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Research Article

Blastocystis Hominis Infection Among Hospitalized Children Due to Diarrhea in Hajar Hospital, Shahre-Kord, Iran

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Background: *Blastocystis hominis* is an intestinal protozoan, recently known as a potential pathogen, which causes intestinal disorders, especially in children. The parasite has a worldwide distribution, ranged from 2% up to 30% in some regions.

Objectives: Given no specific study focused on infection rate of *B. hominis* in children with diarrhea in Iran, this study was carried out to detect frequency of the parasite in children with diarrhea.

Patients and Methods: In a cross-sectional study from September 2009 to July 2010, one hundred and sixty hospitalized children with diarrhea in Hajar Hospital, Shahre-Kord, Iran were enrolled. Stool samples were collected and were examined microscopically in wet direct smear using normal saline and iodine solution (Lugol). Furthermore, permanent trichrome stain was performed and all stools were stained and studied with oil immersion's lens (100×).

Results: Out of 160 stool samples were examined, in 37 cases (23%) including 25 boys and 12 girls, *B. hominis* was the most frequent protozoa, followed by *Giardia lamblia* in 19 cases (12%). *E. histolytica/dispare* were detected only in two cases (1%).

Conclusions: The frequency of *B. hominis* in the study was more than other reports from Iran. This study revealed that among hospitalized children with diarrhea, *B. hominis* was the most common protozoan.

Keywords: *Blastocystis Hominis*; Child; Diarrhea; Iran

1. Introduction

Blastocystis is a genus of unicellular protozoan parasite, belonging to *Blastocystae* class and order of *Blastocystida* and *Blastocystidae* family. The parasite comprises several species, living in the gastrointestinal tracts of humans and animals including farm animals, birds, rodents, reptiles, amphibians, fish, and cockroaches. They have a widespread geographic distribution and are found at a rate of 5-10% in more developed countries, and a rate of up to 50% in less developed areas (1-3). Although the role of *Blastocystis hominis* in human diseases is often referred to as controversial, it seems that certain subtypes of this parasite may be more likely to cause infection, or may pose a risk only when combined with other types of infection. In some cases, the parasite simply resides in the digestive tract without causing harm. A factor influencing clinical manifestations of the parasite is patient's age, with younger children less likely to present symptoms. Some studies documented an association between subtype of the parasite and presentations of the symptoms. Its presence has been reported in a wide variety of intestinal disorders, resembling irritable bowel syndrome (IBS)

such as diarrhea, nausea, abdominal cramps, bloating, flatulence and perianal itching (1-4).

2. Objectives

The purpose of this study was to determine the frequency and clinical manifestation of *B. hominis* among hospitalized children due to diarrhea in Shahre-Kord, Southwest Iran.

3. Patients and Methods

This cross-sectional study was carried out to understand the frequency and clinical symptoms of *B. hominis* in hospitalized children due to diarrhea, from September 2009 to July 2010. All children admitted to Hajar Hospital of Share-Kord during this time period, were enrolled unless the parents did not agree to participate and also where stool collection was not available. Data were collected, using a standard questionnaire, including family history, socioeconomic criteria, and history of illness during the last two months. Clinical criteria were obtained from children's hospital files. Totally, 160 stool samples were collected. All portions of stool specimens

Implication for health policy/practice/research/medical education:

This study is conducted for medical education purposes.

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were examined freshly under microscope by preparing a standard unstained wet direct smear in physiologic saline (0.85%) and a stained mount iodine solution (Lugol) through high-powered lenses (5). Moreover, all stools were stained with permanent trichrome stain and screened with oil immersion's lens (100 ×). Samples were considered positive for *B. hominis*, if any univacuolar, multivacuolar, granular, cystic or amoeboid forms of the parasite were observed. Data were analyzed with the statistical Package for social Sciences (SPSS) version 13.0 by using the Chi-square test for qualities variables.

4. Results

In total, 160 stool samples were examined. 98 participants (61%) were boys and 62 (39%) were girls. The mean age of children was 3.37 year with standard deviation (\pm SD) of \pm 2.38. Mean (SD) age of infected children with *B. hominis* was 3.32 (\pm 2.47) years. The youngest child was a one-year-old girl and the oldest child was a fourteen-year-old boy. One hundred and three children (64%) lived in cities, 53 children (34%) lived in rural areas and 4 children (2%) lived in nomadic tribes. Thirty-seven (23%) samples were infected with *B. hominis*, out of which 12 were girls and 25 were boys. There was no significant relationship between infection with the parasite and gender, place of living and age. The presence of dehydration was investigated and 16 children (10%) were not dehydrated, 78 (49%) had mild dehydration, 58 (36%) were moderate dehydrated, and 8 (5%) had severe dehydration. Only one child was infected by *B. hominis* in children who were not only dehydrated but also had no severe dehydration. In those with mild dehydration, 17 children were infected and in those with severe dehydration, 18 showed infection with *B. hominis*. However, there was no significant relationship between infection by this parasite and hydration status of the patients. Ninety-nine children (62%) lived in cities, 57 (36%) children lived in rural areas and 4 children (2%) lived in tribe's style.

Of those children, living in urban areas, 16 (10%) children were infected with *B. hominis* and among children in rural areas, 20 (13%) were infected by parasite. The Statistics showed a significant relationship between infection of *B. hominis* and place of living with higher rate of infection for children in urban areas. There was no significant difference between infection with *B. hominis* and the member of families in the same house. Among 22, 44, 38, 14 and 5 children with family members of 3, 4, 5, 6 and > 6 respectively 1, 11, 14, 8 and 3 children were infected by *B. hominis*. However, children who lived in family households with 4 or 5 members had higher rate of infection. Association between infection of *B. hominis* and parents' education was studied. A significant relationship was seen between infection by *B. hominis* and less educated parents. Among 9, 89 and 62 children with illiterate, primary or high school and academic educated mothers 2,

27, and 8 children were infected to the parasite respectively. From 6, 69 and 85 children with illiterate, high school educated and academic educated fathers, 2, 19 and 16 children were infected by *B. hominis* (Table 1).

Table 1. Some General Characteristics of Hospitalized Children Due to Diarrhea in Share-Kord, Iran

	No. (%)	Number of <i>B. hominis</i> Infection (%)
Gender		
Male	98 (61%)	25 (16%)
Female	62 (39%)	12 (7%)
Place of living		
Urban	99 (62%)	16 (10%)
Rural	57 (36%)	20 (13%)
Tribe	4 (2%)	1 (1%)
Mother's level of education		
Illiterate	9 (5%)	2 (1%)
Uncompleted high school	89 (43%)	27 (17%)
University education	62 (39%)	8 (5%)
Father's level of education		
Illiterate	6 (4%)	2 (1%)
Uncompleted high school	69 (43%)	19 (12%)
University education	85 (53%)	16 (10%)
Previous infectious diseases		
Yes	14 (9%)	7 (5%)
No	146 (91%)	30 (19%)
Symptoms		
Abdominal pain	113 (71%)	32 (20%)
Appetite loss	92 (58%)	25 (16%)
Vomiting & nausea	90 (56%)	31 (19%)
Weakness and fatigue	69 (43%)	24 (15%)
Bloating	57 (36%)	24 (15%)
Fever	41 (26%)	19 (12%)
Myalgia	3 (2%)	1 (1%)
Headache	0	1 (1%)

There was a significant relationship between infection with *B. hominis* and previous infectious diseases. Out of 160 children, 14 (9%) had a history of infectious diseases during the previous 2 months and 7th of them showed infection of *B. hominis*. The same result was seen for association between using antibiotic in the last month before admission. Fourteen children had a history of using antibiotic in the last month of admission and half of them (6) were infected by *B. hominis*. Co-infection with other intestinal parasites was seen in 21 (57%) infected children by *B. hominis* including three cases with *Giardia lamblia* and

one child with *E. histolytica*/dispare. Other non-pathogen protozoa were *E. coli*, *Endolimax nana*, *Iodamoeba butschlii*, and *Chilomastix mesnili*. The most frequent co-infection was infection of *B. hominis* and *E. coli* detected in 11 children.

5. Discussion

The pathogenic potential of *B. hominis* has been reported in different research since 1899 (1-4, 7, 8). The present study focused on frequency and epidemiological aspects of *B. hominis* infections among hospitalized children due to diarrhea in Hajar Hospital, Shahre-kord, Iran. The results of the study showed that infection of *B. hominis* has not any association with children's age. Although some studies have reported high infection rate of *B. hominis*, Suresh has reported that in patients with 71 - 80 years old, most infections are due to parasite. While El-Shazly has reported a higher rate of infection in 10 - 20 age groups from Egypt (6, 9, 10). Since this study focused on children of 1 - 14 years of age and the study design was different from mentioned studies, it is difficult to compare and interpret the results. Infection of *B. hominis* did not differ between girls and boys of our study, which is in accordance with similar studies proving that infection of *B. hominis* has no relevance to gender (11, 12).

This study revealed that 37 children (23%) were infected by *B. hominis*. This frequency is likely more similar to other reported infectious rates such as 28%, 22% and 29% from studies in Ardebil, Egypt and Turkey respectively (6, 7, 9, 13), however a study from Venezuela has reported a higher rate (48%) of infection in adult patients (14). A significant association was seen between infection of *B. hominis* and place of living. Children living in rural areas had higher rates of infection. This is in agreement with Aksoy report, documented higher frequency of infection in lower economic condition subjects (15). We did not find any significant association between infection of *B. hominis* and the number of siblings; however more infected children were seen in families with 4 or 5 family members. In contrast to the present study, Morgan from the US reported a higher rate of infection of *B. hominis* in crowded households (16). Parents' education was a risk factor, influencing infection with the parasite; children with less educated parents were more susceptible to *B. hominis* infection. This finding is in agreement with studies which have reported poverty as a risk factor for blastocystosis (9, 15, 16). The present study showed that the most frequent symptoms in children suffering from infection of *B. hominis* had abdominal pain, nausea, vomiting, bloating and appetite loss respectively which is in agreement with Miller, Akhlaghi and El-Shazly studies, revealing similar clinical symptoms in subjects infected by *B. hominis* (6, 17-19). Having a history of previous hospitalization and infectious diseases in the last two months of admission can be considered as risk factors for blastocystosis.

This might be due to the patient's immune system, caused immune suppression and susceptibility to acquiring infectious diseases as hold by Cirioni and Wang for this specific parasite (20, 21).

Consuming oral antibiotic during the last week of admission was more frequent in children infected to the parasite and a remarkable reverse association was seen between infection of *B. hominis* and using antibiotic. Of 160 children screened, 14 (9%) had history of using antibiotic and half of them (7 cases) were infected by the parasite. This issue is also in disagreement to parasitological texts that documented using antibiotic decreases rate of stool blastocystis detection (1, 3). However the results cannot be generalized due to the limited sample size. Hence, more examinations are required to support the findings. Co-infection with other intestinal parasites was seen in 21 (57%) infected children to *B. hominis* including 3 cases with *G. lamblia*, one child with *E. histolytica*/dispare, which are pathogenic parasites. Other non-pathogen protozoa were *E. coli*, *E. nana*, *I. butschlii* and *C. mesnili*. Regarding the findings of the present study it was shown that blastocystosis should be considered as a potential pathogenic agent in approaching gastrointestinal disorders and needs to be addressed. According to the findings of the present study regarding clinical symptoms and also looking to the high percentage of children infected by *B. hominis* (23%), there is a possibility that presence of some clinical symptoms is related to *B. hominis* infection. However, further comprehensive studies are needed to understand the precise relationship between clinical symptoms and blastocystosis.

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Authors' Contribution

All authors collaborated equally to conduct the study; Simin Taghipour mainly performed the laboratory tests.

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References

1. Zierdt CH. *Blastocystis hominis*—past and future. *Clin Microbiol Rev*. 1991;4(1):61-79.
2. Markell EK, Voge M, John DT. *Medical Parasitology*. 7 ed.: W.B. Saunders Company; 1994.
3. Garcia LS, Current WL. *Diagnostic Medical Parasitology Intestinal protozoa: Amebae*. 4 ed.; 2001.
4. Markell EK, Udkow MP. *Blastocystis hominis*: pathogen or fellow

- traveler? *Am J Trop Med Hyg.* 1986;**35**(5):1023-6.
5. Melvin DM, Brooke MM. Laboratory procedures for the diagnosis of intestinal parasites. US Department of Health, Education, and Welfare, Public Health Service, Health Services and Mental Health Administration, National Communicable Disease Center, Laboratory Division, Laboratory Consultation and Development Section; 1969.
 6. El Shazly AM, Awad SE, Sultan DM, Sadek GS, Khalil HH, Morsy TA. Intestinal parasites in Dakahlia governorate, with different techniques in diagnosing protozoa. *J Egypt Soc Parasitol.* 2006;**36**(3):1023-34.
 7. Daryani A, Ettehad GH, Sharif M, Ghorbani L, Ziaei H. Prevalence of intestinal parasites in vegetables consumed in Ardabil, Iran. *Food control.* 2008;**19**(8):790-4.
 8. Wang KX, Li CP, Wang J, Cui YB. Epidemiological survey of *Blastocystis hominis* in Huainan City, Anhui Province, China. *World J Gastroenterol.* 2002;**8**(5):928-32.
 9. Suresh K, Smith H. Comparison of methods for detecting *Blastocystis hominis*. *Eur J Clin Microbiol Infect Dis.* 2004;**23**(6):509-11.
 10. El-Shazly AM, Abdel-Magied AA, El-Beshbishi SN, El-Nahas HA, Fouad MA, Monib MS. *Blastocystis hominis* among symptomatic and asymptomatic individuals in Talkha Center, Dakahlia Governorate, Egypt. *J Egypt Soc Parasitol.* 2005;**35**(2):653-66.
 11. Sharif M, Daryani A, Asgarian F, Nasrolahei M. Intestinal parasitic infections among intellectual disability children in rehabilitation centers of northern Iran. *Res Dev Disabil.* 2010;**31**(4):924-8.
 12. Daryani N, Barmaki GH, Ettehad M, Sharif MH, Dehghan A. A cross-sectional study of *Blastocystis hominis* in primary school children, Northwest Iran. *Inter J Trop Med.* 2006;**1**:53-7.
 13. Dogruman-Al F, Simsek Z, Boorum K, Ekici E, Sahin M, Tuncer C, et al. Comparison of methods for detection of *Blastocystis* infection in routinely submitted stool samples, and also in IBS/IBD Patients in Ankara, Turkey. *PLoS One.* 2010;**5**(11).
 14. Devera R, Azacon B, Jimenez M. [*Blastocystis hominis* in patients at the Ruiz y Paez University Hospital from Bolivar City, Venezuela]. *Bol Chil Parasitol.* 1998;**53**(3-4):65-70.
 15. Aksoy U, Akisu C, Bayram-Delibas S, Ozkoc S, Sahin S, Usluca S. Demographic status and prevalence of intestinal parasitic infections in schoolchildren in Izmir, Turkey. *Turk J Pediatr.* 2007;**49**(3):278-82.
 16. Morgan BL. *Blastocystis hominis*: A comparative study of the factors affecting high prevalence in the United States and Venezuela, abstract of PhD thesis. 2009.
 17. Miller RA, Minshew BH. *Blastocystis hominis*: an organism in search of a disease. *Rev Infect Dis.* 1988;**10**(5):930-8.
 18. Taherkhani H, Sardarian KH, Semnani SH, Roshandel GH. *Blastocystosis* in Iran: Epidemiological characteristics and Clinical manifestations. *J Clin Diagn Res.* 2008;**2**:969-72.
 19. Akhlaghi L, Shamseddin J, Meamar AR, Razmjou E, Oormazdi H. Frequency of intestinal parasites in Tehran. *Iranian J Parasitol.* 2009;**4**(2):44-7.
 20. Nahrevanian H, Azarinoosh SA, Esfandiari B, Amirkhani A, Ziapoor SP, Shadifar M. The frequency of cryptosporidiosis among gastroenteritic patients in western cities of Mazandaran Province (2007-2009). *Journal of Qazvin University of Medical Sciences & Health Services.* 2011;**15**(1):78-86.
 21. Cirioni O, Giacometti A, Drenaggi D, Ancarani F, Scalise G. Prevalence and clinical relevance of *Blastocystis hominis* in diverse patient cohorts. *Eur J Epidemiol.* 1999;**15**(4):389-93.