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Short Communication

The Prevalence of *Blastocystis* sp. and Its Relationship with Gastrointestinal Disorders and Risk factors

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Abstract

Background: *Blastocystis* sp., located in the large intestine, is one of the most common zoonotic parasites. Risk factors affect its prevalence and pathogenicity, and it causes gastrointestinal disorders. Thus, this study aimed to investigate the *Blastocystis* sp. prevalence and its relationship with gastrointestinal disorders, in patients referred to laboratories, and provide some prevention strategies.

Methods: In this descriptive-analytical study, 1,000 stool specimens were collected from patients referred to Ilam, Iran laboratories from 2018-2019. Wet mount method was conducted on samples, and suspected specimens were confirmed using trichrome staining. The demographic and clinical information was recorded in a questionnaire. Finally, the results were analyzed using the SPSS.

Results: *Blastocystis* infection was detected in 81 out of 1,000 patients (8.1%) including 61 (75.3%) males and 20 (24.7%) females. and illiterate people were more at risk. The prevalence in rural was more than urban areas, and it was more in the age group of 31-50 year.

Conclusion: There was a significant relationship between *Blastocystis* sp. and risk factors (age, sex, level of education, and residence) and clinical symptoms (stomach ache and nausea) ($P < 0.05$), but interestingly there was no significant relationship between bloating and diarrhea.



Introduction

Blastocystis sp. is one of the most common intestinal protozoa with a worldwide distribution. It is located in the large intestine of humans and many animals and transmitted through the fecal-oral form (1,2).

Its prevalence has a lot of variety in different parts of the world, 5%-23% in developed countries, and up to 60% in developing countries. The difference is because of health conditions so *Blastocystis* sp. is more common in poor health conditions as well as in people who are in direct contact with animals (2-4).

Transmission of the disease occurs through water and food contaminated with cysts and is more common in adults (1, 5). The clinical symptoms of *Blastocystis* sp. are varied and range from infections without symptoms to chronic diarrhea. Signs are usually associated with a stomach ache, bloating, nausea, vomiting, diarrhea, constipation, irritability syndrome, and inflammation of the intestine (1,6-8). Notable results had a significant step for treating and controlling infection (9). On the other hand, despite the improvement in the level of health, *Blastocystis* sp. is still one of the most common parasitic infections in Ilam Province. Therefore, studying the association of *Blastocystis* sp. with clinical symptoms and the role of risk factors can also have a significant impact on community health in addition to knowing the factors affecting parasite pathogenicity and prevalence.

Ilam is a suitable setting for the activity of this parasite for many reasons, i.e., geographical location, climate condition, the considerable animal population, the rich pastures, and the employment of most of the residents to the agricultural and livestock sector. Therefore, epidemiological studies are required to know and control the role of the above factors.

Thus, we aimed to investigate the prevalence of *Blastocystis* sp. and its relationship

with gastrointestinal disorders and risk factors, in people referred to laboratories in Ilam city, Iran in 2018-2019.

Materials and Methods

Study population

This descriptive-analytic study was conducted in Ilam City, the capital of Ilam Province, the west of Iran, and bounded with Kermanshah, Khuzestan, Lorestan from Aug 2018 to Feb 2019 on 1000 random stool samples of patients referred to five laboratories, i.e., the Health Center of Ilam, Ghaem Hospital Lab, Saboor Medical Laboratory, Central Laboratory of Ilam, and Imam Hospital Lab. Mentioned laboratories were among the largest ones in the province, and people referred to them from both urban and rural areas. The study was included 598 (59.8%) males and 402 (40.2%) females out of 1000 patients from 1 to 80 yr of age.

The Ethics Committee of the Medical University of Ilam, Iran approved the study (IR.IMU. 968049.135). Informed consent was obtained from all individual participants involved in the study

Collection and examination of microscopic specimens

Stool samples were collected into a sterile container. All specimens were stored in formalin 5% and transferred to the Paramedical Laboratory of Faculty of Paramedicine until performing the examination. Then they were tested with the wet mount method (10). Suspect ones were confirmed using trichrome staining (11, 12). Patients' information was obtained through contact and interview and gathered in the questionnaires included some characteristics of patients, i.e. clinical symptoms, age, sex, living place, and level of education.

Data analysis

The findings were analyzed using the Statistical Program for Social Sciences software (SPSS ver. 20, IBM Corp., Armonk, NY, USA) and the Chi-Square test.

Results

Blastocystis sp. was seen in 81 (8.1%) out of 1,000 patients (Table 1, Fig. 1). The number of infected men and women was 61 (75.3%) and 20 (24.7%), respectively (Table 2).

Table 1: Frequency prevalence of *Blastocytosis* in people referred to Ilam health centers in 2018- 2019

<i>Age group</i>	<i>(yr)</i>	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
	1-12	451	45.1	49.1	49.1
	20-13	123	12.3	13.4	62.5
	21-30	136	13.6	14.8	77.3
Valid	31-50	129	12.9	14.0	91.3
	70-51	70	7.0	7.6	98.9
	70>	10	1.0	1.1	100.0
	Total	919	91.9	100.0	
	miss- ing	81	8.1		
Missing Total		1000	100.0		

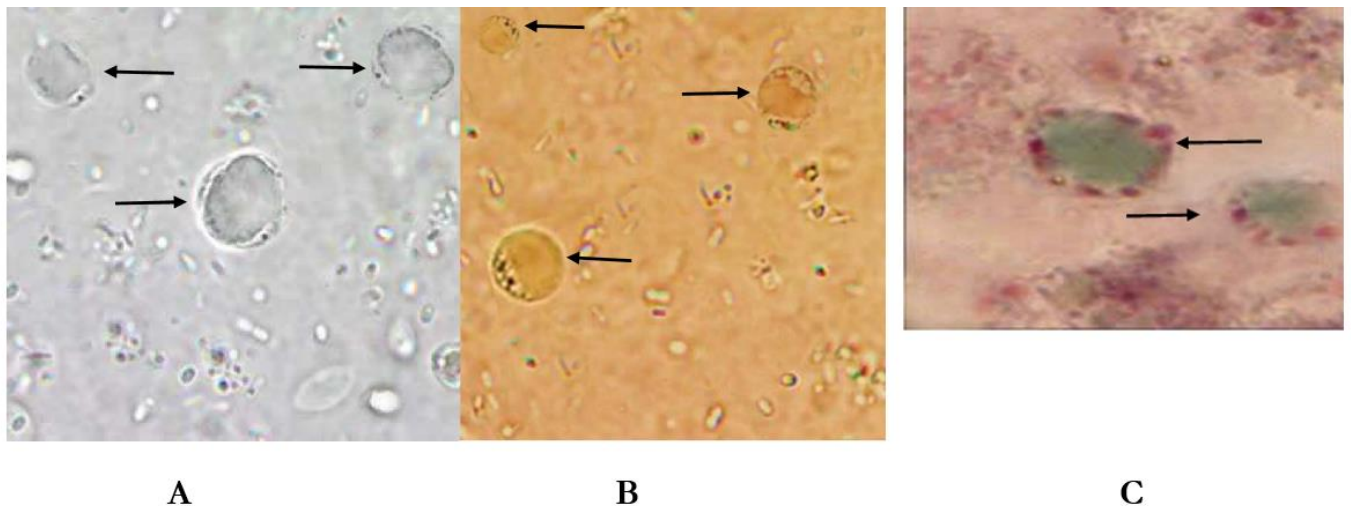


Fig. 1: *Blastocystis hominis* in stool exam (x100). (A) Saline staining (B) iodine mount on grease-free slide (C) trichrome staining

Among age groups, the age group of 31-50 yr old had the highest percentage of infection (40.7%), which showed a significant difference compared to other age groups ($P < 0.05$) (Table 2).

Blastocystis-positive was more common among rural people (59.3%) than urban subjects (40.7%) (Table 2).

Table 2: Frequency of Blastocystosis based on demographic variables of sex, range-age, place and level of education in people referred to Ilam health centers in 2018-2019

<i>Variables</i>	<i>Risk factors</i>	<i>Blastocystosis positive (%)</i>	<i>Total</i>	<i>P-value</i>
Sex	Male	61 (75.3)	81 (100.0)	0.025
	Female	20 (24.7)		
Range-age (years)	1-12	3 (3.7)	81 (100.0)	.011
	13-20	8 (9.9)		
	21-30	22 (27.2)		
	31-50	33 (40.7)		
	51-70	12 (14.8)		
Place	>70	3 (3.7)	81 (100.0)	0.001
	City	33 (40.7)		
Level of education	Village	48 (59.3)	81 (100.0)	0.001
	Illiterate	51 (63.0)		
	Literate	30 (37.0)		

Thirty people (37%) were literate, and 51 people (63%) were illiterate (Table 2). Additionally, 7 (8.6%) out of 81 *Blastocystis*-carriers had no gastrointestinal symptoms in the opposite of 74 patients (91.4%) with gastrointes-

tinal symptoms. Gastrointestinal symptoms were stomach ache 46 (56.8%), flatulence 16 (19.8%), nausea 10 (12.3%) and diarrhea 2 (2.5%) (Table 3).

Table 3: Frequency of clinical symptoms in patients with Blastocystosis by age group in people referred to Ilam health centers in 2018-2019

<i>Age group (yr)</i>	<i>Stomach ache</i>	<i>Flatulence</i>	<i>Nausea</i>	<i>Diarrhea</i>
1-12	3 (100.0)	0 (00.0)	0 (00.0)	0 (00.0)
3 (3.7)				
13-20	7 (87.5)	1 (12.5)	0 (00.0)	0 (00.0)
8 (9.9)				
21-30	12 (54.5)	2 (9.1)	8 (36.4)	0 (00.0)
22 (27.2)				
31-50	13 (39.4)	11 (33.3)	2 (6.1)	0 (00.0)
33 (40.7)				
51-70	10 (83.3)	2 (16.7)	0 (00.0)	0 (00.0)
12 (14.8)				
>70	1 (33.3)	0 (00.0)	0 (00.0)	2 (66.7)
3 (3.7)				
Total	46 (56.8)	16 (19.8)	10 (12.3)	2 (2.5)
81 (100.0)				
<i>P-value</i>	0.012	0.204	0.005	0.101

There was a statistically significant relationship between *Blastocystis* sp. and the clinical signs (Stomach ache and nausea), and also between this parasite and the risk factors (age, sex, education, and residence) ($P < 0.05$).

Discussion

In this study, the *Blastocystis* sp. prevalence in Ilam was 8.1% which was different from or consistent with other studies, as another study reported the 0/025% prevalence of *Blastocystis* sp. in Ilam (13). However, in another study, Abdi et al. published a 9.4% prevalence of *Blastocystis* sp. (14). Furthermore, another study showed a 5.69% of its prevalence among children attending the daycare centers of Ilam (15). There are several epidemiological studies, which include *Blastocystis* sp., on parasitic infections in Ilam. The differences in these studies depend on the time, place, and study population (13-15).

Overall, the prevalence of *Blastocystis* sp. is approximately high in Iran. A wide range of prevalence was reported from 0.8% to 54.5% throughout the country (8). These differences can be due to the diversity of geographical situation, region's socio-economic conditions, and risk factors. The low prevalence in some areas depends on some factors such as the inaccurate determination due to the parasite polymorphism and no clinical symptoms in healthy carriers.

The rate of infection was high in the age group of 16-20, and it was more in females than males (16). However, the present study showed the highest rate of infection in the age group of 31-50 (40.7%), and the infection rate in males (75.3%) was more than in females (24.7%). There were some compatible studies with the present results, as the Shaker et al. in Sari reported the highest rate of infection in the age group of 40-50 yr and men. It can be due to the prolonged duration of contact with the parasite in adulthood (17).

In Sari, the prevalence of *Blastocystis* in rural residents was higher than urban ones, and as the level of education increased, the prevalence of parasites decreased (17). It was compatible with the present study so that *Blastocystis* sp. infection among rural residents (59.3%) were reported more than urban residents (40.7%). It is supposed to be related to people's jobs in rural areas. The high infection level in the age group of 31-50 yr, especially among village's residents, has several reasons, including the direct link of people living in the village with animals, ground, lack of sanitation, use of non-potable water and use of human fertilizers (3). Moreover, the high-risk group in this study was illiterate. Our results showed that there is a significant relationship between parasite and some risk factors, i.e., age, sex, living place, occupation, and level of education.

Comparing our results to other findings suggested the role of the geographical situation in the variation of symptoms associated with *Blastocystis*.

Blastocystis sp. prevalence in Ilam depends on several factors, such as area warming, unsafe disposal of feces contaminated water, etc. Education and awareness of the community, especially in rural areas, is one of the most basic and practical ways to deal with this parasite. Other ways are the construction of sanitary toilets, the identification, and treatment of carriers.

Conclusion

Despite the improvement of health and raising awareness, *Blastocystis* sp. is still one of the most common causes of intestinal disturbances. Therefore, recognizing the risk factors for this parasite can be a significant step to decrease its prevalence and reduce intestinal disorders. It can be done by the authorities responsible for health and other organizations through the adoption of regulatory and control measures. Due to the evidence of its pathogenicity in recent years, association with

pathogenesis in the host, and zoonosis aspects, further studies are recommended.

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Conflict of interest

The authors have no conflicts of interest to declare.

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