Ministry of Higher Education
and Scientific Research
University of Diyala
College of medicine

The Relationship between the infection with Giardia lamblia and some blood parameters

Done by:
Khaleel Ismail Khaleel
Supervised by:
Dr. Mohamed Jasim

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اوصي باستلام وقبول بحث التخرج للطالب خليل اسماعيل خليل بعد اكماله متطلبات البحث كاملة ودون اي نقص واكماله جميع الاحصائيات والتعديلات المطلوبة منه

أ.م.د.محمد جاسم

Abstract
Background
Giardia lamblia (Giardia intestinalis, Giardia duodenales) is a flagellated unicellular eukaryotic microorganism that commonly causes diarrheal disease throughout the world. It is the most common cause of waterborne outbreaks of diarrhea in the United States and is occasionally seen as a cause of food-borne diarrhea. In developing countries, there is a very high prevalence and incidence of infection, and data suggest that long-term growth retardation can result from chronic giardiasis. In certain areas of the world, water contaminated with G. lamblia cysts commonly causes travel-related giardiasis in tourists.

Objective
Aim of the present study was to evaluate the relationship between the infection with G.lamblia and some blood parameters.

Patients and methods
Sixty Stool samples were collected from boys and girls with different age groups attending to albatool hospital complaining from abdominal discomfort and diarrhea .The stool samples were examined with the naked eye for colour, consistency and the presence of any adult helminths, They were then examined by light microscopy for presence of Giardia trophozoite and cyst stages and for detection of other parasites stages, Blood samples collected to estimate WBCs count, RBCs, PCV, Hb,MCHC, MCH and MCV. Thirty blood samples were collected from patients from primary health centers with no history of infection with giardiasis and who were apparently healthy by physical examination.

Results:
The results showed a significant increase ($P < 0.05$) in the number of RBCs and white blood cells especially neutrophils in patients infected with Giardia lamblia in comparison with control. There was a significant decrease ($P < 0.05$) in the PCV, MCHC, MCV and Hb in patients infected with Giardia Lamblia in comparison with control.

Conclusion
Based on the results of this study we concluded that Giardia lamblia infection is a significant public health problem and associated with significant hematological changes long term complications like vitamins and minerals deficiencies and need treatment.

 Keyword: blood parameters, Giardia lamblia, parasitic infection.

Introduction

Giardia lamblia is a protozoan parasite which has worldwide distribution and is common in warm and moist climates throughout the world. Giardiasis is an important unresolved health problem in developing countries, as it is related to poor sanitation and management of supplied water, a problem that is exacerbated by the absence of a simple reliable diagnostic test , The prevalence of G. lamblia ranges from 2%–7% in industrialized countries and 20%–60%in Developing countries [1].

Most infections are probably asymptomatic, but some are associated with subacute or chronic diarrhea and intestinal irritation , which contribute to malabsorption and nutritional deficiency especially in children [2].

Clinical manifestation: -

Symptomatology differs from person to person, depending on such factors as inoculum size, duration of infection, and individual host and perhaps parasite factors. The incubation period generally varies from 9 to 15 days. The acute stage usually begins with a feeling of intestinal uneasiness, followed by nausea and anorexia. Low-grade fever and chills may also be early symptoms. Subsequent symptoms may include explosive, watery, foul-smelling diarrhea; marked abdominal gurgling and distention associated with the passage of foul gas; and perhaps belching, with a foul taste, Upper or mid-epigastric cramps may also occur. Blood and mucus in the stool are rare. The acute stage, which lasts 3 or 4 days, can resemble other causes of traveler's diarrhea and is often not recognized as being due to giardiasis. While most patients experience diarrhea during this time, some of the other symptoms occur less frequently.

Although some acute infection may clear spontaneously, along-standing subacute or chronic infection may develop. This phase may involve 2 or more years of intermittent diarrhea. In individuals returning from endemic areas, the acute stage may not be remembered, and these patients can present with persistent or recurrent mild to moderate symptoms. During this chronic phase, lassitude, headache, and myalgia may occur with continued weight loss, anorexia, and malabsorption. Chronic infection in children may present as failure to thrive. Urticaria, cholecystitis, and pancreatitis have been reported with Giardia infections. Uncommon associated symptoms including arthritis and retinal arteritis and iridocyclitis have responded to specific anti-Giardia treatment.

 As stated by an experienced worker in the field, "the symptomatology of giardiasis is rich and unpredictable; individual variability and the intermittent nature and changing of the symptoms are characteristic".

Many infections disappear after variable periods of time, and about 13% of infected adults and up to 50% of infected young children remain asymptomatic. The duration of the asymptomatic cyst-passing state has not been determined. In patients with giardiasis, the hemogram is usually normal and eosinophilia is rare, Malabsorption of fat, glucose, lactose, xylose, vitamin A, and vitamin B12 has been shown in some patients .

Lactose intolerance, frequently present during infection, may persist for variable periods following apparent eradication of giardiasis with specific treatment. Because this symptom often occurs in individuals from ethnic groups who are predisposed to lactose intolerance, the need for further anti-Giardia treatment must be carefully considered, especially in those with negative post-treatment specimens who have persistent typical giardiasis symptoms[3].

Treatment

Several drugs can be used to treat Giardia infection. Effective treatments include metronidazole, tinidazole, and nitazoxanide. Other medications include paromomycin, quinacrine, and furazolidone. Tinidazole is the first-line drug treatment of giardiasis, as it requires only a single dose to cure infection in most individuals. The related drug metronidazole is as effective, but it requires 5 to 7 days of three times a day therapy. Nitazoxanide appears in limited studies to be as effective as tinidazole or metronidazole, and it does not have the bitter taste of nitroimidazoles. A good alternate for use during pregnancy is paromomycin. Cure of infection varies between 60% and 100% with one course of treatment.

Metronidazole (Flagyl) is given in doses of 250 mg three times a day for 7 days for adults and 5 mg/kg three times a day for 7 days for children. Cure rates are in the range of 85 to 95%. Side effects can include a metallic taste, dark urine, occasional gastrointestinal symptoms, and candida overgrowth in the bowel. The patient should not consume alcohol while under treatment with metronidazole because of an Antabuse-like effect of these drugs.[4]

The mode of action of other 5-nitroimidazoles, e.g., tinidazole and ornidazole, is very likely to be identical . However, tinidazole and ornidazole are more efficacious than metronidazole because they have considerably longer serum half-lives than metronidazole and can be administered as single doses of 1 or 2 g. As a result, they have a better patient compliance than metronidazole.[5]

Materials and Methods

Total Of 60 Male and Female patients With Diarrhea Visited Al Batool Teaching Hospital Were Selected from Period October 2022 to March 2023. The patient age ranges from 3 month to 10 years old and to healthy people. Age and sex matched parasite free to consider as control group.

The stool samples were examined with the naked eye for color, consistency and the presence of any adult helminths, They were then examined by light microscopy (Olympus CH series Japan and Primo star ZEISS Microscopy-Germany) for presence of Giardia trophozoite and cyst stages and for detection of other parasites stages.

Blood samples in EDTA tubes were mixed well in a mixture apparatus and then 0.2 ml of blood from each sample was aspirated by the detector (Sysmex, XP 300 Japan) to estimate WBCs count, RBCs, PCV, Hb, MCHC, MCH and MCV. Thirty blood samples were collected from patients from primary health centers with no history of infection with giardiasis and who were apparently healthy by physical examination.

Data about age, sex and residence were recorded for each child on a special form, together with

the stool examination results , stage of Giardia lamblia and associated parasites.

Results

In this study sixty patient were confirmed to be positive for E. histolytica. thirty healthy matched free parasites used as control group.

Table1: Comparison between patient infected with Giardia lamblia and healthy control regarding blood parameter.

Parameter	Patients N = 60	Control Healthy N = 30
RBCs (X10^6/mm^3)	*6.332 ± 0.33	4.954 ± 0.21
PCV (%)	*30.74 ± 1.354	37.664 ± 1.497
Hb g/dl	*10.34 ± 0.21	12.91 ± 0.53
MCV(mm^3)	*68.21 ± 0.73	84.66 ± 0.28
MCHC(g/dl of RBCs)	*23.22 ± 0.87	28.79 ± 3.11

✱ Significant difference (P<0.05) between patients and control group

Table (1) shows a comparison between mean level of RBCs, PCV, Hb, MCV and MCHC of infected patients with Giardia lamblia and the control group, it shows a significant increase (P <0.05) in the number of RBCs(6.332±0.33) in patients infected with Giardia lamblia in comparison with control(4.954±0.21) and There was a significant decrease (P <0.05) in the PCV(30.74±1.354), MCHC(23.22±0.87), MCV(68.21±0.73) and Hb(10.34±0.21) in patients infected with Giardia Lamblia in comparison with control PCV (37.664±1.497),MCHC(28.79±3.11),MCV(84.66±0.28) and Hb(12.91±0.53)٬

Table (2) shows a comparison between mean level of WBCs of infected patients with Giardia lamblia and the control group.

Parameter	Patients N = 60	Control Healthy N = 30
WBCs (X 10^3/mm^3)	*6.332 ± 0.223	4.591 ± 0.325
Neutrophile	*58.589 ± 0.789	53.448 ± 0.231
Lymphocyte	25.212 ± 0.547	24.879 ± 0.044

* Significant difference (P<0.05) between patients and control group

Table (2) shows a comparison between mean level of WBCs of infected patients with Giardia lamblia and the control group, it shows a significant increase (p<0.05) of infected patients (6.332 ± 0.223) as compared with control group (4.591 ± 0.325).

DISCUSSION

Giardia lamblia is a flagellated protozoan parasite that infects the upper intestinal tract of humans and many animal species [6]. It is the most common gastrointestinal parasitic infection of humans in the United States , and infection is nearly universal early in life in underdeveloped areas [7]. In developed countries, infections occur most frequently in children (particularly in those attending day care facilities [8], homosexuals, institutionalized individuals, travelers, and backpackers. This study was carried out in baquba teaching hospital /Diyala, Iraq, total of 60 Patients of both sexes from all ages were eligible for this study. The results showed a significant increase (P <0.05) in the number of RBCs and white blood cells especially neutrophils in patients infected with Giardia lamblia in comparison with control. There was a significant decrease (P <0.05) in the PCV, MCHC, MCV and Hb in patients infected with Giardia Lamblia in comparison with control.as Giardia intestinalis infection causes enterocytes damage and loss of brush border of the epithelial cells of the intestine that leads to shortening of microvilli and altered epithelial barrier function. The pathophysiology of acute diarrhea in giardiasis implicates increased rates of enterocyte apoptosis, a disruption of the intestinal barrier function, activation of host lymphocytes, CD8+ lymphocyte-mediated shortening of brush border microvilli with or without coinciding villous atrophy, disaccharidase deficiencies, small intestinal malabsorption, anion hypersecretion, and

increased intestinal transit rates [9].

CONCLUSION:

Based on the results of this study we concluded that Giardia lamblia infection is a significant public health problem and associated with significant hematological changes long term complications like vitamins and minerals deficiencies and need treatment.

Contamination of municipal water supplies should be considered as potential risk factor, Housing improvement with appropriate sewage system and educational measures to improve personal hygiene are an important factors to reduce prevalence of infection.

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