Blastocystis Hominis infection and Its Relation with Other Intestinal Parasites among Outpatients, Sohag, Egypt

M.A. Elnazer (1) – M.A. Shatat (2) – E.Kh. Omran (3) – N.M. Ali (2) – M.A. Ibrahim (2)- N. A. Mohammed (4).

1 Medical Parasitology, Faculty of Medicine, Assuit university
2 Medical Parasitology, Faculty of Medicine, Al-Azhar university, Assuit branch
3 Medical Parasitology, Faculty of Medicine, Sohag university
4 Public Health and Community Medicine, Faculty of Medicine, Sohag University

Abstract

Intestinal parasites have a worldwide distribution, mainly in regions with precarious socio-economic and hygiene conditions**.** *Blastocystis* spp. is an anaerobic enteric protozoan inhabits human intestinal tract. *Blastocystis hominis* elicits a big controversy about its pathogenicity and its relation to bowel disease conditions. Our aim for this work is to determine the frequency of *Blastocystis hominis* infection among outpatients attending Ministry of Health hospitals and units in Sohag City and if there is a relation between *Blastocystis hominis* and other intestinal parasitic infections. The present research involved 150 cases from outpatient clinics of randomly selected hospitals and units in Sohag City from June 2016 to January 2017. Fresh stool samples were gathered and examined. Thirty-three samples (22%) were positive for parasitic infection, of whome, only 25 cases (75.8%) were positive for *B. hominis* whether single or mixed with other parasites. Single *B. hominis* infection represented 36% of positive cases. Out of 25 cases infected with *B. hominis*, 4 cases had mixed infection with *G. lamblia* (16%) (P-value = 0.027) and 10 cases had combined infection with *E. coli* (40%) (P-value < 0.001). In conclusion, 33 cases had parasitic infections of whom, 25 cases were positive for *B. hominis*. *G. lamblia* and *E. coli* were more common with *B. hominis* than other parasitic infection. This might be attributed to symmetry in genetic characters or the need for the same environmental conditions. To confirm this relation and its reasons we need further investigations.

Key words: *Blastocystis Hominis*, Intestinal Parasites, enteric protozoan, mixed parasitic infection.

Introduction

Infections caused by intestinal protozoa and helminths are estimated to affect 3.5 billion people globally, causing disease in approximately 450 million people, most of them are children (Schuster and Chiodini 2001)**.**

Blastocystis spp. is an anaerobic, cosmopolitan, eukaryotic, and enteric protozoan that inhabits human intestinal tract (Nissapatorn et al., 2007). *B. hominis* was revealed by a Russian physician, Fedor Aleksandrovich Lesh in 1870 (Sukthana 2001), Brumpt had chosen the name *B. hominis* in 1912 (Zierdt 1991).

B. hominis is a genus of single-celled protozoan belonging to a group of organisms identified as the stramenopiles (also named Heteroknots) that include water molds, algae, and diatoms (Yoshikawa et al., 2007)**.**

It is identified as a globally distributed non-pathogenic human intestinal protozoan parasite, however, its pathogenic potential is questionable (Stenzel and Boreham 2001)**.** A true *B. hominis* pathogenic status is yet

controversial, while it was detected in patients with gastrointestinal manifestations mainly. Furthermore, *B. hominis* is usually found in people who report no symptoms and most cases might be asymptomatic (Amato Neto et al., 2003).

B. hominis infection is more common in developing countries in the tropical and subtropical regions (Keystone 1995). Different surveys have exhibited that the infection rate can vary from 1.6% in industrialized countries to > 50% in developing countries (Stenzel and Boreham 1996). It was frequently detected among food handlers (Fathy 2011). Prevalence of *B. hominis* was eight percent in symptomatic and four percent in asymptomatic food handlers in Egypt (Sadek et al., 1997). Additionally, a study accomplished in Southern Brazil observed that out of 131 positive cases, *B. hominis* (28%), *Entamoeba histolytica / dispar* (10%) and *Giardia duodenalis* (8%) were detected in food handlers (Takizawa et al., 2009).

B. hominis has a heterogeneous species (Carbajal et al., 1997), aside from morphological heterogeneity, *Blastocystis* is antigenically and genetically dissimilar(Tan et al., 2002). Genetic diversity between *B. hominis* and other *Blastocystis* spp. has been considered through random amplified polymorphic DNA (RAPD) and restriction fragment length polymorphism (RFLP) examination of PCR-amplified small-subunit (SSU) r RNA (Abe et al., 2003).

Although the pathogenic effect of *B. hominis* in human morbidity is often considered as controversial, a systemic survey of researches performed by 11 infectious disease specialists from nine countries, found that > 95% of papers published 10 years ago identified it as causing morbidity in immunocompetent individuals (Boorom et al., 2008).

Our aim for this work is to determine the frequency of *Blastocystis hominis* infection among outpatients attending Ministry of Health hospitals and units in Sohag City and if there is a relation between *Blastocystis hominis* and other intestinal parasitic infections. This gives clues to more specific works about the impact of treatment of this parasite alone, by changing intestinal flora pattern or the pH, on the other related intestinal parasites.

Materials and Methods

A total of 150 stool samples were gathered from patients attending outpatient clinics of randomly selected Ministry of Health (MOH) hospitals and units in Sohag City from June 2016 to January 2017. A written consent was obtained from the donors after they were informed about the nature of the test. Detailed history was taken including age, sex, and residence, loss of weight, diarrhea and abdominal pain.

Fresh stool samples were collected in clean, dry, sterile, plastic containers, labelled and examined as fresh as possible or stored at 2-8ºC until examined. If the material was stored, 10 % formalin was used as preservative. Stool samples were examined macroscopically for the gross appearance (Consistency, Colour, odour, presence of blood or mucus and presence of any macroscopic parasites). Microscopic examination by direct saline wet mount, iodine wet mount, formol-ether concentration technique and simple flotation methods were done (Garcia 2009) by low and high power for eggs, larvae and protozoa.

Statistical analysis: Data was organized, tabulated and statistically analysed by SPSS software statistical

computer package version 22 (SPSS Inc, USA)

Results

The present research was performed on 150 patients, out of them, only 33 cases (22%) were positive for parasitic infection, and 117 cases (78 %) were negative (table 1).

Among the 33 cases harbouring parasites, only 25 (75.8%) cases had *Blastocystis* infection while the other 8 (24.2%) cases were negative for *Blastocystis* (table 2). Out of the 25 cases, only 9 (36%) cases had single *Blastocystis* infection, and 16 (64%) cases had mixed infection (table 3).

Concerning the relation between *B. hominis* and other intestinal parasites, we have found some relations which were proven statistically presently and in some previous literature. *G. lamblia* was positive in 16% of cases suffered from *Blastocystis* infection compared to 3.2% of patients who were negative for *Blastocystis* infection (p-value = 0.027) (figure 1). *E. coli* was positive in 10 (40%) out of 25 *Blastocystis* positive cases compared to 4% of patients who were negative for *Blastocystis* (P-value <0.001) (figure2).

E. histolytica was positive in 4% of *Blastocystis* positive cases and 0.8% of *Blastocystis* free cases (P-value = 0.306). *H. nana* was found positive with *Blastocystis* only in 1 case out of 25 (4%) (p-value = 0.167) (table 4).

Table (1): parasitic infection among the infected cases (N. = 150).

Infection	No. (%)
Positive	33 (22%)
Negative	117 (78%)
Total	150 (100%)

Table (2): The frequency of *Blastocystis* infection among the infected cases (N. = 33).

Blastocystis	No. (%)
Positive	25 (75.8%)
Negative	8 (24.2%)
Total	33 (100%)

Table (3): Type of infection among *Blastocystis* cases (N. = 25).

Infection	No. (%)
Single infection	9 (36%)
Mixed infection	16 (64%)
Total	25 (100%)

Table (4): The relation between *Blastocystis* infection and infection with other parasites among infected patients(N=150).

Parasite	*Blastocystis* infection		P-value**
	Positive (N= 25)	Negative (N= 125)	
G. lamblia			
Positive	**4 (16%)**	**4 (3.2%)**	**0.027***
Negative	**21 (84%)**	**121 (96.8%)**	
E. coli			
Positive	**10 (40%)**	**5 (4%)**	**< 0.001***
Negative	**15 (60%)**	**120 (96%)**	
E. histolytica			
Positive	**1 (4%)**	**1 (0.8%)**	0.306
Negative	**24 (96%)**	**124 (99.2%)**	
H. nana			
Positive	**1 (4%)**	**0 (0.0%)**	0.167
Negative	**24 (96%)**	**125 (100%)**	

*** Statistically significant** **** P- value was calculated by Fisher's Exact Test**

Figure (1): The relation between *Blastocystis* infection with *G. lamblia* infection among the infected cases (N=150).

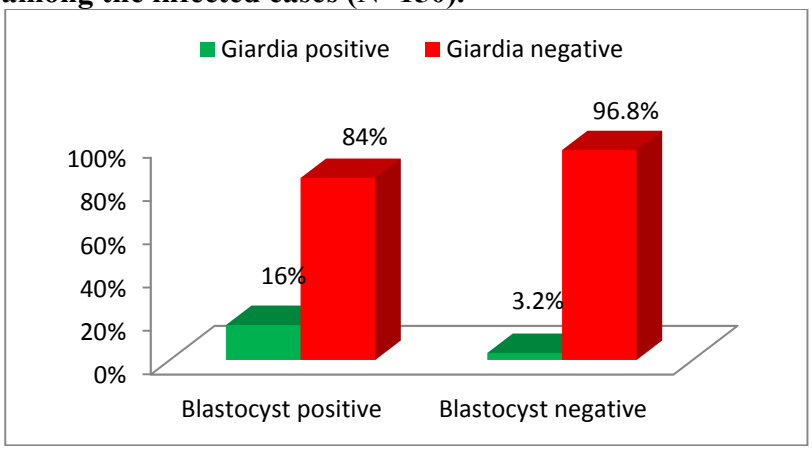
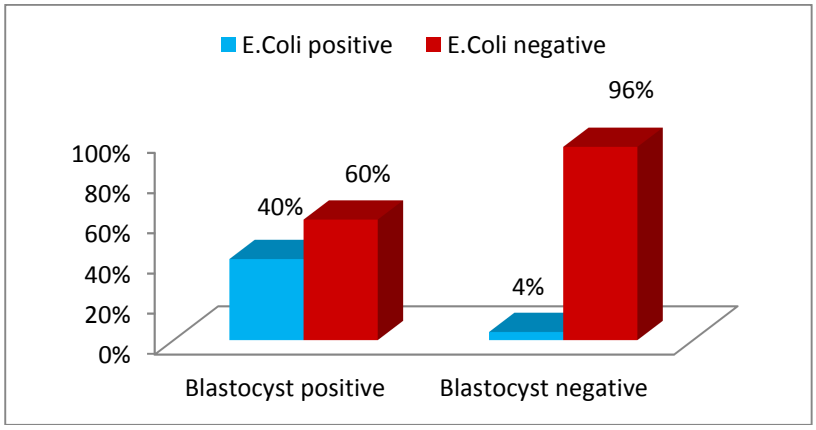


Figure (2): The relation between *Blastocystis* infection with *E. coli* infection among the infected cases (N=150).



Discussion

The present research included 150 patients attended outpatient clinics of randomly selected Ministry of Health (MOH) hospitals and units in Sohag City. The frequency of *B. hominis* infection among the participants was 25 out of 150 patients (16.7%), which is higher than the results of (Abdel-Hafeez et al., 2012) who reported that the prevalence of *B. hominis* in Minia district, Egypt was (7.2%) of immunocompetent patients and (12.1%) of immunosuppressed patients, and lower than the findings of (Alsirieti et al., 2006) in Libya who reported that the prevalence of *B. hominis* was (22.1%).

The difference in *B. hominis* infection rates in different countries can be attributed to the difference in socio-economic standard, health education, personal hygiene, overcrowding and human excreta sanitary disposal. This suggestion is supported by previous reports about the prevalence being higher in developing countries. The literature has reported that *B. hominis* has a global distribution, mostly in developing countries as the prevalence is greater (approximately 30 to 50%) than those reported in developed countries (Stenzel and Boreham 1996, Tan et al., 2002). Additionally, factors concerning immunity can affect the prevalence of infection. Patients with suppressed immunity and positive for *B. hominis* infection were presented with diarrhea and other gastrointestinal symptoms (Brink et al., 2002).

Concerning the relation between *B. hominis* and other intestinal parasites, we have found some relations which were proven statistically and in some previous literature. Out of 25 cases infected with *B. hominis* there were 4 cases had mixed infection with *B. hominis* and *G. lamblia* (16%) (P-value = 0.027). This agrees with the study accomplished in Minia, Egypt by (Abdel-Hafeez et al., 2012) who found that both *B. hominis* and *G. lamblia* infections were detected in 17.6%. Another study performed by (Shehata and Hassanein 2015) in Alexandria, Egypt exhibited that 8.5% of the participants had *B. hominis* with *G. lamblia* infection. Higher proportions were found by (Ramírez et al., 2017) in Colombia who reported that mixed *B. hominis* and *G. lamblia* infection constituted

23.1% and (Bayoumy et al., 2010) in Egypt who reported that the associated *B. hominis* and *G. lamblia* infection represented 27.3%.

Out of the 25 cases infected with *Blastocystis*, there were 10 (40%) cases had concomitant infection with *E. coli* (P-value < 0.001). This agrees with a study performed in Parana, Brazil by (Takizawa et al., 2009) who found that the combined *B. hominis* with *E. coli* infection represented 36%. This finding is much higher than the result of (Shehata and Hassanein 2015) in Alexandria, Egypt who reported that concomitant *B. hominis* and *E. coli* infection constituted 2.5% of respondents. In contrast, a study done by (Ramírez et al., 2017) in Colombia clarified that 55% of the participants had concomitant *B. hominis* and *E. coli* infection.

In the present study, 4% of cases were infected with *B. hominis* and *E. histolytica* (P-value = 0.306). This agrees with a study accomplished by (Shehata and Hassanein 2015) in Alexandria, Egypt who reported that 5.5% of patients had mixed *B. hominis* and *E. histolytica* infection. Another study performed by (Licea et al., 2003) viewed that only 2% had *B. hominis* with *E. histolytica* while, Abdel-Hafeez et al., (2012) reported that the association of *B. hominis* with *E. histolytica* represented 24.6%.

There was 1 case who had mixed infection of *B. hominis* and *H. nana* (4%) out of the 25 cases positive for the parasite (P-value = 0.167). This is in line with a study conducted in Dakahlia Governorate, Egypt by (El Shazly et al., 2006) who found that concomitant *B. hominis* and *H. nana* infection represented 3.9%. This finding is higher than that of (Ramírez et al., 2017) in Colombia as only 0.8% were positive for both *B. hominis* and *H. nana*. On the contrary, (Licea et al., 2003) found that both *B. hominis* and *H. nana* were detected in 8%. these differences may be attributed to the different localities.

Conclusion

The present study was performed on 150 patients, those who were positive for parasitic infection were 33 (22%) cases of whom only 25 (75.8%) cases were infected with *Blastocystis*. Out of the 25 cases, only 9 (36%) cases had single *Blastocystis* infection, and 16 (64%) cases had mixed infection. There is a significant relation between *B. hominis* with *G. lamblia* and *E. coli* and this means that the infection with *G. lamblia* or *E. coli* is common with *B. hominis* than other parasitic infection. This may be attributed to symmetry in genetic characters of these parasites or may result from the need to the same environmental conditions. To confirm this association and its reasons we need further investigations with PCR- based methods in the future.

Conflict of Interest:

The authors declare that they have no conflict of interest.

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