

Brief Communication

Clinical significance and prevalence of *Blastocystis hominis* in Van, Turkey

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ABSTRACT

Objectives: To determine the associated clinical symptoms and prevalence of *Blastocystis hominis* (*B. hominis*).

Methods: Stool samples of 50,185 patients (26,784 males and 23,401 females) who were received at the Parasitology Laboratory of Yuzuncu Yil University Faculty of Medicine, Van, Turkey in the last 5 years were inspected microscopically using saline and iodine-stained wet-mount preparations. Age, gender, and symptoms of patients were recorded and their significance was evaluated.

Results: The prevalence of *B. hominis* in the total sample was 0.54% (275/50185). Out of 275 infected patients, 143 (52%) were males, and 132 (48%) were female ($\chi^2=0.884$; $p=0.348$). The distribution of *B. hominis* infection was high in 7-13 aged children (34.9%) ($\chi^2=306.8$; $p=0.001$). Blastocystis was higher among symptomatic patients (70.2%) compared with asymptomatic patients (29.8%) ($\chi^2=107.13$; $p=0.001$). The most frequent clinical symptoms associated with the disease were abdominal pain (27.3%) and diarrhea (19.6%) followed by anorexia, fever, saliva, anal itching, and nausea.

Conclusion: *Blastocystis hominis* is considered a causative agent of human disease in patients with recurrent symptoms. Due to the significant risk for zoonotic transmission, molecular techniques must be used to determine the route and source of infection.

Saudi Med J 2015; Vol. 36 (9): 1118-1121
doi: 10.15537/smj.2015.9.12444

Blastocystis hominis (*B. hominis*) is the most common parasite that infects the gastrointestinal tract of humans and a wide range of animals, including mammals, birds, reptiles, and arthropods. It has a worldwide distribution and it is often reported as the most common intestinal protozoan. In developing countries, *B. hominis* has a higher prevalence (30-50%) in comparison with developed countries (1.5-10%).^{1,2} The high prevalence in developing countries is related to poor hygiene, and consumption of contaminated

food or water. The classic form that is usually seen in stool specimens varies in size from 6-40 μm , and is characterized by a large membrane bound central body. The cysts are the infective forms and 2 kinds of cysts are formed: thin walled and thick walled. The former type evidently contains schizonts and is possibly auto infective, whereas thick-walled cysts are responsible for external transmission via the fecal-oral route.^{1,2} Although it was first described approximately 100 years ago, its pathogenicity remains controversial. Several researchers consider that it is a commensal organism, others believe it is pathogenic. It has not yet been conclusively shown that the parasite is a causative agent of intestinal diseases, but it has been associated with nausea, fever, urticaria, vomiting, anorexia, diarrhea, cramps, flatulence, discomfort, abdominal pain, and it is also linked to irritable bowel syndrome (IBS).^{2,4} Illness maybe acute, or chronic with symptoms persisting for several years. Those living with poor sanitation, immigrants, travelers, and people in close contact with animals are susceptible to *Blastocystis*-associated disorders. Also in severe immunocompetent patients, a significant correlation was detected between *Blastocystis* and gastrointestinal symptoms.^{2,4,5} Diagnosis is made by detecting characteristic forms of the parasites in fecal samples. It may be difficult to find the parasites in wet mounts. Lugol's iodine and permanent-stained preparations of fecal smears with acid-fast, Giemsa, Field's and trichrome are the most applied methods. Of these, trichrome is the most popular, and the most sensitive stain compared with others.^{2,3} Because of the highest detection rate, a short-term in vitro culture technique must be preferred. The presence of 5 or more parasites in a microscopic field (X400), and the absence of other intestinal pathogens indicates the disease.^{1,4} The cyst forms of the parasite resistant to chlorine treatment survive at the high levels of the stomach acid, for approximately one month at room temperature. In this aspect, the prevalence of the disease is very high, and it appears in quite a wide range.² In this study, the clinical significance and prevalence rates of *B. hominis* were investigated to determine the significance of the disease.

Methods. This study comprised a retrospective survey of the laboratory records of 50185 patients

Disclosure. Authors have no conflict of interests, and the work was not supported or funded by any drug company.

(26784 males and 23401 females) who were suspected to have intestinal parasites presenting to the Parasitology Laboratory, Faculty of Medicine, Yuzuncu Yil University, Van, Turkey. Patients received at our institution between January 2010 and December 2014 were included in the study. Age, gender, and symptoms of the patients were recorded. Stool samples were inspected microscopically using saline and iodine-stained wet-mount preparations. The presence of 5 or more *B. hominis* in the microscopic field (X400) was evaluated as positive. The laboratory results sent to the clinicians included information regarding the density of *B. hominis*, and also other parasites. The patients' age group was categorized as 1-6 years, 7-13, 14-24, 25-44, and over 45 years of age. The differences were considered statistically significant when probability $p \leq 0.05$ was taken into consideration.

Results. The overall prevalence of *B. hominis* was 0.55% (275/50185). Of the 275 patients harboring *B. hominis*, 143 were male (52%) and 132 (48%) were female. There was a similar frequency in males and females, and the differences were not statistically significant ($\chi^2=0.884$; $p=0.348$). The distribution of infection in age groups was: 24 (8.7%) in 1-6; 96 (34.9%) in 7-13 years; 66 (24%) in 14-24; 51 (18.5%) in 25-44; and 38 (13.8%) in over 45 age. The rate was high in 7-13 aged children, and there was a significant difference between the prevalence of infection and age ($\chi^2=306.8$; $p=0.001$). The prevalence of *B. hominis* was significantly higher among symptomatic patients (70.2%) compared with asymptomatic ones (29.8%), ($\chi^2=107.13$; $p=0.001$). Most of the clinical symptoms were observed. The most common symptoms were abdominal pain (27.3%) and diarrhea (19.6%) followed by growth retardation, anorexia, fever, saliva, anal itching, and nausea (Table 1).

Discussion. *Blastocystis hominis* is the most prevalent protozoan parasite found in patients with gastrointestinal symptoms, and also in healthy individuals. The distribution of the parasite is worldwide, especially in tropical and subtropical countries. It has a wide variety of reservoirs, and these make people more vulnerable to the infection.^{1,2} Light microscopic examination of stool samples is the most common method of diagnosis. Identifying some forms of the parasite is difficult; for this reason, stained permanent smears and cultures are recommended. Trichrome staining is more sensitive compared with other staining methods, and the morphology is more clearly defined with this method. Due to lack of recognition of different morphologic forms of the parasite, several cases are

Table 1 - Symptoms associated with *Blastocystis* spp.

| Symptoms | % |
|--------------------|------|
| Abdominal pain | 27.3 |
| Diarrhea | 19.6 |
| Growth retardation | 9.0 |
| Anorexia | 8.7 |
| Fever | 8.7 |
| Saliva | 8.4 |
| Anal itching | 7.6 |
| Nausea | 7.6 |
| Dysuria | 6.2 |
| Vomiting | 5.8 |
| Chest pain | 5.8 |
| Constipation | 4.0 |
| Bloody diarrhea | 3.6 |
| Headache | 3.3 |
| Skin itching | 3.3 |
| Heartburn | 3.3 |
| Weakening | 2.9 |
| Listlessness | 2.5 |
| Cough | 1.8 |
| Halitosis | 1.1 |
| Dizziness | 0.7 |
| Hemoptysis | 0.7 |
| Skin rash | 0.4 |

overlooked. In this regard, the true prevalence of the infection is not known. A short-term in vitro culture technique increases the sensitivity of the detection and is the gold standard method.

To understand the real prevalence of the disease, a comprehensive parasitological examination must be carried out in all symptomatic and asymptomatic groups.^{2,4,6} In this study, we only conducted wet-mount stained with iodine, so the real prevalence may be too high.

Developing countries have a higher prevalence compared with developed countries. Also the prevalence widely varies in different regions of the same country. A higher prevalence was shown in communities with poor hygiene, lack of safe water supply and sewage system. However, infection was reported in all communities and different socioeconomic groups.^{2,3,7} *Blastocystis hominis* was found in Thailand (13.5%),⁸ 17.5% in Saudi Arabia,⁹ 25.7% in primary schoolchildren in Malaysia,⁷ and 32.6% in China.⁶ Also, higher prevalence rates were observed in European countries, such as Italy (13.6%).⁵ The positivity rates were found to be 0.96-56.3% in Turkey.¹⁰⁻¹³ In the present study, the infection rate of *B. hominis* was 0.55%. The prevalence is lower than the rates of previous reports carried out in Turkey, and also in other countries.^{10,13} This is significantly correlated with the diagnostic technique and age groups of inspected individuals.

There were different findings regarding the

relationship between age and gender with the *Blastocystis* infection. Qadri et al⁹ observed that the infection is mostly between the ages of 13-50 years with a 71.8% ratio, and 19.3% at ages over 50. In another study,¹¹ *Blastocystis*-positive patients were predominantly between 20-29 years old. Unlike this, it was significantly higher between the ages 0-19,¹⁰ and the age distribution was determined homogenous with no significant correlation.⁵ In this study, the infection rate was high in 7-13 years aged children (34.9%) and in 14-24 years aged teens (24%). Different results could be obtained because of the discussed age distribution in the studies. The prevalence of *Blastocystis* in males and females was approximately the same (1:1 ratio),^{9,11} or had no correlation.^{5,8,13} Li et al⁶ found a prevalence at 36.9% among females, and 28.2% positivity in males without statistical significance. In contrast to these studies, Alver and Tore¹³ found that 32.1% of *Blastocystis* positive patients were females and 67.9% of them males. Our findings support that gender is not a risk factor for the infection with 0.53% prevalence rates in males, and 0.56% in females.

There is no certain opinion to whether patients infected with *Blastocystis* are symptomatic or not. Qadri et al⁹ detected that the distribution was almost equal; 46.4% symptomatic and 53.6% asymptomatic. Some researcher asserted that asymptomatic carriers appear more than symptomatic ones.^{1,8,14} Ozcakir et al¹⁰ found only 11.2% of the *B. hominis* positive patients had gastrointestinal complaints, and 17.1% of them had allergies. Contrary, the prevalence detected was significantly higher among children with gastrointestinal symptoms in comparison with asymptomatic children.⁷ Kaya et al¹⁵ observed that the frequency rate of intestinal symptoms was 88.4% in the *B. hominis* cases. In this study, not like most research, 70.2% of patients were found symptomatic. As symptoms are nonspecific and they are not the result of the infection, the clinical diagnosis of *Blastocystosis* is unfeasible. More recently, there have been many contrasting reports suggesting *B. hominis* as a causative agent of some gastrointestinal symptoms such as, diarrhea, abdominal pain, cramps, fatigue, anorexia, constipation, flatulence, and nausea. Several studies suggest that *Blastocystis* is also linked to IBS.^{1,2} In most studies, the most frequently recorded symptoms are abdominal pain and diarrhea.^{2,7,9,15} Beside distention (32.6%),¹⁵ constipation (32.2%),⁹ vomiting (30.8%),⁷ and flatulence (21.7%)¹⁴ are commonly detected with this infection. Contrarily, Ozcakir et al¹⁰ observed diarrhea in a few patient (4.1%), and also allergies with a rate of 16.6%. Similar to previous studies, abdominal pain (27.3%) and diarrhea (19.6%) were the most common symptoms in the present study.

There are several limitations to our study. As the study was based on data collected retrospectively, results do not reflect the population's real prevalence.

In conclusion, *B. hominis* should be considered as a causative agent of human disease in patients with recurrent symptoms, especially when the parasite is present in large numbers in fecal specimens in the absence of other known pathogens. Disease is known to be prevalent in a range of domestic animals, and close contact with animals is a significant risk for zoonotic transmission. Molecular techniques must be used to determine the route and source of infection. To be protected from the disease, prevention and control measures must be taken including education and personal hygiene and sanitation.

Received 19th May 2015. Accepted 24th June 2015.

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