



Prevalence of Intestinal Parasitic Infections among Primary Schoolchildren in Kohlan District at Hajjah Governorate, Yemen

Nabil Mohammed Mogalli¹, Wadhah Hassan Edrees^{2*}, Mohammed Sadeq Al-Awar², Mohammed Ali Alshahethi³, Wadee Abdullah Al-Shehari⁴

¹Department of Biology, Faculty of Education and Applied Sciences, Hajjah University, Yemen. ²Medical Laboratory Department, Faculty of Medical Sciences, Al-Razi University, Yemen. ³Department of Biology, Faculty of Applied Science, Amran University, Yemen. ⁴Department of Medical Laboratory, Faculty of Medical Sciences, Ibb University, Yemen.

*Corresponding author: Wadhah Hassan Edrees, Medical Laboratory Department, Faculty of Medical Sciences, Al-Razi University, Yemen: wadah.edrees@alraziuni.edu.ye

Abstract

Background: Intestinal parasitic infections are the most frequently reported in Yemen and significant health problem among schoolchildren with prevalence ranging from 18% to 90%. **Aim:** The present work is a cross-sectional study that aimed at determining the prevalence of intestinal parasitic infection among primary schoolchildren in Kohlan district at Hajjah governorate, Yemen. **Methods:** A total of 400 stool specimens were collected from schoolchildren between January to April 2020 and examined by direct smear and formalin ether concentration techniques. **Results:** The result revealed that 73.25% were positive for intestinal parasite infection with a slightly higher prevalence of protozoa than helminthes infections (52.56 vs. 47.44%, respectively). Also, the highest rate of single parasitic infection was more than multiple parasitic infections. The most frequency of intestinal parasites was 30.03% for *Entameba histolytica* followed by 22.53% for *Giardia lamblia*, 17.75% for *Enterobius vermicularis*, 14.33% for *Ascaris lumbricoides*, 7.51% for *Hymenolepis nana*, 5.4% for *Schistosoma mansoni*, 1.71% for *Trichuris trichiura*, and 0.68% for *Ancylostoma duodenale*. In addition, the parasitic infection among boys was higher significantly higher than infection among girls. **Conclusion:** From the obtained result, different control measures are required for controlling and preventing the prevalence of intestinal parasitosis among schoolchildren.

Keywords: Hajjah, Intestinal Parasite, Schoolchildren, Yemen

Introduction

Intestinal parasitic infections that caused by both protozoa and helminthes parasites are one of the biggest health problems globally and responsible to infect up to 3.5 billion person and approximately 450 million individual is due to intestinal parasites¹. The high prevalence of parasitic infection is

common in developing countries and is estimated up to 50%². Numerous factors play an important role in transmitting the intestinal parasites in the developing countries representing the lack of potable water, poor environmental hygiene, fast population growth, and low economic status^{3,4}.

The children living in poor communities are the most threatening to intestinal parasitic infection. The high susceptibility of children to heavy infection resulting from their increased nutritional requirements and less developed immune systems. As a result of morbidity, they are at increased risk for detrimental effects like poor growth, reduced physical activity, impaired cognitive function, and learning ability⁵.

It was estimated that about 12% of the global disease burdens caused by intestinal parasites are reported among children aged between 5 to 14 years in developing countries⁶. Also, the WHO⁷ documented that up to 270 million and 600 million of the pre-school and schoolchildren, respectively, are living in an area where the parasites are extensively transmitted.

The intestinal parasites that are more easily spread and more common among children in developing countries include *Entameba histolytica*, *Giardia lamblia*, *Hymenolepis nana*, and *Enterobius vermicularis* are spread easily and common among children⁸.

Yemen is one of the developing countries that lack the strategies programming for eradicating or controlling transmission the parasitic infection among the population. The prevalence of intestinal parasitic infections among children in different regions in Yemen has been recorded in several reports. A study by Al-Haddad and Baswaid⁹ showed that *G. lamblia*, *E. histolytica*, *Ascaris lumbricoides*, *Trichuris trichiura*, *H. nana*, *Taenia saginata*, and *Schistosoma mansoni* were the most infective parasites prevailed among children were in Hadramowat.

In Al-Mahweet governorate, a study by Alwabr and Al-Moayed¹⁰ found that *E. histolytica*, *S. mansoni*, *T. trichiura*, and *E. vermicularis* were the most prevalent between schoolchildren. Recently, Qasem *et al.*¹¹ found that the most prevalent intestinal infections among schoolchildren in Ibb city were *E. histolytica*, *G. lamblia*, *A. lumbricoides*, *H. nana*, and *E. vermicularis*.

One study only was carried out at Hajjah governorate, during 2008-2009, to determine the prevalence of intestinal parasitic infection among schoolchildren and found *E.*

histolytica, *H. nana*, *G. lamblia*, *E. coli*, *S. mansoni*, *A. lumbricoides*, *T. trichiura*, *E. vermicularis*, and *Ancylostoma duodenale*¹². This study is not enough to reveal the prevalence of intestinal infection among schoolchildren in Hajjah governorate. Therefore, the current study aimed to evaluate the prevalence of intestinal parasitic infection among primary schoolchildren in Kohlan district at Hajjah governorate, Yemen.

Materials and Methods

Study Design and Area

A cross-sectional study was carried out at the Faculty of Applied Sciences, Hajjah University, and Kohlan clinical center situated in Hajjah city, Yemen between January to April 2020. There were sixteen villages subjected to the current project that are Almaghraba, Almasharega, Naman, Algomar, Bani Hadi, Meran, Alshargi, Bani Hani, Almaghbi, Bani Alshomi, Aladia, Gaidan, Aldarb, Alnajla, Baitdalg, Baitalgahm, and Banigazal that located in Kohlan district.

Ethical statement

The protocol of this study was approved by the University of Hajjah, Yemen, and authorization to start the collection of data was granted by the Education Office of the City of Hajjah.

Sample Collection and Examination

A total of 400 stool samples were randomly collected from schoolchildren aged between 6-15 years old who attending governmental schools. A clean plastic bottle (labeled faecal) was given to each suspected child and was instructed on how to introduce specimens (stool) into the bottles and immediately transmitted to a laboratory for examination. The specimens were prepared and tested by using three methods of routine examination of stool: wet preparation, saline sedimentation centrifuged, and formalin/ether concentration¹³.

However, the required data was collected in a structured questionnaire from the children's parents via a face-to-face interview that includes age and gender.

Results

Four hundred (400) stool specimens were collected of schoolchildren aged between 6-13 years old from Kohlan district, Hajjah city. A total of 252 (63%) specimens were collected from boys and 148 (37%) from

girls. The distribution of collected stool specimens according to village name was figured in Figure 1.

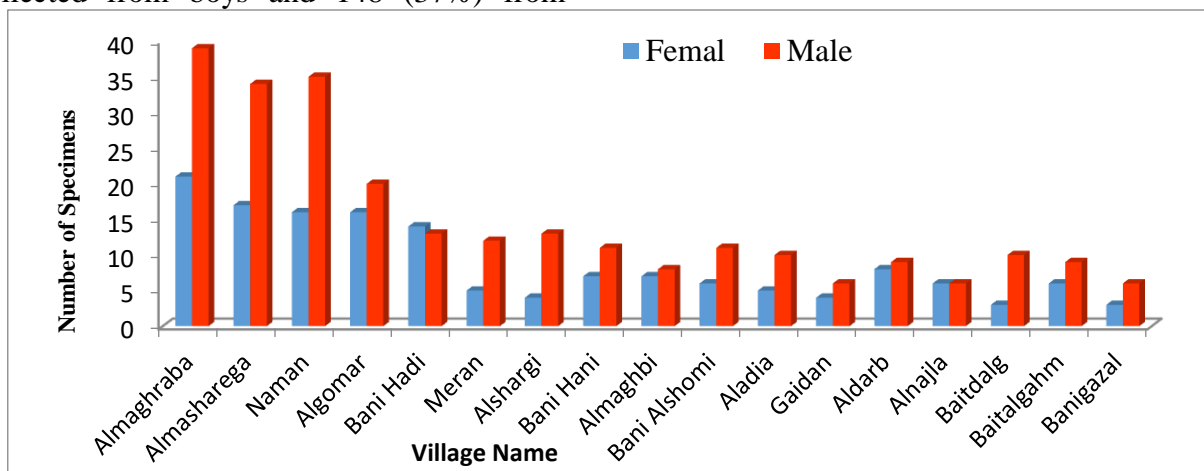


Figure 1: Distribution of collected stool’s specimens according to the site area

The obtained result showed that 293 (73.25%) specimens were reported positive for intestinal parasite infection while 107 (26.75%) specimens were negative. From the

infected schoolchildren, it was found that 206 (70.30%) cases were boys and 98 (28.8%) cases were girls (Table 1).

Table 1: The positive and negative of specimens according to gender

Gender	No. examined (%)	Positive (%)	Negative (%)
Boys	252	206 (70.3)	46 (15.7)
Girls	148	87 (29.7)	61 (20.82)
Total	400	293 (73.25)	107 (26.75)

In the present results, it was found that 154 (52.56%) cases were infected by intestinal protozoa (trophozoite or cyst) while

139(47.44%) cases were infected by intestinal helminthes (eggs) (Figure 2).

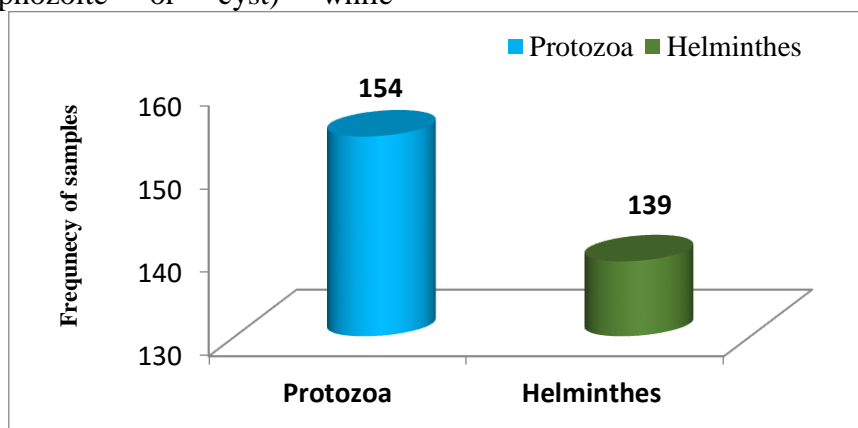


Figure 2: Type of intestinal parasitic infection among schoolchildren

The current findings revealed that the most predominate of intestinal parasites was *E. histolytica* with 88(30.03%) followed by *G. lamblia* 66(22.53%), *E. vermicularis*

52(17.75%), *A. lumbricoides* 42(14.33%), *H. nana* 22(7.51%), *S. mansoni* 16(5.4%), *T. trichiura* 5(1.71%), and *A. duodenale* 2(0.68%) as listed in Table 2.

Table 2: Frequency of intestinal parasite among schoolchildren

Parasitic species	Frequency	Percentage
<i>E. histolytica</i>	88	30.03%
<i>G. lamblia</i>	66	22.53%
<i>E. vermicularis</i>	52	17.75%
<i>A. lumbricoides</i>	42	14.33%
<i>H. nana</i>	22	7.51%
<i>S. mansoni</i>	16	5.46%
<i>T. trichiura</i>	5	1.71%
<i>Ancylostoma</i>	2	0.68%
Total	293	100%

Interestingly, the pattern of parasitic infection between boys and girls indicated that infection among boys was significantly higher

(70.3%) than infection among girls (29.7%) (Table 3).

Table 3: The distribution of parasitic infections regarding gender

Parasites	Boys (n= 252) No. (%)	Girls (n= 148) No. (%)
<i>E. histolytica</i>	62 (24.60)	26 (17.57)
<i>G. lamblia</i>	45 (17.86)	21 (14.38)
<i>A. lumbricoides</i>	32 (12.70)	10 (6.77)
<i>E. vermicularis</i>	34 (13.49)	18 (12.16)
<i>H. nana</i>	20 (7.94)	2 (1.35)
<i>S. mansoni</i>	8 (3.17)	8 (5.41)
<i>T. trichiura</i>	3 (1.19)	2 (1.35)
<i>A. duodenale</i>	2 (0.79)	0 (0)
Total	206 (70.3)	87 (29.7)

Moreover, it was observed that 164 (56%) of cases were infected with one type of parasite while 129(44%) of multiple infections were

infected by multiple types of parasites (Table 4).

Table 4: Infections parasitic multiplicity between schoolchildren

Multiplicity of infections	Number of samples	%
One parasite	164	56%
Multiple parasites	129	44%
Total	293	100%

Discussion

Intestinal parasitic infections among schoolchildren in Yemen are common and neglected tropical diseases. The high prevalence of intestinal parasitic infections

among Yemeni children maybe refers to insufficient hygienic practices, lack of health awareness, poor sanitation and environmental contamination with fecal, absence of drinking water supply, and low-income state^{11,14,15}.

The current study was showed that 400 stool specimens (252 boys and 148 girls) were collected from schoolchildren from Kohlan district, Hajjah governorate. It was revealed that 73.25% of stool specimens were recorded positive for intestinal parasitic infection while 26.75% were recorded negative. These findings are higher than reported in different regions of Yemen including Hadramowat governorate (58.7%)⁹, Ibb (62.7%)¹¹, and Sana'a (54.8%)¹⁶, while the higher prevalence was 90% recorded among schoolchildren in Al-Mahweet governorate¹⁰.

The high prevalence of parasitic infection among schoolchildren in the studied area refers to the war from 2015 until now in Yemen destroyed Yemen's healthcare system and lead to an increase in the prevalence of infectious diseases especially among children suffering from severe malnutrition^{16,17}.

The present work revealed that 52.56% of cases were infected by intestinal protozoa while 47.44% of cases were infected by intestinal helminthes. This result is in disagreement with Qasem *et al.*¹¹ found that protozoa and helminthic infections were 85.64% and 14.36%, respectively, recorded among schoolchildren.

The present study showed that the most intestinal parasites were *E. histolytica* with (30.03%) followed by *G. lamblia* (22.53%), *E. vermicularis* (17.75%), *A. lumbricoides* (14.33%), *H. nana* (7.51%), *S. mansoni* (5.4%), *T. trichiura* (1.71%), and *A. duodenale* (0.68%).

These results are in agreement with earlier studies conducted in Yemen. A study by Qasem *et al.*¹¹ observed that the high frequency of intestinal parasites was *E. histolytica* (61.70%) followed by *G. lamblia* (23.94%), *A. lumbricoides* (7.45%), *H. nana* (4.3%), and *E. vermicularis* (2.61%). Also, Alshahethi *et al.*^{14,15} documented that 54.2% and 61.25%, respectively, of examined children in Amran governorate were infected with *G. lamblia* and *E. histolytica*.

Our finding revealed that the prevalence rate of intestinal parasitic infection was higher among boys than among girls. This result is in disagreement with a study by Qasem *et al.*¹¹

found that the girls were infected significantly higher than boys. This may be explained by the extreme movement of boys and more exposure to out-door eating habits and/or poor personal hygiene behavior compared to girls¹⁸.

The frequency of chronic and heavy intestinal parasitic infection leads to intestinal bleeding, mal-absorption of nutrients, nutritional deficiency, cell and tissue damage. In eventually these results generally affect in retardation of growth, slow height-weight development, reduced mental development, school absenteeism, low academic performance, predisposed to malnutrition and infection^{19,20}.

Conclusion

In conclusion, the findings reveal that the high rate of intestinal parasitic infections among schoolchildren remains a major challenge for the health system. The intestinal parasitic infections are commonly prevalent among poor communities that lack personal hygiene practices and poor environmental hygiene. So, different control measures are required for controlling and preventing the prevalence of intestinal parasitosis among schoolchildren.

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Conflict of interest

The author declares no conflict of interest.

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