Research article

Frequency of intestinal parasites among school children around Al Hawija, Kirkuk city

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ABSTRACT

Introduction and Aim: Intestinal parasite infections among children are a worldwide problem, particularly in developing countries. Intestinal parasitic infections can lead to several health issues including growth and physical development in children. This investigation aimed to determine the prevalence of intestinal parasites in school children residing in Al Hawija, Kirkuk.

Materials and Methods: This study, undertaken between May 2021 and October 2022, involved 247 children aged between 2 and 13 years residing at Al Hawija, Kirkuk City. Stools samples collected from these children were studied for intestinal parasitic infections.

Results: Of the 247 children 194 (78.6%) were seen to harbor intestinal parasites. Among these, the prevalence of protozoal and helminthic infection was observed to be 152 (61.5%) and 42 (17%) respectively. Among the protozoans, the highest prevalence was seen for *Entamoeba histolytica* (61.8%), followed by *Giardia lamblia* (30.9%) and *Entamoeba coli* (7.2%). Similarly, among helminthes, the highest infection was by *Ascaris lumbricoidis* (45.2%), followed by *Enterobius vermicularis* (21.4%), *Trichuris trichura* (11.9%), *Hymenolepis nana* (11.9%) and *Taenia* spp. (9.5%). The prevalence for these parasitic infections was observed to be highest in children aged 2-5 years.

Conclusion: Children aged between 2- 5 years are prone to parasitic infections in comparison to children between 10-13 years.

Keywords: Intestinal parasite infections; protozoans; helminthic parasites; Entamoeba histolytica; Ascaris lumbricoidis.

INTRODUCTION

Intestinal parasites pose a severe hazard to public health, particularly in tropical and subtropical areas. Estimates place the number of infected individuals at 3.5 billion, with children from underdeveloped nations making up the bulk (1-3). Intestinal parasite infections are influenced by the socioeconomic standing of the neighborhood, social practices and traditions, bad environmental and sanitary conditions, poor personal hygiene, a lack of access to safe drinking water, and climatic factors (4). In poorer countries, prevalence rates range from 30 to 60% compared to 2% or fewer in developed countries (5,6). There is a correlation between environmental changes and the occurrence of infection, according to several research on the prevalence of intestinal parasites conducted in various parts of the world (7). Iraq has a high prevalence of intestinal parasite illnesses, which is dependent on environmental conditions, the consequences of population growth, individual and communal cleanliness, and sanitation. Numerous studies on various Iraqi communities have produced varying findings (8,9). The most notable characteristics of parasitic helminths among humans are their long-term persistence within the host, their inability to elicit protective immunity until years or even decades after exposure (10), their complex developmental cycles, which frequently involve stage-specific antigens, their aggregated distribution in human communities, where a small percentage of people harbor the majority of worms (11), and the occurrence of people who are predisposed to heavy infection. In children with high worm burdens, long-term infection, especially if connected to inadequate nutrition, might impede physical and cognitive development (12). Disease may be brought on by host immune responses that cause harm to parasite accumulation locations (12). Hence the goal of this study was to investigate the prevalence of intestinal parasites in children residing in Al Hawija, Kirkuk.

MATERIALS AND METHODS

Samples

Children (n=247) aged between 2 and 13 years participated in the present study. The children were patients at Kirkuk's Al Hawija Hospital between May 2021 and the end of October 2022, diagnosed with acute watery diarrhea and stomach pain. Stool samples were collected from each participant for parasitic investigation. Data regarding age and other general information was gathered through interviews with parents and children.

The stool sample collected was subjected to microscopic diagnosis using a light microscope,

followed by a method of formol-ethyl acetate concentration (13).

Statistical analysis

Minitab software version 17 was used for the data analysis. ANOVA was used to determine the statistical significance at P >0.05 for data obtained.

RESULTS

This study included 247 school children ranging in age between 2-13 years of which 61.9% were males and 38.1% females (Table 1). 41.3% of children examined were residents of Al Hawija while the remaining belonged to areas surrounding Al Hawija (Table 1).

Table 1: Distribution of study participants (n=247) based on age, gender and residence

Parameter	Number (%)	P-value
Age		
2-5 years	108 (43.7)	0.192, NS
6-9 years	78 (31.6)	
10-13 years	61 (24.7)	
Gender		
Male	153 (61.9)	0.415, NS
Female	94 (38.1)	
Residence		
Within Al Hawija	102 (41.3)	0.084, NS
Outside Al Hawija	145 (58.7)	

NS: Non-significant

For the purpose of investigation, the children were divided into three groups based on their age as 2-5 years, 6-9 years and 10-13 years. The children in all age groups were investigated for the presence of parasitic infections. Results showed that of the 247 children tested in this study, 194 (78.54%) were positive for parasitic infection. Among these 152 (61.5%) were seen to be infected with protozoan parasites, while the remaining 42 (17.0%) were infected with helminth worms.

Protozoan parasites

Among the 152 children infected with protozoan parasites, the highest infection as protozoan *Entamoeba histolytica* (61.8%), followed by infection by *Giardia lamblia* (30.9%) and *Entamoeba coli* (7.2%) (Table 2). Children in the 2-5 years age-group were observed to have the highest incidence of *E.histolytica* (34.9%), *G.lamblia* (18.4%) and *Entamoeba coli* (4.6%). The incidence percentage for these protozoans was seen to decrease as the age increased. A significant correlation was seen (P-value 0.0001) between age and protozoan infection in these children (Table 2).

Helminthic worms

Children in this study were tested for infection by the helminthic worms *Ascaris lumbricoidis, Enterobius vermicularis, Trichuris trichura, Hymenolepis nana* and *Taenia spp.* The findings revealed that *Ascaris lumbricoidis* had the highest infection rate of 45.2%, followed by *Enterobius vermicularis*, *Trichuris trichura*, *Hymenolepis nana* and *Taenia* spp (Table 3). Among the different age groups, the highest incidence for these parasitic worms was seen in children aged between 2-5 years (Table 3). However, no statistical correlation (P-value= 0.084) was observed for infection by these helminthic worms and age of children.

Table 2: Age-wise distribution of children infested with different protozoan parasites

Parasites	Number (%) of children in the age group				P-value
	2-5 years	6-9 years	10-13 years	Total	
Entamoeba histolytica	53(34.9%)	28(18.4%)	13(8.6%)	94 (61.8%)	0.0001
Giardia lamblia	28 (18.4%)	12 (7.9%)	7(4.6%)	47 (30.9%)	
Entamoeba coli	7(4.6%)	3 (1.9%)	1(0.7%)	11(7.2%)	
Total (%)	88 (57.9%)	43(28.3%)	21(13.8%)	152(61.5%)	

Table 3: Age-wise distribution of children infested with different parasitic (helminths) worms

Parasitic worms	Number (%) of children in the age group				P-value
	2-5 years	6-9 years	10-13 years	Total (%)	
Ascaris lumbricoidis	11(57.9)	5(26.3)	3(15.8)	19 (45.2)	0.084 NS
Enterobius vermicularis	5(55.6)	3(33.3)	1(11.1)	9 (21.4)	
Trichuris trichura	4(80.0)	1(20.0)	0	5(11.9)	
Hymenolepis nana	2(40.0)	2(40.0)	1(20.0)	5(11.9)	
Taenia spp.	3(75.0)	1(25.0)	0	4(9.5)	
Total No.(%)	25(59.5%)	12(28.6)	5(11.9%)	42(100)	

DISCUSSION

Observations in this study showed the occurrence of infection by the protozoan *E. histolytica* to be the highest among children. This is in line with earlier research (14), who found that this parasite was more prevalent than the other protozoa. The most frequent cause of the widespread spread of intestinal parasitic infections is thought to be their direct transmission to people through the consumption of tainted food and water, as well as the cyst's superior capacity for infection transmission and environmental resistance

(15). This finding is similar to recent studies in Iraq by Mahdi in Basra city (16) and Al-Saeed in Duhok (17), where the prevalence of *Giardia lamblia* infection was reported to be 24% and 31.3%, respectively. In the present study, the prevalence of *Giardia lamblia* infection in diarrheic children in Al Hawija was 47 (30.9%) which is consistent with similar research done in other parts of the world, including Brazil (18) and Sudan (19). Numerous variables, including poor hygiene, crowding, low socioeconomic position, and environmental circumstances, may contribute to this high infection rate (20). In our study, *Giardia lamblia* infection was present in children of all age groups, with increased infection seen in the first 2-5 years, after which incidence rate tended to decline. This observation was similar to studies recorded in Brazil (18) and Kenya (21). The probable explanation for the age-dependent decline rate seen has been attributed to the anti-Giardia immunity (22,23) developed during growing years. Furthermore, greater hygiene practices may have been developed, making it easier to avoid catching this infection (24).

Infection with helminths, such as *H. nana, Enterobius vermicularis, Trichuris trichura, Ascaris lumbricoidis,* and *Taenia* spp., was prevalent in 59.5% of children in this study. These rates are greater than those reported by Abdul-Wahab, *et al.*, (8), who studied preschoolers in Baghdad city, which indicates lack of personal hygiene and sanitation practices not followed properly. Our study also indicated that children between 2 to 5 years are more susceptible to infection with parasites in the intestines, the foremost reason being that children of these ages are more vulnerable to infection as they are in direct contact with soil due to playing in floor, consuming water and eating food from any place that may be contaminated or unclean. This outcome is in line with research conducted by Jasim *et al.*, (25) on Diyala conservative youngsters who had a complete infection rate of intestinal parasites. Bad personal hygiene practices like nail biting, failing to wash hands before eating increase the risk of catching pinworms (*E. vermicularis*; 26) and aid in the spread of the parasite via the fecal-oral route especially in the case of *H. nana* infections, which are most common in children between the ages of 5 and 14 (27).

CONCLUSION

According to the current study's findings, children aged between 2 to 5 years are more prone to get infected by protozoa and helminth infection than older children.

CONFLICT OF INTEREST

There is no conflict of interest for the study.

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