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Prevalence of intestinal parasitic infestation among primary school children in Benghazi

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Abstract. Introduction: intestinal parasitic infestations are amongst the most common infections worldwide. In developing countries parasitic diseases continue to constitute a major public health problem especially among schoolchildren. Epidemiological research carried out in different countries have shown that the social and economical situation of the individuals is an important cause in the prevalence of intestinal parasites. Aim: to determine the prevalence of intestinal parasite among primary schoolchildren in Benghazi and their association with socio-economic factors and hygienic habits. Methods: stratified random sampling was used in the selection of the study sample. A questionnaire and a stool specimen examination were done. Results: a total of 600 stool specimens were collected. 129 students (21.5%) were infected with one intestinal parasite. Giardia lamblia and Entamoeba histolytica were the parasites detected. Intestinal parasite prevalence was higher among male, in schoolchildren with low parents educational level and in family with low income. The relation between infestation presence and mother education is well known. Most of the complaints of the study population and dining out were significantly related with the intestinal parasitic infestation. Conclusions: intestinal parasitic infection is an important public health problem in Benghazi, Libya. Low level of mother education , low family income and dining out were the significant associations. Intervention including health education on personal hygiene to the students and to the parents, especially to mothers are required. The ratio of uneducated women should be declined with specific programs.

Keywords: Parasitic diseases, giardia lamblia, entamoeba histolytica, socio-economic factors and hygienic habits.

Introduction

Intestinal parasitism is a significant public health problem in many parts of the world. The human intestinal tract is parasitized by a wide spectrum of parasitic organism from microscopic , unicillular protozoans to tapeworms measuring several meters in length(1) . About 3.5 billion of people are infected with some kind of intestinal parasite in the world(2). About 60% of the world′s population in 1998 were infected (infested) with gut parasites(3). Intestinal parasitic diseases are among the world′s 10 most causes of diseases , disability and morbidity(4). These diseases are widely prevalent in developing countries , probably due to low standard of sanitation, poor socio-economic conditions and inadequate personal hygiene(5).

Some studies of the intestinal parasitic infections was investigated in Tripoli(6), these study found that the prevalence of intestinal parasitic infection was 14.6% , Giardia lamblia was the common parasite, In Benghazi area in 1980, the prevalence rate of intestinal parasitic infection among primary school children was found to be relatively high, 64.8% were infected with helminths and 75.6% with protozoa(7).

The most common infections in humans are caused by intestinal parasites, which cause intestinal obstruction, malnutrition, iron deficiency anaemia, diarrhoea and malabsorption and other damage to the hosts(8).

In addition, the prevalence of infection is different among various communities[9]; hence, there is a need for the periodical prevalence evaluation in most developing countries including Libya .

Prevention of intestinal parasitic infections, sanitary measures are very important. These include effective environmental sanitation to prevent water and food contamination, proper sewage, adequate handling and treatment of water supplies, food, health education, intermediate host control, personal and domestic cleanliness are probably the most important factors in the reduction of intestinal protozoa[10].

Literature review

El- Boulaqi and co-workers studied the prevalence of intestinal parasites in primary school children in Benghazi. Five primary schools were examined for parasites, 64.8% were infected with helminths and 75.6% with protozoa. Ascaris lumbricoides was the commonest helminth, occurring in 29.6% to 51.0%, followed by hookworm(6.1 to 35.7%), Trichuris (5.5 to 20.6%, Hymenolepis nana (1.2 to 8.0%), Schistosoma mansoni (0 to 7.4%), Strongyloides (0 to 2.4%) and Taenia (0 to 2.4%)[7].

EI-Ammari and Nair conducted a study on the occurrence and prevalence of intestinal protozoan parasites in male and female Libyan nationals residing in Benghazi, Libya. The study revealed that Nearly 50% of the positive cases of both male and female had single infection of E. histolytiea/ E. dispar. Regarding mixed infection, 11.6% male and 12% female contained the cysts of E. histolytiea/ E. dispar + E. eoli in their stools.Prevalence of the cysts of E. histolytiea/ E. dispar reached its peak in 21-30, and the cysts and/or trophozoites of G lamblia in 5-10 age groups thereafter decreased. Significant difference existed ($F= 4.99$; $p< 0.005$) in the parasitic infections between different age groups[10].

In one study on the prevalence of parasites among Libyans and non Libyans in 2004, it has been shown that 14.1% of Libyans, 20% non-Libyan Africans and 16% non-Africans hree groups infected with other parasites were less than 3%. The trophozoites of C. mesnili were found in the stools of Libyans and the cysts of E. hartmanni and I. butschlii in non-Libyan Africans and non-Africans[11].

Sadaga and Kassem conducted a study on the Prevalence of intestinal parasites among primary schoolchildren in Derna city , Libya. The results showed that 31% of the children were infected with at least one or two parasites. These parasites were Giardia lamblia (12.7%), Blastocystis hominis (6.7%), Entamoeba histolytica/ Entamoeba dispar (6.6%), Entamoeba coli (3.2%), E. hartmanni (1.0%), Enterobius vermicularis (0.6%), Ascaris lumbricoides (0.1%) and Hymenolepis nana (0.1%)[12].

An epidemiological survey was carried out in Tripoli by Ben Musa and co-authors to look at the intestinal parasitic infections in Tripoli. The results revealed that 14.6% of children were infected with at least one intestinal parasite. Double infections were in 2% of them. Giardia lamblia was the common parasite, followed by Enterobius vermicularis and then Ascaris lumbricoides[6].

Kassem and co-workers identified the prevalence of intestinal parasites in 196 (56%) of children and neonates. No intestinal helminthic parasites were detected but 13 intestinal protozoan parasites were detected. The most prevalent protozoan was Entamoeba histolytica /E. dispar (36.57%); Blastocystis hominis (12.57%), Giardia lamblia (10.29%), Isospora belli (3.14%) and Balantidium coli (0.86%), the later was detected in non-Libyan children. The non-pathogenic parasites were Entamoeba coli (15.14%), Endolimax nana (13.71%), Entamoeba hartmanni (4.29%), Chilomastix mesnilli (4.29%), Retortamonas intestinalis (3.43%), Dientamoeba fragilis (2%), Iodamoeba butschlii (0.86%) and Trichomonas hominis (0.86%)[13].

In Nalout , western Libya 2008. a hospital based study was done on a total of 800 stool samples from a private laboratory in Tigi city. The results showed an overall rate of 29.6%. Of these patients, 7.59% had double or triple parasitic infections. Children were more infected than adults. The parasites in a descending order were Entamoeba histolytica (21%), Enterobius vermicularis (7.5%), Giardia lamblia (2.5%), Balantidium coli (0.38%), and Hymenolepis nana (0.38%) A Sudanese immigrant employee had Strongyloides stercoralis larva in stool culture(14).

Al- Sekait and co-workers found that the prevalence of pathogenic intestinal parasites in rural Saudi Arabian schoolchildren was (22.6%) among children. The major parasites isolated were Giardia lamblia (13.5%), Schistosoma mansoni (3.8%), Entamoeba histolytica (2.5%), Hymenolepis nana (2.5%), Ascaris lumbricoides (2.0%) and Entrobius vermicularis (1.0%). The Prevalence of intestinal parasites was significantly associated with the child's age, sex, father's educational level, non-public water supply and inadequate latrine type(15).

Analysis of 33,253 stool specimens examined at the American University of Beirut Medical Center (AUH) and 11,611 specimens examined at the Islamic Hospital (IH) in Tripoli over five and three years, respectively were carried out in 1996. The prevalence of intestinal parasites at AUH and IH were 8.47% and 45.35%, respectively (overall 18%). the most common pathogenic parasites found at AUH vs IH were: Giardia lamblia (20.7% vs 10.5% of parasites found), Entamoeba histolytica (19.41% vs 1.25%), Taenia spp. (6.03% vs 4.08%) and Ascaris lumbricoides (2.09% vs 46.97%)(16).

Methods

Study site

This cross sectional study was carried in Benghazi city. Benghazi district located along a coastal of Mediterranean sea in the north part of Libya.

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Epidemiological data

Epidemiological data were collected using a questionnaire which was constructed to assess: child′s family socio-economic status, age, sex, class of study, personal hygiene practices, sanitary facilities, parent′s educational levels and about complaints from intestinal parasite infestation. The questionnaire was written in simple Arabic language.

Study population

Primary school children in the first 3 grades, from Benghazi city.

Stratified random sampling , stratification was done for sex ,grade of study and area, Benghazi city was divided into three regions according to the Ministry of Education , three schools were selected randomly from each region all have Libyan nationality.

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Collection of clinical samples

Three fresh stool samples were collected from each participating school children for accurate occasion sampling.

Processing of specimens

The samples were first inspected macroscopically for the presence of parasitic worms. Then the samples were examined microscopically by direct methods(17).

Wet mount technique

Wet mount teqnigue and examined microscopically by scanning the whole area of the cover slip, under the low power (X10) objective for parasitic Larvae and eggs identification and (X40) objective for protozoa cysts and trophozites identification.

We do not look for E. vermicularis in this study because.

Statistical analysis

Data were analyzed using statistical package for social science(SPSS) version 16.

Descriptive statistics ,as mean , standard deviation, median and mode were used.

Inferential statistics were used when needed , Chi-square(x2) to find the difference in the distribution of the variables between the two groups, P-value were considered significant when ≤ 0.05.Data were presented in form of tables and figures , were the figures done by Microsoft Excel 2007.

Results and Discussion

Table 1 : Prevalence of intestinal infestation according to sex.

Sex	Infestation				Total	
	Yes		No			
	No.	%	No.	%	No.	%
Male	82	25.9	234	74.1	316	100
Female	47	16.5	237	83.5	284	100
Total	129	21.5	471	78.5	600	100

$X^2 = 7.831$, df = 1 , p = 0.005 (Significant).

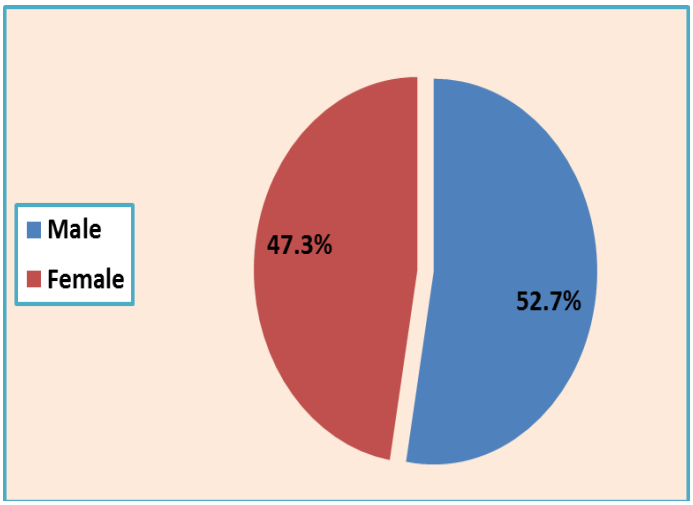

Table 2. Prevalence of intestinal infestation according to age .

Age / year	Infestation				Total	
	Yes		No			
	No.	%	No.	%	No.	%
6	22	11.4	171	88.6	193	100

7	41	20.2	162	79.8	203	100
8	54	31.0	120	69.0	174	100
9	12	40.0	18	60.0	30	100
Total	129	21.5	471	78.5	600	100

X^2 = 27.327 , df = 3 , p = 0.0001 (Significant). Mean= 7.6years. Std.Deviation = 1.13years. Median = 7 Mode=7 Minimum= 6 Maximum=9

Table 3. Prevalence of intestinal infestation according to class of study.

Degree	Infestation				Total	
	Yes		No			
	No.	%	No.	%	No.	%
First	24	11.8	179	88.2	203	100
Second	40	19.9	161	80.1	201	100
Third	65	33.2	131	66.8	196	100
Total	129	21.5	471	78.5	600	100

X^2 = 27.366 , df = 2 , p = 0.0001 (Significant).

Table 4. Prevalence of intestinal infestation according to family income

Family income / Libyan Dinar	**Infestation**				**Total**	
	Yes		**No**			
	No.	**%**	**No.**	**%**	**No.**	**%**
≤ 500	**34**	**47.2**	**38**	**52.8**	**72**	**100**
501- 1000	**91**	**18.0**	**414**	**82.0**	**505**	**100**
› 1000	**4**	**17.4**	**19**	**82.6**	**23**	**100**
Total	**129**	**21.5**	**471**	**78.5**	**600**	**100**

X^2 = 32.080 , df = 2 , p = 0.0001 (Significant). Mean= 777.6 Std.Deviation = 219.3 Median = 750.0 Mode=700.0 Minimum = 450.0 Maximum= 1700.0

Table 5. Prevalence of intestinal infestation according to mother′s educational level

Mother′s educational level	Infestation				Total	
	Yes		No			
	No.	%	No.	%	No.	%
Illiterate	5	71.4	2	28.6	7	100
Primary	24	38.1	39	61.9	63	100
Secondary	34	23.9	108	76.1	142	100
University& higher	66	17	322	83	388	100
Total	129	21.5	471	78.5	600	100

$X^2 = 25.756$, df = 3 , p = 0.0001 (Significant).

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Table 6 : Prevalence of intestinal infestation according to father′s educational level.

Level of father education	Infestation				Total	
	Yes		No			
	No.	%	No.	%	No.	%
Primary	17	45.9	20	54.1	37	100
Secondary	47	36.4	82	63.6	129	100
University& higher	65	15	369	85	434	100
Total	129	21.5	471	78.5	600	100

$X^2 = 41.089$, df = 2 , p = 0.0001 (Significant)

Table 7 : Prevalence of intestinal infestation according to dining out

Dining out	Infestation				Total	
	Yes		No			
	No.	%	No.	%	No.	%
Yes	107	28.6	267	71.4	374	100
No	22	9.7	204	90.3	226	100
Total	129	21.5	471	78.5	600	100

$X^2 = 29.737$, df = 1 , p = 0.0001 (Significant)

Table 8 : Prevalence of intestinal infestation according to symptoms .

Presence of symptom	Infestation				Total	
	Yes		No			
	No.	%	No.	%	No.	%
Yes	115	53.5	100	46.5	215	100
No	14	3.6	371	96.4	385	100
Total	129	21.5	471	78.5	600	100

X2 =203.145 df= 1, p= 0.0001 (significant)

Table 9 : Prevalence of intestinal infestation according to past history

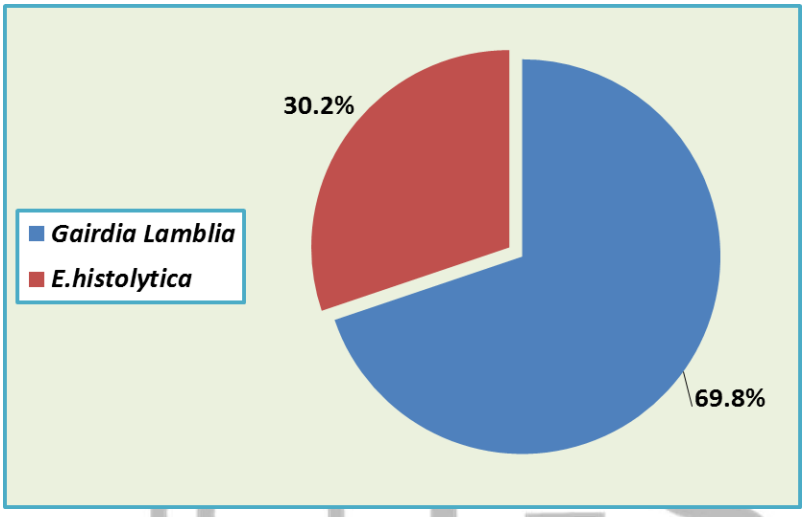
Past history of infestation	Infestation				Total	
	Yes		No			
	No.	%	No.	%	No.	%
Yes	29	22.5	9	1.9	38	100
No	100	77.5	462	98	562	100
Total	129	21.5	471	78.5	600	100

$X^2 = 72.227$, df = 1 , p = 0.0001 (Significant).

Table 10 : Prevalence of intestinal infestation according to type of infestation.

Type of infestation	No	%*
Gairdia lamblia	90	15
Entamoeba histolytica	39	6.5
Total	129	21.5

*** percentage from 600 students.**



Discussion

A total of 600 school children were included in this study, (52%) were male and (47.3%) were female.

The result revealed that the prevalence rate of intestinal parasitic infections was 21.5% in primary schoolchildren in Benghazi city. However prevalence rate in Benghazi city was relatively higher than that found among children in Tripoli 14.6%(6).

On other study , prevalence rate of intestinal parasitic infestations in primary schoolchildren in Benghazi city was lower than that reported for some developing countries include Rural Ecuador 90% and Turkey 37.2% (18).

Prevalence rate of intestinal parasitic infestation was slightly higher in male (25.9%, 82/316) than in female (16.5%, 47/284), this difference was statistically significant ($p_{=}$ 0.005).

This may be due to difference in social and hygienic habits practiced by both sexes(19).Also could be due to more outdoor activities among boys than girls one of the reasons for this finding. This is almost similar to report of another study among school children in Nepal(20) and disagree with study done in Turkey which found there are no correlation between sex and infestation.

The age of student was ranged from 6 to 9 years , with mean age 7.6 ± 1.13y. There were difference of prevalence of infestation in different group, The present study revealed that the prevalence increase with increase of age, were in 6 age was 11.4% and increase up to 40% in 9 age old, and this difference was statistically significant (p = 0.0001), This finding perhaps because mother are responsible for hygiene of younger group , and elder group are more independent, energetic and active life of the elder group with the lack of awareness of the issue of personal hygiene and it is consistent with the study conducted in Saudi Arabia(21).

Same as the age the infestation increase as the stage of class room increase it various from 11.8% in first class to 33.2% in third class and this difference is explained by increasing in the age, and this difference was statistically significant (p= 0.0001), This result agree with high of intestinal parasite among age group of 8-9 years in presents study, because these groups of children are fully independent in toilet use and are more involved in both outdoor activities and feeding.

Income of the family was 777.6±2.93 Libyan dinars, with minimum income 450 LD and maximum 1700 LD, the highest prevalence rate was found in family with low income (74.2%) and was lowest in that of high income (17.4%), it will known that the income is affection the socio-economic status of the family. This study demonstrated that family economic status seems to affect the prevalence rate of intestinal parasitic infestation, high infection rate being associated with low family income. This results is in agreement with results of other studies in Malaysia(22) and Gaza strip(23).

Poverty, with its attendant lack of sanitation, is well known as a predisposing factor to parasitic infestations . The prevalence and intensity of some intestinal parasitic infections among children is an indication of the standard of living and environmental sanitation as well as other socioeconomic factors like family size, food availability, standard of child care and other cultural characteristics of the community(24).

As the highest prevalence rate (71.4%) was detected among children of mothers with lowest educational level while it was lowest (17%) in children of mothers with high educational level (university and higher).

These difference was statistically significant (p= 0.0001). One of the factors strongly associated with intestinal parasite infection in this study was low educational level of children mother's, this finding is similar to the results of studies in other developing country(25). In Egypt found that the knowledge, perception, and behavior of mothers were helpful in designing and implementing an effective community based intestinal parasites control program(26).

Same result found in father's educational level, where father's with primary level had their children highest prevalence (45.9%), while father's with university degree and higher the prevalence rate was 15% and this difference was statistically significant (p= 0.0001). this result is similar to the study done in Malaysia(27).

This is more likely that parents of students at high level of education provide better sanitation condition for their children than low educational level parents.

Highest significant difference was found between the children who dining out 28.6% and who did not 9.7%. Dining out habits seem to be strongly associated with prevalence rate of intestinal parasitic infections. This may be attributed to low level of cleaning inside restaurant , and also Food handlers with poor personal hygiene and inadequate knowledge on food safety could be the source of food borne pathogens(28):So Practice of appropriate food prepared and cooked seems to decreased intestinal parasitic infestations.

Prevalence rate of intestinal parasitic infestation was more associated in children with symptoms 53.5% and in the children with non symptoms 3.6%, this difference was statistically significant (p= 0.0001). Abdominal pain was recorded in 83.9% of children with infestation but 16.1% without. Vomiting recorded in 88.2% of children with infestation verse 11.8% of children without infestation. Loss of appetite was 24.1% of children with infestation, while 75.9% in children without infestation. So the mother and teacher should pay attention and advising to contact medical care when the children complain of abdominal pain and having vomiting, these finding were similar to results conducted in Turkey.

In the present study, intestinal parasitic infection was found to be more common among children with past infestation in 22.5% (p = 0.0001).the recurrence of infestation in children that because of constant risk factor as parent's educational level and family size. This finding agrees with study done among schoolchildren in Mexico(29). This is probably due

to low knowledge of students about the transmission of intestinal parasites and high level of mother education which provide better sanitation condition for their children than low level to prevent future infection.

From this study two types of infestation were detection (15%) Gairdia lamblia and (6.5%) Entamoeba histolytica. This finding is consistent with other studies conducted in Libya in different geographical areas Sirt(13), Derna(12),they are also the most common in Benghazi(30). Indicating that intestinal parasites infection is an important public health problem in Libya. Worldwide very high prevalence rates were reported from developing countries like Lebanon(31) and Iraq(32).A study in Australia1998 reported that the prevalence rate of G. lamblia was336.6%(33). while in Iraq the rate of E.histolytica was 30%. Similar to the results of current study conducted in various parts of the world like Oman(34) and Iran(9).

This could be attributed to the different geographical location and time of the survey(35), Also poor public health conditions , personal hygiene and inadequate health education serve to promote the spread of parasites that are transmitted from person to person like Gairdia lambilia and Entamoeba histolytica(36),these parasites have direct life story, being transmitted from human to human by feco-oral route during which cysts are discharged in human stool leading to widespread contamination of the environment occurs and eventually infective stages are swallowed by new hosts(37) ,also both can be transmitted orally by drinking water and both are environmental contaminants of the water supply(38).

No intestinal helminthic parasites were detected in this study. Whereas few study from Libya have reported E.vermicularis as the most common helminthes among schoolchildren(6), while other studies reported A. lmbricoides as the most common helminthes(39, 7).

Conclusion

The intestinal parasitic infestation is a public Health problem in Benghazi primary school children. Giardia lambilia and Entamoeba histolytica are the only infestation recovered in this study. Six main factors were identified and established as the most predictors of parasitic infestation among school children in Benghazi are, male gender, older children, low family income, level of parent education, dining out and past history of parasitic infestation.

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