



## International Journal of Current Research and Academic Review

ISSN: 2347-3215 Volume 4 Number 7 (July-2016) pp. 50-56

Journal home page: <http://www.ijcrar.com>

doi: <http://dx.doi.org/10.20546/ijcrar.2016.407.007>



### Possible Association between *Blastocystis hominis* and Bowel Disorders among Iraqi Patients in Kirkuk Province

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#### KEYWORDS

IBS,  
IBD,  
*Blastocystis hominis*,  
BMI.

#### A B S T R A C T

Bowel disorders include a large variety of diseases such as Irritable bowel syndrome (IBS) (a chronic gastrointestinal disorder characterized by abdominal pain or discomfort) and Inflammatory Bowel Diseases (IBD) (Crohn's disease and Ulcerative colitis) both associated with abnormal bowel habits results either in diarrhea, constipation or alternative cycle of both or mixed diarrhea and constipation. This study is an investigation to prove the role of *Blastocystis hominis* in development of IBS or IBD. A total of (608) stool samples were collected from Irritable Bowel Syndrome (IBS) patients (472), Inflammatory Bowel Diseases (IBD) as a disease control (79), and apparently healthy control group (HC) (57) of both sexes included males (372) and females (236) from Kirkuk Province-Iraq Hospital such as Azadi Teaching Hospital. All those stool samples were directly examined for *Blastocystis hominis* or other pathogenic agents and BMI for patients and control groups were estimated. It was showed that there was a highly significant incidence of *Blastocystis hominis* (33.7%) & (41.8%) (Among IBS and IBD respectively) in comparison with (12.3%) among healthy control group (P= 0.0001). Most those patients were at age group 20-40 years (47.9% and 45.6% for IBS and IBD patients respectively). Majority of IBS and IBD patients (39.4% and 34.2% for IBS & IBD respectively) complained from diarrhea in highly significant manner in comparison with control group (only 7%) (P=0.001). Furthermore, it was become clear that most IBS patients (51.3%) were over-weight with highly significant differences in comparison with IBD patients (35.4%) and HC (33.3%) (P = 0.001). It could be concluded that *Blastocystis hominis* play a crucial role in IBS or IBD development and increment in body weight may enhance the development of bowel disorders.

## **Introduction**

There are many variety of bowel disorders such as irritable bowel syndrome (IBS) which is a chronic functional gastrointestinal disorder characterized by abdominal pain or discomfort associated with abnormal bowel habit in the absence of any currently detectable structural, physiological or biochemical abnormalities of the gastrointestinal tract (Longstreth *et al.*, 2006). In the absence of a reliable or a validated biomarker, IBS is defined on the basis of symptoms according to one of several diagnostic systems such as Rome III diagnostic criteria (Dorn *et al.*, 2009). Another form of bowel disorders are Inflammatory Bowel Diseases (IBD) include Crohns' disease and Ulcerative Colitis. IBS is undoubtedly a heterogeneous disorder and may, indeed, encompass a number of distinct entities (Loftus, 2004). It comes as no surprise, therefore, that over the years a number of factors have been proposed as relevant to the etiopathogenesis of IBS and its various symptoms such as psychological and environmental agents besides infection with different agents (Drossman *et al.*, 2010; Ji *et al.*, 2005; Spiller *et al.*, 2009).

Later, studies have described a possible role for protozoan parasites, such as *Blastocystis hominis*, *Dientamoeba fragilis*, and others in the etiology of IBS or IBD (Tungtrongchitr *et al.*, 2004; Yakoob *et al.*, 2010). Hence, it is essential that all patients with IBS undergo routine parasitological investigations in order to rule out the presence of protozoan parasite as the causative agents of clinical signs. Even though signs and symptoms are uncomfortable, IBS — unlike ulcerative colitis and Crohn's disease— doesn't cause changes in bowel tissue or increase risk of colorectal cancer (Spiller *et al.*, 2009).

The main aim of this study to the role of *Blastocystis hominis* in induction of IBS and

IBD bowel disorders and its relationship with clinical features and role of BMI in development of these disorders.

## **Materials and Methods**

From the 21 of December/ 2014 till the 21 of December /2015, (608) samples of both stool and sera were collected from patients with irritable bowel syndrome (IBS) (472), Inflammatory Bowel Diseases (IBD) (72) and apparently healthy volunteers' group (HC) (57) of both sexes included male (372) and female (236), in Kirkuk Province-Iraqi Hospitals such as Azadi Teaching Hospital. Stool Direct examination was performed for all stool samples (Salman, 2015).

## **Results and Discussion**

### **Demographical Picture for the Studied Groups**

Table 1 showed that the mean of patients' ages was ((36.09±16.36) and (34.14±15.96) years for Irritable Bowel Syndrome (IBS) and Inflammatory Bowel Diseases (IBD) respectively) while it was (31.66 ±14.21 years) for healthy control with non-significant differences between groups (P =0.111). Table 1 revealed that there highly significant differences between the studied groups according the mean of BMI ((26.1919±3.63, 25.58±7.12) Kg/ m<sup>2</sup> for IBS & IBD groups respectively) in comparison with HC group (24.56±3.40 Kg/ m<sup>2</sup>) (P= 0.001). It seems to be that overweight and obese individuals were predominants among IBS that the other groups.

According to the clinical feature, it was clear from the above table that diarrhea had been recorded in high frequency among (39.4%) of IBS patients and (34.2%) IBD patients in comparison with only (7%) of HC group and with highly significant difference in

comparison with other clinical signs such as constipation and alternative forms of diarrhea and constipation (D & C) (P=0.001).

Interestingly, direct stool examination showed *Blastocystis hominis* in ((33.7%) and (41.8%) of IBS and IBD cases respectively) with highly significant difference in comparison with HC group (12.3%) and other etiological agents such Bacteria, *Candida albicans* and other parasitic infections (P=0.001).

### Relationship between *Blastocystis hominis* and Age groups

Table 2 showed the relationship between the Lab. findings and the age of patients. It is clear from this table that there were high incidence with *Blastocystis hominis* (40.2%) and others etiological agents (50.5%) were among the age group 20-40 years either among IBS or IBD patients with highly significant differences in comparison with the other age groups (P=0.002).

### Association between *Blastocystis hominis* and Clinical Features

The relationship between *Blastocystis hominis* and the main clinical features was listed in Table 3. This table showed that (35.2%) of the *Blastocystis hominis* cases were characterized by alternative pattern of diarrhea and constipation while (30.2%) of this parasite cases showed diarrhea; in comparison with other etiological agents diarrhea was the dominants in (46.3%) of cases with highly significant association (P=0.001).

### Correlation between *Blastocystis hominis* and BMI

It was noticed that there was a highly significant relationship between BMI and the causative agent. Table 4 revealed that (50.8%) of *Blastocystis hominis* cases were within normal body weight. However, 41.2% of the *Blastocystis hominis* cases were illustrated among over-weighted individuals.

Table.1 Demographical picture for the studied groups

Parameters	Patients Group IBS	Disease Control IBD	Healthy Control	P value Pearson Chi-Square
Mean of Age ± SD	36.09±16.36	34.14±15.96	31.66 ±14.21	P=0.111 (NS)
BMI ( Kg/ m <sup>2</sup> )	26.1919±3.63	25.58±7.12	24.56±3.40	P=0.001 (HS)
M:F ratio	289:183=1.58	43:36=1.944	40:17=2.86	P=0.178 (NS)
<b>Clinical Features:</b>				
1. Diarrhea	186 (39.4%)	27 (34.2%)	4 (7%)	P= 0.001 (HS)
2. Constipation	131 (27.8%)	22 (27.8%)	7 (12.3%)	
3. Alternative Diarrhea & Constipation	140 (29.7%)	16 (20.3%)	1(1.8%)	
4. Normal	15 (3.2)	14 (17.7)	45(78.9%)	
<b>Lab-Findings:</b>				
1. Nil.	20(4.2%)	26(32.9%)	50(87.7%)	P= 0.001 (HS)
2. <i>Blastocystis hominis</i>	159(33.7%)	33(41.8%)	7(12.3%)	
3. Others	293 (62.1%)	20(25.3%)	0(0.0%)	
<b>Total</b>	<b>472</b>	<b>79</b>	<b>57</b>	<b>608</b>

**Table.2** Correlation between *Blastocystis hominis* & age groups

			Finding			Pearson Chi-Square
			Nil	<i>Blastocystis hominis</i>	Others	
Age groups / Year	(<20)	N	21	27	51	P=0.002 HS
		%	21.9%	13.6%	16.3%	
	(20 - 40)	N	53	80	158	
		%	55.2%	40.2%	50.5%	
	(41 - 60)	N	20	69	85	
		%	20.8%	34.7%	27.2%	
	(61 - 80)	N	2	23	19	
		%	2.1%	11.6%	6.1%	
Total		N	96	199	313	
		%	100.0%	100.0%	100.0%	

**Table.3** Correlation between *Blastocystis hominis* and clinical features

Clinical Feature		Finding			Chi-Square (P-value)
		Nil	<i>Blastocystis hominis</i>	Others	
Normal	N	58	15	1	P=0.00 HS (P<0.01)
	%	60.4%	7.5%	.3%	
Diarrhea	N	12	60	145	
	%	12.5%	30.2%	46.3%	
Constipation	N	19	54	87	
	%	19.8%	27.1%	27.8%	
Diarrhea & constipation	N	7	70	80	
	%	7.3%	35.2%	25.6%	
Total		N	96	199	313
		%	100.0%	100.0%	100.0%

**Table.4** Correlation between *Blastocystis hominis* and BMI

BMI (Kg/m <sup>2</sup> ) groups		Finding			Chi-Square (P-value)
		Nil	<i>Blastocystis hominis</i>	Others	
Lean (<18.5)	N	4	9	9	P=0.00 HS (P<0.01)
	%	4.2%	4.5%	2.9%	
Normal weight (18.5 - 24.9)	N	57	101	118	
	%	59.4%	50.8%	37.7%	
Over weight (25 - 29.9)	N	28	82	179	
	%	29.2%	41.2%	57.2%	
Obese (30+)	N	7	7	7	
	%	7.3%	3.5%	2.2%	
Total	N	96	199	313	
	%	100.0%	100.0%	100.0%	

In comparison with the other agents (57.2%) of the cases were among over-weighted patients with highly significant difference (P=0.001).

Both irritable bowel syndrome and inflammatory bowel diseases share symptoms of altered bowel habits associated with abdominal pain or discomfort (Gao, 2013). Irritable bowel syndrome has been referred to as a functional bowel disorder, which is diagnosed by a characteristic cluster of symptoms in the absence of detectable structural abnormalities. Inflammatory bowel disease is a heterogeneous group of disorders characterized by various forms of chronic mucosal and/or trans-mucosal inflammation of the intestine. Possible shared pathophysiologic mechanisms include altered mucosal permeability, an altered interaction of luminal flora with the mucosal immune system, persistent mucosal immune activation, alterations in gut motility, and a role of severe, sustained life stressors in

symptom modulation (Yakoob *et al.*, 2004; Ramirez-Miranda *et al.*, 2010). In this the study, evidence referred to both of them showed controversial results in the etiological agents and clinical signs.

*Blastocystis hominis* was isolated in higher frequency among IBD and IBS patients. The current results were comparable to that of the other particularly those related to presence of *Blastocystis hominis* in control group samples. Meanwhile, the other pathogens dominant among IBS group and with highest frequency. These findings are disagree with the others. On the other hand, most IBS patients are over-weighted, IBD patients to some extent are normal-weighted.

Regarding the etiological agent, *Blastocystis hominis* alone recorded in (33.7%) and (41.8%) IBS and IBD cases respectively. Although, it was observed that most IBS cases (62.1%) collectively were due to other etiological agents such as bacteria, *Candida albicans* and other parasites such as

*Dientamoeba fragilis* and *Entamoeba histolytica* which are in concordance with the other (Mumcuoğlu *et al.*, 2013).

Considering age of patients, the present study evoked that most the studied patients were at age group of 20-40 years while the other studies denoted that 40-60 years age group with highly prevalence with IBS due to *Blastocystis hominis*. The interpretation of the results is attributed to the effects of environmental and emotional stress upon Iraqi people due to the bad security condition and the waste products of the s perhaps may participate in the induction of IBS in addition to the crucial role of infectious agents (Jimenez-Gonzalez *et al.*, 2012; Eroglu *et al.*, 2009). On the other hand, no previous study investigate the effect of infection with this parasite on BMI.

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#### How to cite this article:

Abdulrazzaq Mohammed Hammood, Yahya Jirjees Salman and Batool Ali Ahmed. 2016. Possible Association between *Blastocystis hominis* and Bowel Disorders among Iraqi Patients in Kirkuk Province. *Int.J.Curr.Res.Aca.Rev.4(7): 50-56.*  
doi: <http://dx.doi.org/10.20546/ijcrar.2016.407.007>