



Full Length Research Paper

Detection of *Blastocystis hominis* in patients with neoplasms undergoing chemotherapy or radiation therapy.

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This study was performed to estimate the prevalence of *Blastocystis hominis* in cancer patients undergoing treatment recruited from the Clinical Oncology Department, Cairo University. Two hundred candidates were chosen and divided into four groups. Group A: 50 patients with haematological malignancies treated with chemotherapy. Group B : 50patients with solid organ tumors treated with chemotherapy. Group C: 50 patients with solid organ tumors treated with radiotherapy. Group D: 50 apparently healthy subjects not known to have malignancy but having G I T complaints were included as control group. Stool Samples collected from all groups were subjected to different copro-parasitological methods including, direct stool examination Stool culture and modified Trichrome stain (MTS). In this study, *Blastocystis hominis* showed to be the most prevalent protozoon in neoplastic patients (26%). Culture on Jone's medium revealed much higher sensitivity in detecting the protozoon (57 cases which constituted 28.5% of the candidates) Again, in this work, infection rates were higher in Group B patients having solid organ tumors and treated with chemotherapy (32%).In this work, it was found that radiation therapy might have caused irreversible damage while chemotherapy probably resulted in reversible cell jeopardy .This study could be of vital importance in endemic areas, where routine survey for parasitic diseases especially opportunistic parasites and protozoa should be done in cancer and immune suppressed patients.

Keywords: Haematological malignancies, solid organ tumors, chemotherapy, radiotherapy, *Blastocystis hominis*

INTRODUCTION

Treatment of cancer patients with chemotherapeutic agents predisposes to dysfunction of the immune system in many ways. Many of these agents damage the bodies' anatomical barriers such as the skin and mucous membranes. Others cause damage of all rapidly dividing

cells including blood cells or cause suppression of the bone marrow (Zembower, 2014). Treatment with radiation, even if administered to limited target volume, proved to cause immune dysfunction due to a decrease in T and B lymphocytic counts in peripheral blood. Again, splenic and lymph nodes radiation can depress cell-mediated immunity and antibody production (Lee et al., 2010). Parasitic infections are one of the major public health problems worldwide particularly in developing

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countries. Due to suppression of the immune response in cancer patients, some of these infections can be more hostile and life threatening (Wassef, 2016). *Blastocystis hominis* is an enteric protozoan parasite with zoonotic potential, it is one of the most common parasites colonizing the human gut, with incidence ranging between 10% of the inhabitants in developed countries and 50% in developing countries (Tan et al., 2006).

The clinical features of illness which have been attributed to *Blastocystis spp* might include nausea, anorexia, abdominal pain and acute or chronic diarrhea (Jones et al., 2009). *Blastocystis spp* have often been associated with irritable bowel (IBS)-like symptoms (Jimenez-Gonzalez et al., 2012). Another study, suggested that immunosuppression plays an important role in the display of clinical symptoms (Tan, 2008).

MATERIAL AND METHODS

One hundred and fifty candidates attending the Clinical Oncology Department Kasr El Einy Hospital Cairo University and receiving chemo or radiotherapy, were divided into 3 groups: Group A: 50 patients with haematological malignancies (leukaemias, lymphomas or multiple myelomas) treated with chemotherapy. Group B: 50 patients with solid organ tumors treated with chemotherapy. Group C: 50 patients with solid organ tumors treated with radiotherapy. A fourth Group D: 50 patients attending out-patient clinic of Theodore Bilharz research institute (T B R I) not suffering any malignancy but presenting with various gastro-intestinal complaints referred to as control group.

Ethical consideration

The protocol of this study was approved by the head and staff members of medical parasitology department and head of clinical oncology department Kasr Al-aini faculty of medicine, Cairo university, as well as approval of the ethical committee of clinical oncology department. In addition this study was approved by the ethical committee at Theodore Bilharz Research Institute. Data and sample collection were performed after obtaining the verbal consent of the subjects included in this study. Participants with positive results were informed through their physician to receive adequate treatment.

Sampling and data collection

Fresh fecal specimens were collected from all the study groups of patients. Faecal samples were collected in dry, clean wide mouth plastic containers with tight fitting lids. Each container was labeled with the patient's name, identification number and date of collection. Each sample

was examined using different copro-parasitological methods i. A small part of specimen was examined microscopically by direct wet smear ii. Part for microscopic examination of samples prepared by using Formal-ether concentration technique .iii. Part for permanently stained smears using modified Trichrome stain (M T S). iv. Part was directly cultured on Jones' media and incubated at 37°C incubator and then microscopically examined after 48 and 72 hours for the growth of *Blastocystis hominis*.

RESULTS

In the present study, *Blastocystis hominis* was the most commonly found parasite. Its presence was investigated by several diagnostic methods. By wet saline technique 9 cases (4.5%) were detected. This prevalence increased to 12 cases (6%), when using Formol-acetate concentration technique A higher value of 24 cases (12%) was detected while using the MTS method. Finally, culture on Jones' medium gave a much higher sensitivity in detecting *Blastocystis hominis* 57 cases (28.5%).

The highest prevalence of *Blastocystis hominis* was found in group D (36%). However, no statistically significant difference was recorded between different groups. Number and percentages of positive cases in each group are represented in table 2.

DISCUSSION

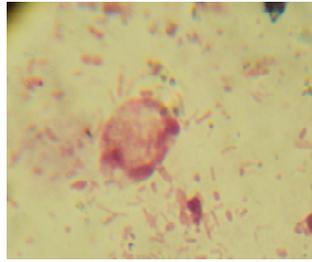
The results of this work, indicated the superiority of the culture method than other procedures undertaken to detect *Blastocystis hominis* in stool. This finding could be attributed to the clearer field that made detection easier in addition to multiplication of the parasite in culture thus increasing its number. Many researchers highlighted the value of in vitro cultivation for the diagnosis of Blastocystis and its superiority to other staining techniques (Moussa, 2009, Dogruman et al., 2010).

In this study, *Blastocystis hominis* was detected in 57 out of the 200 participants (28.5%). This goes with the previous findings of Boorom et al (2008) and Tan (2008). The authors stated that the prevalence of *Blastocystis hominis* is higher than that of other intestinal parasites. Berger (2014) reported different prevalence rates which reached 49.6%. Several studies from Africa showed *Blastocystis hominis* infection to be at a higher rate in HIV-positive patients, than in negative controls. This shows that it is an important pathogen in the immunocompromised patients. On the other hand individuals of group D also yielded a high percentage of infection denoting that immunocompetent patients are also vulnerable to this infection.

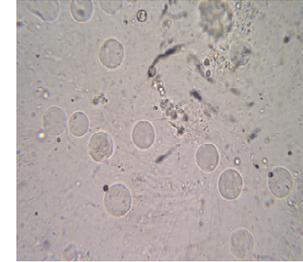
In the present study, infection rates were higher in Group B patients harboring solid organ tumors and given



Blastocystis hominis from positive stool specimens by direct examination using iodine



Blastocystis hominis from positive stool specimens using Modified Trichrome Stain



Blastocystis hominis from positive cultured stool specimens

Table 1 Positive case of *Blastocystis hominis* detected by different diagnostic techniques and prevalence of opportunistic parasites in cancer patients from NEMROCK

Method	Wet mount	Formol Ether	MTS	Culture
Number	9	12	24	57
Percentage %	4.5%	6%	12%	28.5%

Table2 Prevalence of *Blastocystis hominis* in control and cancer cases and prevalence of opportunistic parasites among cancer patients from NEMROCK

Case Groups	Positive		Negative	
	Number	Percentage %	Number	Percentage %
Group A	12	24%	38	76%
Group B	16	32%	34	68%
Group C	11	22%	39	78%
Group D	18	36%	32	64%
Total	57	28.5%	143	71.5%

chemotherapy (32%). This goes with the previous findings of Steer (2007) who stated that the incidence of is increased in patients with Duke's A,B,C colorectal carcinoma (53%). This finding may support the theory that *Blastocystis hominis* may play a role in the development of colorectal carcinoma

Previous studies in Egypt reported different prevalence rates which varied from 4%.(Sadek et al.,1997) to 49.6%(Berger,2014).There was no significant statistical difference between both genders, yet patients aged 41-50 years old were the most infected(43%). A higher rate of infection occurred in patients living in rural areas. This finding is in accordance with Nimri and Meqdam,(2004),who reported that transmission and prevalence of *Blastocystis hominis* infection are associated with the interaction of mainly socioeconomic status, occupational and personal hygiene pointing to farmers living in rural areas where they live closely to animals thus are at a higher risk of acquiring Blastocystosis .

In conclusion, this study could be of vital importance in endemic areas where routine survey for parasitic diseases especially opportunistic parasites and protozoa,

should be done in cancer and immunosuppressed patients.

REFERENCES

- Berger S (2014). *Blastocystis*. Infectious diseases of Egypt E-book. Gide on informatics, Inc. p.45-47.
- Boorum KF, Smith H, Nimri L, Viscogliosi E, Spanakos G, Parkar U and Jones MS (2008). Oh my aching gut: irritable bowel syndrome, *Blastocystis*, and asymptomatic infection. Parasit Vectors, 1:40.
- Dogruman-AI F, Simsek Z, Boorum K, Ekici E, Sahin M, Tuncer C, Kustimur S and Altinbas A (2010). Comparison of methods for detection of *Blastocystis* infection in routinely submitted stool samples, and also in IBS/IBD patients in Ankara, Turkey. PLoS One 5:e15484. doi:10.1371/ journal. pone. 0015484.
- Jimenez-Gonzalez DE, Martinez-Flores WA, Reyes-Gordillo J, Ramirez-Miranda ME, Arroyo-Escalante S, Romero-Valdovinos M, Stark D, Souza-Saldivar V, Martinez-Hernandez F, Flisser A, Olivo-Diaz A and Maravilla P (2012). *Blastocystis* infection is associated with irritable bowel syndrome in a Mexican patient population. Parasitol. Res. 110:1269–1275.
- Jones M, Whipps C, Ganac R, Hudson N and Boroom K (2009). Association of *Blastocystis* subtype 3 and 1 with patients from an Oregon community presenting with chronic gastrointestinal illness. Parasitol. Res. 104:341– 345.
- Lee SH, Joung M, Yoon S, Choi K, Park WY and Yu JR (2010).

- Multiplex PCR Detection of Waterborne Intestinal Protozoa: *Microsporidia*, *Cyclospora* and *Cryptosporidium*. The Korean J Parasitol, 48(4): 297–301.
- Moussa HME (2009). In vitro Cultivation for Detection and Phenotypic Study of *Blastocystis* spp. in Stool Samples. PUJ; 2, (1): 33 – 46.
- Nimri LF and Meqdam M (2004). Enteropathogens associated with cases of gastroenteritis in a rural population in Jordan. Clin Microbiol Infect.; 10(7):634-9.
- Sadek Y, El-Fakahany AF, Lashin AH and El-Salam FA (1997). Intestinal parasites among food-handlers in Qalyobia Governorate, with reference to the pathogenic parasite *Blastocystis hominis*. J Egypt Soc Parasitol.; 27(2):471-8.
- Steer H (2007). *Blastocystis hominis* and Colorectal Cancer. Ann R Coll Surg Engl.; 89(5), 539.
- Tan K (2008). New insights on classification, identification, and clinical relevance of *Blastocystis* spp. Clin Microbiol Rev. 21: 639–665
- Tan T and Suresh K (2006). Predominance of amoeboid forms of *Blastocystis hominis* in isolates from symptomatic patients. Parasitol. Res. 98 (3):189–193.
- Zembower TR (2014). Epidemiology of Infections in Cancer Patients. Cancer Treatment and Research. 161:43-89.