
Prevalence of Giardiasis among Children from Wadi Al-Shati, Libya

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ABSTRACT

Objective: Small scale survey was performed to know the infection status of *Giardia lamblia* among children residing in nine villages rural localities of Wadi Al-Shati province, Libya. **Methods:** A total of 501 stool specimens, from were examined by direct smears (normal saline and iodine preparation) and formalin-ether concentration methods. **Results:** The overall prevalence of *Giardia lamblia* was 3.1% (16 infected) and there was no significant difference between the used methods ($p > 0.05$). The infection was found to be synchronized with other intestinal parasites, *Entamoeba histolytica* /*E. dispar*, *E. coli* and with *B. hominis*. In general, girls were more infected (3.8% , 10) than boys (2.5%, 6). However, difference between them was not statistically significant ($p > 0.05$). The highest prevalence (7.4%) of *G. lamblia* was found among 12 to 14 years old age group and lowest (0.9%) was found among less than one year group. The prevalence of infection was associated with overcrowding of the family ($p = 0.011$), body waste disposal ($p = 0.000$), floors of homes ($p = 0.000$), and water supply ($p = 0.043$). Abdominal pain was the most common symptoms (0.75%). **Conclusion:** The present study offers first epidemiological attempt to report the prevalence of giardiasis among children living in different villages of Wadi Al-Shati province. This region could be classified as low prevalence area for giardiasis . However, more studies are needed in order to delineate the predictors associated with *Giardia* infection in Libya.

Key words: *Giardia lamblia*, Prevalence , children, Wadi Al-Shati.

Introduction:

Giardia lamblia recognized as the most common intestinal pathogen, with an estimated number of 2.8×10^{10} infecting per year in humans¹. The prevalence rates may reach 20 to 60 % in some areas in the developing countries.² This parasite is usually pointed as one of the causes of childhood diarrhea³, it also causes children's retarded growth and development⁴. In Libya, a number of limited studies have been performed and showed prevalence of 1.2 to 11.4 %^{5, 6, 7}, most of the results of these studies were hospital-based data. The prevalence rate 2%⁸ of *G. lamblia* infection were reported in school aged children in Tripoli Libya. An analytical study for the epidemiology of *G. lamblia* carried out in Sebha city, Libya⁹, who examined 7109 stool samples and reported prevalence of 1.45% (103 infected). So far, only one study has been carried out in Wadi-Al-Shati province on intestinal parasites¹⁰, who reported 1.76% prevalence of *Giardia* infection among random individuals.

Epidemiological data about this parasite are unavailable from Wadi Al-Shati region in Libya. Against this background, studies are required to determine the prevalence and possible risk factors might contributing *G. lamblia* transmission. This cross sectional study was aimed to survey the prevalence of *Giardia lamblia* and also to investigate possible risk factors for giardiasis among children in some areas of Wadi Al-Shati province, Libya.

Methods:

Zone of Wadi Al-Shati municipal branch, approximately at 27-28 N latitude, measures about 20 Km², with children about 15754. The research was conducted during the period of March to end of July 2010. A total of 501 stool samples were randomly collected from children from nine rural villages (Ashkida, Qirah, Brak , Zuwayah, Zaluaz, Tamzawah, Ququm, Hay Al-mshashya and Aqar) for the detection of *Giardia lamblia* infections. Out of

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501, 240 were boys and 261 were girls. The population aged from less than one year to fourteen years old. Data about age, sex, place of residence and clinical symptoms and possible epidemiological factors such as: overcrowding or family size (more than three person per room), source of drinking water (taped water or bringing from outside), body waste or excrement disposal system (sewage system connected or not connected to Municipal system of waste collection exists) and type of floors of dwelling homes (floors of dirt or cement), were obtained.

As soon as samples collected, were examined macroscopically and each sample was processed and examined immediately after collection, by routine direct fecal smear microscopy using normal saline and Luogl's iodine preparations, and formalin-ether sedimentation technique for the detection of parasites¹².

The results for the prevalence of *G. lamblia* associated to genders, age group, different localities, factors associated with the prevalence of *G. lamblia* and clinical symptoms were expressed as percentages and statistical analysis was carried out by using chi square test. A probability (p) value of less than 0.05 was considered as significant whenever appropriate.

Results:

The result showed that total positive samples for *G. lamblia* were 16 of 501(3.1%). All the stool specimens found positive in direct smears microscopy were also found positive in concentration technique, Formalin-ether method detected 3 more positive samples which were found negative in direct smear

microscopy. No, significant difference ($p = 0.583$) was found between the methods for the detection of *G. lamblia*. The infection was found to be synchronized with other intestinal parasites, *Entamoeba histolytica* /*E. dispar*, *E. coli* and with *B. hominis*.

The prevalence of *G. lamblia* among girls was 3.8% (10 infected) and boys was 2.5% (6 infected), there was no significant difference between both genders ($p = 0.412$). The lowest (0.9%) prevalence of *G. lamblia* and higher (7.4%) positive rate was found among less than 1 to 2 and 12 to 14 years old age group respectively, according to age group and sex, there was no significant difference between them ($p = 0.87$).

The factors associated with the presence of *G. lamblia* among children are shown in the Table 1. When these factors were correlated with the *G. lamblia*, a statistically significant relation was found between: the presence of *G. lamblia* with overcrowding / present in the 15 families (4.8%); $p = 0.011$, body waste disposal by cesspool 14 (6.7%); $p = 0.000$, floors of home with dirt 14 (12.3%); $p = 0.000$ and water supply inside the home 16 (4.1%); $p = 0.043$.

Ten children living in different rural areas were infected only with *G. lamblia*, Out of these, 4 were symptomatic individuals, 1(33.3%) where boys and 3 (42.9%) were girls. There was no significant difference between symptomatic girls and boys ($p = 0.852$). The most common clinical symptom was abdominal pain. Out of 4 children infected only with *G. lamblia*, 3(75.0%) were complaining of cramping abdominal pain, and 1(25.0%) with constipation. There was no significant difference between them ($p = 0.360$).

Table 1: Factors associated with the prevalence of *Giardia lamblia* among children.

Factors		No. of sample not infected (%)	No. of sample infected (%)	P value
Overcrowding ((more than three person / room)	Present	300 (95.2)	15 (4.8)	0.011
	Absent	185 (99.5)	1 (0.5)	
Body waste disposal	Sewer	290 (99.3)	2 (0.7)	0.00
	Cesspool	195 (93.3)	14 (6.7)	
Floors of home	Dirt	100 (87.7)	14 (12.3)	0.00
	Cement	385 (99.5)	2 (0.5)	
Water supply	Inside home	382 (95.9)	16 (4.1)	0.043
	Out side	103 (100.0)	0.0	

Discussion:

Giardia lamblia is an vulnerable infection and has been associated with diarrhea and malabsorption, especially among children with increasing prevalence in different regions of the world⁴. Most of the data available in Libya on this organism are hospital based, and community based data are not available. Moreover, epidemiological survey of giardiasis has not been made so far, in Wadi Al-Shati province, Libya.

The cross sectional study carried out on children from nine rural localities show an overall the prevalence of giardiasis was 3.1% (16 infected of 501). This result agrees with other studies, who reported low prevalence of *G. lamblia* in some parts of Libya, as it was 3.77% in children in Benghazi¹¹, 1.2% in children with diarrhea in Zileten⁶, 2.0% in school aged children in Tripoli⁸. Moreover, a lower prevalence rate of giardiasis (1.76%) has also been reported in random population of Wadi Al-Shati province,¹⁰. However, other studies reported that *G. lamblia* was the most common among children in Northern, Libya^{5,7} (11.4% in Benghazi and 12.7% in Derna city respectively). Moreover, other studies also reported a higher prevalence of giardiasis, as it was 8.7% in out patients in Tripoli¹³, 7.8% in expatriates in Benghazi¹⁴, 6.24% in children attending hospital in Benghazi¹⁵, 5.85% children with gastroenteritis in Benghazi¹⁶, 7.2% among Libyan patients in Sirte¹⁷ and 10.29 % in children and neonatus admitted in Ibn-Sina Hospital, Sirte¹⁸. The results of present study are also similar to the results reported in Tehran,¹⁹ with low prevalence of giardiasis (2.8 %) in a large population based survey of school children. The present study showed a lower prevalence of giardiasis than some other parts of the world, as it was 5.8% in Argentina²⁰, 8% in Gaza Strip²¹, 10.9% in Iran²², 16.5% in Turkey²³, 38.5% in Iraq²⁴, 14% in Syria⁴, 30.96% in Pakistan²⁵ and 12.3% in Sudan²⁶.

Generally, girls had a higher prevalence of giardiasis 3.8% (10 infected) than boys 2.5% (6 infected), but the difference between genders was not significant ($p=0.412$). Similar results have been reported by others^{27,8,10}, who reported more prevalence of *G. lamblia* in females than males and difference was not statistically significant. In an epidemiological survey of giardiasis in Syria among school children⁴ also reported that girls are more

infected with *G. lamblia* than boys, and did not find significant difference between them. Previous study reported no difference in the prevalence of giardiasis between genders²⁸, while Several other studies found boys were more prone to be infected than girls²⁹. In Sebha city, Libya, males have a higher rates of infections (1.94 %) than females (1.09 %)⁹. In the present study, 12 to 14 years old age children have more infection than other age groups. This is perhaps because at this age children fully independent in toilet use and are more involved in outdoor activities which might lead to *Giardia* transmission³⁰. A highest prevalence (1.81%) in 7 to 12 years old children also reported in Sebha, Libya⁹. A higher prevalence of giardiasis (24.9 %) has been reported among children age 4 to 12 years in Yemen³¹.

The results showed that overcrowding in the houses (more than three persons per room) has significant difference ($p=0.011$). This finding is similar to the study in Derna city, Libya⁷, who reported that large family size had more giardiasis. However, in another study in Sirte, Libya¹⁸ have found that family size had no significant effect on the prevalence of intestinal parasites in children and neonatus. Overcrowding in the families supports the dissemination of intestinal parasites in Argentina²⁰. In Brazil it was reported that number of children in the families are the risk factor associated to prevalence of *G. lamblia* among children³². Moreover, in a cross sectional study carried out on school children in Damascus, Syria have reported that number of siblings in home as a significant predictor for giardiasis⁴.

The sewage system of houses in Wadi Al-shati region showed a significant association ($p=0.000$). with prevalence of *G. lamblia* among children (more *Giardia* infection in cesspool than sewer system or connected to Municipal system). This indicates that probably there is contamination of neighborhood's soil from body waste disposal coming out from cesspool, and making favorable for the transmission of *G. lamblia* among children. This result differs from a study in Argentina²⁰, which reported elevated level of intestinal parasites among children dwelling with sewer system than cesspool. However, other study in Syria⁴ did not find correlation between giardiasis and sewage system (connected or not connected to municipal system) in the community.

This study reported a significant difference ($p = 0.000$) in the prevalence of giardiasis and type of floors of the houses living in different villages of Wadi Al-Shati region. Children residing in the houses with floors of dirt or soil have more *G. lamblia* infection than floors of cement. This indicates that dirt or soil floors of the houses may be providing favorable ground for transmission of *G. lamblia* in this region. This finding is similar to the study in an Argentinian rural community³³, who reported that dirt floors inside the home were associated with prevalence of giardiasis.

Majority of houses in different areas of Wadi Al-Shati province have urbanized water supply system (piped-water) in their houses. In the present study, significant differences ($p = 0.043$) existed in the prevalence of giardiasis, and source of drinking water in the houses in the region. All the children found positive for *G. lamblia* had source of drinking water inside the homes through piped or taped water. None child was found positive for this organism those, who consumed drinking water brought from outside the homes. It indicates that there is contamination of water before drinking probably by contaminated family members. This may be due to large size or overcrowding in the houses in different areas. Similarly, a study in Argentina reported that children have more intestinal parasitoses, who had water supply inside the house compared to outside the house²⁰. A study in Derna city, Libya, reported that families with better supply at home had less risk of intestinal parasites in children⁷. However, in Syria it was reported that sources of drinking water (availability of piped or not piped water in homes) was not significant risk factor for giardiasis among children⁴.

There was no significant association ($p = 0.448$) between personal hygiene level of children and the prevalence of *Giardia* infection, probably because some of children or their parents answered untruthfully due to social stigma and children may be having hand

washing variable habits before meals and after using the toilet. However, a significant statistical association was found between children's family hygiene level, and the presence of intestinal parasites in Argentina²⁰. This result differs from³⁴, who reported comparatively higher prevalence of intestinal parasites (78.0%) among children in closed community in Benghazi city (Orphans, mental institutes and prisons), probably due to lack of personal hygiene and lack of standards of environmental sanitation.

There was significant correlation between the level of education of both father's ($p = 0.029$) and mother's ($p = 0.044$) among children living in Hay Al-mshashya village of Wadi Al-Shati province. This is similar to the studies of^{7, 8}, who reported prevalence of giardiasis was related to education and socio-economic status of family in the city of Derna and Tripoli, Libya respectively. Similarly,³⁵ in Thailand it have been reported that low education level was contributory factor in acquiring the intestinal pathogens in kitchen employed food handlers in a tertiary care hospital. In Syria⁴ and in India³⁶ also reported that children with better educated mother and father had lower *G. lamblia* infection.

Clinical features of giardiasis may range from diarrhea to constipation, nausea, abdominal pain, and flatulence. However, many patients infected with *G. lamblia* do not present symptoms. These asymptomatic individuals are important reservoirs for the spread of infection³⁷. The present study, indeed, found the most common complains was abdominal pain. This finding was consistent with the finding of^{38, 33, 25, 39}, who observed abdominal pain was most common symptom among giardiasis patients in Thailand, Egypt, Argentina and Pakistan respectively. Of four children infected only with *G. lamblia*, only one had complain of constipation. This represents chronic infection of *G. lamblia* in this child.

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