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Prevalence of Diarrhea Caused by Intestinal Parasites in Children in AL-Kufa City, Iraq

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ABSTRACT

Background: Intestinal parasites are one of the most common causes of diarrhea in children and it has almost global prevalence with high prevalence rates in developing countries.

Objective: The aim of this study was to compare between the prevalence of *Entamoeba histolytica* (*E. histolytica*) and *Giardia lamblia* (*G. lamblia*) as a cause of diarrhea in children in AL-Kufa City, Iraq.

Patients and methods: Four hundred children with age ranged between 1-10 years old that had diarrhea and were admitted to the General Hospital in AL-Kufa City from June 2021 to February 2022. Parasites were diagnosed according to stool microscopic examination.

Results: Out of 400 children, there were 325 infected by parasites (190 *E. histolytica* and 135 *G. lamblia*), age group 4-6 yeas was the most infected with 80 and 54 cases by *E. histolytica* and *G. lamblia* respectively. The rural area was the highest infected than urban with 105 and 85 cases by *E. histolytica* respectively, and 90 and 45 by *G. lamblia* respectively.

Conclusion: There were high prevalence of diarrheal infections in children caused by *E. histolytica* and *G. lamblia*, and the most infections were more in rural than urban.

Keywords: Prevalence, Diarrhea, *E. histolytica*, *G. lamblia*, AL-Kufa City, Iraq.

INTRODUCTION

Intestinal parasites are one of the causes of diarrhea in children and it has an almost global prevalence with high prevalence rates in developing countries, especially since at least five million children suffer from diarrhea annually [(1)]. Diarrhea is the largest contributor to malnutrition and more serious in rural areas as poor sanitary conditions, lack of cleanliness or unavailability of drinking water, and the low educational level of mothers are all factors that increase the incidence of diarrhea [(2, 3)]. The use of human excreta and untreated sewage water as fertilizer for many crops is a cause of transmission of intestinal parasites [(4)]. About 70% of diarrhea cases in developing countries are caused by food contamination with intestinal parasites as a result of lack of health awareness and lack of hygiene [(5)].

Entamoeba histolytica and *G. lamblia* are the most parasites that cause diarrhea in children especially in developing countries such as Iraq [(6)]. Across the globe, more than three billion people suffer from intestinal protozoan parasites, which are highly prevalent [(7)]. Food or water contaminated with the parasites is typically used to transmit by the faecal-oral route. Furthermore, it can be spread through soil, fresh vegetables, direct contact, residing in endemic areas, and swimming in infected water [(8)]. *Entamoeba histolytica* and *G. lamblia* infections commonly cause weight loss, bloody diarrhea, severe dysentery, physical exhaustion, fatigue, and abdominal pain. Due to the severe side effects of amoebic dysentery that can result from negligence, asymptomatic *E. histolytica* infections are more dangerous than those with symptoms [(9)].

There are few published studies that describe the relative contribution of these different parasitic infections in school-age children in AL-Kufa City, Iraq and there were few reports that focus on the relationship between infection by parasites and lifestyle. Therefore, the aim of this study was to compare between the prevalence of *E. histolytica* and *G. lamblia* as a cause of diarrhea in children in AL-Kufa City, Iraq according to gender, age group and lifestyle during nine months.

PATIENTS AND METHODS

Sample collection: This epidemiological study performed in AL-Kufa City from June 2021 to February 2022. 400 stool samples were collected from children of age ranged between 1-10 years old suffering from diarrhea and primary enteritis at AL-Kufa General Hospital. During the collection process, clean plastic bottles containing specific information about the children, including their name, age and lifestyle (urban or rural) [(10, 11)].

Diagnosis of parasites: A direct saline method prepared with 0.9% sodium chloride was used to examine stools under a light microscope to determine their characteristics (mucous, serous, greasy, and bloody) as well as colors (yellow, brown, semi-brown, and greenish). We took a little bit of recently passed stool with a wood applicator, mixed it with physiological saline and Lugol's iodine solution, and then placed onto a glass slide. Using

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the direct smear technique, we examined the slide for cysts and trophozoites under a microscope [3, 12, and 13].

Ethical considerations:

The study concept for human studies was approved from Kufa University's College of Science and AL-Kufa General Hospital by The Institutional Ethics Committee. Additionally, before taking part in the study, each individual gave written, informed consent.

This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

Windows 2010 and SPSS version 23 was utilized to evaluate the study's data. Numbers and percentages have been used to compare between two types of parasites according to gender, age group, rural and urban area [14]. Unpaired sample t-tests was used to compare two groups, and one-way ANOVA tests was performed to compare groups that had been separated based on the parameters that were assessed [15]. A statistically significant threshold of significance was set at $P \leq 0.05$.

RESULTS

Total infections

The results of the current study indicated that there were 325 children infected with two types of parasites; 190 (58.47%) infected by *E. histolytica* (90 males and 100 females) and 135 (41.53%) infected by *G. lamblia* (55 males and 80 females) (Table 1).

Table (1): Total numbers and percentages of children infected by *E. histolytica* and *G. lamblia*

Parasites	Males	Female	Total No.(%)
E. histolytica	90	100	190 (58.47)
G. lamblia	55	80	135 (41.53)
Total No.(%)	145 (44.61)	180 (55.39)	325 (100)

Age groups and lifestyle

Table (2) showed the numbers and percentages of infections caused by *E. histolytica* according to age groups and rural or urban area, the results proved that there were 105 cases (55.26%) in rural and 85(44.74%) in urban, 67cases (63.81%) were males and 38 (36.19%) were females in rural area, while there were 49 (57.64%) males and 36 (42.36%) females in urban. Age group 4-6 was the highest prevalence with 80 (42.10%) cases followed by age group 7-10 with 70 (36.85%) and age group 1-3 with 40 (21.05%) cases.

Table (2): Numbers and percentages of infections caused by *E. histolytica*

Age group (Year)	*E. histolytica*				
	Rural		Urban		Total No.(%)
	Male	Female	Male	Female	
1-3	15	10	9	6	40 (21.05)
4-6	25	15	22	18	80 (42.10)
7-10	27	13	18	12	70 (36.85)
Total No.(%)	67 (63.81)	38 (36.19)	49 (57.64)	36 (42.36)	190 (100)
Total No.(%)	105 (55.26)		85 (44.74)		

Table (3) showed the numbers and percentages of infections caused by *G. lamblia* according to age groups and rural or urban area, the results proved that there were 90 cases (66.66%) in rural and 45 (33.34%) in urban, 52 cases (57.77%) were males and 38 (42.23%) were females in rural area, while there were 28 (62.22%) males and 17 (37.78%) females in urban. Age group 4-6 was the highest prevalence with 54 cases (40%) followed by age group 7-10 with 53 (36.26%) and age group 1-3 with 28(20.74%) cases.

Table (3): Numbers and percentages of infections caused by *G. lambilia*

Age group (Year)	*G. lamblia*				
	Rural		Urban		Total No.(%)
	Male	Female	Male	Female	
1-3	12	8	6	2	28 (20.74)
4-6	20	17	10	7	54(40)
7-10	20	13	12	8	53 (36.26)
Total No.(%)	52 (57.77)	38 (42.23)	28 (62.22)	17 (37.78)	135 (100)
Total No.(%)	90 (66.66)		45 (33.34)		

The relationship between infection with intestinal parasites, age and lifestyle

The results of the current study showed a significant increase in the incidence rate of children with rural slope, which amounted to 55.2% and 66.6% compared to children with urban slope, which had incidence rate of 44.7% and 33.3% for the *E. histolytica and G. lamblia* respectively, the data of the samples were correlated to the criteria that were used as shown in the table (4).

Table (4): Correlation between infection with intestinal parasites and lifestyle of the affected children, distributed by age groups

Correlations		Parasite	Place	Sex	Frequently	Age
Parasite	Pearson Correlation	1	.000	.000	-.369	.000
	Sig. (2-tailed)		1.000	1.000	.076	1.000
	Sum of Squares and Cross-products	6.000	.000	.000	-27.500	.000
	Covariance	.261	.000	.000	-1.196	.000
	N	24	24	24	24	24
Place	Pearson Correlation	.000	1	.000	-.436*	.000
	Sig. (2-tailed)	1.000		1.000	.033	1.000
	Sum of Squares and Cross-products	.000	6.000	.000	-32.500	.000
	Covariance	.000	.261	.000	-1.413	.000
	N	24	24	24	24	24
Sex	Pearson Correlation	.000	.000	1	-.449*	.000
	Sig. (2-tailed)	1.000	1.000		.028	1.000
	Sum of Squares and Cross-products	.000	.000	6.000	-33.500	.000
	Covariance	.000	.000	.261	-1.457	.000
	N	24	24	24	24	24
Frequently	Pearson Correlation	-.369	-.436*	-.449*	1	.451*
	Sig. (2-tailed)	.076	.033	.028		.027
	Sum of Squares and Cross-products	-27.500	-32.500	-33.500	927.958	55.000
	Covariance	-1.196	-1.413	-1.457	40.346	2.391
	N	24	24	24	24	24
Age	Pearson Correlation	.000	.000	.000	.451*	1
	Sig. (2-tailed)	1.000	1.000	1.000	.027	
	Sum of Squares and Cross-products	.000	.000	.000	55.000	16.000
	Covariance	.000	.000	.000	2.391	.696
	N	24	24	24	24	24

*Correlation is significant at the 0.05 level (2-tailed).

DISCUSSION

The results of the current study showed that there were high infections with parasites with 235 cases (Tabl e 1) and the most cases were in rural area (Tables 2 and 3). Also, the results indicated that there was a significant increase between infection with intestinal parasites and lifestyle of the infected children and age groups (Table 4). This result is high compared to a local study in Baghdad, Babylon and Mosul [16], where the percentages were 51.5%, 48.8% and 64.16% respectively. Other studies in Thi-Qar and Erbil Province in Iraq proved that there were high cases infected with intestinal parasites in males and females [17, 18]. The simple morale between the sexes may be due to the homogeneity of habits leading to the spread of intestinal parasite infection between the sexes in a close manner, as well as to the fact that children of both sexes have similar behaviors in playing with each other and using the same tools, especially among brothers, sisters and relatives, especially in poor families, and this was confirmed in Najaf and in Babylon, which confirmed that both sexes are exposed to the same chances of infection with intestinal parasites [19, 20].

While, other studies showed that there were significant differences in infections between males and females, which was attributed to physiological and anatomical factors and habits related to sex, while the infection rate in males was recorded to be higher than the infection rate in females. The reason for this was attributed to that the behavior of males is different from the behavior of females in terms of leaving the house frequent friction outside and exposure to sources of infection [21, 22].

Therefore, the children in the countryside are more susceptible to infection than children in the city, where the cultural, health, and living standards are low, and the frequent breeding of domestic animals increases the low level of hygiene, in addition to providing an opportunity for the gathering of insects, including flies, which are the best mechanical carrier for protozoan bags and worms' eggs [23, 24].

The reason for the high rates of infection with intestinal parasites in all parts of Iraq is due to the deteriorating health conditions and the lack of medicines used to treat intestinal parasites, as well as the lack of attention to personal hygiene, in addition to the lack of chemicals used to sterilize drinking water, contamination of foodstuffs sold in unhealthy ways, raising animals inside homes and collecting water polluted sewage, which provided the appropriate conditions for the growth and reproduction of domestic insects that carry eggs and bags of parasites [25, 26].

CONCLUSIONS

Infections with intestinal parasites are still high in AL-Kufa City, Iraq, which threatens the public health of children due to the lack of health awareness and the lack of appropriate health care.

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