

Prevalence of Intestinal Parasites among Children in Khanaqin City East of Diyala/Iraq

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Abstract

The current study was carried out during the period between November/2018 and March/2019. The study was aiming to investigate the types and proportions of intestinal parasites among children who visited the primary health care center in the city of Khanaqin - Diyala governorate. The total number of specimens examined, during the course of study, was 805 stool specimens. These specimens were taken from children in the age range 1-10 years, and direct smear was the method used for the investigation of the intestinal parasites existence. The results showed that 156 children were infected with intestinal parasitic infections. These infections were categorized as four types of Protozoa and one type of intestinal Helminthes. The incidence ratio of intestinal parasitic infection was 19.373%, where the percentages of parasites considered in the current study have found to be 62.179% for the *Entamoebahistolytica* followed by 12.820% for the *Giardia lamblia*, 12.820 of *Entamoebacoli*, and 3.205% for the *Iodomoebabutschillii*. Moreover, the study has reported one type of Helminthes represented by the *Entrobivirusvermicularis* with occurrence ratio of 6.410%.

Keywords: Intestinal parasite, *Entamoebahistolytica*, Protozoa, Helminthes, *Giardia lamblia*.

Introduction

Intestinal parasite (IP) is one of the most widespread pathogens in the world, it infects around 3.5 billion persons a year, the majority of them are children¹. This type of infection represents an endemic disease worldwide, especially in the tropic and subtropical regions¹. It is mainly represented by Protozoa and Helminthes³, and they are transmitted by water and contaminated food⁴. However, the infection can also be transmitted from person to person by Oral-Fecal⁵. Apparently, all age groups are susceptible to IP infection, however the infection is likely to increase among children, especially those who are living in overcrowded, poor and rural communities that do not meet health care requirements^(6,7). For children, IP infections may cause many critical health issues. It results in iron deficiency, anemia, growth delay, weight loss, abdominal pain, dyspepsia and many health and physical issues⁸. Generally, literature review has revealed wide prevalence of IPs. In a study conducted by⁹ on a number of primary schools in Al-Khalis district/Diyala province, wide spread of many types of IPs, among children, was

reported, and the effect of some environmental factors on the infection was recorded. In another study, an increase in the incidence of IPs infection among families with low educational levels was reported¹⁰. In the same context, another study was indicated high incidence ratio of intestinal parasites infections among children in rural areas, and attributed the reason to the lack of services and scarcity of good drinking water¹¹. In the same way, several other studies conducted by^(12, 13) have indicated the spread of intestinal parasites among children in Baghdad. They have also pointed out some important aspects that could contribute to the spread of infections. Furthermore³, conducted a study in Dohuk – Kurdistan/Iraq and reported the types and extent of existence of IPs among children.

Material and Methods

During the period between November 2018 and March 2019, 805 stool samples were collected and inspected to investigate the types and prevalence of intestinal parasites among children in Khanaqin city. The samples were taken from children who visited

the primary health care sector due to suffering from gastrointestinal diseases, intestinal colic, and diarrhea cases. The samples were initially collected from the children's stools and kept in clean, perfectly sealed and dry plastic containers to keep the sample hydrous, as well as to prevent dryness. A questionnaire was then prepared to collect the required information from the children's parents. The collected information included child's sex, age, living area, number of family members, and the drinking water source (tap or filtered water). Collected stool samples were then subjected to laboratory test to investigate the presence of parasites (Trophozoites, Cyst, and Ova). 156 infected cases with intestinal parasites Protozoa and Metazoa were isolated.

The laboratory test consisted of two method:

a. Gross examination: Before conducting the microscopic test, the samples were examined with necked eyes. The purpose of this examination was to check the status of the stool samples in terms of the texture, color, and odor. Mostly, liquid stool contains trophozoites, while the cyst is predominantly found in the full-formed stool. Diarrhea caused by *Entamoedahistolytica* are normally recognized by its pong, and the existence of blood or mucus which are the evidence of the presence of amoebic infection. However, the existence of *Giardialambliia* in the stool is recognized by the yellowish-green color, oily texture, and the mucus. On the other hand, in case of infection with helminthes, the stool mostly be in its full-form unless co-infection.

b. Direct smear method: This method was implemented by preparing a clean slide, before a drop of the physiological solution (0.9%) table salt was placed on one side of the slide. Then, small amounts of the stool sample were taken from different places of the sample using a wood stick, and one of them was mixed with the physiological solution. On the other side of the slide, a drop of iodine solution was placed and thoroughly mixed with another small amount taken from the same stool sample. After that, the slide was covered with the slide cover.

Subsequently, the microscopic slides were examined using a microscope with magnification force of (40x, 10x).

Results

The results obtained from the present study showed that children in Khanaqin were infected by a number of IPs during the period between November 2018 and March 2019. A total of 805 stool samples were collected from children and tested in the primary health care sector in Khanaqin city. The children were suffering from gastrointestinal diseases and diarrheal diseases, they were clinically examined by specialist doctor before laboratory tests were made to investigate the presence of IPs infection. The results revealed that 156 children were infected, which represents total infection percentage of 19.378%. From the total number of infected cases, 70 infections were for females which represent 44.871%, and 86 infections were for males which represent 55.128% as shown in Table (1).

Table 1. Percentage of IPs infection between the studied samples for both sexes.

Infection percentage	Number of infected females	Infection percentage	Number of infected males	Infection percentage	Number of parasitic infections	The total Number of examinees
44.871%	70	55.128%	86	19.378%	156	805

The study, also, showed that children were infected with 5 types of the IPs. Out of these 5 types, 4 belong to protozoa which are *Entamoadahistolytica*, *Giardia lamblia*, *Entamoeba coli*, and *Iodoobabutchillii*. Table (2) shows that *E.histolytica* was in the first place with highest incidence of parasitic infection, it has infected 97 children which represent 62.179%. In the second place, the *Giardia lamblia* comes with total number of

infections of 59 that is 37.820%, followed by *E. coli* which infected 20 children with infection percentage of 12.820%, and then *Iodoobabutchillii* 5 infected cases which represents 3.205%. Moreover, the study showed some infections with helminthes, 10 children were diagnosed to be infected with *Entrobisusvermicularis* which is 6.410%.

Table 2. Types of IPs and the number and ratio of infections for each them during the study period.

Type of parasite	Number of infections	Percentage by the parasite
Entamoebahistolytica	97	62.179%
Giardia lamblia	59	37.820%
Entamoeba coli	20	12.820%
Entrobiumvermicularis	10	6.410%
Iodomoebabutschillii	5	3.205%

The results given in Table 3 confirm the presence of some bilateral intestinal parasitic infections which means that the children were simultaneously infected with two different types of IPs. These infections were characterized as; *Giardia lamblia* with *E. coli* in 12 infected cases which is 7.629% of the total number of infections, followed by *Entamoebahistolytica* with

Entrobium vermicularis 10 cases representing 6.410% of the infections. Moreover, the *Entamoebahistolytica* with *Entamoeba coli* were found in 8 infections which is 5.128% of the total cases. The minimum recorded infection incidence ratio was 3.205% which represents 5 infections caused by *Giardia lamblia* with *Iodomoebabutschillii*.

Table 3. Co-infections with IPs among the investigated samples.

co-infection type	Number	Infection occurrence rate
E.histolytia + E.coli	8	5.128%
Giardia lamblia +E.coli	12	7.692%
E.histolytia + Entrobiumvermicularis	10	6.410%
Giardia lamblia + Iodomoebabutschillii	5	3.205%

Table 4 shows the incidence ratio of IPs infection among the children categorized according to their sex and age group. It has been found that highest infection incidence ratio was among children in the aged between 5-10 years old which represents 47.435%. The infected cases were divided into 40 infected males (54.1%), and 34 infected females (45.94%). Infants' infections come in the second place with 48 infected cases representing

a percentage of 30.769%. Out of the 48 infections, 27 were for males and 21 for females which are respectively signify 56.3% and 43.8%. However, the lowest infection incidence ratio was in children under the age of 5 years. The total number of infections was 34 and the infection incidence ratio was 21.794%, 19 were males and 15 were females representing 55.9% and 44.11% respectively.

Table 4. Percentage of IPs infection according to age groups.

Age group	Number of infections	Infection percentage	Number of infected males	Infection percentage	Number of infected females	Infection percentage
Infants	48	30.769%	27	65.3%	21	43.8%
Below 5-years	34	21.794%	19	55.9%	15	44.11%
5-10 years	74	47.435%	40	54.1%	34	45.94%

Table (5) shows the incidence ratio of intestinal infection categorized according to living area (city center, district, and village). The results revealed that the highest ratio of infection was among the children

who live in villages. The whole number of infections were 87, (55.769%) split into 44 males (50.6%) and 43 females (49.7%). Districts come in the second place after the villages with total number of infections of 43 cases

(27.564%), the males share was 31 cases (72.1%) while the females share was 21 cases (27.9%). Finally, city center comes in the last place with minimum number of infections. The study recorded 26 infected case in the

city center, which signifies occurrence ratio of 16.666%. Out of these cases, the number of males were 11 and females were 15 which denote occurrence ratio of 42.3% and 57.7% respectively.

Table 5. Percentage of IPs infection according to living area.

Living area	Number of infections	Infection percentage	Number of infected males	Infection percentage	Number of infected females	Infection percentage
City center	26	16.666%	11	42.3%	15	57.7%
District	43	27.564%	31	72.1%	12	27.9%
Village	87	55.769%	44	50.6%	43	49.4%

The study has also investigated the relation and occurrence ratio of children's infection with intestinal parasites and the drinking water source. The study has observed increment in the number of infected children

who depend on tap water as a drinking water source. The number of infected children were found to be 92, (58.974%) compared to 64, (41.025%) for children who used to drink filtered water, as given in Table 6 below.

Table 6. The relationship and percentage of the infection with intestinal parasites and the source of drinking water.

Drinking Water Source	Number of Infections	Infection Percentage
Tap water	92	58.974%
Filtered water	64	41.025%

Discussion

This study has been conducted in the primary care sector in the city of Khanaqin-Diyala. The study was targeting children who visited the pediatric care department and were complaining from gastrointestinal diseases and diarrhea. The study considered children from different living areas, that relatively vary in the social environmental and economic conditions, to make it possible to relate the prevalence of the disease to the living conditions of those areas. Current study disclosed that the total incidence of the intestinal parasite infection was 19.778%. This is lower than what was reported by¹⁵ and³ who have reported infection incidences ratio of 24% and 22.27% respectively. However, the result presented here is higher than that of¹⁶ and¹⁷ who reported occurrence ratio of 14% and 17.4%, respectively. Current study revealed that the highest infection occurrence ratio was with *E. histolytica* (62.179%). This conforms with what was recorded¹⁹, who reported

increase in this parasite compared to the rest of Protozoa. The second was the *Giardia lamblia* which was the reason behind 37.820% of the infections. This result is very comparable with what has been reported by⁶ where the existence ration of *Entamoebahistolytica* and *Giardia lamblia* have been shown to be 66.8% and 36.8% respectively. The most common reason behind the wide spread of the of IPs infections is attributed to their direct transmittance to humans by taking food and water contaminated with contagious stages, and due to the superior ability of the Cyst to transmit the infection and to resist the environmental conditions²⁰. Though, flies play more significant role because they represent a *vector host* for the infection. The present study has also shown infections with *Entrobivirusvermicularis* (6.410%), which is relatively lower than what²¹, as he has pointed that the infection occurrence ratio as 24.9%. The *Entrobivirusvermicularis* was the most common intestinal worm among children. This was ascribed to the large

number of children within the same family, their participation in blankets, clothing and sleeping places, as well as the lack of health and social awareness, and the low educational level of the parents²². Further, the study has also recorded many cases of co-infections with IPs. 35 cases were recognized representing 22.43%. This finding conforms with number of studies found in the literatures that recorded many co-infections with IPs.

Conclusion

The results showed that 156 children were infected with intestinal parasitic infections. These infections were categorized as four types of Protozoa and one type of intestinal Helminthes. The incidence ratio of intestinal parasitic infection was 19.373%, where the percentages of parasites considered in the current study have found to be 62.179% for the *Entamoebahistolytica* followed by 12.820% for the *Giardia lamblia*, 12.820 of *Entamoebacoli*, and 3.205% for the *Iodomoebabutschillii*. Moreover, the study has reported one type of Helminthes represented by the *Entrobivirusvermicularis* with occurrence ratio of 6.410%.

Financial Disclosure: There is no financial disclosure.

Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the College of Education for pure science, Iraq and all experiments were carried out in accordance with approved guidelines.

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