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ORIGINAL ARTICLE

Prevalence of intestinal parasites in patients with gastrointestinal symptoms by focus on soil-transmitted helminthes infection

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ABSTRACT

Aim: The aim of this study was to determine the prevalence of soil-transmitted helminth infections (STHs) infection and other intestinal parasites in patients with gastrointestinal (GI) symptoms in Tehran Province, Iran.

Background: The World Health Organization (WHO) suggests that many people in the world are chronically affected by STHs and intestinal parasites. Furthermore infection is closely correlated with poverty, poor environmental hygiene and impoverished health services.

Patients and methods: In this cross-sectional study, random stool samples from 912 patients with GI symptoms were collected and examined using light microscopy and the formalin–ether concentration method for detection of protozoa and of STH eggs. Also modified acid-fast staining was used to identify *Cryptosporidium parvum.* Agar plate cultures were used for the recovery of *Strongyloides stercoralis* larvae.

Results: STH infections found in these patients were *Ascaris lumbricoides* 5(0.5%), hookworm 3(0.3%), *Hymenolepis nana* 14(1.5%), *Enterobius vermicularis* 3(0.3%). The prevalence of protozoan parasites were 46 (5.1%), for *Entamoeba coli*, 31 (3.4%) for *Blastosystis hominis*, 27 (3%) for *Giardia lamblia*, 25 (2.74%) for *Endolimax nana*, 20 (2.2%) for *Entamoeba histolytica/Entamoeba dispar complex*, 12 (1.31%) for *Iodomoeba butchelii* 9, (1%) for *Chilomastix mesenelli*, and 7 (0.8%) *Cryptosporidium parvum*.

Conclusion: A significant relationship was found between age group, location and educational achievement with STH infection but no statistical correlation was seen between demographic parameters and GI symptoms with intestinal protozoan parasites. The result of this study showed that, even in Tehran Province with a relatively high level of social hygiene, it is possible to find a high level of STH and intestinal protozoan infections.

Keywords: Prevalence, soil-transmitted helminthes, gastrointestinal symptoms, Iran

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INTRODUCTION

Soil-transmitted helminthiases infections (STHs) remain an important cause of morbidity and sometimes mortality in developing countries (1). These infections are endemic in communities with poor environmental sanitation and low levels of personal hygiene and health awareness (2). The prevalence of STH is particularly high in poor agricultural societies where human feaces are used as a fertilizer (2). The most common STHs are caused by intestinal nematodes, especially *Ascaris lumbricoides*, *Trichuris trichiura*, and the hookworms (*Ancylostoma duodenale* and *Necator*

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americanus) (3, 4). An estimated 4.5 billion individuals are at risk of STHs (1.2 billion with *A. lumbricoides*, 800 million with *T. trichiura*, and more than 700 million with hookworms (6).

The highest rates of Ascaris infection occur in China and Southeast Asia, in the coastal regions of West Africa, and in Central Africa. Trichuris infections reach their highest prevalence in Central Africa, Southern India and Southeast Asia. Hookworm infections are common throughout much of sub-Saharan Africa, in addition to South China and Southeast Asia (7, 8). There are many routes of infection, including contamination of food and water and penetration through skin (9). In a national survey in Iran, of 45 128 people aged 2 years or older, intestinal parasitic infections were found in 19.3% of the study population. Among these, *Giardia lamblia* (10.9%) and *Entamoeba histolytica/E. dispar* (1.0%) were the most common pathogenic protozoa (10).

STHs, *H. nana* and intestinal protozoan parasites are an ongoing health problem in the Middle East including Iran, and the prevalence of infection may be increasing (11). For example, the prevalence of human ascariasis recorded in Mazandaran Province rose from 0.3% in 1961 (12) to 6.3% in 1995 (13) in Yasoj. Ziaali (1991) reported the prevalence of intestinal parasites to be near 50% in Kerman, the most prevalent parasite being *Ascaris lumbricoides* (14). In one study in Ghaemshahr, a total of 557 subjects were examined for intestinal parasites among whom 2.8% had protozoan and 5.7% had intestinal helminth infections. *Giardia lamblia* was the most frequent protozoan parasite (32.8%) (15).

In the present study, we determined the frequency of pathogenic parasite infections with a focus on STH and protozoans in gastrointestinal (GI) patients in Tehran Province, a region of Iran with high levels of hygiene and public-health services.

PATIENTS and METHODS

Residents in the catchment area of Shaheed Beheshti Medical University (SBMU) in Tehran Province presenting with GI symptoms were included in the potential study population. Each subject was interviewed following a questionnaire requesting information on demographic factors (such as age, sex, location of residence and educational level attained) and also eight common gastrointestinal symptoms such as abdominal pain, vomiting, nausea, anorexia, and diarrhea. A stool sample was then collected based on standard sampling methods from each person. The research protocol was approved by the Ethics Committee of the Research Center for Gastroenterology and Liver Diseases.

Stool specimens preserved in SAF (sodium acetate, glacial acetic acid and formalin) were sent to the National Department of Food-borne Diseases Laboratory. The stools were examined using light microscopy and the formalin–ether concentration method for detection of protozoa and of geo-helminth eggs (16). A modified acid-fast staining was used to identify *Cryptosporidium parvum*. Agar plate cultures were used for the recovery of *Strongyloides stercoralis* larvae.

Descriptive statistics and frequency tables were used to describe the results. Chi-square tests were performed to compare the proportion of binomial variables among groups of patients (with demographic factors) and the P-value set at five percent. All analyses were done using SPSS software.

RESULTS

All 912 subjects presented with GI symptoms including abdominal pain (60%), vomiting (31.5%), nausea (48.5), anorexia (64.9%), diarrhea (10.2%) and other symptoms (48.5%). Of the subjects, 55.2% were female. The age (mean ± SD) was 41.0±17.2 years, (42.3 ± 16.7 years for males; 40.0 ± 17.5 years for females; there was no significant difference in age between the two groups

when compared p=0.52). Of 912 patients recruited stool samples, 890 reported normal stool, 18 reported chronic diarrheas and 4 acute diarrheas. Subjects were residents in the districts shown in table 1. The distribution of enteric parasites detected in the survey is shown in table 2.

Table 1. Frequency of GI parasites according to localities of subjects within Tehran Province.

Location	Number (%)
Firoozkooh	82 (9)
Damavand	80 (8.8)
Pakdasht	73(8.0)
Varamin	77(8.4)
Shemiranat	101(11.1)
North of Tehran	269(29.5)
East of Tehran	230(25.2)
Total	912(100.0)

In total, 28 individuals (3.07%) had helminth infections and 163 individuals (17.87%) had pathogenic or non pathogenic protozoan parasites. There was a seasonal distribution of stool sample collection as follows: 347(38%) of samples were collected in the spring, 203(22.3%) in the summer and 362 (39.7%) during the autumn.

Table 2. Sex distribution of patients according to intestinal parasite infections.

	Female	Male	Totals	P-Value
Giardia lamblia	14	13	27(3)	0.242
E.histolytica/E.dispar	10	10	20(2.2%)	0.656
Cryptosporidium parvum	5	2	7(0.8%)	0.469
E.coli	28	18	46(5.1%)	0.59
E.nana	13	12	25(2.7%)	0.47
B.hominis	16	15	31(3.4%)	0.68
I. bütschlii	8	4	12(1.2%)	0.16
Ch.mesnili	3	6	9(1%)	0.41
hookworm	2	1	3(0.3%)	0.688
Hymenolepis nana	5	9	14(1.5%)	0.178
Ascaris lumbricoides	2	3	5(0.5%)	0.662
Enterobius vermicularis	0	3	3(0.3%)	0.090

The helminths identified were *Ascaris lumbricoides* 5(0.5%), hookworm 3(0.3%), *Hymenolepis nana* 14(1.5%), and *Enterobius*

Table 3. Prevalence rate of intestinal parasite in different locations.

	Firoozkooh	Damavand	Pakdasht	Varamin	Shemiranat	North of Tehran	East of Tehran	Total (%)	P-value
Giardia lamblia	5	2	4	4	-	6	6	27(3)	0.007
E.histolytica / E.dispar	3	3	3	3	2	4	2	20(2.2)	0.36
Cryptosporidium parvum	1	-	-	2	1	1	2	7(0.8)	0.48
E.coli	3	2	1	3	8	18	11	35 (3.83)	0.54
E.nana	3	-	3	2	6	5	5	24 (2.63)	0.66
B.hominis	1	4	2	4	2	12	6	31 (3.39)	0.59
Ch.mesenelli	2	2	1	1	1	1	1	9 (0.98)	0.32
I.butschelii	-	3	1	1	1	3	3	12 (1.31)	0.56
Hymenolepis nana	6	1	1	1	1	3	1	14(1.5)	0.02
hookworm	-	-	-	-	1	1	1	3(0.3)	0.87
Ascaris lumbricoides	1	1	-	-	2	1	-	5(0.5)	0.28
Enterobius vermicularis	-	1	-	-	-	1	1	3(0.3)	0.77
Strongyloides stercoralis	-	1	1	1	-	-	-	3(0.3)	0.24

vermicularis 3(0.3%). The prevalence of protozoan parasites were 3% for *Giardia lamblia* (9 trophozoite and 18 cyst), *Entamoeba histolytica / Entamoeba dispar* 2.2%, *Entamoeba coli* 5.1% (11 trophozoite and 35 cyst), *Blastocystis hominis* 3.4%, *Cryptosporidium parvum* 0.8%, *Endolimax nana* 2.7% (2 trophozoite and 23 cyst), *Enteromonas hominis* 0.2%, *Iodamoeba bütschlii* 1.3% and *Chilomastix mesnili* 1% (3 trophozoite and 6 cyst).

DISCUSSION

The prevalence of intestinal parasites in our sample is 1.2% for STHs, 5.9% for intestinal protozoa and 1.5% for *H.nana*. Among pathogenic protozoan parasites, *G. lamblia* showed the highest prevalence and among helminths, *H.nana* was the most frequently found in this study. In another study from Zahedan city, among the 1562 patients intestinal protozoa were presence in 27.3% of the samples (17). Compared to the Zahedan city study, the prevalence of intestinal protozoa in our study was very low. This may be related to different levels of hygiene and public-health services between these two cities. There was a statistically significant correlation between both of these parasite species and home locality of subjects (Table 3). There was no significant correlation of overall prevalence of enteric parasites with demographic factors or GI symptoms. There was no significant correlation with sex of subject (table 2). However, there was a significant relationship between age group, location and education level with particular species of enteric parasite. For example, *Cryptosporidium parvum* and *H.nana* infections were significantly more prevalent in younger subjects, a result noted in other Iranian studies (3-8). *C.parvum* and hookworm had significant relationships with poorly educated level. There was also significant seasonal variation in prevalences of *Giardia lamblia*, *E.histolytica/ E.dispar* and hookworm, with prevalences of *G. lamblia, E.histolytica / E.dispar* and hookworm highest in summer and spring, respectively.

The result of this study showed that, even in an area of Iran with high levels of public health and hygiene, it is possible to find high levels of STH. If these levels of infection are to be reduced, concerted efforts will be required to find the sources of contamination and for the prevention of STH to be a high priority (18). This would be supported by further studies in other locations, ideally with greater geographical and sample size coverage to investigate possible relationships between different demographic, occupation and social variables and GI parasite infections.

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