

Survey of Giardiasis Symptoms in Patients Referred to Health Care Centers in Zahedan, South-Eastern Iran, 2017-2018



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Abstract

Background: There are many pathogenic intestinal parasites in humans, one of which is *Giardia lamblia*. This parasite has a variety of clinical symptoms in individuals. Poor health, weather conditions, and inappropriate lifestyle are all factors contributing to the high incidence of giardiasis.

Objective: Based on factors influencing the prevalence of giardiasis in the region, this study was performed on subjects referred to Zahedan health care centers.

Materials and Methods: A total of 671 stool specimens of subjects who referred between March 2017 and October 2018 were examined using direct and formalin ether concentration techniques. All demographic and clinical data in questionnaires were recorded. Data were analyzed using X2 test to determine any differences in the prevalence of giardiasis and clinical symptoms between different age groups.

Results: Of 671 samples, 346 (51.1%) were positive. The most common complaint among participants was abdominal pain (64.1%), followed by diarrhea (53.7%), abdominal cramps (44.7%), nausea (32.6%), weight loss (30.9%), anorexia (26.8%), headache (22.2%), fatigue (14.1%), and fever (13.2%). Most of the clinical symptoms such as abdominal pain, abdominal cramp, weight loss, and headache were reported in females, and the results of chi-square test showed a significant difference ($P < 0.05$). The age group of 1-12 years had the highest percentage of infection (49.42%). The data indicated that the highest rate of infection was observed in this group, showing a significant difference in comparison with other age groups ($P < 0.05$).

Conclusion: The results of this study showed that in addition to health education, preventing the transmission of parasites to children would also be necessary.

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Background

Giardia lamblia is one of the pathogens of the human small intestine that is endemic in most countries. The parasite has been reported all over the world and the rate of human infection by this parasite varies between 1% and 25%. The outbreak of *Giardia* infection is directly related to lack of hygiene and health facilities. Giardiasis is more common in primary schools, kindergartens, and orphanages.¹ Humans are the main host and reservoir of the parasite, therefore, direct transmission (oral-fecal), contaminated food or water, and mechanical transmission of the parasite cysts by insects can be major pathways

of infection.² About 70% of infected people living in indigenous areas lack specific symptoms. However, children (1-12 years), pregnant women and people with weakened immune systems are at high risk for infection and have clinical symptoms.^{3,4} Steatorrhea (fatty stool), watery or greasy stools, delayed growth and weight loss, fatigue or malaise, abdominal cramps and bloating, gas or flatulence, nausea and allergic symptoms may be important clinical signs of giardiasis in individuals.^{5,6} In spite of increasing health care services in most countries, there is still a high incidence of infection due to poor health status.⁷ The aim of this study was to determine

the prevalence and clinical signs of giardiasis in patients referred to health care centers in Zahedan between 2017 and 2018.

Materials and Methods

Study Area

Sistan and Baluchistan is the second largest province in Iran. It is located between 29°49'24"N and 60°86'69"E and is about 1352 meters above sea level with desert climate (with average annual temperature and rainfall of 22.8°C and 98.8 mm, respectively) (Figure 1).

Sample Collection

This study was performed from March 18, 2017 to October 29, 2018 on individuals referred to health care centers in Zahedan (Sistan and Baluchistan province), south-eastern Iran. The sample size was calculated using Epi6 software. A total of 671 samples were taken from individuals who presented with intestinal disorders. The questions included in the questionnaire (Wieger, 2001) were asked orally (this questionnaire is used to understand the association between clinical symptoms and *Giardia lamblia* genotypes). Individuals with intestinal disorders caused by other microbial agents were excluded from the study.

Sample Preparation

Stool specimens were macroscopically divided into watery, soft and formed stools. Persons with acute, subacute, and chronic clinical symptoms had watery stool (containing trophozoites and cysts), soft stool (similar to acute form), and formed stool (containing cysts), respectively. Stool specimens were collected using stool bottles. Then, the samples were transferred to the parasitology laboratory and examined immediately. After confirmation of giardiasis by wet mount and direct smear, using normal saline and D'Antoni iodine stain solution 1.5%, (for watery samples) and formalin-ether (for soft and formed samples), patient data were collected.^{8,9} Figures 2A and 2B show *Giardia lamblia* cyst and trophozoite in individuals' samples, respectively.

Statistical Analysis

Data analysis for this study was performed using the SPSS software version 20.0 (SPSS, Chicago, IL, USA). In order to determine the difference in the prevalence of giardiasis and symptoms of infection between males and females as well as different age groups of individuals, the X² test was used.

Results

Of 671 samples, 346 (51.1%) were positive. The age of individuals ranged from 1 to 76 years. The highest and lowest percentages of positive cases were reported in July (92 of 671, 26.1%) and October (7 of 671, 2%), respectively. The most common complaint among patients



Figure 1. Geographic Map of Sistan and Baluchistan Province in Iran.

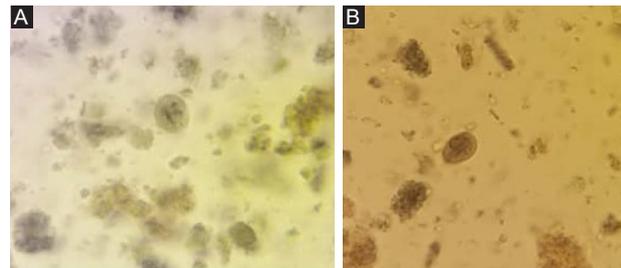


Figure 2. (A) *Giardia lamblia* Cyst and Trophozoite in Stool (original). (B) *Giardia lamblia* Cyst in Stool (original)

was abdominal pain (64.1%). Briefly, in present study, diarrhea (53.7%), abdominal cramps (44.7%), nausea (32.6%), weight loss (30.9%), anorexia (26.8%), headache (22.2%), fatigue (14.1%) and fever (13.2%) were also reported in patients. Most of the clinical symptoms such as abdominal pain, abdominal cramp, weight loss, and headache were reported in females, and the chi-square test showed a significant difference ($P < 0.05$) (Table 1).

Among the age groups, the highest percentage of infection (49.42%) was reported in the age group of 1 to 12 years, followed by age groups 13–26 (33%), 27–46 (12.7%), and over 47 years (4.6%) (Table 2). There was no significant difference in terms of the symptoms of giardiasis and different age groups. In addition, data indicated that the highest rate of infection belonged to this group, showing a significant difference in comparison with other age groups ($P < 0.05$). The results showed that 186 (53.7%), 124 (35.8%), and 36 (10.4%) of the samples were watery, soft, and formed stool, respectively.

Discussion

Due to the specific geographical and climatic characteristics of south-eastern Iran such as low moisture content of soil and lack of vegetation, *Giardia lamblia* is one of the most common protozoa in this area.¹⁰ In several previous studies conducted in Zahedan, the most important pathogenic protozoa reported in children was *Giardia lamblia*.^{11,12} In a meta-analysis study conducted by Daryani et al in 2007, *Giardia* was identified as the most common parasite infecting children in Iran.¹³ In a study conducted by Taherkhani et al in Hamadan, 20.4% (55.4% males and 44.6% females) were individuals

Table 1. Survey of Giardiasis Symptoms in Individuals Referred to Health Care Centers in Zahedan Based on Gender

| Symptoms | Female | | Male | | P Value |
|-----------------|--------|------|------|------|---------|
| | No. | % | No. | % | |
| Fever | 21 | 12.2 | 25 | 2.14 | 0.63 |
| Weight loss | 63 | 36.8 | 44 | 1.25 | 0.03 |
| Headache | 50 | 29.2 | 27 | .415 | 0.004 |
| Abdominal pain | 140 | 81.8 | 82 | 46.8 | 0.000 |
| Abdominal cramp | 94 | 54.9 | 61 | 8.34 | 0.001 |
| Anorexia | 32 | 18.7 | 61 | 8.34 | 0.001 |
| Nausea | 63 | 36.8 | 50 | 5.28 | 0.16 |
| Fatigue | 29 | 16.9 | 20 | 4.11 | 0.21 |
| Diarrhea | 101 | 59.0 | 85 | 5.48 | 0.10 |

with giardiasis. The most common clinical signs were abdominal pain, diarrhea, and vomiting, respectively. In their study, the incidence was higher compared to our study, and the clinical symptoms were similar.¹⁴ The results of a study conducted in Kashan showed that 36% of children were infected with *Giardia lamblia* (15% less compared to our study). The most common symptom was abdominal pain. Furthermore, the least reported clinical sign was vomiting, which is different from the present study.¹⁵ Diarrhea is one of the most common symptoms of giardiasis. Some studies in other countries had shown that *Giardia* infection can be reported in 60% to 100% of individuals. The prevalence of giardiasis in the present study was less compared to these study.^{16,17} In 2 other studies, the prevalence of abdominal pain among individuals was reported to be higher compared to our study.^{18,19} In 2019, Egyptian researcher studied the clinical symptoms of people with giardiasis and found that the prevalence of diarrhea, abdominal colic, abdominal distension and vomiting was reported to be 100%, 90.3%, 28%, and 6.6%, respectively. Therefore, it can be concluded that the prevalence of diarrhea and other symptoms were different from the present study.²⁰ In a study conducted by Lehto et al on children aged 6 to 18 months, it was found that there was a significant relationship between giardiasis and children's growth failure, and it was better to be considered in our study.²¹ Considering the influence

of different factors on the prevalence of giardiasis, a study was conducted to examine the effect of seasons on the prevalence of infection and it was reported that it ranged from 8.29% in dry seasons to 12.10% in wet seasons.²² Studies in Iran and other parts of the world suggest that due to increased health care services in communities, the prevalence of giardiasis has not decreased. In addition, factors such as the immune system, weather, and population density may also play a role in infecting people.

Conclusion

Based on the findings and results, it can be mentioned that given the high prevalence of giardiasis in children in this region, considering the ways to increase the level of hygiene in the area to reduce infections is of great importance. In addition, identifying parasite strains can also help in preventing and treating the disease.

Authors' Contributions

Study concept and design: VR, MZ and SE; Acquisition of data: VR, SE, and PAS; Analysis and interpretation: ZHB.

Ethical Approval

All stages of the plan were carried out in accordance with ethical standards of Zahedan University of Medical Sciences.

Conflict of Interest Disclosures

The authors declare that they have no conflict of interests.

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None.

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Table 2. Survey of Giardiasis Symptoms in Individuals Referred to Health Care Centers in Zahedan Based on Age Groups

| Symptoms | Age Groups | | | | | | | | P Value |
|-----------------|------------|------|-------|------|-------|------|-----|------|---------|
| | 1-12 | | 13-26 | | 27-46 | | 47> | | |
| | No. | % | No. | % | No. | % | No. | % | |
| Fever | 25 | 16.6 | 13 | 11.3 | 5 | 11.3 | 3 | 18.7 | 0.80 |
| Weight loss | 61 | 35.6 | 32 | 27.8 | 10 | 22.7 | 4 | 25.0 | 0.06 |
| Headache | 40 | 23.3 | 21 | 18.2 | 13 | 29.5 | 3 | 18.7 | 0.98 |
| Abdominal pain | 115 | 67.2 | 75 | 65.2 | 22 | 50.0 | 10 | 22.7 | 0.11 |
| Abdominal cramp | 77 | 45.0 | 63 | 54.7 | 10 | 22.7 | 5 | 11.3 | 0.06 |
| Anorexia | 43 | 25.1 | 34 | 29.5 | 13 | 29.5 | 3 | 18.7 | 0.82 |
| Nausea | 53 | 30.9 | 42 | 36.5 | 12 | 27.2 | 6 | 37.5 | 0.78 |
| Fatigue | 23 | 13.4 | 16 | 13.9 | 6 | 13.6 | 4 | 25.0 | 0.42 |
| Diarrhea | 95 | 55.5 | 64 | 55.6 | 20 | 45.4 | 7 | 43.7 | 0.21 |

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