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Article

Prevalence of Intestinal Parasitic Infections among children in Kirkuk City, Iraq.

Huda Mawlood Taher[1,], Ali Hasan Mohamed[2], Selda Saeed Yaseen[3]*
[1] Department of Microbiology, College of Medicine, University of Kirkuk, Kirkuk, Iraq.
[2] Department of Internal and Preventive Medicine, College of Veterinary Medicine, University of Kirkuk, Kirkuk, Iraq.
[3] Department of Veterinary Microbiology, College of Veterinary Medicine, University of Kirkuk, Kirkuk, Iraq.
** Correspondence: huda.mawlood@uokirkuk.edu.iq*
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ABSTRACT

Intestinal parasites are endemic in many developing areas, and they are regarded as one of the most frequent tropical diseases, where they are responsible for adult and child morbidity and mortality. The current study is a survey to determine the prevalence of intestinal parasite infections in patients attending the General Hospital for Pediatrics in Kirkuk City from January 2021 to September 2021. Stool samples were examined by direct smear method with normal saline 0.9 % NaCl and 1% iodine-Lugol solution staining method to determine the outcomes of the current investigation. The results were assessed using the Q-square statistic test. The current study's findings revealed that intestinal parasites were reported in 69(31.7), the most affected group of patients with intestinal parasites, those 1-3 years old (11.4%), Intestinal protozoa infection were (24.3%) significantly more than helminths with (7.4%). The most common protozoa were *Entamoeba histolytica* (17.9%), the next common protozoan found was *Giardia lamblia* (6.4%). Intestinal helminth infections were reported in this study (7.4%). Males were more infected with intestinal parasites (18.4%) than females (13.3%). The highest infection rate with intestinal parasites was recorded between August (6.4%) and September (4.6%). Double infection was detected in three cases with *Entamoeba histolytica* and *Giardia lamblia*. At the same time, no triple infection was reported during this study.

Keywords: Intestinal parasitic infections, Intestinal protozoa, Intestinal helminths, Kirkuk.

INTRODUCTION

Intestinal parasites can be protozoan or helminths living within the host. These parasites represent an endemic disease that affects people worldwide, especially in tropical and subtropical areas; it infects around 3.5 billion persons a year 1. It can be transmitted from person to person by oral-fecal 2. All age groups are susceptible to Intestinal Parasite infection, the majority of them are children [3]; there are several environmental and socio-economic factors contributing to the presence of Intestinal Parasite infection in children; among them is lack of

education, lack of personal hygiene, poverty, the absence of potable water, inadequate disposal of excreta, and poor housing facilities [4].

These infections can potentially cause severe health problems for children, resulting in anemia, iron deficiency, weight loss, growth delay, dyspepsia, abdominal pain, malnutrition, and growth retardation [5], Still the main causes of mortality and morbidity worldwide [6].

Amoebic dysentery is a dangerous disease caused by E. .histolytica, resulting in 100,000 deaths annually. It can cause severe diarrhea abscesses in the colon, liver, lung, and other organs, and it is the third leading parasite cause of death worldwide, after malaria and schistosomiasis [7].

Giardiasis is a disease caused by Giardia lamblia and affects children and adults, causing malabsorption syndrome and weight loss in those infected [8]. Both E. histolytica and G. lamblia can be spread from person to person through contaminated food or drinking water, as well as fecal–oral contact [9].

The most common intestinal helminths that cause digestive disorders are Ascaris lumbricoides, Strongyloides stercolaris, Enterobius vermiculates, and hookworms [10].

Although several studies were carried out on the prevalence of Intestinal parasitic infections in Iraq, several localities still lack epidemiological information on Intestinal parasite infections. Thus, this study aimed to determine the prevalence of intestinal parasitic infections according to the type of parasites and relate such infections with age, sex and month in Kirkuk City, Iraq.

MATERIALS AND METHODS

The total number of people investigated in this study was 218. Their ages range from less than a year - 12 years old. There were 95 females and 123 males. This study was carried out in the General Hospital for Pediatrics laboratory in Kirkuk City. These samples were obtained from people in the hospital (of different sexes and ages attending the hospital) from January 2021 to September 2021.

A stool sample from each one was collected in a sterile container, and each specimen was examined macroscopically and microscopically; in the macroscopical examination, were noted for many characteristics, including consistency, color, composition, odor, presence of blood and mucous. Then, two direct smears were done, one in normal saline and the other in Lugal's iodine. A small part of the stool specimen was examined using the wooden applicator with a warm normal saline (37ºc). Then, a cover slip was applied, and scanning under 10x and 40x objective lens were performed to demonstrate the presence of protozoan trophozoites or cysts, worm eggs and larvae. The second smear was stained with iodine, which is used to stain the internal structure of the cystic stages of the parasites, while it kills the trophozoites so they become nonmotile.

A part of the stool sample for each individual was processed using a formol-ether sedimentation technique and was examined microscopically to identify parasites.

The Chi-square (X^2) test was used to analyze parasitological examinations and data collected from patients using questionnaires and assess the differences in prevalence among genders, age groups, and months.

RESULTS

Of 218 stool samples examined by direct method and concentration technique, 69 were positive for intestinal parasites; the total infectivity rate was 31.7%. The frequency of the parasitic infestations was higher among males (18.4%) than

females (13.3%), but this difference was not statistically significant (p>0.05) (table 1).

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Sex	No. of stool samples examined	% of stool samples examined	No. of the positive sample	% of a positive sample
Males	123	56.4	40	**18.4**
Females	95	43.6	29	**13.3**
Total	218	100	69	**31.7**

P-value= 0.059 **Table 1. Prevalence of Intestinal parasites according to sex**

Non-sig. P≥0.05

The overall infection rate by intestinal protozoa was higher than intestinal helminth infection. Of the samples investigated, E. histolytica was the most prevalent intestinal parasitic infection (17.9%), whereas Ascaris lumbricoides was the predominant helminth (2.8%) Table 2.

Parasites	Sex		Total
	Males	Females	
Protozoa			
Entamoeba histolytica	21(9.6)	18(8.3)	**39(17.9)**
Giardia lamblia	8(3.6)	6(2.8)	**14(6.4)**
Total Protozoa	29(13.2)	24(11.1)	**53(24.3)**
Helminthes			
Enterobius vermicularis	7(3.2)	3(1.4)	**10(4.6)**
Ascaris lumbricoides	4(1.9)	2(0.9)	**6(2.8)**
Total Helminthes	11(5.1)	5(2.3)	**16(7.4)**
Total	40(18.3)	29(13.4)	**69(31.7)**

*P-value=0.058 **Table 2. Prevalence of Intestinal parasites among children in Kirkuk city**

Sig. P≥0.05

Table 3 showed the highest infection group with intestinal parasites, those with 1-3 years old (11.4%); otherwise, the group with 10-12 was the least affected (3.3%).

Parasites	Age groups					Total
	< 1	1-3	4-6	7-9	10-12	
Protozoa						
Entamoeba histolytica	8(3.6)	14(6.4)	8(3.7)	4(1.8)	5(2.3)	**39(17.9)**
Giardia lamblia	3(1.4)	5(2.3)	2(0.9)	3(1.4)	1(0.5)	**14(6.4)**
Total Protozoa	11(5)	19(8.7)	10(4.6)	7(3.2)	6(2.8)	**53(24.3)**
Helminthes						
Enterobius vermicularis	1(0.5)	4(1.8)	3(1.4)	1(0.5)	1(0.5)	**10(4.6)**
Ascaris lumbricoides	-(0.0)	2(0.9)	3(1.4)	1(0.5)	-(0.0)	**6(2.8)**
Total Helminthes	1(0.5)	6(2.7)	6(2.8)	2(1)	1(0.5)	**16(7.4)**
Total	12(5.5)	25(11.4)	16(7.3)	9(4.2)	7(3.3)	**69(31.7)**

P-value=0.621 **Table 3. Prevalence of Intestinal parasites according to age group.**

Non sig. P≥0.05

The infection rate with Intestinal parasites during a year is shown in table (4). The highest infection rate was during August (6.4%), July (6%), and September (4.6%), respectively, and the lowest infection rate was during February (0.9%).

Months	No. of examined(%)	No. of Positive(%)
January	17(7.8)	**4(1.8)**
February	11(5.1)	**2(0.9)**
March	20(9.2)	**6(2.8)**
April	19(8.7)	**5(2.3)**
May	26(11.9)	**8(3.7)**
June	29(13.3)	**7(3.2)**
July	35 (16)	**13(6)**
August	31(14.2)	**14(6.4)**
September	30(13.8)	**10(4.6)**
Total	218(100)	**69(31.7)**

*P-value= 0.041 **Table 4. Prevalence of Intestinal parasites according to months.**

Sig. P≥0.05

Overall, considering single and double infection, the commonest parasite was E.histolytica, which was presented in (17.9%) of the examined sample; the infection with a single parasite was more common (95.6%) than that with double parasite infection between E. histolytica, and G. lamblia (4.4%)are shown in Table 5.

Type of parasitosis	Positive of parasites No.	 %
Single	66	**95.6**
Double(*Entamoeba histolytica& Giardia lamblia*)	3	**4.4**
Triple or more	-	**0.0**
Total	69	**100**

P-value= 0.0007 **Table 5. Type of Intestinal parasitic infection in the examined sample.

Sig. P≥0.05

In this study, we observed no significant differences (p≥0.05) between the studied group's age group. The intensity of infection(2.8%) was higher in the age group(4-6) than in other groups; this results in agreement with [15]. This might be related to the high activities and behavior of children in this age group; they typically play and move around, covering a larger area, increasing the risk of infection. The highest infection rate (6.4 %) was recorded in August, while the lowest percentage was recorded in February at 0.9 %. These differences were shown to be statistically significant with a p-value ≥0.05. Climate has an impact on the prevalence of intestinal parasite infections.

The highest incidence of intestinal parasites was found in a single infection(95.6%). Double infection was reported only in three cases, combined with Giardia lamblia and Entamoeba histolytica (4.4%).

DISCUSSION

Intestinal parasite infections are one of the major health concerns, particularly in developing countries [11]. This study shows the overall prevalence of intestinal Parasitic infection among children in Kirkuk city. We collected a total of (218) samples among males and females during the period from January 2021 to September 2021,(69) samples were positive (31.7%). This result was lower than that reported by 12, which recorded that the total infection rate was 37.5% among children in Diyala city. A different result was observed by previous studies, which were done in Baghdad City (24.39%) by [13]. Both genders, females and males in different age groups, were exposed to the chance of infection because they all lived in the same conditions of disease. However, different percentages for infection could be attributable to physiological, behavioral, and immunological variations between genders and endocrine activity, as male bodies are more tolerant than female bodies[14]. Our study showed no relationship between this parasite's infection and the patient's gender, which led to an agreement with findings from another Iraqi study[15].

The most prevalent types of intestinal parasite are E. histolytica(17.9%). The widespread of protozoal infections may be due to the easy transmission routes of these intestinal parasites, which are transmitted via the fecal-oral route, either directly from person to person or indirectly by eating or drinking fecally contaminated food and water, as well as the protozoan simple life cycle does not require an intermediate host[16]. The result of the study closed with a study conducted in Baghdad City that found protozoan(18.56%) more than helminth infections(2.45%)[13]. Also, another study in Diyala province shows protozoan (73%) more than helminths (26.9%)[12]. During the summer months, many amoebiasis and giardiasis infections were discovered[17]. Iraq is one of the countries that have long, hot, dry summers and short, cold, rainy winters; hot and dry conditions promote parasite infection. Demographic factors also play a role; for example, swimming in lakes and rivers during hot weather enhances infection susceptibility for infections[18]. Other studies have shown comparable findings carried out in Erbil City, Iraq. The present study indicated multiple infections were lower than those reported in other studies [16]. The differences in the prevalence of these intestinal parasite infections in our study may be due to several factors, including different climatic conditions, sample size determination, study time, nutrition and socio-economic, and health-related behavior[20].

CONCLUSION

This study demonstrates that Intestinal parasitic infections are common among children in Kirkuk City, and this infection was affected by sex, age and month.

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Conflict of interests:

The author of this paper declares that he has no financial or personal relationship with individuals or organizations that would unacceptably bias the content of this paper and, therefore, declare that there is no conflict of interest.

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Ethical Approve:
We declare that the study does not need ethical approval.

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