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Infections with *Blastocystis hominis* in patients with colorectal cancer in Mosul city, Iraq

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ABSTRACT

Background: *Blastocystis hominis* is a worldwide distributed intestinal parasite that can be transmitted feco-orally, recently considered to be pathogenic and many studies start to connect between many GI problems and infection with this parasite.

Materials and method: 40 colorectal carcinoma (CRC) patients and 80 apparently healthy blood donors were selected to enroll in this study, fecal samples was collected and preserved, *B. hominis* antigen was detected by ELISA method.

Results: the study showed that 15 out of 40 (37%) of CRC patients and 33 out of 80 (41.25%) persons were infected with *B. hominis*.

Conclusion: the incidence of *B. hominis* in both CRC patients and normal healthy blood donors is relatively high in comparison to other localities in Iraq and in other neighboring countries and that could be due to low hygienic standards.

Keywords: Blastocystis hominis, Blastocystosis, colorectal carcinoma.

INTRODUCTION

Blastocystis hominis is an organism of uncertain affinities living in the intestine of humans and probably other hosts. Other species of *Blastocystis* exist in many animals, some of them may also occur in humans. Studies indicate that whatever symptoms are present can be attributed to unrecognized concomitant pathogens such as *Entamoeba histolytica*, *Giardia* sp. or *Dientamoeba* sp. These symptoms disappear after appropriate treatment, whereas *B. hominis* persists. No lesions have been recognized[1].*B. hominis*is one of the most common parasites isolated from stool specimens in symptomatic and asymptomatic persons. It is transmitted by feco-oral route. Such unicellular protozoan has three major forms; vacuolar, granular, and amoeboid. The vacuolated form (10-30 μm) was the most frequently detected in fecal specimens[2]. It was considered as harmless yeast, but it is now getting acceptance as an agent of human intestinal disease especially under immunosuppressive conditions [2,3].

Blastocystis is an extremely ubiquitous parasite with a worldwide distribution; It is not uncommon for it to be the most frequently isolated parasite in epidemiological surveys [4,5]. Prevalence varies widely from country to other and within various communities of the same country. In general, developing countries have higher prevalence of the parasite than developed countries, and this has been linked to poor hygiene, exposure to animals, and consumption of contaminated food or water[6].Recently, many studies start to investigate the incidence and prevalence of this parasite among different groups of population and the relationship of this parasite with many GI diseases. A study conducted in Dohook Governorate in the north of Iraq by Al-Saeed and his team which was conducted on 610 visitors of Shilan Private Hospital and Hevi Pediatric Hospital of different age groups suffering from variant GI symptoms, the study showed that 31 (5.08%) patients were infected with *Blastocystis hominis*. [7].Ahmed Al-Moussawi conducted a study on the Prevalence of Intestinal Parasites Among Rural Population in Babylon Province, the study was conducted in Al-Doullab village on 681 persons which showed that there was 427 were infected with GI parasite and 28 (4.1%) persons were infected with B. Hominis specificly[8].Another study conducted in the south of Iraq, specifically in Al-Muthanna Province by Adnan Uobeed and his colloquies on 127 IBS patients and 40 healthy individuals, the study showed that 58 (45.67%) of 127 were positive for *B. Hominis* and no one among control was infected[9].

In 2014 a study conducted by Souhaila Mahmood and her colloquies about the best routine method used in Baghdad's hospitals, the study was conducted on 200 patients and 50 workers in the hospitals, and they found that 14 (7%) of

patients and 1 (2%) of workers were infected with *B. Hominis*[10].The study conducted by Kadir and his colloquies was on children in Tikrit city in 2016 in which showed that out of 1100 child who enrolled in this study, there were 25 child (2.27%) was infected with *B. hominis*[11]. While a similar study conducted by Tafti and his team in Iran also on children showed that about there were 5 (2.8%) out of 180 child enrolled in this study was infected with *B. hominis*. [12].Beyhan and his colloquies conducted a study in Van, Turkey, and the study was conducted on 50185 persons, only 275 (0.55%) persons were infected with *B. hominis* in that city[6].Özçakir and his colloquies conducted an earlier study in turkey on 770 subjects divided as four groups of patients and a fifth control group in 2007, they choose 475 patients with GI disturbances, 82 patients with allergic problems, 90 Immune compromised patients, 23 Patients with Chronic renal failure, and 100 Healthy individuals, they investigate different types of parasitic infections and found that *B. hominis* was the most prevalent parasite, and found that the overall infection was 94/770 (12.2%) divided as following: 53 (11.2%) of patients with GI disturbances, 14 (17.1%) of patients with allergic problems,11(12.2%) of Immune compromised patients , 3 (13%) of Patients with Chronic renal failure, and 13 (13%) of Healthy individuals were infected with *B. hominis*. [2].Interestingly another study conducted by Amr Mohamed and his colloquiesin kingdom of SaudiArabia(KSA)studied the prevalence of *B. hominis*among colorectal carcinoma (CRC) patients in Makkah, KSA. Interestingly, the study results suggested a possible association between *B. hominis*subtype-I and CRC condition, which postulate a potential influence of this pathogen on carcinogenesis of CRC[13].

The aim of this study is to evaluatethe incidence of this parasite in colorectal carcinoma patients and blood donors (as control) in Mosul city –Iraq, as the city include a major center of oncology represented by Mosul oncology and nuclear medicine hospital.

MATERIALS AND METHODS

A totally 120 subjects were enrolled in this study and categorized as 40 patients with colorectal carcinoma (CRC) who were receiving chemotherapy in Mosul oncology and nuclear medicine hospital, and 80 apparently healthy blood donors who visited Mosul city central blood bank for blood donation.Stool samples was taken from these individuals by using plastic containers specified for stool samples collection and directly a 10% formalin saline is added for preservation, the samples were labeled, and stored at cold dark place, after the completion of sample collection, the samples were homogenized by vortex mixer and added to 1.5 ml Eppendorf tubes containing stool diluent, mixed by vortex mixer, and left to stand for 10 min. Then the supernatant was used for kit microtiter plate, and the processing continued as the instruction provided by the manufacturer. Then the plate was measured by ELX800 BioTek ELISA at 450 nm and the results were calculated as instruction by the manufacturer.[14-23]

RESULTS

The test results showed that there were 15 patients of CRC groupwere positive for B. hominis Ag out of 40 patients enrolled in this study, which represents 37.5%; while in other hand there were 33 persons of blood donors group were positive for *B. hominis* Ag out of 80 persons enrolled in this study, which represents 41.25%; as showed in table 1.

Table1: Number of CRC patients and blood donors with percentage

Category	Total	Positive (%)	Negative (%)
CRC	40	15 (37.5)	25 (62.5)
Blood donors	80	33 (41.25)	47 (58.75)

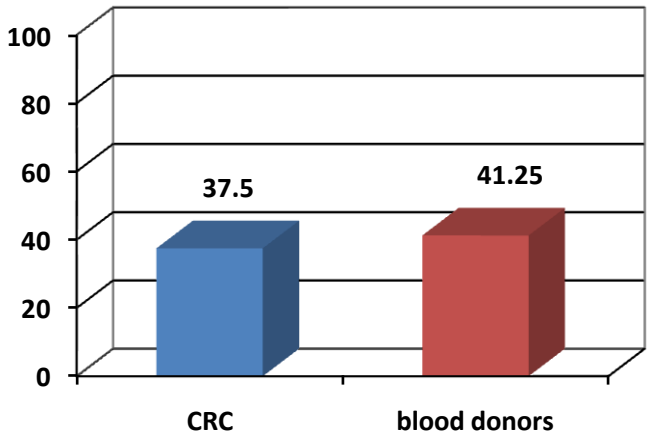

Figure 1: Percentage of positive *B. hominis* infections in CRC and blood donors

This figure represents the percentage of positive Blastocystis hominis –Ag test in both CRC and blood donor groups.

Table2: Differences in Ag results between groups of study population

Group	IgG (mean ±SD)	P value
CRCpatients (n=40)	0.38±0.49	0.6956
Blood donor (n=80)	0.41±0.50	

There is no significant differences in Ag results between CRC patients and blood donors group at p value = 0.6956

DISCUSSION

*B. hominis*is a common intestinal parasite worldwide, many epidemiological studies in Iraq and neighboring countries which are considered as rivers water provider (Turkey and Iran) showed a relatively high incidence and prevalence in many population groups of both healthy and ill patients[2,3,6,12, 24].So, it is important to conduct many studies concerning this parasite and it's prevalence and relationship with many GI problems, this study conducted in Mosul city on two groups of population, apparently healthy blood donors, and patients with colorectal carcinoma. The results of this study also showed a relatively high incidence if *B. hominis* infections among both groups,(CRC 15/40 (37.5%) and blood donor group (33/80 (41.25%), the blood donors group showed a higher incidence of infection (although it is not significant variance from patient group), and that could be attributed to the chemotherapy cycles and co-administration of antibiotics in patient group specially metronidazole to avoid opportunistic infections, which may affect the parasite; knowing that metronidazole is considered as the drug of choice for *B. hominis* infection[24].The results of this study is much higher than that conducted in Dohook city by Al-Saeed which showed that only 5% of the patients enrolled in his study were positive for *B. hominis* and that could be attributed to the relatively higher hygienic standards and well controlled purified water supplies.[7]

The data of this study is in high conflict with another study conducted by Ahmed Al-Moussawi in Babylon Province which showed a very low prevalence of *B. hominis* in the selected samples (4% only) [8] , but still with high agreement with Adnan Uobeed's study which showed a closer results(45.67%)[9]; that could be attributed to the time variation between the two studies. Souhaila Mahmood's study in 2014 showed a relatively hospital visitors were infected with B. hominis, but that could be due to the age variation, because the samples were collected from all visitors without considering their age (i.e. most of the visitors could be children)[10].

The results of this study also compared with studies conducted in two neighboring countries which are Turkey and Iran to evaluate the prevalence of B. hominis infection across borders and as a river water source[24].Starting with the study conducted by Özçakir and his colloquies in Turkey on 770 subjects in 2007, they investigate different types of parasitic infections ; They found that B. hominis was the most prevalent parasite, and also showed that the overall infection was 94/770 (12.2%) divided as 11(12.2%) of Immune compromised patients , 3 (13%) of Patients with Chronic renal failure, and 13 (13%) of Healthy individuals were infected with B. hominis, the infection of B. hominis in this study was higher in immune compromised patients i.e. CRC patients were 15/40 (37.5%), while the infection among healthy individuals was 33/80 (41.25%)which is also higher that their results, which could be attributed to more health care facilities[2]. The same comparison is applicable to the results of Tafti's study in 2014 also found a much lower rate of infection represented in only 2.8% in comparison to 41.25% and 37.5% of blood donors and CRC patients respectively in this study[12].

This study found that there is a high incidence of B. hominis infection in both CRC patients and blood donors group as a normal individuals, such infection could be one of many risk factors for more serious problems in the future, one of these risks could be colorectal cancer development or propagation. Such risk was found many studies, one of them a study conducted in KSA in 2017 gave a relationship between the *B. hominis* infection and CRC development, and such infection could be as a causative agent, or at least a co-factor in cancer development [13].

CONCLUSION

The incidence of B. hominis in both CRC patients and normal healthy blood donors is relatively high in comparison to other localities in Iraq and in other neighboring countries and that could be due to low hygienic standards.

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