

# BLASTOCYSTIS HOMINIS INFECTION, A CAUSE OF HUMAN DIARRHEA

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**Abstract.** *Blastocystis hominis* has long been described as a non pathogenic protozoan parasite until recently when claims have been made that it can result in pathogenic conditions. Of the 729 stool samples (614 from survey and 115 from pediatric wards) examined, 18.1% of them were found to be positive for one or more intestinal protozoan cyst. The commonest was *Giardia intestinalis* (8.4%) followed by *Entamoeba coli* (7.1%) and *Entamoeba histolytica* (5.1%) in the normal children without symptoms of diarrhea. When diarrheic stools were examined, the commonest parasite encountered was *Giardia* (20.4%), followed by *E. coli* (15.9%) and *E. histolytica* (9.7%). *Blastocystis* was observed in 4.4% of the children who had diarrhea and 1.1% among the children taken from the normal population in the rural areas.

## INTRODUCTION

*Blastocystis hominis* was classified as a harmless intestinal yeast infecting man and primates. Its reclassification as a protozoan parasite has been widely accepted but its pathogenicity is clouded with controversy. The significance of *B. hominis* as a neglected cause of diarrhea was raised by Ricci *et al* (1984). Since then, its role in causing diarrhea has been reported widely (Markell and Udkow, 1986; Russo *et al*, 1988; Zierdt, 1991) and has been reported from USA (Doyle *et al* 1990; Sheehan *et al*, 1986), England (Casemore *et al* 1984), Thailand (Taylor *et al*, 1985), Zaire (Babcock *et al*, 1985), Yugoslavia (Henry *et al* 1986), Canada (Pikula, 1981), Egypt (Kain *et al*, 1987) and Sri Lanka (Dissanaike, 1993).

Several clinical studies on *B. hominis* has been carried out but the number of reports are few because of its low incidence and as such it is difficult to determine its pathogenicity. Most of the cases are not hospitalized, but symptomatic cases of blastocystosis have been reported (Zierdt, 1988).

This paper reports an epidemiological study of *Blastocystis hominis* infection from Malaysia and its possible role in causing diarrhea.

## MATERIALS AND METHODS

Stool specimens were collected from 729 children

whose ages ranged from 1-13 years. (391 boys and 338 girls). Single stool specimens were collected from two oil palm and rubber estates, 30km from Kuala Lumpur, situated in Selangor, Malaysia. The plastic bags for collection of stool was distributed one day prior to the actual collection of feces. Samples were returned to the laboratory and stored in a cold room (at 4°C) were all and examined within a week. Stools examined consisted of 614 samples obtained from surveys of parasitic infections among children who come from the rural areas of Selangor, situated 30km from Kuala Lumpur, Malaysia and 115 pediatric patients who were admitted for diarrhea. Fecal examinations were carried initially using the direct and formal ether sedimentation techniques to detect protozoan cysts. Semi diarrheic and watery stools were also stained by using the modified Ziehl-Neelsen technique but most were examined using iodine-stained preparation.

## RESULTS

Of the 729 stool samples collected, 18.1% of them were found to be positive for one or more intestinal protozoan parasite as shown in Table 1. The age distribution and gender of the children examined are in the same table. The most common protozoan parasite detected was *G. intestinalis* (8.4%) followed by *E. coli* (7.1%) and *E. histolytica* (5.1%). *Blastocystis hominis* (1.1%) was the least common parasite detected. The parasites were more common among the 1-6

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Table 1

Prevalence of intestinal protozoa among children by age and gender.

	Gender				Age						Total 729	
	Male		Female		1-6		7-9		10-13			
No. examined	391		338		304		197		228		729	
	No. + ve	%	No. + ve	%	No. + ve	%	No. + ve	%	No. + ve	%	No. + ve	%
	75	9.2	57	16.7	68	22.4	37	18.8	27	11.8	132	18.1
<b>Protozoa:</b>												
<i>E. histolytica</i>	21	5.3	16	4.7	14	4.6	14	7.1	9	3.9	37	5.1
<i>E. coli</i>	27	6.9	25	7.4	19	6.3	17	8.6	16	7.0	52	7.1
<i>G. intestinalis</i>	29	7.4	33	9.8	27	8.9	14	7.1	20	8.8	61	8.4
<i>I. butschlii</i>	4	1.0	5	1.5	2	0.7	5	2.5	2	0.9	9	1.2
<i>E. nana</i>	2	0.5	5	1.5	-	-	4	2.0	3	1.3	7	1.0
<i>B. hominis</i>	3	0.8	5	1.5	3	1.0	2	1.0	-	-	8	1.1
<i>T. hominis</i>	6	1.6	5	1.5	3	1.0	5	2.5	3	1.3	11	1.5

year age groups (22.4%) an least among the older children (11.8%). There was no significant difference between the genders.

Of the 113 diarrhea cases, 27.4% were found to be positive for intestinal protozoan parasites as shown in Table 2. The most common protozoan detected was *G. intestinalis* (20.4%) followed by *E. coli* (15.9%) and *E. histolytica* (9.7%). *Blastocystis* was detected in 4.4% of the children who were admitted to the pediatric ward of the Unversity Hospital, Kuala Lumpur. The overall prevalence rate for *Blastocystis* among normal and diarrheic children was only 1.1%.

## DISCUSSION

*Blastocystis hominis* has been classified as pathogenic by the Centers for Disease Control, USA and the College of American Pathologists require reporting of *B. hominis* in stool specimens. It is often associated with other protozoa like *E. histolytica*, but sometimes it may be the only organism present.

Table 2

Prevalence of intestinal protozoa among 113 pediatric diarrhea cases.

	No. positive	% positive
No. examined: 113	31	27.4
<b>Protozoa</b>		
<i>E. histolytica</i>	11	9.7
<i>E. coli</i>	18	15.9
<i>G. intestinalis</i>	23	20.4
<i>B. hominis</i>	5	4.4
<i>T. hominis</i>	6	5.4
<i>E. nana</i>	1	0.9
<i>I. butschlii</i>	1	1.8

Several researchers (Markell and Udknow, 1986; Russo *et al* 1988; Sheehan *et al*, 1986; Zierdt, 1991) have claimed that *B. hominis* is responsible for causing acute or chronic diarrhea. Recorded symptoms include cramps, vomiting, dehydration, abdominal pain, sleeplessness, nausea, weight-loss, inability to work, lassitude, dizziness, flatus, anorexia, pruritis, tenesmus and blood in stool (Zierdt, 1988). Sheehan *et al* (1986) reported that 8 of 19 patients showed increased eosinophilia. Most of the cases reported were self-limiting and symptoms appear and disappear in 1-3 days. Cases of mortality among apes kept in the zoos have been reported (Zierdt, 1988). Of the 8 cases of *B. hominis* in our study, three of them also had *E. histolytica* infection and five only had *B. hominis*. Five out of eight cases were associated with diarrhea which lasted between 2-3 days. In the absence of other parasites, *B. hominis* virulent strains may be responsible for the diarrhea. However, viral or bacterial pathogens could not be ruled out.

*B. hominis* cysts were readily recognized in saline preparation of stool samples. The cysts measures 5-15 µm in diameter with a large clear central vacuole sometimes called the central body.

There is evidence linking *B. hominis* with aggravated diarrhea among AIDS patients (Libre *et al*, 1989; Garavelli *et al*, 1988).

In an epidemiological study of *B. hominis* in Papua New Guinea, 54% of the population in a village were found to be infected but none of them showed evidence of pathogenicity (Ashford and Atkinson, 1992). This further supports other studies which claim that *Blastocystis* is not pathogenic (Casemore *et al*, 1984; Miller and Minshow, 1988; Taylor *et al* 1985; Senay McPherson, 1990). Of the eight cases of *Blastocystis* infection reported in this study, in five of them this parasite existed alone by itself without any other parasitic infections. The stool did not show any evidence of bacterial or fungal infection. The five cases were associated with diarrhea but the possibility of viral infection or allergic reaction cannot be dismissed. The pathogenicity of *B. hominis* should not be ruled out because it is possible that there are some strains of *B. hominis* which may be pathogenic and this may explain why some researchers have reported pathogenic conditions. Infection with *B. hominis* occurs mainly through fecal pollution and as such, it is a public health problem. Patients with a history of diarrhea should be investigated for *Blastocystis* as one of the pathogens during their investigation in the absence of other organisms.

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## REFERENCES

- Ashford RW and Atkinson EN. Epidemiology of *Blastocystis hominis* infection in Papua New Guinea: Age prevalence and associations with other parasites. *Ann Trop Med Parasitol* 1992; 86 : 129-36.
- Babcock D, Houston R, Kumaki D, *et al*. *Blastocystis hominis* on Kathmandu, Nepal. *N Engl J Med* 1985; 313 : 1419.
- Casemore DP, Armstrong M, Jackson TB. Clinical relevance of *Blastocystis hominis*. *Lancet* 1984; 1 : 1234.
- Dissanaike AS. *Blastocystis hominis*: An old organism with a new significance. *Ceylon Med J* 1993; 38 : 7-9.
- Doyle PW, Helgason MM, Mathias, RG, Proctor EM. Epidemiology and pathogenicity of *Blastocystis hominis*. *J Clin Microbiol* 1990; 28 : 116-21.
- Garavelli PL, Ors P, Scaglione L. *Blastocystis hominis* infection during AIDS. *Lancet* 1988; 2 : 1364.
- Henry MC, DeClegg D, Lokombe B, *et al*. Parasitologic observations of chronic diarrhea in suspected AIDS adult patients in Kinshasa (Zaire). *Trans R Soc Trop Med Hyg* 1986; 80 : 309-10.
- Kain KC, Noble MA, Freeman HJ, *et al*. Epidemiology and clinical features associated with *Blastocystis hominis* infection. *Diagn Microb Infect Dis* 1987; 8 : 235-44.
- Llibre JM, Tor S, Manterola JM, Carbonell C, Foz M. *Blastocystis hominis* chronic diarrhoea in AIDS patients. *Lancet* 1989; 2 : 221.
- Markell EK, Udkow MP. *Blastocystis hominis*: A pathogen or fellow traveller. *Am J Trop Med Hyg* 1986; 35 : 1023-6.
- Miller RA, Minshow BH. *Blastocystis hominis*: An organism in search of a disease. *Rev Infect Dis* 1988; 10 : 930-8.
- Pikula P. *Blastocystis hominis* and human disease. *J Clin Microbiol* 1987; 25 : 1981.
- Ricci N, Toma P, Furlani M, *et al*. *Blastocystis hominis*. A neglected cause of diarrhoea? *Lancet* 1984; 1 : 966.

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- Russo AR, Stone SC, Taplin ME, Snappes HJ, Doern CV. Presumptive evidence of *Blastocystis hominis* as a cause of colitis. *Arch Intern Med* 1988; 148 : 1064.
- Senay H, McPherson D. *Blastocystis hominis*: Epidemiology and natural history. *J Infect Dis* 1990; 162 : 987-90.
- Sheehan DJ, Rancher BG, McKittrick JC. Association of *Blastocystis hominis* with signs and symptoms of human disease. *J Clin Microbiol* 1986; 24 : 548-50.
- Sun T, Katz Z, Tanenbaum B, Schenone C. Questionable clinical significance of *Blastocystis hominis* infection. *Am J Gastroenterol* 1989; 84 : 1543-7.
- Taylor DN, Echeverria P, Blases MS, *et al.* Polymicrobial etiology of travellers diarrhoea. *Lancet* 1985; 1 : 381-3.
- Zierdt CH. *Blastocystis hominis*, a long misunderstood intestinal parasite. *Parasitol Today* 1988; 4 : 15-7.
- Zierdt CH. *Blastocystis hominis*-past and future. *Clin. Microbiol Rev* 1991; 4 : 61-79.