

Original Article

Prevalence of Intestinal Parasitic Infections among Patients Referring to Medical Diagnostic Laboratories, Kashan, Central Iran, 2015-2018

Shirin Khodabakhsh Arbat¹, Hossein Hooshyar^{1*}, Hadi Sadeghi¹

¹Department of Parasitology, School of Medicine, Kashan University of Medical Sciences, Kashan, Iran

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Introduction: Intestinal parasitic infections are among the most common diseases worldwide and are significant indicators of the health status of communities, especially in developing countries. This study aims to determine the prevalence of intestinal parasites infection in patients referring to Kashan diagnostic laboratories from July 2015 to August 2018. **Methods:** This cross-sectional study was carried out on 6921 patients referring to medical diagnostic laboratories, Kashan, central Iran. Fecal specimens were examined by direct smear and formalin-ether concentration methods. The results together with risk factors including sex, age were recorded and analyzed by descriptive statistics using SPSS 16 software. **Results:** Out of the 6921 individuals examined, 3636 (52.5%) were male and 3285 (47.5%) were female. Microscopy revealed the prevalence of parasitic infection by 4.96% (4.96 ± 0.5). Totally 5.1% of males and 4.6% of females had intestinal parasite infections. No significant association was seen between sex, seasons, and parasite infections. Rate of infection to intestinal parasites were *Blastocystis* spp. (3.06%), *Entamoeba coli* (0.95%), *Giardia intestinalis* (0.59%), *Iodamoeba butschlii* (0.23%), *Endolimax nana* (0.20%), *Entamoeba hartmanni* (0.20%), *Dientamoeba fragilis* (0.14%), *Chilomastix mesnili* (0.07%), *Entamoeba histolytica/Entamoeba dispar* (0.05%) and *Hymenolepis nana* (0.01%) was the only intestinal worm that observed in one individual. The results showed that 4.48% of the examined individuals were infected with one parasite, 0.39% with two and 0.08% with 3 or more parasites. **Conclusion:** The prevalence of intestinal parasites in our study was lower than those from other areas of Iran and other countries, indicating an increase in health status as well as public awareness of infectious diseases. *J Med Microbiol Infect Dis*, 2018, 6 (2-3): 62-66.

Keywords: Prevalence, Intestinal parasites, Kashan, Iran.

INTRODUCTION

Intestinal parasitic infections are among the most common human infections worldwide and are considered as critical health indicators of a community, especially in developing countries [1]. According to the World Health Organization (WHO) report, more than two billion people in the world are infected with intestinal parasitic infections [2-3]. More than 1.5 billion (24%) of the world's population are estimated to be infected with parasitic infections such as *Ascaris lumbricoides*, hookworms and *Trichuris trichiura* [4]. These infections are widespread mainly in tropical and subtropical regions. The highest incidences are reported from developing countries, more in sub-Saharan Africa, North and South America, China, and East Asia, where people are struggling with health problems, insufficient water supply, rapid population growth and other economic and social problems [4-6]. The most prominent pathogenic protozoa of human intestine are *Giardia intestinalis*, *Entamoeba histolytica/Entamoeba dispar*, *Dientamoeba fragilis* and *Blastocystis* sp. [3, 6]. *Giardia intestinalis* is one of the most common etiological agents of parasitic diarrhea in humans and animals. This parasite has a global distribution, and it is estimated that 280 million people are affected by this parasite worldwide [7]. The global prevalence of this protozoon in human has been estimated to be about 8 to 30% in developing countries and 1 to 8% in developed countries [8]. In Iran, like other developing countries, parasitic diseases in communities are considered

as one of the critical health issues. Infection rates of giardiasis in different regions of Iran have been reported to be between 1.2%-38% [9].

Amoebiasis is the third leading cause of death by parasitic diseases around the world. According to WHO report, *E. histolytica* has infected 50 million people around the world and has contributed to about in 90-110 thousand deaths each year [10]. *Blastocystis* spp. are considered as common intestinal parasites in the world and were traced in the human and many animals intestine [11]. The prevalence of this parasite in developed countries ranges from 0.5% to 23% [12] while in some developing countries it exceeds to more than 60% [13-14]. In a systematic review study, the average rate of *Blastocystis* infection was reported to be 3% in Iran [15]. *Dientamoeba fragilis* is another most common intestinal parasites in humans with a global distribution; its prevalence varies from 0.9% to 82.9% in different countries,

***Correspondence:** Hossein Hooshyar
Department of Parasitology, School of Medicine, Kashan University of Medical Sciences, Kashan, Iran, 8715988141.

Email: hooshyar4@yahoo.com

Tel: +98 (31) 55540021 **Fax:** +98 (31) 55541112

depending on the diagnosis method and studied population [16-19]. Several studies in Iran indicated *D. fragilis* prevalence within the range of 1% to 10% [12, 20].

In addition to the severe complications that may lead to death, intestinal parasite infections can have a negative impact on the humans' health status, especially children and seniors. Depending on the parasite load and host immune system, it can cause symptoms and various complications such as malnutrition, weight loss, iron deficiency, growth retardation in children, ileus, and appendicitis in patients.

Consumption of contaminated water and food is one of the common ways human acquire intestinal parasites [21]. Because Kashan city is one of the tourism zones of the country and a high number of tourists visit this city, parasitic infections of people is a critical issue in this city. Information on the prevalence of human infections and the common parasite species would assist health authorities to adopt proper measures to reduce infection rate and its distribution in this city. This study aims to determine the prevalence of intestinal parasites infection in patients referring to Kashan diagnostic laboratories within 2015-2018.

MATERIAL AND METHODS

Study area and sampling. Kashan City, covering an area of 4415.07 km², is in the center of Iran, north of Isfahan Province between 50° 55' - 52° 29' east longitude and 33° 30' - 34° 27' north latitude along Kavir desert. Due to a gradient of altitude, this city has two relatively different climates; the moderate climate in mountainous areas and hot and arid climate in deserts. The annual precipitation of this city is 45.61 mm, and its annual average temperature is 19.7°C. This cross-sectional study was carried out on 6921 individuals who referred to Kashan medical diagnostic laboratories from July 2015 to August 2018. The demographic data of the subjects including sex, age and season were recorded in the questionnaires.

Stool examination. One fresh stool sample was collected, and direct stool smear technique was first employed to examine present protozoan trophozoite (X400). Then, to enhance the accuracy of the test, formalin-Ethyl

acetate concentration technique was used followed by Lugol staining.

Statistical analysis. The results and data of each were registered and entered into a spss 16 software, and finally analyzed by Chi-Square and Fischer statistical test. The confidence interval was calculated and *P*-value <0.05 was considered significant. The information of the participants was kept entirely confidential, and each was defined with a code in the study.

Ethical consideration. This study was approved by Research Ethics Committee, Kashan University of Medical Sciences, Iran (Ethics code: IR.KAUMS.MEDNT.REC.1396.118).

RESULTS

Out of 6921 participants, 3636 were male (52.5%), and 3285 female (47.5%). Microscopy revealed the prevalence of parasitic infection by 4.96 % (4.96± 0.5). Only, one person (0.01%) was infected with the helminth *Hymenolepis nana*, and the rest with protozoan infections. Totally 5.1% of males and 4.6% of females had intestinal parasite infections, and no significant relationship was seen between age and infections (*P* < 0.05), or sex and intestinal parasites (*P*=0.34).

The intestinal protozoan infection rates included *Blastocystis Sp.* 212 (3.06%), *Entamoeba coli* 66 (0.95%), *G. intestinalis* 41 (0.59%), *Iodamoeba butschlii* 16 (0.23%), *Endolimax nana* 14 (0.20%), *Entamoeba hartmanni* 14 (0.20%), *D. fragilis* 10 (0.14%), *Chilomastix mesnili* 5 (0.079%), *E. histolytica/E.dispar* 4 (0.05%) and *H. nana* 1 (0.01%) (Table 1). The most prevalent protozoan parasite was *Blastocystis*. This parasite also was the most common organism in multiple infections. In this investigation, 306 (4.48%) of the individuals were infected by one parasite, 27 (0.39%) with two and 6 (0.08%) with 3 or more parasites (Figure 1). The average age among infected individuals was 37.02 ± 1.08 years (age range: 31-40) (Table2). The highest frequency of parasitic infection was in spring (38.9%) and lowest in autumn (15.6%). There was no statistically significant difference between infection rates and seasons (*P*> 0.05).

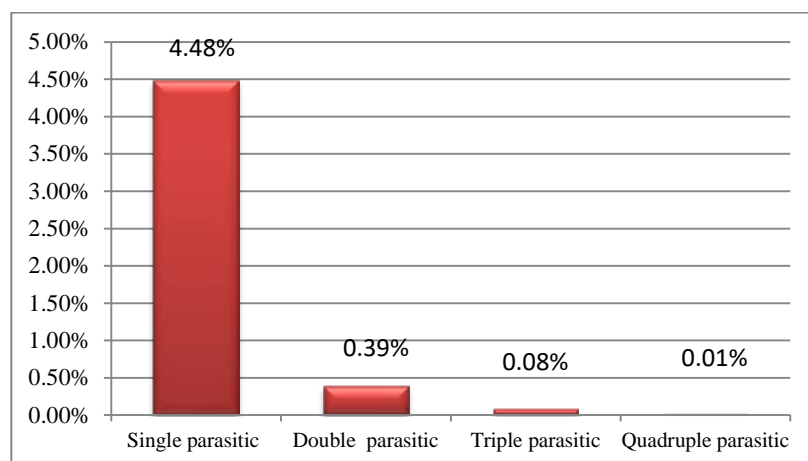


Fig. 1. Frequency of single and multiple parasites infections among patients referring to medical laboratories, Kashan, Iran 2015-2018

Table 1. Prevalence of intestinal parasitic infections and the rate of multiple infections among patients referring to medical laboratories of Kashan, central Iran (2015-2018)

Parasite species	Frequency	
	No.	(%)
Single infection		
<i>Blastocystis</i> sp.	187	2.7
<i>E. coli</i>	54	0.78
<i>G.intestinalis</i>	38	0.54
<i>I. butschlii</i>	11	0.15
<i>E. nana</i>	1	0.01
<i>E. hartmanni</i>	8	0.11
<i>D. fragilis</i>	7	0.10
<i>Ch. mesnili</i>	3	0.04
<i>H. nana</i>	1	0.01
Total	310	4.48
Double infection		
<i>Blastocystis</i> sp. + <i>E. coli</i>	9	0.13
<i>Blastocystis</i> sp. + <i>E. nana</i>	7	0.10
<i>Blastocystis</i> sp. + <i>G.intestinalis</i>	3	0.04
<i>Blastocystis</i> sp. + <i>D. fragilis</i>	2	0.02
<i>Blastocystis</i> sp. + <i>E. hartmanni</i>	1	0.01
<i>D. fragilis</i> + <i>E. nana</i>	1	0.01
<i>E. coli</i> + <i>I. butschlii</i>	1	0.01
<i>E. coli</i> + <i>E. hartmanni</i>	1	0.01
<i>E. nana</i> + <i>E. hartmanni</i>	1	0.01
<i>E. nana</i> + <i>Ch. mesnili</i>	1	0.01
Total	27	0.39
Triple and quadruple parasitic		
<i>Blastocystis</i> sp. + <i>I. butschlii</i> + <i>E. histolytica</i> / <i>E. dispar</i>	2	0.02
<i>E. histolytica</i> / <i>E. dispar</i> + <i>E. hartmanni</i> + <i>I. butschlii</i>	1	0.01
<i>E. hartmanni</i> + <i>I. butschlii</i> + <i>E. nana</i>	1	0.01
<i>E. nana</i> + <i>E. coli</i> + <i>Ch. mesnili</i>	1	0.01
<i>Blastocystis</i> sp. + <i>E. histolytica</i> / <i>E. dispar</i> + <i>E. hartmanni</i> + <i>E. nana</i>	1	0.01
Total	6	0.08

Table 2. Distribution of intestinal parasites among age groups referring to medical laboratories of Kashan, central Iran (2015-2018)

Parasite species	Age groups							Total No. (%)
	<10 No. (%)	11-20 No. (%)	21-30 No. (%)	31-40 No. (%)	41-50 No. (%)	51-60 No. (%)	>60 No. (%)	
<i>Blastocystis</i> sp.	23 (30.84%)	21 (9.90%)	37 (17.45%)	42 (19.81%)	32 (15.09%)	29 (13.67%)	28 (13.20%)	212 (100%)
<i>E. coli</i>	11 (16.66%)	4 (6.06%)	7 (10.60%)	7 (10.60%)	10 (15.15%)	15 (22.72%)	12 (18.18%)	66 (100%)
<i>G. intestinalis</i>	12 (29.46%)	3 (7.31%)	10 (24.39%)	8 (19.51%)	3 (7.31%)	4 (9.75%)	1 (2.43%)	41 (100%)
<i>I. butschlii</i>	0 (0%)	2 (12.5%)	3 (18.75%)	4 (25%)	2 (12.5%)	2 (12.5%)	3 (8.75%)	16 (100%)
<i>E. nana</i>	0 (0%)	0 (0%)	1 (7.14%)	5 (35.71%)	2 (14.28%)	5 (35.71%)	1 (7.14%)	14 (100%)
<i>E. hartmanni</i>	0 (0%)	2 (14.3%)	3 (21.42%)	6 (42.85%)	2 (14.28%)	1 (7.14%)	0 (0%)	14 (100%)
<i>D. fragilis</i>	1 (10%)	1 (10%)	1 (10%)	2 (20%)	1 (10%)	2 (20%)	2 (20%)	10 (100%)
<i>Ch. mesnili</i>	0 (0%)	0 (0%)	2 (40%)	1 (20%)	0 (0%)	1 (20%)	1 (20%)	5 (100%)
<i>E. histolytica</i> / <i>E. dispar</i>	0 (0%)	1 (25%)	1 (25%)	0 (0%)	0 (0%)	1 (25%)	1 (25%)	4 (100%)
<i>H. nana</i>	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1 (100%)
Total	46 (12.01%)	34 (11.2%)	66 (17.23%)	75 (19.58%)	53 (13.83%)	60 (15.66%)	49 (12.79%)	383 (100%)

DISCUSSION

In our study, 4.96% were infected, and nine species of protozoan and only one species of worm infection (*H. nana*) were observed. This finding is consistent with the recent studies in Iran showing a decline in intestinal helminths human infection [22]. Previous studies in Iran during 2005 - 2016 revealed that the prevalence of intestinal parasites was between 4.7% and 19.7% [23-27]. Another study on the incidence of intestinal parasites in Haftkel County, Southwest of Iran, in 2017, showed that 4.8% of individuals were harbored one of the human intestinal helminths or protozoa [28]. Also, a study in Bandar Abbas, southern Iran showed that the prevalence of intestinal parasites in primary school children was 6.5% which is consistent with the findings of our study [24]. However, in Hamedan Province,

Iran, the prevalence of intestinal parasites showed to be much higher than (35.1%) [1] what we obtained in this study. In general, intestinal parasitic infections have decreased compared to previous decades in Iran. This decrease can be attributed to the improved health and treatment status of the people as well as their increased awareness and knowledge of infectious diseases. In this study, the prevalence of protozoan infection was more than that of intestinal helminths. In contrast to helminths ova, cyst of intestinal protozoa are more likely to be infectious immediately after release in the environment and are transmitted faster.

The most common intestinal protozoan identified in this study was *Blastocystis* sp. (3.06%), while in a recent study in Haftkel, the most common one was *G. intestinalis*

(3.16%) [28]. In an investigation in Sari, the prevalence of intestinal parasites was 15.5% with the highest and lowest rates belonging to *G.intestinalis* (9.53%) and *I. butschlii* (0.5%), respectively, and *H. nana* (0.3%) as the only intestinal worm infection [29]. Also, in northwestern Ethiopia, the diversity of parasitic worm was higher than intestinal protozoa [30-31]. In these studies, intestinal pathogenic protozoa, *E. histolytica*, and *G.intestinalis* and intestinal worms, like *H. nana* and *A. lumbricoides*, *S. stercoralis*, *T. trichiura*, *Schistosoma mansoni*, and *Taenia* sp. were reported [30-31].

In our study, the most prevalent parasitic infection was among the age group of 31-40 years old, followed by the age group 21-30 years old. In a similar study, the highest parasitic infection rate was in the age group of 20-40 years old (30). This may be due to the similarity of population condition in both studies. In agreement with previous studies [8], our study also revealed the highest levels of *G. intestinalis* infection in children ≤ 10 years old and then in the 21-30 age group. Children in developing countries are more likely to be exposed to *G. intestinalis* infection due to poor public health conditions. In conclusion, the prevalence of intestinal parasites in our study is lower than those reported in other areas in Iran and other countries. Generally, in comparison with the results of a previous study in this city (2007-2011) that reported the intestinal parasitic infections as 7.6% [32], our study revealed a decrease in the prevalence rate, indicating an improvement of health status, and people awareness and improvement of environmental facilities in semi-urban areas.

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest associated with this manuscript.

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