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ORIGINAL ARTICLE

Prevalence of parasitic infection among diarrhetic patients attending the hospital in Ain Al-Tamur district, Karbala, Iraq

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ABSTRACT

Introduction: Diarrhea is one of the most common diseases, and it causes death due to the depletion of body fluids, which leads to severe dehydration. The main causes of diarrhea are viruses, bacteria, and parasites. The most common parasites that cause diarrhea are "*Entamoeba histolytica* and *Giardia lamblia*." Diarrhea infections are common in developing countries due to unhealthy environments, poor sewage drainage, and lack of attention to personal health.

Methods: The study was conducted on patients suffering from diarrhea who visited the hospital in Ain Al-Tamur district, Karbala governorate, Iraq. The samples of stool were collected in a single-use container. At first, the stool sample was examined with the naked eye to detect the color and texture of stool, then using a microscope to detect the cysts of the parasites.

Results: The results showed that the highest rate of parasitic infection was recorded for *Entamoeba histolytica* with an infection rate of (14%), while *Giardia lamblia* recorded the lowest rate of infection of (4%), and the differences were significant ($p \leq 0.05$). Regarding the gender, the results revealed that the differences were not significant ($p \leq 0.05$) between females and males for infection with both parasites. The study also showed the effect of a person's age on infection rates. The highest infection rate of *Entamoeba histolytica and Giardia lamblia* was at the age of (16–45) years, while the minimum rate of infection was at (< 1 year). The results also show the effect of the different seasons of the year on the rates of *Entamoeba histolytica* and *Giardia lamblia* infection, as the results show the highest rate of *Entamoeba histolytic* infection was in the spring, while the lowest rate was in the summer. Regarding *Giardia lamblia*, the results revealed that the maximum infection rate was also in spring, but the lowest rate was in winter.

Conclusion: We can conclude from the current study that the main causes of parasitic diarrhea in the Ain Al-Tamur district are *Entamoeba histolytica* and *Giardia lamblia* and the former is the more prevalent as well as the infection rates are affected by the age and seasonal variation but not affected by the gender.

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INTRODUCTION

Diarrhea is one of the most common diseases, and it causes death due to the depletion of body fluids, which leads to severe dehydration. The main causes of diarrhea are viruses, bacteria, and parasites.[1] Infections with Intestinal parasites are common in developing countries due to unhealthy environments, poor sewage drainage, and lack of attention to personal health.[2,3] *Entamoeba histolytica* and *Giardia lamblia* are the main parasites. *Entamoeba histolytica* causes amoebic colitis and amoebic dysentery and has an infection rate of about 480 people globally, which is responsible for 100,000 deaths annually. Weight loss, severe dysentery, bloody diarrhea, muscular exhaustion, weariness, and stomach discomfort are all common signs of *Entamoeba histolytica* infection. Since carelessness will result in severe amoebic dysentery and its side effects, the asymptomatic *Entamoeba histolytica* infection is more harmful than the infection with symptoms. Frequently, asymptomatic carriers are the only people who have trophozoites in the intestinal lumen "non-invasive infection".[4] When trophozoites excyst in the small intestine, they colonize and invade the mucosal layer of the large intestine. The infection could progress and become an extraintestinal illness that spreads to the host's liver, brain, and lungs, among other body organs,[5,6] regarding *Giardia lamblia*, it has an infection rate of about 280 million cases annually with no life-threatening.[7,8] The incidence of *Giardia lamblia* ranges between 2% to 7% in industrialized countries and 20% to 60% in developing countries.[9] Diarrhea, steatorrhea, abdominal pain, bloating, gas, pale, oily, foul-smelling feces, and weight loss are all symptoms of Giardiasis.[10] Humans become infected with *Entamoeba histolytica* and *Giardia lamblia* either from one person to another or through contaminated food and equipment with cyst stage.[11,12] Diarrhea is the second cause of communicable diseases that lead to death.[13] Deaths are increasing in developing and low-income countries.[14,15]

This parasite is widespread in Iraq. The infection rate of the parasite was recorded in Basra 29 and 15%, respectively, in 2005,[16] and it was recorded at 15 and 1%, respectively, in Mosul.[17] The number of confirmed cases of amoebiasis was 1543 and 1539 in men and women, respectively, in Dhi Qar governorate,[18] while it was 524 and 426, respectively, in Babylon governorate, and it was 524 and 426, respectively, in Erbil for the year 2020.[19]

METHODS

Study design and period: An epidemiological study was carried out to detect the prevalence of diarrheal disease related to parasitic infection among the patients of the Ain al-Tamur district in Karbala governorate, central Iraq. The study included the effect of age and gender on infection rates through the year's four seasons from Mar 1, 2021, to Feb 28, 2022.

Study settings: The study was conducted on patients who visited Ain Al-Tamur District Hospital. This district is located in the west of Karbala Governorate in central Iraq. The district is located in a desert area 80 km west of the governorate's center. This area depends on the water of wells and springs mainly. The district is located between latitude 32.33580°N and longitude 44.29254°E. The district's population is about 90,000 people, and this area rises 50 m above sea level (Figure 1).

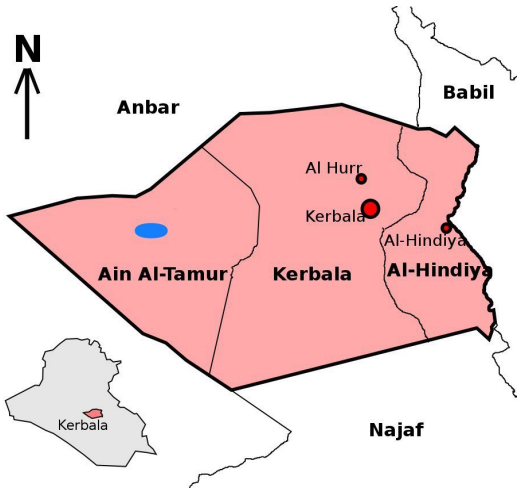

Figure 1: the map of Karbala governorate showing Ain Al-Tamur district.[20]

Study population: All patients have diarrhea attending Ain Al-Tamur hospital.

Variables

Dependent Variables: diarrhea with *Entamoeba histolytica* infection, diarrhea with *Giardia lamblia* infection and non-parasitic diarrhea.

Independent Diarrhea: Gender, age and seasons.

Sample Procedure: Samples were collected from people with diarrhea who attended Ain Al-Tamur Hospital of both sexes and of all ages. They were collected in a single-use container. At first, the stool sample was examined with the naked eye to detect the color and texture of stool; then, the samples were examined under a microscope by direct examination and concentration method for detecting eggs or cysts of any parasites.

All samples were examined under the microscope by two methods

- Using normal line 85% to detect the motile trophozoite phase
- Using Lugol's iodine 5% to detect the structure of trophozoites and cysts.

Data Analysis:

Data were analyzed using Chi-square by SPSS program version 22 for Windows 10.

Ethics Issue

This study was conducted under the instructions of the ethical committee of Ain Al-Tamur hospital.

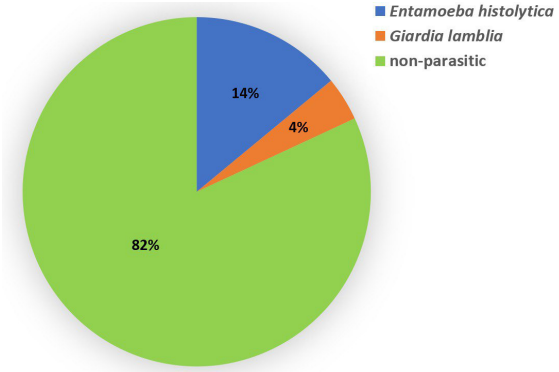

Figure 2 infection rate of *E. histolytica* and *G. lamblia* in patients suffering from diarrhea

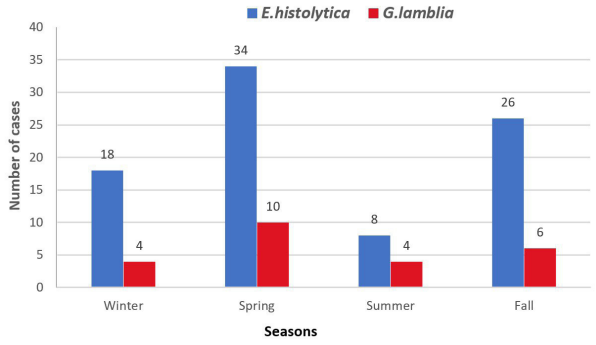

Figure 3: number of cases of *E. histolytica* and *G. lamblia* infection recorded through the year's seasons.

RESULTS

The current study was conducted on 502 patients suffering from diarrhea who attended Ain Al-Tamur Hospital, as they were 238 males and 264 females of different ages.

Throughout the study period, which extended for a whole year, only two parasites were recorded in people suffering from diarrhea, namely *Entamoeba histolytica* and *Giardia lamblia*.

Figure 2 shows that the highest rate of parasitic infection was recorded for *Entamoeba histolytica*, with an infection rate of 14%. In comparison, *Giardia lamblia* recorded the lowest rate of infection of 4%, and the differences were significant ($p \leq 0.05$).

With regard to gender, the results show that the number of cases and percent of infection with *Entamoeba histolytica* was 42 (48.8%) in males and 44(51.2%) in females, while in *Giardia lamblia* 14 (56%) in males and 11(44%) in females with referring to that there were no significant differences ($p \leq 0.05$) between females and males for infection with both parasites (Table 1).

The study also shows the effect of a person's age on the rates of infection with intestinal parasites. Table 1 shows that the maximum rate of infection of *Entamoeba histolytica* was 37.2% at the age of 16–45 years, while the lowest incidence of infection was 6.9% at the age (<1 year). Regarding *Giardia lamblia*, the highest infection rate of 52% was recorded at the age of (16–45) years, and the minimum infection rate of 8% was recorded at the age (<1 and > 46 years), and all differences were significant ($p \leq 0.05$).

Figure 3 shows the impact of the different seasons of the year on the number of cases of *Entamoeba histolytica* and *Giardia lamblia* infection. The results show that the highest number of *Entamoeba histolytica* infections was 34 in the spring, while the lowest was 8 in the summer. Regarding *Giardia lamblia*, the results reveal that the maximum number of cases was 10 in spring while the lowest number was 4 in winter and the differences were significant ($p \leq 0.05$).

DISCUSSION

This study was conducted in an area where no study of parasitic infections was previously carried out because the area is a manor and far from the city center, and it is geographically isolated as well as far from the sources of rivers in Iraq. The residents of this area depend mainly on water from wells and springs. The results of this study show that the incidence

Table 1: Effect of gender and age on E.histolytica and G. lamblia infection rate

	Entamoeba histolytica		*Giardia lamblia*		*Non-parasitic*	
	No.	*Percent%*	*No.*	*%*	*No.*	*%*
Gender						
male	42	48.8	14	56	238	47.4
female	44	51.2	11	44	264	52.6
total	86	100	25	100	502	100
ages						
<1	6	6.9	2	8	88	17.5
1-5	18	20.9	3	12	112	22.3
6-15	18	20.9	5	20	96	19.2
16-45	32	37.5	13	52	122	24.3
>46	12	13.9	2	8	84	16.7
total	86	100	25	100	502	100
	p = 0.035*		p = 0.030*			

of amebiasis is higher than the rate of giardiasis in people suffering from diarrhea who attend Ain Al-Tamr Hospital. This may belong to the longer persistence of *Entamoeba histolytica* cyst than *Giardia lamblia* cyst.[21] The results also found that the differences between males and females for parasite infection are insignificant. This result agrees with,[18,22] while it differs with,[23] who found that males are more infected with parasites than females. This discrepancy may be due to social differences between different societies in the roles of women and men that affect a person's exposure to infectious stages.[24]

With regard to the effect of age on the rate of parasite infection, the current study proved that the highest infection rates of the two parasites were recorded at the age of 16–45 years, while the lowest infection rate was recorded at the age of less than one year and the age higher than 46 years. The reason may be because people at this age are the most active movable and are considered the working class in society. The rate of their exposure to the infectious stages of the parasite is high.[25]

The results also show that the maximum infection rate of the parasite was recorded in the spring, while the minimum infection rate was recorded in the summer and winter seasons. The reason may be the large spread of insects that transmit diseases, especially the house fly. Graczyk *et al.*[26] explained that the house fly is one of the most essential mechanical vectors of protozoa to humans. The multiplication and spread of these insects increase dramatically in the spring.[27] The humidity factor may also have an effect, as rain increases in winter and spring, which prolongs the cysts' period of life in humid places until they are transmitted to humans.[28]

CONCLUSION

we conclude from the present study the following:

- "*Entamoeba histolytica* and *Giardia lamblia*" are the only enteric parasites associated with diarrhea in a patient in the Ain Al-Tamur district.
- *Entamoeba histolytica* is more prevalent than *Giardia lamblia*.
- Males and females have equal chances for infection with intestinal parasites.
- The most active ages (16-45) have higher infection rates.
- Spring is the season when most infection cases occur.

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Competing of interest

There is no competing interest

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