The prevalence of Giardia lamblia parasites infection among primary school children in Al - Zawia District – Libya.

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Abstract

This study was conducted to determine the prevalence of Giardia lamblia (G. lamblia) parasite among children from three schools located in Zawia District - Libya. Stool samples were collected from 300 students (aged 6 to 14 years) and examined to search for the G. lamblia parasites by using the direct wet film in which the normal saline solution and Lugol's iodine used separately on the same slide beside that the concentration technique (precipitation) in formalin and ether used. In this study 9 out of 300 cases (03.00%) were positive by a direct method and sedimentation technique. These results are considered to be of the lowest rates for parasite infections.

المستخلص

أُجريت هذه الدراسة لتحديد مدى انتشار الإصابة بطفيل الجارديا اللمبلية Giardia. lamblia بين أطفال المدارس الإبتدائية في ثلاث مدارس بمنطقة الزاوية - ليبيا. حيث تم جمع عينات براز من عدد 300 طفل من أطفال هذه المدارس تتراوح أعمارهم بين 6 و 14 سنة، وتم فحصها للبحث عن طفيل الجارديا اللمبلية باستخدام طريقة الفلم الرطب المباشر في المحلول الملحي وصبغة الأيودين بعمل لطختين منفصلتين على نفس الشريحة، وباستخدام تقنية التركيز (بالترسيب) بالفورمالين والإيثر، فكانت النتيجة أن 9 أطفال من بين 300 طالب(03.00%) وُجد أنهم مصابون بالطفيل بطريقة المسحة الرطبة المباشرة وبطريقة التركيز بالترسيب معاً. وهذه النتائج تعتبر من النسب المنخفضة بالنسبة للإصابة بالطفيل.

Key wards: G. lamblia, direct wet film, concentration technique (precipitation).

Introduction:

Giardia lamblia is one of the most common protozoan intestinal parasites in both developing and developed countries. Human infections have been reported in different climatic regions from tropical climate to Arctic. About 200 million

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people suffering from symptoms of G. lambelia and about 500,000 new cases are recorded each year [WHO1996]. In the United States, Britain and Mexico, the G. lamblia is considered to be endemic among children under the age of five and adults between 25 and 39 years old [Benenson 1995].

The infection with G. lamblia occurs by swallowing their cysts in a fecally contaminated food or water of an infected person as well as by anal-oral route. Cysts of G. lamblia are infectious once they are ingested with feces [Rendtorf 1954]. Garadia cysts can survive for weeks or months in cold water. Infections can occur from city water tanks and resist traditional water treatment methods such as chlorine or ozone [Huang and White 2006]. Based on positive results of stool analysis, it was found that the prevalence of Giardia infection in children ranged from 1% to 72% depending on geographical area and age group. The spread of the disease between children differs from country to country and among the population in the same country. In some developing countries, the incidence of affected young children is very high for instance, in Guatemala, the incidence was increased slightly between first and third years of age. [Ortega and Adam 1997]. In Peru, the rate of infection among children aged 6 months was significantly high [Miotti et al 1986]. In the USA, it was noted that Giardia was the most common parasite found in the stool samples analyzed for the detection of various parasites and the rate of spread between different ages ranged between 4% to 12% depending on the year and the state [Kappus et al 1994]. In Bangladesh, 33 nursing mothers and their children were followed for a full year in the peri-urban areas showing a difference with the highest incidence in women, both had G. lamblia at least once during period of study, and children began to develop the infection at an early age (the first three months of life) and that 86% of the children are suffering from diarrhea, indicating that the first exposure to the parasite G. lamblia can cause disease [Islam et al 1983]. The study of [Esrey et al 1989] has shown that a significant percentage of pre-school children in rural Lesotho, South Africa, had Giardiasis. The incidence of infection in southern Yemen was high among children aged 6-15 years [Kopecky et al 1992]. The study of [Magambo et al 1998] on intestinal parasites in southern Sudan, showed that the incidence of G. lamblia among school children was considered high. A survey of 770 families in the Beheira area of Egypt by random sampling and examination showed that the children between the ages of 6 months and 12 years were infected with G. lamblia in a moderate ratio [Curtale et al 1998].

Materials and Methods:

Study population: This study was conducted on a number of students in three primary schools randomly chosen from the list of schools in Zawia district in western suburban of Libya. A total of 300 random samples of fresh feces were collected from children aged 6 to 14 years after obtaining permissions from the Ministry of

Education to visit schools and obtain samples from students.

Collection of stool samples: Each student was given an envelope containing a plastic bottle with a tight screw cap to collect the stool, a letter and a questionnaire for the study was included. Each child was asked to bring the following day the stool sample as well as the questionnaire that the student has requested to fill with his/her guardian. On the second visit in the following day, stool samples were collected from the students, each questionnaire was given a code, which was also written on the sample.

Laboratory examination: The laboratory tests carried out by using the direct examination of wet stool samples using saline solution and iodine used separate spots on the same glass slide, as well as the use of formalin-ether concentration technique. G. lamblia was detected in the smears using an optical microscope at a magnification power (40 x).

Statistical analysis:

The Statistical Package for Social Studies; SPSS (version16.0) was used for analysis. P value of less than 0.05 was considered significant.

Results:

A total of 300 stool samples were examined in order to detect the presence of G. lamblia parasite, the results revealed that 9 out of 300 samples which represent a rate of 03.00% of the samples of children from those three primary schools were positive by using both direct examination and in the sediment concentration method, while no parasites were detected in 291 samples by using both methods, as shown in figure 1.

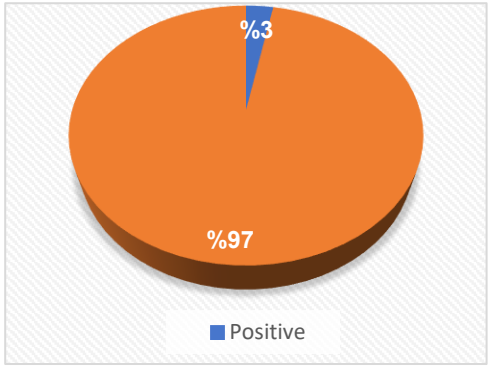

Figure 1- Prevalence of G. lamblia infections among 300 school children in Al-Zawia area.

The results revealed that 7 out of 9 children found to have G. lamblia cysts in their feces with no symptoms, while only 2 out of 9 with slight symptoms. The first child was complaining about colic, lack of appetite and diarrhea, while the second was suffering from colic and loss of appetite only.

Distribution of G. lamblia parasite infection between the rural and urban areas:

The results showed that 4 out of 181 children attending rural schools were infected with G. lamblia parasite which represent a rate of 20.21%. While among 119 students attending urban schools 5

students (40.20%) were positive as shown in table 1 & figure 2.

Table 1- Distribution of G. lamblia infections between the schools targeted by the study.

School	Location of school	Positive	Negative	Total
Hi-Elwahda	Urban	05 (04.20%)	114 (95.80%)	119
Western Godaim	Rural	03 (03.66%)	79 (96.43%)	82
Alsida Zainb	Rural	01 (01.01%)	89 (98.99%)	99
Total		09 (03.00%)	291 (97.00%)	300

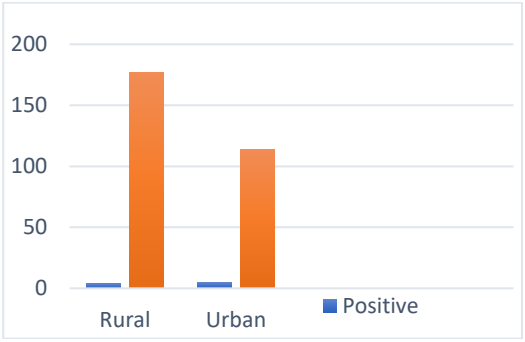

Figure 2- Distribution of infections between the rural and urban areas

The prevalence of infections according to consistency (state) of stool:

1- In formed stool samples, a total of 17 samples, there was no positive cases 0.00%.
2- In semi formed stool samples, 4 out of 41 samples were positive (9.76%).
3- In soft stool samples, 3 out of 236 samples were positive (1.27%).
4- In semi liquid stool samples, 2 out of 06 samples, with a positive rate of (33.33%). The results are shown in table 2.

Table 2- prevalence of infections according to the consistency (state) of stool.

Stool form	Positive	Negative	Total
Formed	**00 (00.00%)**	**17 (100%)**	**17**
Semi formed	**04 (09.76%)**	**37 (90.24%)**	**41**
Soft	**03 (01.27%)**	**233 (98.73%)**	**236**
Semi liquid	**02 (33.33%)**	**04 (66.67%)**	**06**
Total	**09 (03.00%)**	**291 (97.00%)**	**300**

The prevalence of G. lamblia infections according to the age groups:

The results showed that, in the children aged 6 to 10 years, 2 out of 112 samples were positive 1.79%, while in children aged 11 - 14 years, 07 out of 181 samples were positive (3.72%). As shown in table 3.

Table 3- The prevalence of G. Lambila parasites according to age groups.

Age group	**Positive**	**Negative**	**Total**
6-10 y	**02 (01.79%)**	**110 (98.21%)**	**112**
11-14 y	**07 (03.72%)**	**181 (96.28%)**	**188**
total	**09 (03.00%)**	**291 (97.00%)**	**300**

Rates of infection of G. lamblia parasites in relation to gender of the children:

1- 1- In boys, 03 out of 112 stool samples were positive (02.68%).
2- 2- In girls, 06 out of out of 188 stool samples were positive (03.19%), as shown in figure 3.

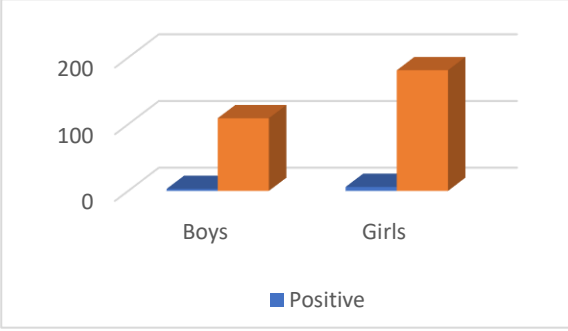

Figure 3- The prevalence of infections according to gender of children

The prevalence of G. lamblia infections according to the source of drinking water:

The study found that the number of students who use deep water for drinking represent the largest proportion of school children in this region (203 children) 5 of them which represent a rate of 20.46% were infected with G. lamblia, followed by children who use the water pipes for drinking (89 students) 3 of them were infected (3.37%), then children who drank from deep wells and filtered water (5 children), the number infected children was 1 (20.00%).

While students who use the filtered water for drinking (2 children), the parasite was not detected in either of them. Finally, one child was drinking from deep wells and filtered water, the parasite was not detected in his fecal sample. The details are shown in table 4.

Table 4- The prevalence of infections according to the source of drinking water.

source of drinking water	Positive	Negative	Total
Deep wells	05 (%02.46)	198 (97.54%)	203
Water of pipes	03 (03.37%)	86 (96.63%)	89
Deep wells + water pipes	01 (20.00%)	04 (80.00%)	05
Filtered water	00 (00.00%)	02 (100%)	02
Deep wells + filtered water	00 (00.00%)	01 (100%)	01
Total	09 (03.00%)	291 (97.00%)	300

Discussion:

This study provided information on the prevalence of G. lamblia infection among primary school children in Zawia district in western suburban of Libya. The direct examination of stool samples collected from 300 students as well as the formaldehyde concentration technique was used due to its high sensitivity in the

diagnosis of intestinal parasites. The results of this study found that 9 samples which represent a rate of 3.00% of the samples of primary school children in Al-Zawia area were infected with G. lamblia, this reflects the level of hygiene in Zawia area in general. Furthermore, the low incidence of G. lamblia parasites reflects the level of health care and hygiene in the primary schools that have been included in the study.

The current results are considered among the lowest rates of G. lamblia infections, which were recorded by some previous studies such as the study of Hussein (2009) which showed similar percentages of infection among children which reviewed in some hospitals in Baghdad. In Guatemala, where the incidence rate of infection was increased from 0.7% in the first year to 3.6% in the third year of age [Ortega and Adam 1997]. In South Sudan Magambo et al 1998, studied the incidence of intestinal parasites among school children, and they found that the rate of G. lamblia infection was 9.8%, and in some Libyan studies, for instance Hana (2018) studied the prevalence of intestinal parasites in primary school children in Houn city with the focus on G. lamblia was 3.5% out of 600 cases, as well as study of Nouara et al (2015) in Al-Khoms, Libya showed that 21 Libyans out of 1250 and 40 Africans resident in Al-Khoms out of 1133 were infected with G. lamblia. In addition, Sifaw et al (2016) review was shown the incidence of G. lamblia in Zawia children was 1.8%.

While these results were lower than those in many previous studies around the world, such as those found in Peru, where the rate of G. lamblia infection among children at the age of six months is 40.00% [Miotti et a, 1986; Ortega, and Adam 1997], In Bangladesh, where 33 of nursing mothers and their children were followed for a full year in urban areas, 82.00% of women and 42.00% of children were found to be infected with G. lamblia [Islam et al 1983]. In Bikinin city in Senegal, it was found that the high prevalence of Giardiasis in this urban area (43.70%) [Salem et al 1994].

The study of Esrey et al 1989 showed that 23.60% out of 267 pre-school children in rural Lesotho, South Africa, had infected with G. lamblia parasite. The incidence of infection in southern Yemen was 35.00% among 104 children aged 6-15 years [Kopecky et al 1992]. In a survey of 770 families in the Beheira area of Egypt by random sampling, the results of examinations revealed that 24.70% of children between the ages of 6 months and 12 years were infected with G. lamblia [Curtale et al 1998].

In view of the statistical results of this study, it was found that the rates of infection showed a slight increase as the children progress in age. The lowest

percentage was found among children who use filtered water as a source of drinking water. The highest rate of infection was among children who drink from deep wells and water pipes. The results also showed no significant differences between children living in rural or urban areas, as well as among children in different target schools. No differences were observed between males and females in the study population.

It is possible to say that the low rate of infections of Giardia parasites may be due mainly to the spread of health education among the inhabitants of Zawiya area and their adherence to health rules. The absence of urban and rural differences is evident in that the health awareness and rules are followed in both regions.

Recommendations:

1- Further studies should be conducted to find the prevalence of G. lamblia and other parasites among the children in other areas of Libya.
2- More investigations should be done to explain the relationship between the occurrence of parasites and factors that contribute to the infection.

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