

⇒ Research Article



Intestinal Parasites in Diarrheal Patients in Bandar Abbas, Southern Iran

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Received March 16, 2021, Accepted: May 30, 2021, Published Online: December 12, 2022

Background

Diarrhea is one of the most common causes of gastrointestinal disease causing morbidity and mortality in the developing world (1, 2). Intestinal parasites, pathogenic bacteria, and viruses are the main causes of diarrhea. Intestinal parasites are considered important human parasites and an essential public health issue in most communities, especially in tropical and subtropical regions (3). It is estimated that 1.7 billion cases of diarrhea annually occur, in general, and 1.5 million in young children in particular (4, 5). Diarrheal disease is the second most common cause of death in children under five years (1). A significant proportion of diarrheal diseases can be prevented by providing healthy water and personal hygiene (6). Intestinal protozoa, which are more common in children with diarrhea, include *Giardia lamblia* (*G. lamblia*), *Blastocystis* species, *Entamoeba histolytica*, *Cryptosporidium* species, and *Dientamoeba fragilis* (7). *G. lamblia* is one of the causes of diarrhea with a prevalence of 2%-5% and 20%-30% in developed and developing countries, respectively (8). *Blastocystis* spp. are the most common enteric protozoa isolated from diarrheal patients in most developed countries

(9). Although it has been a long time since its discovery, there are many controversies about the pathogenicity of this parasite. Nonspecific symptoms such as diarrhea, abdominal pain, nausea, fatigue, vomiting, anorexia, and flatulence are detected in those who demonstrate clinical signs (10).

Objectives

The current study mainly aimed to determine the prevalence of intestinal parasites in diarrheal patients in Bandar Abbas, Southern Iran.

Methods**Study Area and Study Population**

This cross-sectional study was performed to evaluate the prevalence of intestinal parasitic infections and related factors among patients with diarrhea referring to 3 hospitals in Bandar Abbas, Iran from October 2018 to May 2019. The census method was used for the sampling. This city is located in southern Iran; a tropical region, attached to the Persian Gulf with high humidity (20%-100%) and a warm climate (11).

Data Collection and Parasitological Examination

The stool samples (watery and loose) of patients with the symptoms of gastroenteritis, who were admitted to infectious wards or referred to the laboratory, were evaluated based on the aim of the study. After obtaining written consent, the researcher administered a questionnaire to each patient, including items on sociodemographic characteristics such as age, gender, occupation and educational level (the parents caring for the patient), residency (urban or rural), type of reception (outpatient or inpatient), contact with animals, underlying diseases, addiction, and recent travel history within 3 months. The recipients of anti-parasitic drugs and diarrheic patients from bacterial infections were excluded from the study.

A single fresh stool sample was collected from each participant with a clean stool cup and immediately transferred to the laboratory of the Paramedical Faculty of Hormozgan University of Medical Sciences. The specimens were examined by the direct wet mount (normal saline and Lugol) and formalin-ether concentration method (3) which enhanced the recovery of protozoan cysts and ova of helminths. Trichrome staining was used for the better detection of protozoa. The oocysts of *Cryptosporidium* spp. were identified by a permanent slide after the formalin-ether concentration method and stained with the modified acid-fast staining.

Statistical Analysis

SPSS software (version 20, Chicago, IL, USA) was applied for the data analysis. In addition, the relationship between the variables and the presence of intestinal parasites was assessed by the chi-square test, and the level of significance was $P < 0.05$.

Results

A total of 170 diarrhea patients' stools were evaluated in this research. Of these, 57.6% and 42.4% of specimens were collected from males and females, respectively. Table 1 presents the detailed sociodemographic characteristics of the diarrheic individuals in three hospitals in Bandar Abbas. The overall prevalence of intestinal parasites was 22 (12.9%). Based on data in Table 2, the most common protozoan species were *Blastocystis* spp. 10 (5.9%) and *G. lamblia* 7 (4.1%). No statistically significant relationship was found between the infection and the variables ($P > 0.05$).

Discussion

In this cross-sectional study, the overall prevalence of intestinal parasites was found to be 12.9% among diarrheal patients in Bandar Abbas' hospitals; this rate was lower in our study compared to the studies conducted in the other parts of Iran and other countries, including Nahavand, western Iran (32.2%) (12) and Northwest Ethiopia (56.9%) (13). However, it is consistent with that of a study

Table 1. Sociodemographic Characteristics and Intestinal Parasites of the Diarrheic Individuals of Three Hospitals in Bandar Abbas, Iran

Variable	Number (%)
Age group (y)	
<5	59 (34.7)
5-15	17 (10)
15-30	23 (13.5)
>30	71 (41.8)
Gender	
Male	98 (57.6)
Female	72 (42.4)
Occupation	
Animal husbandman	2 (1.2)
Farmer	7 (4.1)
Labor	9 (5.3)
Housewife	67 (39.4)
Employee	31 (18.2)
Others	54 (31.8)
Educational level	
<Diploma	112 (65.9)
Diploma	28 (16.5)
>Diploma	30 (17.6)
Residency	
Urban	119 (70)
Rural	51 (30)
Type of reception	
Outpatients	73 (42.9)
Inpatients	97 (57.1)
Contact with animals	
Yes	41 (24.1)
No	129 (75.9)
Underlying disease	
Yes	38 (22.4)
No	132 (77.6)
Travel history	
Yes	98 (57.6)
No	72 (42.4)
Addiction	
Yes	11 (6.5)
No	159 (93.5)

Table 2. Prevalence of Intestinal Parasites in Diarrheal Patients in Bandar Abbas, Southern Iran

Parasites	Number (%)
<i>Giardia lamblia</i>	7 (4.1)
<i>Entamoeba coli</i>	1 (0.6)
<i>Blastocystis</i> spp.	10 (5.9)
<i>Hymenolepis nana</i>	1 (0.6)
<i>Cryptosporidium</i> spp.	3 (1.8)
Total	22 (12.9)

performed in Northern Iran 9.1% by Vahedi et al (14). Our data, compared to those obtained by Zebardast et al (3) in different parts of Iran, suggested that not only it is in line with the overall prevalence of intestinal parasites (10.6%) but also with the prevalence of various parasites. Similar to many other studies, *G. lamblia* and *Blastocystis* spp. were the most common parasites in diarrheal patients (12, 15). Differences in the health standards of each region, as well as the methods used to detect parasites, are the reasons for the difference in the prevalence of parasites. The role of *Blastocystis* spp. in the pathogenesis and pathology of the gastrointestinal tract is unclear and has always been debatable (10). The parasite appears to have many subtypes, and it is unclear which is more involved in human disease; however, the third subtype is more common in human studies (9). Unfortunately, the determination of *Blastocystis* subtypes was not within the scope of the study, which is one of the limitations of the present study. The prevalence of *Blastocystis* spp. was 5.9%, which conforms to the result of the study of Khoshnood et al (3.33%) in southwestern of Iran (16), but inconsistent with the finding of Vahedi et al (1.8%) in Northern Iran (14).

The prevalence of *Cryptosporidium* spp. using acid-fast staining was 1.8%, which matches the results of many other studies in the country (12, 17), while not being in line with the findings of studies in other countries and Iran (18).

Compared to the findings of a previous study conducted in Bandar Abbas (19), the prevalence of the parasite has significantly decreased due to the differences between the subjects.

The prevalence of *G. lamblia* was 4.1%, which corroborates with the results of other studies (4.1%, 2.3%, and 2.75%) conducted in Mazandaran and Nahavand) in Iran (12, 14) and Pakistan (20). Despite the high percentage of children under 15 years (44.7%) in this study, we expected a higher prevalence of *G. lamblia*, as the prevalence of this parasite in children under 5 years was 16.7% in Ethiopia (21). It should be noted that the prevalence of the parasite in primary school children was 17.23% (22) in Bandar Abbas in the past 20 years. Increasing the level of health and literacy in the community and improving the environment are effective factors in reducing this parasite. However, as mentioned earlier, bacterial or viral agents may have been involved in the diarrhea of these patients, which should be investigated in the future.

The prevalence of parasitic helminths in the present study was extremely low, only one case of *Hymenolepis nana* was detected, which conforms to the result of Vahedi et al in northern Iran and Kiani et al in western Iran (12, 14). Intestinal helminthiasis have been decreasing in recent years throughout the country (23). Only parasites with direct fecal-oral transmission were observed with a low prevalence. Sanitation and hygiene have played a role

in this declining trend by increasing public awareness and improving health.

The other limitation of the research was the small number of samples due to the limited time because this article is the result of an MSc student's thesis.

Conclusion

Blastocystis spp. and *G. lamblia* were the predominant intestinal parasites detected in patients with diarrhea. The results revealed that intestinal parasites, especially helminth infections, have significantly decreased in recent years.

Acknowledgments

We would like to thank Hormozgan University of Medical Sciences for supporting and funding this study. We greatly appreciate the participants for cooperation during the study.

Author Contributions

Study concept and design: KSS and MN; Analysis and interpretation of data: KSS, MN, and SHT; Drafting of the manuscript: KSS and MTA; Statistical analysis: SHT; Acquisition of data: MN, SHT, MS, and KSS; Critical revision of the manuscript for the important intellectual content: MN, SHT, MS, MTA, and KSS.

Conflict of Interests

The authors declare that there is no conflict of interests.

Ethical Approval

The Ethics Committee of Hormozgan University of Medical Sciences approved the study protocol (IR.HUMS.REC.1397.164).

Funding

This study was financially supported by Hormozgan University of Medical Sciences, Bandar Abbas, Iran.

Informed Consent

The aim of the study was described to patients or their parents and informed consent was obtained from all the enrolled ones.

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