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The effect of intestinal parasite on some hematological parameters among patients with irritable bowel syndrome

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ABSTRACT

Irritable bowel syndrome (IBS) is a chronic functional gastrointestinal disorder with an estimated prevalence of 10% around the globe. Humans and animals contain intestinal parasites live in guts, and the intestinal wall is preferred for most of these parasites. Human intestine contaminated by many parasites, the most common of them are intestinal worms, *Giardia*, *blastocyst* and others. The current study was conducted on 76 Iraqi participants suffering from IBS, during the period from November 2021 to March 2022. We have noticed the presence of different types of parasites in 54 samples with IBS, the most prominent of them *Blastocyst hominis* and *Entamoeba histolytica* and 22 samples that do not contain parasites. This study proved that the highest rate of parasite infection was for *Blastocystis hominis* and the lowest percentage for *Teania saginata* which also affects the hematological parameters in patients with irritable bowel syndrome.



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Introduction

Intestinal parasites are the parasites which inhabit the gut. In taxonomy, parasites of the intestine are include two subgroups: Protozoa: which include *Entamoeba histolytica*, *Giardia lamblia*, *Cryptosporidium parvum* and *Balantidium coli*. Helminthes: include both of nematodes and flat worms. Nematodes of the intestine are the human parasitic infection most commonly. It comprises *Enterobius vermicularis*, *Ascaris lumbricoides*, *Trichuris trichiura* and *Strongyloides stercoralis*. Flat worms (cestodes and trematodes), comprise *Taenia* species and *Hymenolepis nana* [1]. Many of gastrointestinal tract (GI) infections are because of parasites. Human directly can be infected by protozoa throw the passage of feces into the environment, while helminthes require maturation period in the soil, then to become able for infection. Life cycle other parasites like *Taenia saginata* require the host as a mediator. High mortality is in infants because of GI tract infections where the indicators of nutrition and hygiene are low. The most commonly GI tract infections of pathogens is by fecal-oral transmission , whether by food, water and hands when fecal material contaminate them then transformed to the mouth[2].

The prevalence of intestinal parasites and the possible association are between irritable bowel syndromes (IBS) and parasitic infections. In the IBS patients, *Blastocystis* sp. was detected and *Giardia* sp. cysts were observed, these parasites were found either alone or with other parasites, it is possible that these parasites may cause IBS. There is a possible link between IBS and parasitic infections [3]. Many studies have done to explain the association between IBS and parasitic infections [4]. *Dientamoeba fragilis* and *Blastocystis* have been linked to the etiology of IBS [5]. In his systematic review which focuses on the role of *D. fragilis* and *Blastocystis* in IBS [4]. Functional bowel disease can be caused because of the infection with *Giardia lamblia*, including IBS, the patients with IBS can also found *Entamoeba histolytica*, *Hymenolepis nana*, *Taenia* spp, *Entamoeba coli* and *Ascaris lumbricoides* [6].

Irritable bowel syndrome (IBS) is a chronic, and highly common of gut interaction disorders (formerly called functional gastrointestinal [GI] disorders). Clinically, IBS is described by symptoms of disordered defecation and frequent abdominal pain [7].

Material and methods

Study population:- The current study was conducted on (76) Iraqi participants, (54) with IBS and intestinal parasites and (22) with IBS and without intestinal parasites (control) diagnosed by consultant physician according to clinical signs and several laboratory tests were performed on the blood sample, including the complete blood count (CBC) test during the period between November 2021 to March 2022.

A-Collection of blood samples:- Samples of blood (2ml) were drawn intravenously with a sterile injection and then emptied in a plastic tubes containing anticoagulant EDTA (ethylene diamine tetra acetic acid) and complete blood count (CBC) performed.

B-Collection of stool samples:- Samples of stool were collected in clean containers avoiding contamination with water, urine or any other contaminants. Then they examined by naked eye for odor, color, and the presence of mucus or blood. Finally, microscopic examination occurred directly with iodine stain and normal saline solution [8].

Statistical Analysis

For statistical analysis, software (SPSS, USA) was used. $P < 0.05$ was considered a statistically significant difference.

Results and discussion

The result was that: the ratio of white blood cell (WBC) , lymphocyte (LYM) and Neutrophil (Neu) increased, but decrease occurred in the ratio of Hb for the IBS patient infected with parasite, the high percentage of (WBC) due to *Enterobius vermicularis* (10.150) and the lower due to *Entomoeba coli* (8.100) when compare with control, the high percentage

of (Neu) due to Entamoeba coli (7.550), but do not found the lower percentage less than control, the high percentage of (LYM) due to Trichuris trichura (3.270) and also do not found lower concentration when compare with control and due to Hb notes lowers in the percentage when compare with control excepted the Enterobius vermicularis (13.900), Giardia lamblia (12.900) and Entamoeba coli (12.830) that were higher than control.

A functional bowel disorder defined by the presence of abdominal pain recurrents associated with altered bowel habits is known as Irritable bowel syndrome (IBS) [9].

Humans and animals gut contain intestinal parasites live in, and the intestinal wall is preferred for most of these parasites. Human intestine contaminated by many parasites, the most common of them are intestinal worms, Giardia, blastocyst and others [10].

Table 1. Levels of hematological parameters among study groups.

Study groups/ Parameters	No. (%)	WBC 103/mm3	Neu 103 /mm3	LYM 103 /mm3	Hb g/d l	
Control	22	8.365	5.248	1.671	12.295	
Blastocyst hominis	18	8.617	5.589	11.750	2.544	
Entamoeba histolytica	11	8.800	5.627	11.466	2.691	
Balantidium coli	6	8.983	5.983	12.830	2.467	
Pentatrichomonas hominis	2	9.100	6.550	10.800	3.150	
IBS	Giardia lamblia	2	8.700	6.000	12.900	2.350
	Entamoeba coli	2	8.100	7.550	11.700	3.200
	Enterobius vermicularis	2	10.15	6.700	13.900	3.100
	Teania saginata	1	9.800	6.200	12.100	3.110
	Ascaris lumbricoides	7	8.957	6.029	11.129	2.386
Trichuris Trichura	3	9.230	5.667	10.567	3.270	
P-Value		0.041	0.051	0.242	0.023	

* The same letters mean there is no differences between them under the level of significantly >0.05.

** -The different letters mean there is difference between them under the level of significantly >0.05.

White blood cells or leukocytes were part of the immune system participating in both the innate and humeral immune responses. They circulate in the blood and mount inflammatory and cellular responses to injury or pathogens (11).

Hematologic study shows an increase in the blood of patients that infection with parasites the high levels of W.B.C. due to W.B.C ability for the destruction of parasites by the adhesion to its walls and secretion of granules have the ability in external parasite wall destruction (12). Parasite are attachment to the lining of the intestine affects the absorption process, particularly in G. lamblia, since this parasite absorbs fats and feeds on mucous secretions, therefore cause a deficiency of vitamins B12 and A in the body. Other parasites, particularly E. histolytica have the ability in analyzing the hosts globules and blood cells, leading to necrosis and bleeding for the lining of the intestinal mucosa. Moreover, they contain enzymes in mucosal-layer such as cysteine protease and collagenase (13). The WBC may have changed as a result of the parasite present since the WBC, particularly lymphocytes and granule cells, served as the body's immunological defense against the parasites (14).

The blood molecule called hemoglobin (Hb), which contains iron and is necessary for animals to carry oxygen, the fact that erythrocyte Hb is one of the family of H b proteins with members found in all three domains of life — bacteria, eukaryotes , and archaea — is less commonly known (15). The intestinal parasite cause vitaminosis, digestive disturbance, also release the trophozoite motile feeding stage and adherence to intestinal villi another parasite absorbing about 50 ml of blood day (16) (12) (13), showed decrease in Hb in the individual infection with parasite because they feed also on the food digested in intestine, while some parasites causing anemia by excreting blood-dissolving substances (17) (18). Additionally, there was a high frequency of anemia and intestinal parasite infection among the patients. To avoid and lower the burden of illness, preventive steps must be taken, such as routine deworming and health education regarding a nutritionally balanced diet, iron supplements, and personal cleanliness habits for both parents and their children (19). Changes in the Hb value showed anemia owing to iron shortage. In addition, the parasites produce diarrhea, which leads to dehydration and affects the Hb value (14).

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