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ORIGINAL STUDY

Prevalence of Giardia Infection: A Cross-Sectional Study in Basra Province, Iraq

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ABSTRACT

Giardiasis is a common parasite infection that is seen more frequently than any other parasitic infection worldwide. This infection is especially prevalent in tropical areas and in developing nations that have a poor standard of living and poor health conditions. The Giardia parasite is able to infect people of any gender, as it enters the body by the mouth, passes down the oesophagus, and finally reaches the stomach, where it is not negatively impacted by gastric acids. The goal of this study is to determine the extent to which patients who were treated at Al-Zubair General Hospital in Basra, Iraq, from January 1 to December 31, 2024, contracted Giardia lamblia. There were a total of 924 participants that took part in the cross-sectional survey. The collection and analysis of fecal matter samples were carried out using formalin-ethanol concentration techniques. The identification of G The morphological inspection of cysts and trophozoites under a microscope was used to identify lamblia. According to the findings of this study, Entamoeba histolytica was the most common infectious agent, with 117(12.6%) patients testing positive for the protozoan. Furthermore, there were 22 patients, which is 2.3% of the total, who tested positive for Giardia lamblia, and 3 patients, which is 0.3% of the total, who tested positive for Enterobius vermicularis. According to the gender distribution, there was a 2.5% infection rate of Giardia lamblia among males and a 2.1% infection rate among females. According to the statistical analysis, there was not a statistically significant relationship between the number of infections and the months in which the samples were collected or the various age groups.

Keywords: Giardia infection, Prevalence, Cross-sectional study, Hospital-based

1. Introduction

The most frequent cause of intestinal infections worldwide is the protozoan Giardia lamblia, sometimes referred to as Giardia intestinalis [1]. Giardia is a type of parasite protozoa that can infect both the large and small intestines of different vertebrates. In tropical regions, G. lamblia is a very common human intestinal protozoan. Its clinical severity ranges from extremely hazardous to asymptomatic. The severity of giardiasis is thought to be influenced by a number of host factors, including food, immunity, and co-infection with other agents, in addition to the pathogenic characteristics, such as infection strain and dose. It is the protozoan that is most frequently found in people worldwide [2]. The infection of

giardiasis may be acquired by consuming resistant environmental cysts in the feces, in contaminated food, or water [3]. Consumption of ten cysts only can lead to a sickness in man. The parasite can easily spread in communities since the cysts which are already mature are infectious when they are released after being transmitted between individuals [4]. Even though the primary host is people, dogs, cats, and beavers are also susceptible to G. lamblia as they might also have cysts that could contaminate the water sources and transmit the virus to human beings. Giardiasis is spread through the ingestion of cysts of a newborn or animal feces. The infections of intestinal parasites are prevalent among people of low socioeconomic status, unhygienic surroundings, improper waste disposal, contaminated water sources and unhygienic practices

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[5]. Gastrointestinal symptoms are the signs of malabsorption which include flatulence, stools are oily, diarrhea, abdominal cramping, epigastric pain, and stetterhea. Still, the infections are not supposed to have any noticeable symptoms. It has been indicated by epidemiological studies that it correlates with manifested diseases relating to malabsorption though the illness is often underdiagnosed [6]. The estimate is that the incidence of these intestinal protozoal infections amongst human beings ranges between 1 and 8 percent in the rich countries and 8 and 30 percent in the poor countries [7]. The infection of intestinal parasites is one of the significant issues in Iraq, the country with conflictual history and the lack of resources [8, 9]. Infections with *G. lamblia* remain a major problem in Iraqi hospitals, particularly among patients who arrive with diarrhoea and intestinal disorders [10]. Therefore, by gathering stool samples from patients at the Al-Zubair General Hospital in the governorate of Basra, this study seeks to ascertain the prevalence of *G. lamblia* infection.

2. Materials and methods

2.1. Study area

The purpose of the study was to determine whether individuals who got medical care at Al-Zubair General Hospital in the city of Basra were infected with *Giardia lamblia*. The research was carried out throughout the course of a time period that began on the first day of January and ended on the last day of December in the year 2024. Al-Zubair General Hospital has a variety of amenities, including an obstetrics and delivery suite, an intensive care unit, an accident and emergency department, a mortuary, an endoscopy suite, a primary surgical department, and other services. There are 216 healthcare workers, 256 nurses, and 46 physicians that are employed at the hospital. There are around 5,000 patients in the hospital each month, which is the average number of patients. According to [11], patients of the hospital make up eight percent of the total number of visitors to the Basra Governorate.

2.2. Ethical considerations

Approval number 5/264 indicates that the study has been green-lit by the Medical Basra Technical Institute's Ethical Review Committee, which is associated with Southern Technical University. Participation was entirely voluntary, and they were apprised of the study's aims and research ethics, including measures to protect their anonymity. Written consent was given by parents or guardians in the

names of the participants who are under the age of eighteen, and informed consent was secured during the course of the study's sample either verbally or in written form. In addition to being provided with an overview of the goals and the planned methodology of the research, the participants were also presented with the opportunity to voluntarily withdraw from the study without fear of any repercussions. Furthermore, the participants were assured that any potentially identifiable information that was related to the hospital or institution would be removed following the coding process in order to ensure the integrity of the data that was collected.

2.3. Inclusion and exclusion criteria

People of any age who visited Al-Zubair General Hospital during the data collecting period and were suspected of having parasite infections made up the research population; An individual who accepted to participate in the study was included though anybody who failed to consent and anybody that had the treatment of helminth within two weeks before the specimen collection period was excluded.

2.4. Data collection and processing

The sociodemographic information about the patient and the factors were gathered through face-to-face interview and a standardized questionnaire by a qualified nurse. The questionnaire was pre-tested and revised before it was used in the actual data collection process. Data concerning the age and sex of the patient among other relevant information were collected during the visit.

2.5. Sample collection and processing

Researcher collected stool samples from 924 patients at Al-Zubair General Hospital in Basra Iraq. The study team explained the purpose to participants and assured them of data privacy leading to their willing involvement. Each person provided a sample in a screw-capped container with a unique ID number to protect their identity. Participants collected their samples and delivered them to the lab in separate containers. Scientists first spotted protozoan cysts or trophozoites by smearing fresh samples. They identified giardias lamblia under a microscope by looking at the shape of cysts (which stained dark) and trophozoites. They tested staining methods for stool samples using Lugol iodine and formalin-ether concentration. To see protozoan trophozoites in diarrhea samples, researchers used direct smears (wet mount) under a microscope. To make a direct smear, they put a

Table 1. Distribution of intestinal parasites in Al-Zubair General Hospital.

Parasite name	No. Positive	Percentage %
Entamoeba histolytica	117	12.7%
Giardia lamblia	22	2.3%
Enterobius vermicularis	3	0.3%
Total	142	15.3%

thick layer of poop on a slide with some drops of distilled water or salt water. They covered it with a cover slip and looked at it under a microscope. This study used the formalin-ether concentration method. During sampling, they weighed out a small bit (1–5 g) of fresh poop. They mixed it up and spun it at 3000 rpm for five minutes. They dried off the stuff that settled at the bottom and added a drop of Lugol iodine to what was left. Then they checked it out under a microscope [12].

2.6. Data analysis and interpretation

We entered the data into SPSS version 23 after we verified its completeness. In order to make sense of the data, we next examined the descriptive statistics. Calculations for continuous variables' means and standard deviations were performed. We determined percentages and frequencies for categorical variables. We also calculated the odds ratios' 95% confidence intervals to account for any confounding variables. In all cases, we considered a p-value below 0.05 to be significant. To finish up, we showed our findings using tables and written descriptions.

3. Results

Entamoeba histolytica caused the most cases, with 117 people (12.6%) testing positive for this pathogenic protozoan. Giardia lamblia came in second with 22 people (2.3%), and Enterobius vermicularis came in third with 3 people (0.3%), Table 1. From January to December 2024, 924 people who went to Al-Zubair General Hospital in Basra and had their stools checked were part of this study. Out of the 924 samples that were tested, 22 (2.3%) were found to have Giardia lamblia. The results are shown in Fig. 1, Table 2 shows that 396 of the subjects were between the ages of 1 and 9 years old, with 13 (2.5%) being male and 9 (2.1%) being female. Out of the 924 stool samples that were collected, 142 were found to have intestine protozoan infections, which is 15.3% of the total. The age group 10–19 years old had the highest infection rate (4.3%), followed by people over 50 (2.9%). Table 3 shows that there was

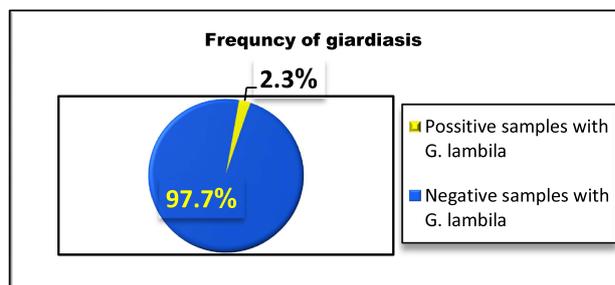


Fig. 1. Frequency of Giardia lamblia in Al-Zubair General Hospital.

Table 2. Distribution of Giardia lamblia according to patient's gender.

		Female		Male	
result	negative	Count	403	499	902
		% within result	44.7%	55.3%	100.0%
positive	Count	9	13	22	
		% within result	40.9%	59.1%	100.0%
Total	Count	412	512	924	
		% within result	44.6%	55.4%	100.0%

Statically significant X^2 test = 0.124, df = 1.
 P < 0.05, Odds Ratio = 1.167.

Table 3. Distribution of Giardia lamblia according to the age groups.

		negative	positive	
Age less than one year	Count	161	1	162
		% within Age	99.4%	0.6%
1–9 year	Count	385	11	396
		% within Age	97.2%	2.8%
10–19 year	Count	109	5	114
		% within Age	95.6%	4.4%
20–29 year	Count	58	2	60
		% within Age	96.7%	3.3%
30–39 year	Count	47	1	48
		% within Age	97.9%	2.1%
40–49 year	Count	41	0	41
		% within Age	100.0%	0.0%
above 50 years	Count	102	1	103
		% within Age	99.0%	1.0%
Total	Count	903	21	924
		% within Age	97.7%	2.3%

Statically significant X^2 test = 6.797, df = 6.
 P < 0.05, Likelihood Ratio = 8.193.

no statistically significant change in the number of people with Giardia lamblia across the age groups. Giardia infections were more common in July (4.5% of cases), but none were reported in August. These changes were not statistically significant, as shown in Table 4.

Table 4. Distribution of *Giardia lamblia* according to the months of the year.

		negative	positive		
months	Apr	Count	107	2	109
		% within months	98.2%	1.8%	100.0%
	Aug.	Count	47	0	47
		% within months	100.0%	0.0%	100.0%
	Dec.	Count	34	1	35
		% within months	97.1%	2.9%	100.0%
	Feb.	Count	88	2	90
		% within months	97.8%	2.2%	100.0%
	Jan.	Count	77	1	78
		% within months	98.7%	1.3%	100.0%
	Jul.	Count	42	2	44
		% within months	95.5%	4.5%	100.0%
	Jun.	Count	50	2	52
		% within months	96.2%	3.8%	100.0%
	Mar.	Count	74	3	77
		% within months	96.1%	3.9%	100.0%
	May.	Count	137	2	139
		% within months	98.6%	1.4%	100.0%
	Nov.	Count	130	2	132
		% within months	98.5%	1.5%	100.0%
	Oct.	Count	74	3	77
		% within months	96.1%	3.9%	100.0%
	Sep.	Count	43	1	44
		% within months	97.7%	2.3%	100.0%
	Total	Count	903	21	924
		% within months	97.7%	2.3%	100.0%

Statically significant χ^2 test = 5.793, df = 11. $P < 0.05$, Likelihood Ratio = 6.393.

4. Discussion

Parasitic infections of the intestines that are caused by single-celled organisms continue to be among the most common causes of illness across the globe. These infections lead to health difficulties and also contribute to a socioeconomic crisis in the communities that are impacted. The overall prevalence of protozoan infections is estimated at 15.3 percent, with the most prevalent infections being *Entamoeba histolytica* (12.7%), *Giardia lamblia* (2.3%), and *Enterobius vermicularis* (0.3%). The issue of public health posed by *E. histolytica* and *G. lamblia* is seen as significant, resulting in changing prevalence rates in Iraq, with *E. histolytica* frequently identified as the predominant infection. When we look at the results of this article and other Arab papers, we see that the percentage of intestinal parasite infections in Aden, Yemen, was very high in several hospitals. For example, the rate of *Entamoeba histolytica* infection was 26.87 percent [13]. At Dejen Primary Hospital in Ethiopia, 26.1% of people had *Entamoeba histolytica* and 9.2% had *Giardia lamblia* [14]. An investigation conducted in

the province of Duhok in Iraq showed that the prevalence of *E. histolytica* in the locality was 78.0% as compared to the 4.9% prevalence of *G. lamblia* [15].

Moreover, the studies conducted in Zakhko, Iraq demonstrated that the general prevalence of the parasitic protozoa was 18.65 whereas the prevalence of *E. histolytica* was discovered to be 68.61 [16]. The results that are given here go to show that the public health system always finds itself in an enduring danger due to the presence of such diseases such as *Giardia lamblia* and *Entamoeba histolytica* among others. Consequently, to mitigate the degree of the outcomes of such types of diseases, there is the need to establish preventive and control measures that are effective. The study that we carried out at Al-Zubair General Hospital showed that giardiasis infection rate is 2.5% among men and giardiasis infection rate is 2.1% among women. According to the findings of the Chi-Square (0.124) and odds Ratio (1.167), we can conclude that the difference between the male and female gender is not statistically significant. Subsequently, the results of the current research prove that the null hypothesis, which states that there is no difference in terms of exposure or infection based on gender, is right. The null hypothesis is valid since it implies that there is no difference between the susceptibility of both genders to infection. The results of this paper are in line with the results of other studies that have been carried out by other researchers who have also established similar patterns in gender distribution. According to their findings, males and females can equally be susceptible to infection [17]. Nevertheless, the results of this research do not match with another research which concluded that the infection rate was 8.16 percent among the males and 5.88 percent among the females in the Diyala Province [18]. Through our analysis we have been able to unearth information that shows the fact that there is no material difference between the various age groups. Despite the fact that the findings indicate that some age groups show a difference in terms of the rate of infection, it is far more likely that this difference is due to simple chance variation rather than the existence of causal relationship. However, it was found that, based on the results of our enquiry, the age group that recorded the highest rate of infection with *Giardia* was the group that was between the ages of 10–19 years, and the group with the least rate of infection was the one that was between the ages of 40–49 years. Despite the fact that there were no significant discrepancies identified, the findings are not consistent with the results of other research that has been carried out in Najaf [19], which discovered that the age group that was most affected by the parasite is 15–45 years old, and [20] in Kirkuk, which determined that the age group of

48–60 months (40%) had the highest infection rate [19, 20]. This is thought to be the consequence of people failing to properly clean their hands with both soap and water before sitting down to eat or after they have used the toilet. Even though the greatest rates of giardiasis were found in the month of July (4.5%), and no infection rates were reported in the month of August, the results of the research that is now being conducted have shown that there is no association between the months of the season of study and giardiasis. This finding was consistent with a study conducted by [23] in Sulaymaniyah and with a study conducted by [22] in Duhok. However, it was not consistent with a study conducted by [24] in Basrah, wherein the study period and *G. lamblia* infection were found to be significantly correlated.

4.1. Strengths and limitations of the study

The most robust components of the study were the primary and laboratory data that were acquired from patients who were chosen at random, as well as the investigation of co-parasitization. The methodology of this study has a number of shortcomings, including the absence of multivariate analysis, which prohibits the researchers from controlling for possible confounding variables, as well as the inability to determine causal associations. In addition, the fact that there is no data available that addresses the status of symptoms in the group that was studied (whether the individuals exhibited symptoms or not) could have contributed to the occurrence of selection bias. It lasts for a single season and is dependent on a microscopic inspection of the stool, which is not as reliable as molecular diagnostics and data that has been collected over multiple seasons.

5. Conclusion

In this study, we looked at the common parasites *E. histolytica* and *G. lamblia*, which can cause infections in our area. Only 2.3% of 924 respondents were positive in *Giardia* infection. This is a small percentage which indicates that our prevention programs and health programs including the appropriate treatment of the infected persons are effectively curbing the spread of these parasites. The environmental factors also contribute largely towards ensuring that there are low rates of infection. Breaking down the data by gender we observed a minor difference: the rate of infection was 2.5% among men and 2.1% among women. Though these figures are not statistically important, they do suggest that the male species can be slightly more prone to

infections. This may be because of many factors such as differences in biology or other social modes. We recommend that the future study be conducted with the help of molecular diagnostics and involve greater sample sizes of different places such as hospitals and health centers at different times in the year.

Conflict of interest

No conflict of interest.

Ethical approval

This study was performed in line with the principles of the Medical Basra Technical Institute's. Approval was granted by the Ethics Committee of University southern technical university (Date 2024/No5/264).

Data availability

All the necessary information are presented in the article.

Funding statement

There was no outside funding to this study.

Author contribution

The single contribution to the manuscript was made by the author.

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