (sand, grass and paving). For 5.6% the residence was constructed of wood and the peridomicile area was sandy, cobbled or mixed (Table 2). A total of 12.7% had a vegetable garden in the peridomicile. The presence of domestic animals was reported in 70.4% of the residences, where the dog was the most common at 86.0%. Family incomes ranged from less than '1' to up to '9' minimum wages, while averaging between 2 and 5 minimum wages (73.9%), as shown in Table 2.

Table 2. Socio-economic characteristics of patients examined for intestinal parasites in a Reference Center for Ostomy in Pelotas, RS, Brazil, 2010.

Variable	Number of patients	(%)
Income*		
Up to 1 income	13	20.0
2 a 3 incomes	33	50.8
4 a 5 incomes	15	23.1
6 a 7 incomes	03	4.6
8 a 9 incomes	01	1.5
Education Level		
None	04	5.9
Primary School incomplete	38	55.9
Primary School complete	06	8.8
Secondary School incomplete	01	1.5
Secondary School complete	10	14.7
College incomplete	04	5.9
College complete	05	7.3
Habitation		
Owner, Paid	62	87.3
Owner, Paying	02	2.8
Renter	07	9.9
Kind of habitation		
Masonry	67	94.4
Wood	04	5.6

* Minimal income at 2010 year (R\$510,00)

A total of 76.1% of the patients had colostomies, 23.9% ileostomies. The average duration of the stoma was 3.6 years. In relation to the surgical procedures that lead to intestinal ostomy, 37.1% were performed due to rectal cancer, followed by 24.3% for cases of bowel cancer, and 15.7% due to other inflammatory bowel diseases, such as perforated diverticulitis, ulcerative colitis, Crohn's disease, and Hirschsprung's disease. We observed a lower frequency for interventions due to surgical complications (7.1%), chagasic megacolon (4.3%), or abdominal trauma

(2.9%). Among cancer patients, women (55.1%) were more operated on than men, mostly for cancers of the rectum and intestines.

Chemotherapy was part of the treatment for 11 intestinal ostomies (15.7%), one of which was by oral anti-neoplastic, whereas the other 10 were exposed to cycles of invasive chemotherapy.

When the patients were asked about their knowledge of parasites or worms, 69.0% of interviewees understood general aspects of the subject. Of these, 39 individuals were able to cite species and popular names such as “roundworm”, *Ascaris* sp. or “worm”, *Taenia* sp., or “tapeworm”, *Giardia* sp., and even *Schistosoma* sp., an unusual trematode in the region. School, media, and work were mentioned as information sources about parasitoses. However, few people cited the medical professional, or the Basic Public Health Unit, as promoters of this knowledge (4.1% by doctors and 8.2% at public health clinics).

When the patients were asked about prevention, 56.3% indicated the importance of hand or nail hygiene, cutlery and food preparation (including proper cooking). They also mentioned animal control, the use of anti-helminthics, and due care with gardens. However, 33.8% of respondents had no knowledge of parasite prevention for animals, and as to worms, (76.5%) did not consider it essential to have more knowledge on the subject, even without knowing of the related prophylactic measures against parasites.

The duration time for intestinal stoma in patients was four, five, and fourteen months, the 4th respondent was unable to communicate. The use of drugs was also revealed, but the drugs used had no an active ingredient that could act against the helminths diagnosed. Two respondents rarely ate outside of the home, and the other two reported never eating outside of their own homes. None of the affected individuals practiced preventive treatments against parasites.

DISCUSSION

Determining the form of assistance for any communicable disease requires not only knowledge of the etiological agent, biological, and environmental factors, but also information about the host (17).

The relatively low rates of intestinal parasites in this population may result from the fact that the patient’s index of socio-economic status (family income, and educational level) might be considered reasonable; 73.2% of participants had an income of two or more minimum wages. Their relative indexing, when compared to the general population, was superior. According to data from the National Household Survey (PNAD) (9) only 19.4% of the population has family income of less than two minimum wages, and only 2.3% of the population is without any type of income.

As for the negative diagnosis of intestinal protozoa, it is worth noting the differences from those found in other studies carried out in the country (15,

21). Factors such as differences in research populations, associated with different diagnostic techniques, could possibly contribute to such differences.

In our study 76.1% of the subjects had colostomies while 23.9% had ileostomies. We also noticed a similarity between definitive (45.1%), and temporary (50.7%) treatments. When examining duration times of use of the collectors, it was observed that the reuse of the same device, when it cannot be separated from the body for cleansing, may last up to three days, (when it must be replaced). While when the device has two parts, where the collector may be separated for cleaning, the average duration is higher, of up to seven days, (when it also must be changed). Difficulty in cleaning, and the time that a device can remain where feces are stored, suggest the possibility of self-infection due to internal or external handling, and retention of eggs, cysts, or even larvae inside the collectors.

In the 1970s, institutions such as the World Health Organization (WHO), emphasized the need to consider the cultural context of the population to better adapt health practices. They also noted the importance of community participation when combating endemic diseases. Local beliefs and initiatives must be evaluated to create understandable and attractive educational messages, which will naturally increase the population's participation in a particular program (27).

A total of 69.0% of respondents reported knowledge of the major intestinal parasites. Most patients had not received information about these diseases in either medical or health centers. This reinforces the idea that healthcare occurs in two distinct contexts, through professional networks of health, or not, mostly in the family context where sometimes the information is deficient (8).

According to Villela et al. (2009), vigilance of parasitic infectious diseases in health services still occurs in an *ad hoc* and casual way, and even in Basic Health Units (UBS), the professionals usually do not act as an educational subject, often because of a lack of qualifications, which results in a low rate of prevention of these diseases.

Both eggs and larvae of *E. vermicularis*, were found in ileostomy subjects. It is known of this parasitic cycle that infection with eggs after ingestion by the host happens as they hatch in the small intestine, undergoing two transformations in the intestine and cecum as they become adult parasites (17). Thus, finding this nematode in the larval form is probably due to interruption of the small intestine, resulting in the expulsion of the still immature worm. Also, it is known that the eggs are not normally found in the feces, but in the perianal region, however, they were found in fecal matter of an individual with an ileostomy, suggesting the possible non-hatching of the egg, and subsequent exit from the small intestine. The parasitic forms found in these patients lead us to see a relationship between ostomy type, remaining intestinal length, and intestinal parasitism life cycle. We assume that the shortened path from the small intestine led to incomplete development of the parasite.

In a study conducted by Massara & Murta (2009), the presence of intestinal helminth eggs in urban transport was evaluated in Belo Horizonte, Minas Gerais, showing an indexed presence of 31.6% for eggs of Oxyuridae in

seat cushions, which would likely as also apply for *E. vermicularis*. This finding is relevant in terms of public health, because *E. vermicularis* egg infection can occur easily by inhalation or ingestion in public environments. Though infrequent, there is the possibility of appendix infection according to Silva et al. (2008)(24) for *E. vermicularis*, the most frequently found helminth for which presence is correlated with pathological changes in the appendix. The pathologies range from acute neutrophilic inflammation, lymphoid hyperplasia, and eosinophilia, to potentially fatal complications such as gangrene and peritonitis. Moreover, there are no signs or symptoms that indicate the presence of the parasite.

The finding of *S. stercoralis* in only one patient with intestinal stoma in this study may be a result associated with the better sanitary conditions, the education, or the family income as observed for the participants. However, this single case of infection deserves mention because of the peculiar mechanism of endo-self infection that can cause the individual to suffer a chronic disease with the potential to last for decades, even without exogenous reinfection (1). This is especially true of enterostomized patients maintaining the mucosal bowel in direct contact with the eliminated feces. Also we mention the related risks of hyper-infections by the parasite and highlight the high risk of mortality in immunocompromised individuals, immunosuppressive drug users, the elderly, and patients with malignant tumors (5, 20, 25).

The colostomy patient who presented *Taenia* sp. eggs in the feces, after treatment showed no traces of the cestode. However, taeniasis may be present asymptotically, some patients manifest changes in appetite (anorexia or excessive appetite), nausea, vomiting, abdominal pain, diarrhea, weight loss, irritability, and fatigue. The worm is common, especially in developing countries, and has been reported by others as a cause of acute appendicitis (mainly by location) without previous symptoms (11, 24, 25).

None of the subjects (who were positive for intestinal parasites) reported signs and symptoms that would lead to suspicion of parasitism. The absence of signs and symptoms does not rule out the possibility of infection, or the likelihood of environmental contamination, but the host-parasite cycle will end only if and when there is proper diagnosis, and treatment that is combined with environmental and health education.

In conclusion, our results show that even if the parasitism in the study population is considered relatively low, it was possible to confirm the presence of helminths in individuals undergoing intestinal stoma in the public health system.

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