JOURNAL OF CLINICAL MICROBIOLOGY, Nov. 1989, p. 2407–2409
0095-1137/89/112407-03$02.00/0

Vol. 27, No. 11

Clinical Significance of *Blastocystis hominis*

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Received 20 April 1989/Accepted 17 July 1989

A total of 19,252 stool specimens from 12,136 patients were examined by direct microscopy and the ethyl acetate-Formalin concentration method during the last 2 years. All liquid specimens and those in which parasite identification was difficult or equivocal were also examined in trichrome-stained preparations. A total of 3,070 intestinal parasites were seen in 2,889 patients. *Blastocystis hominis* was found in fecal material from 647 patients (17.5%). A total of 132 cases (25.6%) were observed to be in association with other enteric pathogens. *B. hominis* in large numbers was present as the only parasite or with other commensals in 515 specimens from patients (79.6%). Of these patients, 239 (46.4%) had symptoms, the most common being abdominal pain (87.9%), constipation (32.2%), diarrhea (23.4%), alternating diarrhea and constipation (14.5%), vomiting (12.5%), and fatigue (10.5%). Forty-three (18%) of the patients were treated with metronidazole (0.5 to 1.0 g/day) because of recurrent symptoms and the presence of large numbers of *B. hominis* cells in repeated stool specimens. After 7 to 10 days of treatment, all patients became asymptomatic with negative stools on follow-up examinations for *B. hominis*.

Although the pathogenic potential of *Blastocystis hominis* in human enteric disease had been reported in the older literature (2, 3, 9, 15), most of the recent textbooks describe it as a commensal found frequently in fecal specimens (7, 10, 17). Despite occasional case reports since 1976 regarding its association with human disease (4, 6, 13, 18), many physicians and clinical microbiologists consider its presence in stool specimens to be of questionable significance (8, 11). Recently, Sheehan et al. (16) and Babcock et al. (1) described the association of human disease with the presence of *B. hominis* in stool specimens of several patients and emphasized the need for further studies to elucidate its role and effective therapies. Since we have observed *B. hominis* in stool specimens of 647 patients in the last 2 years, we decided to undertake a retrospective chart review of these patients. Our findings are presented in this report.

(This paper was presented in part at the 89th Annual Meeting of the American Society for Microbiology, New Orleans, La. [S. M. H. Qadri, F. Al-Dayel, and R. P. Williams, Abstr. Annu. Meet. Am. Soc. Microbiol. 1989, C334, p. 449].)

MATERIALS AND METHODS

A total of 19,252 fresh stool specimens from 12,136 patients at the King Faisal Specialist Hospital and Research Centre (KFSH&RC), Riyadh, Saudi Arabia, were examined for the presence of intestinal parasites. The fecal specimens were grossly examined for stool consistency. Watery or diarrheal specimens were examined microscopically within 10 to 20 min of their receipt in the laboratory by using saline and iodine-stained wet-mount preparations. Soft or formed stool samples were examined by these procedures within 6 h of receipt. All specimens were subsequently concentrated by the ethyl acetate-Formalin method. The laboratory report sent to the clinicians included information about numbers of *B. hominis* cells and other parasites as few, moderate, or many. Wheatley's modification of Gomori's trichrome stain was also performed on all liquid specimens and those in which identification of parasite(s) was difficult or equivocal.

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RESULTS

Over a 2-year period, 19,252 consecutive stool specimens from 12,136 patients were examined at KFSH&RC for the presence of intestinal parasites. KFSH&RC is a 500-bed tertiary-care referral hospital with admissions of 27,842 patients and an outpatient volume of 698,469 during the period of this study. Of the 2,889 patients with intestinal parasites, 647 had *B. hominis*. The medical charts of these patients were reviewed for the presence of other pathogens, pertinent laboratory findings, symptoms, underlying disease, therapy, and follow-up. *B. hominis* was found in association with other organisms in 359 patients (Table 1); 132 had potentially pathogenic protozoan and metazoan parasites, *Campylobacter jejuni*, and *Shigella flexneri*; 227 had commensals. The former group was excluded from further follow-up for obvious reasons of difficulty in interpreting the data in terms of attributing any symptoms to *B. hominis*.

Of the remaining 515 patients harboring *B. hominis*, the male-to-female ratio was about 1; and 8.9% of the infestations were in children and 19.3% were in patients over 50 years old (Table 2). No enteric symptoms were found in 55.6% of the patients. Large numbers (more than three to five organisms per 40× field) of *B. hominis* cells were found as the only pathogen in 107 of the 239 patients with symptoms and in association with nonpathogenic parasites in 132 of these patients. The most common symptom was found to be abdominal pain, followed by constipation, diarrhea, and others (Table 3). Medical chart review showed that eosinophilia (9 to 11%) was present in 22 of these patients. A total of 71 patients had an underlying disease or condition, including duodenal ulcer (26 patients), leukemia (18 patients), ulcerative colitis (17 patients), kidney transplant (3 patients), peptic ulcer (3 patients), breast cancer (2 patients), and bleeding hemorrhoids (2 patients). Endoscopy in a 26-year-old female patient was suggestive of *Campylobacter* infection or giardiasis. However, *B. hominis* was the only organism detected in five different specimens.

The presence of large numbers of *B. hominis* cells alone in three to five repeated stool specimens, persistence or recurrence of symptoms, and eosinophilia in 43 of the symptomatic patients led to the administration of metronidazole

TABLE 1. *B. hominis* in association with other microorganisms

Microorganism	No. of patients
Pathogens	132
Giardia lamblia	71
Entamoeba histolytica	19
Schistosoma mansoni	18
Enterobius vermicularis	7
Dientamoeba fragilis	6
Ascaris lumbricoides	4
Campylobacter jejuni	5
Shigella flexneri	2
Commensals	227
Entamoeba coli	104
Endolimax nana	69
Chilomastix mesnili	27
Entamoeba hartmanni	16
Iodamoeba buetschlii	8
Dicrocoelium dendriticum	3

(250 to 500 mg twice a day for 7 to 10 days). This resulted in the resolution of symptoms, with the stools becoming negative for *B. hominis* on follow-up examination in all 43 patients over a period of 3 to 6 months.

DISCUSSION

Like *Giardia lamblia* of 30 years ago, *B. hominis* has been traditionally regarded as a harmless parasite of humans and has not found it easy to have itself recognized as a human pathogen. Recent interest in its clinical significance has resulted in sporadic reports over the last 12 years (4, 6, 13, 18). Phillips and Zierdt (12) in 1976 reported the pathogenic potential of *B. hominis* in humans and gnotobiotes, and this was followed by a report of two cases of mild persistent diarrhea in Italy (13). Although incidence rates of 12.2% in Southern California (6), 16% in New York (16), 10% in Nepal (1), and 14.1% in Yugoslavia (Z. P. Pikula, Letter, J. Clin. Microbiol. **25**:1581, 1987) have been found for *B. hominis*, only 1 of the 2,000 specimens examined in North Wales (4) was positive for *B. hominis*. Of the 12,136 patients examined in this series, 647 (5.3%) had *B. hominis*, surpassed only by *Entamoeba coli* (9.1%) and *Endolimax nana* (5.8%).

Garcia et al. (6) reported that 61% of their positive specimens had few cells of *B. hominis*, 29% had moderate numbers, and 10% had many organisms. At KFSH&RC, we found that 21, 24, and 55% of specimens had few, moderate, and many organisms, respectively. Sheehan et al. (16) enumerated *B. hominis* cells and found that 43 (69%) of 62 patients had five or more cells per 40× field. Although our method of enumeration was semiquantitative owing to this being a retrospective study, we found that 89% of our patients with signs and symptoms of enteric disease had "many" organisms, compared with 82.6% in the series of Sheehan et al. (16).

TABLE 2. Sex and age distributions and presence of symptoms in patients with *B. hominis* without nonpathogenic parasites

Characteristic	No. (%) of patients
Total	515
Male	226
Female	289
Age (yr)	
<12	46 (8.9)
13–50	370 (71.8)
>50	99 (19.3)
Organism(s)	
Commensals	237 (46.1)
B. hominis alone	278 (53.9)
Symptom(s)	239 (46.4)
Plus commensals	132 (25.6)
Plus *B. hominis* alone	107 (20.7)

TABLE 3. Distribution of symptoms in 239 patients with *B. hominis* with or without commensals

Symptom	No. (%) of patients
Abdominal pain	210 (87.9)
Constipation	77 (32.2)
Diarrhea	56 (23.4)
Alternating diarrhea and constipation	35 (14.5)
Vomiting	30 (12.5)
Fatigue	25 (10.5)
Anorexia	13 (5.4)
Nausea	9 (3.7)
Headache	9 (3.7)
Food intolerance	8 (3.3)
Depression	8 (3.3)
Flatus	4 (1.7)

Garcia et al. (6) observed that 24 (66.6%) of 36 patients had enteric symptoms, consisting mainly of diarrhea (79%), abdominal pain (58%), nausea (29%), and cramps (29%). Of the 23 patients with high *B. hominis* counts in feces in another series, 19 (82.6%) had symptoms (16), with abdominal discomfort (79%) being the most frequent complaint, followed by anorexia (53%), diarrhea (52%), and flatus (52%). Excluding the specimens containing known human pathogens, 239 (46.4%) of the 515 patients in our study had signs and symptoms of human disease. Eighty-nine percent of these patients had large numbers of *B. hominis* cells in the stools. As in the study of Sheehan et al. (16), the most frequent symptom was abdominal pain (88%). However, in our patients the second most common complaint was constipation (32%), followed by diarrhea and constipation (15%) and others.

Despite the presence of symptoms in 239 patients with *B. hominis* alone or in association with commensals, only 43 patients were treated with metronidazole. Resolution of symptoms accompanied by the absence of *B. hominis* cells in stool on follow-up examinations in all cases resulted after 7 to 10 days of therapy. Similar responses to metronidazole in four patients were described in the recent literature (5, 6, 14, 18).

Our study supports the emerging view that *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. Until recently, our laboratory reports sent to clinicians of harmless intestinal parasites, such as *Entamoeba coli*, *Chilomastix mesnili*, and others, included the statement that "the organism(s) reported are generally considered as non-pathogenic." We have discontinued this practice for *B. hominis*.

ACKNOWLEDGMENTS

Thanks to Peter B. Herdson for critical review of the manuscript, to Mohammed Shafi and Mohammed Hariri for a few chart reviews, and Erlinda M. Umali for secretarial assistance.

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