ISSN 1996-3351

Asian Journal of Biological Sciences

http://knowledgiascientific.com

Knowledgia SCIENTIFIC
A Place to Publish Outstanding Research

Asian Journal of Biological Sciences 5 (1): 57-61, 2012
ISSN 1996-3351 / DOI: 10.3923/ajbs.2012.57.61

Prevalence of *Blastocystis hominis* in Lorestan Province, West of Iran, 2010

[1,2]E. Badparva, [3]Y. Pournia and [4]Sh. Fallahi

[1]Department of Parasitology, Tarbiat Modarres University, Tehran, Iran
[2]Department of Parasitology, Faculty of Medicine, Lorestan University of Medical Sciences, Khorramabad, Iran
[3]Faculty of Medicine, Lorestan University of Medical Sciences, Khorramabad, Iran
[4]Department of Parasitology, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Corresponding Author: E. Badparva, Department of Parasitology, Faculty of Medicine, Lorestan University of Medical Sciences, Khorramabad, Iran Tel: +98 9161611993

ABSTRACT

Blastocystis is a zoonotic and protozoan parasite whose pathogenesis has been proven in many studies in recent decades. It is transmitted through the fecal-oral route and its prevalence rates differ in different countries and communities. This study was conducted to investigate the prevalence of gastrointestinal parasites, particularly *Blastocystis hominis*, in Lorestan province of Iran. In this study, 2,838 fecal samples along with completed questionnaires containing epidemiological questions were gradually collected in a year and examined in clinical laboratories throughout the province using the direct method (Lugol-Normal Saline) and concentration method (Formalin-Ether). The results were recorded in the lower part of the questionnaire designed for this purpose both qualitatively and, in case of positive results, quantitatively. The data were analyzed statistically and the samples infected with *Blastocystis hominis* were kept in a freezer for molecular examinations. Out of the 2838 fecal samples, 139 cases (5%) were infected with *Blastocystis hominis,* out of which 42 and 58% were the samples from urban and rural residents, respectively. Moreover, 35% of the infected individuals were females and 65% were males, showing a statistically significant difference. In terms of age group, city and occupation, the age group of 70-79, Boroujerd and ranchers had the highest prevalence rates with 8.3, 20 and 8.3%, respectively. The prevalence of *Blastocystis hominis* infection in the province was 5% and this parasite was the second most prevalent parasite after *Giardia lamblia*. Its high prevalence in ranching occupation can be attributed to the zoonotic feature of the parasite. However, its high prevalence in older people can be considered as the secrets of the parasite, so more studies are needed. Since the parasite is highly polymorphic, more knowledge and experimentations are needed for its exact diagnosis. Its diagnosis can affect epidemiological results because the parasite may be the cause of unknown diseases.

Key words: *Blastocystis hominis*, lorestan province, prevalence

INTRODUCTION

Blastocystis is a zoonotic, anaerobic and protozoan parasite found in the gastrointestinal system of humans and animals (Abe *et al*., 2003). Its human type is *Blastocystis hominis* that was recognized as a yeast in human stools in 1912 (Yoshikawa *et al*., 1998). In subsequent divisions, it is introduced as a protozoan of the stramenopiles, which are protozoa from the chromista division. Many of its unknowns have been revealed in recent decades (Tan, 2008). Various studies have

emphasized its potential pathogenetic power and its strong attachment to conA and HPA lectins of the host's intestinal wall as a virulence factor (Tan *et al*., 2008). It secretes cysteine proteinase to break secreted IgA in the intestine, resulting in the stability of the parasite (Hussein *et al*., 2008; Mirza and Tan, 2009). Various symptoms and abnormalities have been attributed to it including diarrhea, abdominal pain, bloating, fever, nausea, gastrointestinal cross, joint pain and skin irritation (Eroglu *et al*., 2009; Jones *et al*., 2009). However, since the parasite is found both in healthy people and patients, its pathogenesis is ambiguous (Puthia *et al*., 2005).

Blastocystis hominis is a highly polymorphic parasite with various forms including ameboid, vacuolar, granular and cystic and is reproduced through different ways including binary division, plasmotomy, sporogony, endodyogeny and germination, which are unique characteristics. These characteristics result from its genetic variety and lead to multiplicity of its life cycle (Tan and Suresk, 2007).

The parasite is transmitted through the fecal-oral route and through contaminated water or food (Jones *et al*., 2009). On the other hand, it is a zoonotic parasite that causes infection in animals such as swine, cattle and birds, which are sources for human contamination. The prevalence of this parasite varies in different countries, in different communities of a country and in different seasons (Rhongbutsri, 2005; Li *et al*., 2007). The rate is 1.5 to 10% in developed countries while it reaches 50% in developing countries (Su *et al*., 2009). This increased rate in developing countries is attributed to poor hygiene and consumption of contaminated water and food (Souppart *et al*., 2009). This study investigated the prevalence of gastrointestinal parasites, particularly *Blastocystis hominis*, in Lorestan province of Iran in 2010 to open a window into new studies.

MATERIALS AND METHODS

This cross-sectional, descriptive study was carried out on 2838 stool samples taken from people living in Lorestan province (west of Iran) via a multiphase cluster sampling to determine the prevalence of gastrointestinal parasites, particularly *Blastocystis hominis*. The stools were tested using the wet or direct method (Lugol-Normal Saline) and the concentration method (Formalin-Ether).

The researchers went to towns and cities of the province based on a time schedule. Then they provided the involved health officials with necessary education and facilities. The studied individuals were randomly selected based on a list of available families in health centers via a randomized cluster sampling method. Considering the capacity of the libraries, the health officials went to selected houses, collected the samples and coded the containers. A two-part questionnaire was completed for each person. The first part contained 13 epidemiologic-demographic items including gender, age, place of living, family population, employment, education, water supply, hygienic condition of living place, way of washing vegetables, presence of soap and way of using soap in lavatories. The second part of the questionnaire consisted of the results of laboratory tests such as qualitative results including presence or absence of parasites and quantitative results of each method including the mean of number of parasites in ten microscopic fields in positive cases.

The collected samples were sent to laboratories the following morning and were examined using the direct and concentration methods. The results were recorded in the lower part of the questionnaire both qualitatively and quantitatively. The samples containing *Blastocystis hominis* were kept in a freezer for molecular examinations and the questionnaires were delivered to the Statistics Unit for statistical analyses.

RESULTS AND DISCUSSION

Out of the 2,838 stool samples collected, the parasite *Blastocystis hominis* was found to be the second most prevalent parasite in the province with 139 positive cases (5%) after *Giardia lamblia* with 186 cases (6.7%). Forty two percent of the individuals infected with *Blastocystis hominis* were living in urban areas and 58% in rural areas. Moreover, 35% and 65% of the infected people were males and females respectively, showing a statistically significant difference. No significant relationship was found in terms of using or not using soap.

Most of the obtained data including the percentage of contamination in terms of age, occupation and prevalence in different areas of the province are presented in the Table 1-3.

This study investigated the prevalence of gastrointestinal parasites, particularly *Blastocystis hominis* as an unknown protozoan, in Lorestan province (west of Iran) in 2010 for the first time. The prevalence was found to be 5% and this intestinal parasite was found to be the second most prevalent parasite after *Giardia lamblia* with 6.7%. Present result was not consistent with the result of a study carried out in Tehran in which *Blastocystis hominis* was reported as the most prevalent parasite with a prevalence of 12.8% (Akhlaghi *et al*., 2009).

In addition to its exceptional characteristics in morphology, methods of reproduction and life cycles, the parasite possesses many other unique and unknown characteristics. For example, contrary to other parasites which have a fecal-oral transmission route (Dagei *et al*., 2008), the parasite is more prevalent in elderly individuals (Hussein *et al*., 2008; Stenzel and Boreham, 1996) and few negative effects of the parasite have been reported on growth indices in children (Ertug *et al*., 2007). In this study, as presented in Table 1, the highest (8.3%) and lowest (2.4%) rates were reported for the 70-79 age group and the under-10 age group respectively. This result is similar to the results in other areas of the world including a study in China, in which the highest rate was reported for the 60-year-old people and then those in the 10-17 age group (Li *et al*., 2007).

On the other hand, we know that *Blastocystis hominis* is a zoonotic protozoan parasite that is transmitted directly. Therefore, as proven in some studies (Rhongbutsri, 2005; Li *et al*., 2007), it is expected that the prevalence will be the highest in those who handle animals. In our study, the

Table 1: Percentage of *Blastocystis hominis* infection in terms of age groups

Age	<10	10-19	20-29	30-39	40-49	50-59	60-69	70-79
Tested cases	578	584	478	445	301	204	88	60
Positive cases	14	37	26	20	21	11	5	5
Percentage of infection	2.4	6.3	5.4	4.5	7	5.4	5.7	8.3

Table 2: Percentage of *Blastocystis hominis* infection in terms of occupation

Occupation	<6	Students	Workers	Employees	Housewives	Farmers	Ranchers	Unemployed
Tested cases	272	764	208	108	806	130	24	166
Positive cases	10	34	8	5	60	5	2	7
Percentage of infection	3.5	4.3	3.7	4.4	6.9	3.7	8.3	4.2

Table 3: Percentage of *Blastocystis hominis* infection in cities of lorestan province

City	Boroujerd	Sepiddasht	Aligoodarz	Alashtar	Khorramabad	Doroud	Kouhdasht	Poldokhtar	Azna	Nourabad	Total
Tested cases	533	96	265	167	559	292	303.0	262	173	154	2804
Positive cases	110	6	6	3	10	3	1.0	0	0	0	139
Percentage of infection	20	6.3	2.3	2	1.8	1	0.3	0	0	0	5

prevalence was the highest (8.3%) in ranchers compared with other occupations despite the lower number of the ranchers (Table 2) and it shows the zoonotic feature of the parasite

The prevalence of the parasite varies in different countries, even in different communities of a countries and different seasons (Rhongbutsri, 2005; Li *et al*., 2007; Su *et al*., 2009). It is known to be the resident of tropical and subtropical areas (Stenzel and Boreham, 1996). In this study, as presented in Table 3, the rates ranged from 0 to 20%. In addition, contrary to expectations, the lowest rate was reported for Poldokhtar as the hottest area of the province and the highest rate for Boroujerd as a relatively cold area in the province. Differences in prevalence rates in different countries and even communities depend on diverse factors including culture, health facilities, communications with other humans and animals, etc. However, it seems that the most important factor among epidemiological indicators in these cases is diagnosis and this issue relatively affected the results in our study. The reason is that the parasite is highly polymorphic with diverse forms and sizes and the majority of therapeutic and health centers and even diagnostic centers, in Iran ignore this parasite with proven pathogenesis. Therefore, the parasite has remained unknown. If necessary reforms happen, higher prevalence rates can be expected. It is recommended that positive steps should be taken to have the exact diagnosis of the parasite via applying experts and utilizing more sensitive diagnostic methods such as staining, culturing and molecular diagnosis, since the parasite may be the unknown pathogen of many diseases.

ACKNOWLEDGMENTS

We hereby thank Tarbiat Modarres University of Tehran for the financial support of the present study. We also appreciate the sincere help of Mr. Mokhayeri, Mr. Barkhordari and Mr. Sharafi from the Deputy for Health, Lorestan university of Medical sciences.

REFERENCES

Abe, N., Z. Wu and H. Yoshikawa, 2003. Zoonotic genotypes of *Blastocystis hominis* and restriction fragment length polymorphismanalysis of the small subunit ribosomal RNA gene. Parasitol. Res., 90: 124-128.

Akhlaghi, L., J. Shamsedin, A.R. Meamar, E. Razmjou and H. Oormazdi, 2009. Frequency of intestinal parasites in Tehran. Iran. J. Parasitol., 4: 44-47.

Dagei, H., O. Kurt, M. Demirel, I. Ostan and N.R. Azizi *et al*., 2008. The prevalence of intestinal parasites in the province of Izmir, Turkey. Parasitol. Res., 103: 839-845.

Eroglu, F., A. Gene, G. Elgun and I.S. Koltas, 2009. Identification of *Blastocystis hominis* isolates from asymptomatic and symptomatic patient by PCR. Parasitol. Res., 105: 1589-1592.

Ertug, S., S. Karkas, P. Okyay, F. Ergin and S. Oncu, 2007. The effect of *Blastocystis hominis* on the growth status of children. Med. Sci. Monit., 13: 40-43.

Hussein, E.M., A.M. Hussein, M.M. Eida and M.M. Atwa, 2008. Pathophysiological variability of different genotypes in experimentally infected rats. Parasitol. Res., 102: 853-860.

Jones, M.S., C.M. Whipps, R.D. Ganac. N.R. Hudson and K. Boroom, 2009. Association of blastocystis subtype 3 and 1 with patients from an Oregon community presenting with chronic gastrointestinal illness. Parasitol. Res., 104: 341-345.

Li, L.H. X.P. Zhang, S. Lv, L. Zhang, H. Yoshkawa and Z. Wu, 2007. Cross-sectional surveys and subtype classification of human Blastocystis isolates from four epidemiological setting in china. Parasitol. Res., 102: 83-90.

Mirza, H. and K.S. Tan, 2009. *Blastocystis* exhibits inter and intra-subtype variation in cysteine protease activity. Parasitol. Res., 104: 355-361.

Puthia, M.K., A. Vaithilingam, J. Lu and K.S.W. Tan, 2005. Degradation of human secretary immunoglobulin A by *Blastocystis*. Parasitol. Res., 97: 386-389.

Rhongbutsri, P., 2005. Seasonal prevalence of blastocystis hominis among patients attending Thammasat Chalermprakiat Hospital, Pathum Thani province, Thailand. J. Trop. Med. Parasitol., 28: 39-42.

Souppart, L., G. Sanciu, A. Cian, I. Wawrzyniak and F. Delbac *et al*., 2009. Molecular epidemiology of human blastocystis isolates in France. Parasitol. Res., 105: 413-421.

Stenzel, D.J. and P.F.L. Boreham, 1996. *Blastocystis hominis* Revisited. Clin. Microbiol. Rev., 9: 563-584.

Su, F.H., F.Y. Chu, C.Y. Li, H.F. Tang, Y.S. Lin and Y.J. Peng, 2009. Blastocystis hominis infection in Long-term care facilities in Taiwan: Prevalence and associated clinical factors. Parasitol. Res., 105: 1007-1013.

Tan, K.S.W., 2008. New insights on classification, Identification and clinical Relevance of *Blastocystis* SPP. Clinical. Microbiol. Rev., 21: 639-665.

Tan, T.C. and K.G. Suresk, 2007. Evidence of plasmotomy in *Blastocystis hominis*. Parasitol. Res., 101: 1521-1525.

Tan, T.C., K.G. Suresh and H.V. Smith, 2008. Phenotypic and genotypic characterization of *Blastocystis* hominis isolates implicates subtype 3 as a subtype with pathogenic potential. Parasitol. Res., 104: 85-93.

Yoshikawa, H., I. Nagano, Z. Wu, E.H. Yap, M. Singh and Y. Takahashi, 1998. Genomic polymorphism among *Blastocystis hominis* strains and development of subtype-specific diagnostic primers. Mol. Cell. Probs, 12: 153-159.