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Prevalence of Intestinal Parasites Among the Rural Primary School Students in the West of Ahvaz County, Iran, 2015

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Abstract

Background: Parasitic infections are among the most important global health problems, especially in the developing countries. They are among the most common forms of infectious diseases in the world. According to the report of the world health organization (WHO), about 3.5 billion people worldwide are infected by a kind of parasite, and 450 million people each year become ill due to complications caused by parasites.
Objectives: Due to a lack of accurate statistics on the prevalence of the parasite in primary school children in rural areas of West of Ahvaz, Iran, the current study aimed at investigating the prevalence of intestinal parasites in the mentioned group.
Methods: The current descriptive epidemiologic analysis was conducted on 306 rural primary school students in the Western regions of Ahvaz County in 2015. Collected samples were transferred to the laboratory of parasitology in the school of medicine, and underwent a direct and sedimentary formalin-ether test.
Results: Out of the 306 students under study, 180 (58.8%) were male and 126 (41.2%) female. Of these students 88 (28.8%) were with 1 or more intestinal parasites, which Giardia lamblia, with the prevalence of 61 (19.9%) subjects had the highest rate, followed by Entamoeba dispar, Entamoeba histolytica, Blastocystis hominis, and Entamoeba coli with the prevalence of 12 (3.9%), 9 (2.9%), and 6 (1.9%), respectively, . Six (1.9%) students showed coinfection by the 2 parasites. There was a significant relationship between the prevalence of the parasite and the variables of age, the source of drinking water, and the method of washing vegetables and fruits, but no significant relationship was observed between the prevalence of the parasite, and parents' level of education and children's gender. There was no case of infection with the worms.
Conclusions: Similar to other recent studies, only protozoan infection was observed in the current study. Giardia lamblia had the highest infection rate. According to the pathogenesis properties of protozoan in the infected people, especially children, it is necessary to compile educational programs to control and prevent the aforementioned infections and other protozoan infections among the primary school students.

Keywords: Intestinal Parasitic, Prevalence, Rural

1. Background

Parasitic infections are among the most important worldwide health problems, especially in the developing countries. In some areas of the world, protozoans and worms are among the causes of infection and mortality in infants and children (1, 2). They are among the most common infectious diseases in the world. According to the report of the world health organization (WHO), about 3.5 billion of world population is infected with parasites and 450 million, mostly children, become ill annually due to parasites (1). Parasitic infections cause iron deficiency anemia, slow growth, weight loss, low concentration, abdominal pain, digestion problems, anger, and aggression (3-6). These diseases are among the most common infectious diseases in primary school children and are one of the causes of malnutrition in this age group as well (7). Parasitic diseases have adverse effects on the children's education status and the majority of intestinal parasites cause impairment in mental growth and cognitive evolution of children (8, 9).

Given the direct relationship between parasitic diseases and malnutrition, the issue of controlling such diseases and paying attention to them is crucial. Since parasitic infections are associated with environmental and health conditions (7, 9), its high incidence represents the lack of health system performance (10). Socioeconomic statuses as well as inadequate access to sanitation, education, and the type of water supply were the significant risk factors for infection with helminths.

So far, no study is conducted on the prevalence of intestinal parasites in primary school children in Ahvaz, Khuzestan province, Iran; hence, according to the geographical and climatic situation of the city, it is important

to control and prevent the intestinal parasites due to the high prevalence of physical, psychological, and social damage they cause in the community; therefore, the current study aimed at determining the prevalence of parasitic intestinal diseases in rural primary schools of West of Ahvaz.

2. Methods

2.1. Study Area

2.1.1. Ahvaz

Ahvaz is a county in the Southwest of Iran. According to the 2011 census, its population was 1 112 021. According to the air-pollution ranking survey by the WHO (2011), Ahvaz was on top. Ahvaz, the capital and the most populated city of Khuzestan province, is built on the banks of the Karun river. The city has an average altitude of 20 meters above the sea level (Figure 1) (11, 12).

The current cross sectional, descriptive study was conducted on 306 rural primary school students in the Western areas of Ahvaz county, Southwest of Iran. Nine rural schools in West of Ahvaz were selected by a cluster and conventional random sampling method. After a visit to schools, based on the list of students, 34 people were randomly selected from each school and also from each educational base; the questionnaires including age, gender, parental education, parental job, along with labeled specific dishes and the method to collect specimens were distributed among the students to take home and attempt to collect the specimens with the help of their parents. Sampling was performed from April 2014 to March 2014. A total of 306 stool specimens were collected and transferred to the laboratory of parasitology in the School of Medicine. Then, stool specimens were examined for the parasitic forms by wet mount and sedimentary formalin-ether tests.

3. Results

In the current study, out of 306 (58.8%) students were male and 41.2% female. Table 1 shows the prevalence of parasitic infection among the study subjects. Giardia sp. with 19.9% prevalence was on the top, followed by *E. dispar*/*E. histolytica* 12 (3.9%) cases, *B. hominis* 9 (2.9%), and *E. coli* 6 (1.9%) cases of coinfection with parasites; in addition, no contamination with worms was observed.

Based on age, gender, parents' education level, the source of drinking water, and the method of washing vegetables, the prevalence of parasitic contamination is shown in Table 2.

With regard to drinking water source, 84.1% of the families of the subjects consumed the barrel water purchased from the water purification shops and the rest used tap water.

To wash vegetables and fruits, 48.7% of the families merely used water, and 51.3% used disinfectants.

Table 1. The Prevalence of Parasitic Infection in Rural Primary School Students in the West of Ahvaz County

Types of the Parasite	No. (%)
Giardia lamblia	61 (19.9)
Entamoeba dispar*/*Entamoeba histolytica	12 (3.9)
Blastocystis hominis	9 (2.9)
Entamoeba coli	6 (1.9)
Total	88 (28.8)

Table 2. The Prevalence of Parasitic Contamination Based on Different Variables

Variable	Infected	Non-Infected	Total
Gender			
Male	58 (32.2)	122 (67.8)	180 (58.8)
Female	30 (23.8)	96 (76.2)	126 (41.2)
Total	88 (28.8)	218 (71.2)	306
Age, y			
6	22 (35.5)	40 (64.5)	62 (20.2)
7	12 (27.3)	32 (72.7)	44 (14.3)
8	15 (32.6)	31 (67.4)	46 (15)
9	21 (36.2)	37 (63.8)	58 (18.9)
10	-	25 (100)	25 (8.1)
11	7 (25.9)	20 (74.1)	27 (8.8)
12	11 (25)	33 (75)	44 (14.4)
Total	88 (28.8)	218 (71.2)	306
The level of education in parents			
Bellow guidance school	76 (28.8)	187 (71.2)	263 (85.9)
High school diploma	12 (32.4)	25 (67.6)	37 (12.2)
University graduation	-	6 (100)	6 (1.9)
Total	88 (28.8)	218 (71.2)	306
Drinking water source			
Barrel water	64 (24.9)	193 (75.1)	257 (83.9)
Tap water	24 (48.9)	25 (51.1)	49 (16.1)
Total	88 (28.8)	218 (71.2)	306
Method of washing vegetables			
Only water	24 (16)	126 (84)	150 (49)
Water and disinfectants	64 (41.1)	92 (58.9)	156 (51)
Total	88 (28.8)	218 (71.2)	306

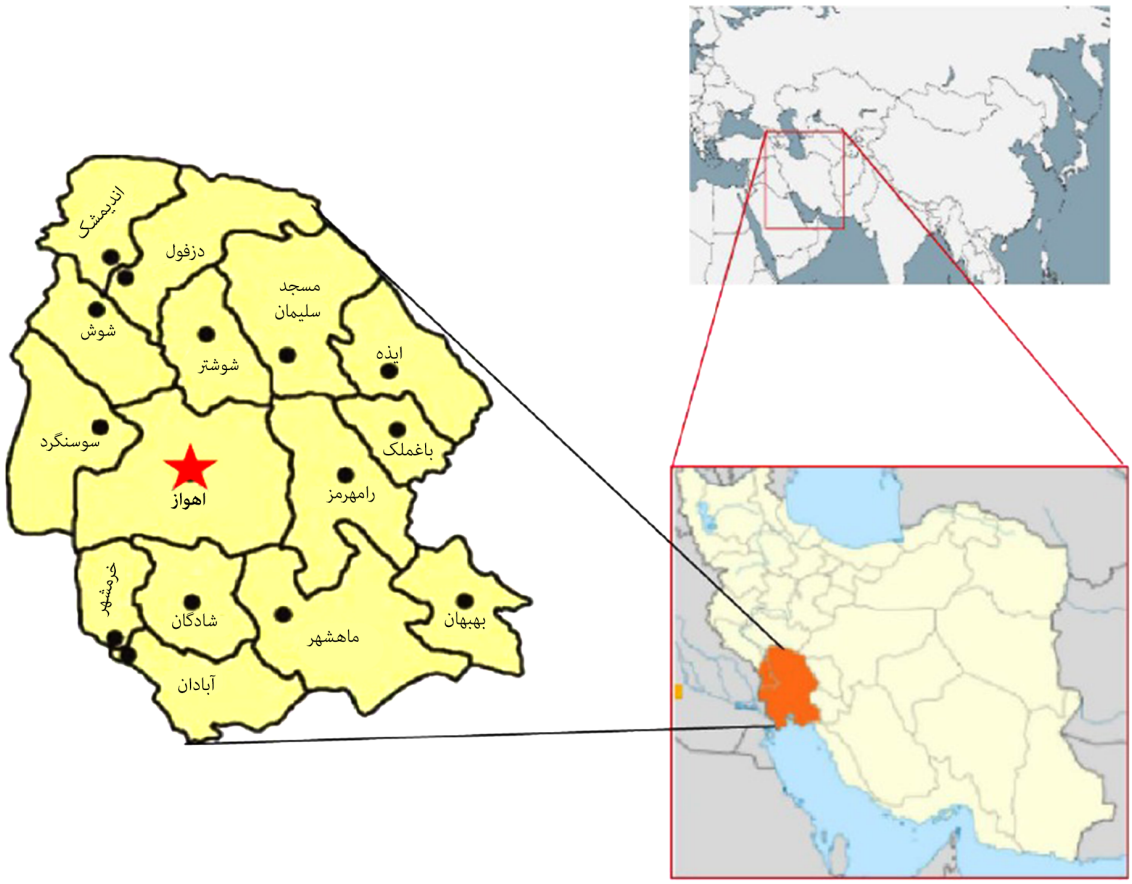

Figure 1. Geographical Location of Ahvaz City (The Study Region is Shown With Asterisk.).

In the study, 85.9% of the parents just completed the guidance school, 12.2% had high school diploma, and only 1.9% had academic education.

4. Discussion

The current study evaluated the prevalence of intestinal parasites in rural primary school students in West of Ahvaz and as indicated, the prevalence of parasitic infection in the study was 28.8%. The results of the current study were consistent with those of Rostami et al. with the prevalence of 28.8% (13) and Daryani et al. with the prevalence of 27.7% (14); but it was less compatible with the results obtained from other studies such as those of Kousha et al. in Tabriz, Iran, with 44% (15). Less consistency was also observed in the studies on people from lower social classes and poor living accommodations. The current study showed that *G. lamblia* with the prevalence of 19.9% had the highest prevalence among the isolated protozoans. This high prevalence could be due to overcrowdedness of the schools, lack of proper sewage disposal system, probable contamination of water with the protozoan cysts, resistance against chlorination, and lack of observance of food hygiene guidelines. Therefore, the obtained results were consistent with those of the majority of the studies that reported the high prevalence of *Giardia* sp., Tappe et al. with a prevalence of 20.5% (16), and Saidi and Sajadi et al. 20.5% (17). Failure to observe worm infection can be due to not using human feces on farms, improvement of health and public hygiene levels in the region, the absence of appropriate interface hosts for most of the worms, and the use of anthelmintic for children in the health care centers in the rural areas.

In the current study, the prevalence of the parasite in the infected children was 32.2% in males and 23.8% in females; the difference between the 2 rates was statistically insignificant (P value = 1.0). Therefore, gender difference

did not affect the prevalence of parasites. The findings of the study were inconsistent with those of Soheyli Azad et al. in Robat Karim, Iran, where the difference between the genders was significant (18), but the results were consistent with those of the other studies, Saidi and Sajadi (17) and Kousha et al. in Tabriz, which showed the difference between the genders was insignificant (15).

The results obtained from the extent of the outbreak in different age groups showed a significant difference between the age groups (P value = 0.03). These results showed that all age groups were not equally exposed to parasitic infection. Infection among the age group of 9 years and below was more than those of the other age groups. This difference was probably due to more contact of these age groups with parasitic sources. The prevalence of parasite infection was higher among these age groups, because touching dirt, lack of personal hygiene observance, and dealing with the children in same age are more common among them; therefore, results of the current study were inconsistent with those of Saidi and Sajadi that did not find significant differences among the age groups regarding the prevalence of protozoan infection (17). Furthermore, in the study conducted by Rostami et al. the maximum amount of infection was observed in the 1st years of primary school (13); similar to the results of the current study that reported the maximum amount of infection in the age groups below 9 years.

In the current study, there was no significant relationship between the level of education in parents and the prevalence of infection in children (P value = 0.8). In a study conducted by Rostami et al. no significant difference was observed between the educational level of parents and the prevalence of parasites in children; the results were similar to those of the present study (13). But in a study conducted by Ahmad-Rajabi et al. in Bam, Iran, no significant association was observed between the parents' educational level and the prevalence of parasites in children (19); same results in the current study may result from the parents' educational level bellow guidance school.

Another finding of the current study was a significant relationship between the method of washing vegetables and fruits, and the prevalence of parasitic infections (P value = 0.0); that is the prevalence of parasitic infection in children who consumed vegetables and fruits washed with water and a few drops of dish washing liquid was lower than the ones who had taken vegetables and fruits merely washed with water; thus, the result was consistent with that of Atashnafas et al. in which a significant difference was observed between the method of washing vegetables and fruits, and the prevalence of parasitic infections (20).

In the studied region drinking water is provided in 2 ways, tap water and barreled water refined by the shops specifically active in this field and distribute drinking water among the villagers. The parasite infection prevalence in children had a significant relationship with drinking water sources (P value = 0.002). Children who used the barreled drinking water were more infected compared with the ones who used tap water. Probably it was due to failure to assess the adherence to drinking-water guidelines in the water purification shops and pollution during distribution; however, no study was conducted in this regard.

4.1. Conclusions

Due to the high incidence of parasitic infections, especially Giardia sp. in the study subjects, health care centers are recommended to take training on the observation of drinking-water hygiene guidelines. In addition, to reduce the density of students in classes, renovate the school toilets, and prevent food supply around the schools by non-hygienic and authorized suppliers, proper regulations and programs should be performed. Periodic tests can be also helpful to decrease parasitic contaminations.

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Footnotes

Authors' Contribution: Both authors contributed equally to the work.

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Conflict of Interests: Authors declared no conflict of interest.

References

1. Alum A, Rubino JR, Ijaz MK. The global war against intestinal parasites–should we use a holistic approach?. *Int J Infect Dis.* 2010;**14**(9):e732–8. doi: 10.1016/j.ijid.2009.11.036. [PubMed: 20399129].
2. Saki J, Khademvatan S, Masoumi K, Chafghani M. Prevalence of intestinal parasitic infections among food handlers in Khuzestan, Southwest of Iran: a 10-year retrospective study. *Afr J Microbiol Res.* 2012;**6**(10):2475–80.
3. Okyay P, Ertug S, Gultekin B, Onen O, Beser E. Intestinal parasites prevalence and related factors in school children, a western city sample–Turkey. *BMC Public Health.* 2004;**4**:64. doi: 10.1186/1471-2458-4-64. [PubMed: 15615592].

4. Miller SA, Rosario CL, Rojas E, Scorza JV. Intestinal parasitic infection and associated symptoms in children attending day care centres in Trujillo, Venezuela. *Trop Med Int Health.* 2003;**8**(4):342–7. [PubMed: 12667154].
5. Khademvatan S, Masjedizadeh R, Rahim F, Mahbodfar H, Salehi R, Yousefi-Razin E, et al. Blastocystis and irritable bowel syndrome: Frequency and subtypes from Iranian patients. *Parasitol Int.* 2017;**66**(2):142–5. doi: 10.1016/j.parint.2017.01.005. [PubMed: 28087441].
6. Javaherizadeh H, Khademvatan S, Soltani S, Torabizadeh M, Yousefi E. Distribution of haematological indices among subjects with Blastocystis hominis infection compared to controls. *Prz Gastroenterol.* 2014;**9**(1):38–42. doi: 10.5114/pg.2014.40849. [PubMed: 24868297].
7. Hosain GM, Saha S, Begum A. Impact of sanitation and health education on intestinal parasite infection among primary school aged children of Sherpur, Bangladesh. *Trop Doct.* 2003;**33**(3):139–43. doi: 10.1177/004947550303300306. [PubMed: 12870597].
8. Legesse M, Erko B. Prevalence of intestinal parasites among schoolchildren in a rural area close to the southeast of Lake Langano, Ethiopia. *The Ethiopian Journal of Health Development (EJHD).* 2017;**18**(2).
9. Lee KJ, Bae YT, Kim DH, Deung YK, Ryang YS, Kim HJ, et al. Status of intestinal parasites infection among primary school children in Kampongcham, Cambodia. *Korean J Parasitol.* 2002;**40**(3):153–5. [PubMed: 12325445].
10. Sharma BK, Rai SK, Rai DR, Choudhury DR. Prevalence of intestinal parasitic infestation in schoolchildren in the northeastern part of Kathmandu Valley, Nepal. *Southeast Asian J Trop Med Public Health.* 2004;**35**(3):501–5. [PubMed: 15689056].
11. Saki J, Asadpoori R, Khademvatan S. Prevalence of intestinal parasites in vegetables consumed in Ahvaz, South West of Iran. *J Med Sci.* 2013;**13**(6):488.
12. Saki J, Foroutan-Rad M, Asadpouri R. Molecular Characterization of Cryptosporidium spp. in Wild Rodents of Southwestern Iran Using 18s rRNA Gene Nested-PCR-RFLP and Sequencing Techniques. *J Trop Med.* 2016;**2016**:6834206. doi: 10.1155/2016/6834206. [PubMed: 27956905].
13. Rostami M, Tohidi F, Sharbatkhori M, Taherkhani H, Eteraf A, Mohammadi R, et al. The prevalence of intestinal parasitic infections in primary school students in Gorgan, Iran. *Med Lab J.* 2012;**6**(2):42–6.
14. Daryani A, Ettehad GH. Prevalence of Intestinal infestation among primary school students in Ardabil, 2003. *J Ardabil Univ Med Sci.* 2005;**5**(3):229–34.
15. Kousha A, Hakimi S, Fallah E, Nokhahi I, Sarafraz S, Shahnami A. Prevalence of Intestinal Parasites among Symptomless Primary School Children Attending Urban Health Centers, Tabriz. *Tabriz Med J.* 2011;**33**(3):58–62.
16. Tappe KH, Mohammadzadeh H, Khashaveh S, Rezapour B, Barazesh A. Prevalence of intestinal parasitic infections among primary school attending students in Barandooz-Chay rural region of Urmia, West Azerbaijan province, Iran in 2008. *Afr J Microbiol Res.* 2011;**5**(7):788–91.
17. Saidi JM, Sajadi SM. Study of the parasitic infections of school children in rural areas of Hamadan. *J Hamadan Univ Med Sci.* 2001;**8**(3):36–41.
18. Soheili Azad AA, Nourjah N, Shahbazi F. Relationship between parasite infection and malnutrition in Robat Karim elementary school students. *Razi J Med Sci.* 2005;**12**(45):87–96.
19. Ahmad-Rajabi R, Varzandeh F, Arab M, Abbaszadeh A. Prevalence of intestinal parasite infections in the day care centers of bam. *J Rafsanjan Univ Med Sci.* 2003;**2**(2):102–11.
20. Atashnafas E, Ghorbani R, Peyvandi S, Imani S. Prevalence of intestinal parasitic infections and related factors among school children in Semnan province (2005). *Koomesh.* 2006;**8**(1):75–84.