A Study of the prevalence of human intestinal parasites in some primary school children in Houn city, Libya

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Abstract:

Background: Intestinal parasites cause significant morbidity and mortality throughout the world. The prevalence of intestinal parasites is not recorded in the population of primary school children in Houn city, Libya.**Objectives**:An epidemiological survey was carried out in Houn city to collect baseline data on the prevalence of intestinal parasitic infections among some primary school children in Houn city, Libya.

Materials and Methods: a total of 600 stool samples (during January, February and March 2016) were collected from randomized population of some primary school children in Houn city. All stool specimens were examined by direct-smear microscopy, and formalin-ether sedimentationmethod for the detection of intestinal parasites in normal saline and Lugol's iodine preparations.

Results: The study revealed an overall prevalence of intestinal parasites133/600 (22%). The most common protozoan parasite was Entamoeba histolytica/dispar (4.83%), followed by Entamoeba coli (3.83%), G. lamblia (3.5%), Endolimax nana (2.83%), B. hominis (1.83%), and mixed infections of E. nana & B. hominis (1.83%) followed by E. coli& G. lamblia and E. nana & E. histolytica (1.66%). Highsignificant difference was existed between the single and mixedparasitic infection forschools children(p=0.000),(16.83%) samples yielded single parasite, whereas (5.33%) samples had mixed parasites. Out of 600 stool samples, 76(12.67%) were found positive by the direct smear microscopy, and 133(22.17%) by the formalin-ether sedimentation concentrationmethod. There was no significant difference (P>0.05) between direct smear and concentration method for the detection of intestinal parasites in stools. The prevalence rate of intestinal parasites were (13%) in males and (9.17%) in females was not statistically significant (P>0.05). The highest prevalence rates (63.30%) were found in age group 12-14year, while the lower infected rate (3.63%) was reported at age group 6-8years. was high significant difference between them (P<0.05).

Conclusion:Intestinal parasitic infections (helminthes/protozoa)constitute a global health burden in many developing countries (Harhay, et al.; 2010). The present study reported only five protozoa parasites were prevalent in school

children, while the helminthes infections are uncommon in this study and it was provide the baseline data to clinicians and health authorities for the treatment parasitic infections in community of the region, therefore, there is the need for continuous mass programs to improve sanitation and hygieneeducation of teachers, students and parents is required.

Introduction:

Parasitic infections are a serious public health problem because they cause anemia, growth retardation, aggression, weight loss, and other physical and mental health problems, especially in children. (Daryani, et al.; 2017) Parasitic diseases cause over 33% deaths globally (Mulatuet al.; 2015).

There are three main classes of parasites that can cause disease in humans: protozoa, helminths and ectoparasite (Legesse and Eroko, 2004). Protozoan parasites being single celled can rapidly multiply inside the body leading to the development of the serious infection. Most of the protozoan infections tend to be asymptomatic. However, the common symptoms associated with it include abdominal discomfort, vomiting and dysentery (Hegazy, et al., 2014). When burden of infection is pronounced, it may cause several complications like diarrhea, malaise, bloating, fatigue, epigastric discomfort, malnutrition, mal-absorption, intestinal ulceration, gastroenteritis, weight loss, abscesses, mental retardation and even death. Protozoan

infections can also lead to structural and functional abnormalities of small intestines in humans and can be misdiagnosed as appendicitis or other inflammatory diseases of gastrointestinal tract. Children are the primary victims of gastrointestinal protozoan parasites (Abdullah et al., 2016).Helminthiasis is any macro-parasitic disease of humans and other animals in which a part of the body is infected with parasitic worms (Rebecca et al., 2011). Helminths are large, multicellular organisms that are generally visible to the naked eye in their adult stages. Like protozoa, helminthes can be either free-living or parasitic in nature. In their adult form, helminthes cannot multiply in humans (Munis and Ferreira, 2002).

Intestinal parasitic infections (helminthes/protozoa) are found worldwide both in developing and industrialized countries and constitute a global health burden in many developing countries (Harhay et al., 2010). Generally young children and adolescents in developing countries display the highest prevalence of intestinal parasites and burden of morbidity (**Ostan**, **et al.; 2007**). Children because of their complex nutritional requirements and less developed immune systems are observed to be the principal sufferers of these parasitic infections (Scrimshaw, 1994), overcrowding, lack of clean water and poor personal hygiene with weak nutritional status in children are known to be risk factors (Alum, et al., 2010 and Tiwari, et al., 2013). Although Libyancountry and people in communities usually

have high standard of cleanliness, general good health, clean water supply and proper sewage disposal (El-Buni & Khan, 1998) and (Ibrahim, et al., (1993), the epidemiological patterns of parasitic diseases in a rapidly developing country like Libyaare further complicated by the arrival of large numbers of migrant workers leading to destabilizing effects on the normal pattern of disease transmissions (EI-Ammari, & Nair, 2003).

The commonest intestinal protozoan infections among Libyan population are Blastocystis hominis followed by Entamoeba histolytica/Entamoeba dispar or Giardia lamblia ,Entamoeba coli, Endolimax nana and Chilomastix mesnili(EI-Ammari, & Nair, 2003),(Al-Fellani, et al.; 2005) and (Saleh2007)Moreover, Cryptosporidium spp infections have been reported in Libya among patient particularly in children with diarrhea(Bugharara, et al.;1999),(Kara, et al.; 2006), (Ghenghesh, et al.; 2016) and it was reportedin the stools of HIV/AIDS patients by Mohamed, et al.; (2017). Relatively low infections rates of helminthes have been reported in this country. (Dar, et al.; 1979), (Al-Fellani, et al.; 2005), (Sadaqa and Kassem,2007), (Ben Mousa, 2007) reported helminthes in the stool samples of school aged children in Tripoli and Mohamed, et al.;(2017) who reported only one stool sample showed the egg of Ascaris lumbricodesamong HIV/AIDS patients in south western, Libya. While Saleh (2007) and Ibrahim, et al.; (1993) did not find helminthes infections

among outpatients in Sebha and school aged children in Tripoli respectively.

The objectives of the present study were to investigate the prevalence of intestinal parasitesin school childrenby stool examination (direct wet smear microscopy and formalin-ether concentration methods) among six primary school children in Houn city, Libya.

Materials and Methods:

Study area:The study was conducted in Houn city, it is 240 km south of Sirte, 370 km from Muisrata and 272 km north of Sabha (29°07′16″N 15°56′25″E). Hun has a hot desert climate with long, extremely hot summers and short, warm winters as well as very little rainfall throughout the year. Population total in Hun city is (2010) 30,715.

Study population: This study was conducted in some primary school children were selected by systematic random sampling using the master list of the schools In Houn city- Libya, between the first week of January and the last week of March2016.

Sample:A total of 600 random fresh stool samples were collected from primary school children aged between 6 and 14 years. Permissions to visit schools and obtain samples from students were obtained from the ministry of education.

Collection stool samples: Each student was given small package containing a covering latter, screw capped universal plastic container, questionnaires and was asked to provide, on the

next day, a single fecal sample. At the second visit, the containers were collected. One or two additional visits were paid to get the undelivered the container and or the questionnaire, then transported to the laboratory. A code was given to each questionnaire. This cod was also written on the samples.

Laboratory investigation:The stool samples were taken immediately to the Medical Laboratorydepartment at the faculty of medical technology - Sirt University for examination. The Laboratory investigation included the naked eye examined of stool samples for color, consistency and the presence of any adult helminths. They were then examined microscopically by direct wet smears and formalin-ether sedimentationmethods. Two types of direct wet film preparation were done for each sample at the same time, 1 slide by using normal saline 0.85% for detecting the motility of trophozoites and Lugol's iodine 5% slide for demonstrating structures (Cheesbrough, 1998).

Statistical analysis:Statistical analysis was performed by using a two-tailedx^2 test.P value of < 0.05 was considered significant.

Results:

1. **Intestinal parasitic infection**: A total of 600 stool samples were collected, screened for the presence of intestinal parasites by using direct smear microscopy, and formalin-ether sedimentation method in the Laboratory of Faculty Medical Technology Houn. The stool samples of 133 children (22%), out of the total 600 examined were found to

have the cysts and/or trophozoites of intestinal protozoan parasites in them. (Figure 1)

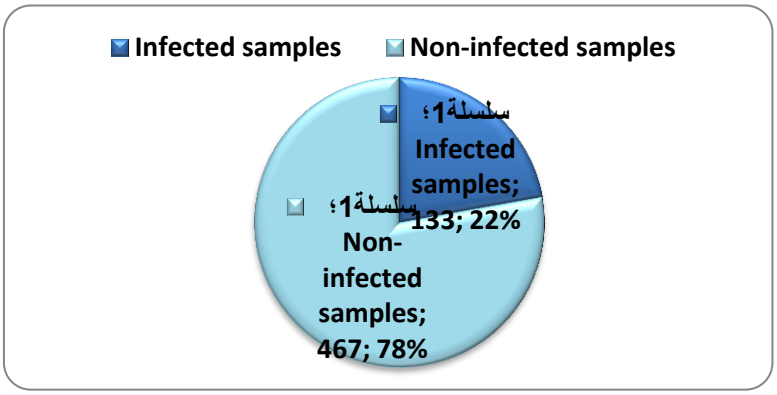

Figure (1): The prevalence of intestinal parasites infection in primary schoolchildren.

2. **Single or mixed parasitic infection**:Intestinal parasites infection may be caused by one or more parasites simultaneously. We, therefore, assessed the pattern of infection whether it was single or double. We found the frequency of infection caused by a single parasite was highest about 16.83 % (n=101 out of 133 positive subjects), while the double infection remained only 5.33% (n=32 out of 133 positive subjects), high significant difference wasexisted between the single and mixedparasitic infection forschools children(p=0.000)(Figure2).

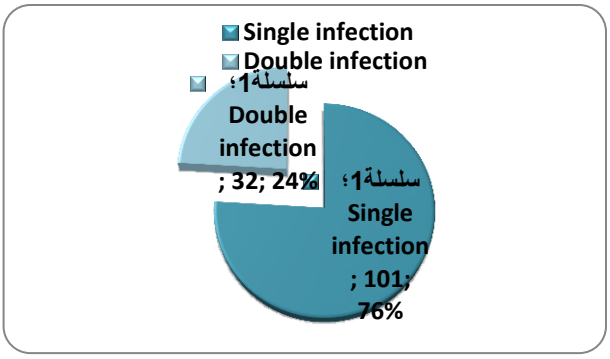

Figure (2): **Percentage of the positive cases of primary schoolchildren having the single or mixed infection of intestinal protozoan parasites**.

3. **The identification of intestinal parasites**:The examination of stool samples showed the occurrence of five intestinal protozoan parasites in them. The most common parasites detected wereEntamoeba histolytica/E.dispar(4.83%), followed by Entamoeba coli (3.83%), Giardia lamblia (3.5%), Endolimax nana (2.83%), Blastocystis hominis (1.83%), and mixed infections of Endolimax nana &Blastocystis hominis (1.83%) followed by Entamoeba coli&Giardialamblia and Endolimax nana &Entamoeba histolytica (1.66%). Table (1)

Parasites	**No. infected**
Single infection	
Entamoeba coli	23(3.83%)
Entamoeba histolytica/E.dispar	29(4.83%)
G. lamblia	21(3.5%)
Endolimax nana	17(2.83%)
Blastocystis hominis	11(1.83%)
Total	101(16.83%)

Mixed infections	**No. infected**
E. coli& G. lamblia	10(1.66%)
E. nana& B. hominis	11(1.83%)
E. nana & E. histolytica/E.dispar	11(1.66%)
Total	32(5.33%)

Table (1): The intestinal parasites detected in primary schoolchildren

4. **Comparison between two methods in the diagnosis of intestinal parasite in primary schoolchildren**: All the positive stool samples found in direct smear microscopy (76) (saline and iodine smears) were also found positive in concentration technique for intestinal parasites. Formalin-ether sedimentation method detected 57 more number of positive samples which were negative indirect smear microscopy. (Table2) shows no significant difference

(P>0.05) was found between direct wetsmear microscopy and concentration method for the detection of intestinal parasites.

No. examined	**Methods in the diagnosis of intestinal protozoa**	
600	**Direct smear microscopy Positive**	**Formalin–ether Sedimentation**
	76(12.67%)	133(22.17%)

Table (2): The comparison between two methods in the diagnosis of intestinal parasite in primary schoolchildren

5. **The prevalence of intestinal parasites in primary schoolchildren according to gender**:The results of this study in table (3)showed that, the males were found to have higher prevalence rates of intestinal parasite than females, 13% (78/600) males and 9.17% (55/600) females were found to be infected with intestinal parasites. There was no significant difference between them (P>0.05).

The results	**Gender**		**Total**
	Male	**Female**	
Positive	78(13%)	55(9.17%)	133
Negative	292	175	467
Total	370	230	**600**

Table (3): **The prevalence of intestinal parasites in primary schoolchildren according to gender**

6. **The prevalence of intestinal parasites in primary schoolchildren according to age groups**:The present results in the table (4) showed significant increase in intestinal parasites infection with increase the age groups of schoolchildren, the lower positive rate was (3.63 %) in (6-8age group) followed by (20.66%) positive rate in (9-11age group), followed by the higher positive rate was (63.30%) found in (12-14age group). There was high significant difference between them (P<0.05).

Age groups	**No. of samples**	**No. Negative**	**No. Positive**	**% Positive**
6–8years	220	212	8	(3.63%)
9–11year	271	215	56	(20.66%)
12–14year	109	40	69	(63.30%)
Total	600	467	133	(22.17%)

Table (5): **The prevalence of intestinal parasites in primary schoolchildren according to age groups**

Discussion:

This study provides the first estimate of intestinal parasitic (Protozoa) prevalence among some primary schoolchildren in

Houn city. In the present study we used the direct wet smear technique and the formalin ether sedimentationconcentration technique which was used because of its higher diagnostic sensitivity of intestinal parasites than the direct smear technique (saline and iodine smears).The results of the stool sample analysis revealed that, 76(12.67%) of primary school children samples were positive by direct method, while by sedimentation method the positive rate were 64 133(22.17%). These results were no statistically significant ($p > 0.05$). This finding is consistent with a study done by El said, et al.; (2014) which reported that the 45 (7.4%) of primary school children samples were positive by Direct method, while by sedimentation method the positive rate were 64 (10.6%).

The examination of stool samples from some primary schoolchildren in Houn city revealed the only prevalence of intestinal protozoan parasites infections was 22 %, high prevalence of protozoan infection may due to their simple life cycle and way of transmission. This finding is consistent with a several studies done in different parts of Libyaby Ben Musa (2007), Sadaga (2007), Al Kilani, et al.,(2008), Abdulkadir, et al, (2013), Ghenghesh, et al.; (2016) andMohamed, et al.; (2017), whichhad shown the prevalence of intestinal protozoan parasites between 1-31%. The fluctuations with other studies due to the different in implementing experiments, seasons, socioeconomic status for the subjected persons at the time of study and the

weather either warm climates or cool whereby more common in warm climates than in cool ones (Meyer and Jarroll ,1980).

The rate of stool samples with single infection in the present study was (16.83%) which much higher than the rate of mixed infection (5.33%), was nearly similar to that results previously reported by (Dar et al, 1979 and Sadaga, 2007), (22.9%) single infection and (4.3%) mixed infection reported by (Hamdan et al., 2010) and (10.1%) of single infection and (0.5%) of mixed infection reported by (Mohamed et al., 2014) in Wadi Al-Shati RegionSaad, et al.; (2009) reported (22.56%) infection rate with a single parasite , (2.01 %) infection rate with double parasites and (0.08 %) triple infection and Abera and Nibret (2014) have reported single (35.1%), double (8.4%) and triple infection (0.8%) in children in Ethiopia. On contrast, (Kitvatanachaiet al., 2008) showed that, the rate of mixed infections (56.8%) was much higher than that of single infections (17.3%) in Thailand. The varying differences in mixed infections may be due differences in concentrations of parasites and sanitation conditions of the communities (Chin., et al.; 2016).

In the present study, the detected intestinal parasites were E. histolytica/E.dispar(4.83%), Entamoeba coli (3.83%), G. lamblia (3.5%), Endolimax nana (2.83%) and B. hominis (1.83%). E. histolytica /E.dispardetected as the most common protozoa with a rate of (4.83%), different rates were reported in other studies in Libya as 0.3% in Benghazi (Dar et al, 1979),

15.7% in Benghazi (EL-Boulaqi et al, 1980), 6.6% in Derna district (Sadaga, 2007), (36.57%) in children and neonates in Sirt by (Kasssem et al, 2007) and (3.1%) in primary schools in Zawia by (Mohamed, et al., 2014), 3%–4%E. histolytica in school children in Tripoli, (Ben Musa, et al.;2007), 3.1% E. histolytica in primary children in Zawia (El-Said, et al.; 2014), ESalem, et al.; (2018) was reported 4.0% of E. histolytica among school children in Sebha, Libya.A slightly higher prevalence of 11.8% E. histolytica was found among children in Zliten reported by (Ali, et al.; 2005), 6.6% E. histolytica among primary school children in Derna District, (Sadaga and Kassem 2007) 9.5% E. histolytica in adults and children in Brak, Wadi Al-Shati, (Mergani, et al.; 2014) and 12.1% E. histolytica in school-aged children and adults in Al-Khoms city (El-Ammari and Nair 2015).

In the present study therate of males infected with intestinal protozoan parasites was higher when compared with the same of infected females, even though the difference was found to be not statistically significant ($p>0.05$). This result was similar to other studies in Libya (Kasssem et al, 2007), (Abdulkadir, et al, 2013). The results are also in agreement with studies in other parts of the world [Al-Saeed and Issa (2006), EI-Ammari & Nair, 2003], on other country Gelaw, et al.,(2013) in Ethiopia, reported infection rate (11.8%) in females, (17.9%) in males. The differences in prevalence may be because males have access to

play in parks than their females who are often engaged in the household chores (Alemu, et al., 2011).The differences in prevalence's may be because males have access to play in parks than their females who are often engaged in the household chores(Alemu A, et al.; 2011).

In addition, thepresent study revealed significant ($P<0.05$) association between the occurrence of intestinal parasitic infections and age groups, (63.30%) of primary schoolchildren, aged 12-14 years. Several previous studies had tackled the relationship between the prevalence of intestinal parasitic infections and age groups as Gelaw et al., (2013) where prevalence of intestinal parasites was high in age group of 10–12 years compared to other age groups, 27.2% of primary schoolchildren, aged 7-12 years, were infected by one or more intestinal parasites Hamdan et al.;(2010), Al-Shammari, et al.; (2001). It may be attributed to fault hygienic practice following the defecation practice where old children carry out the cleaning procedures by themselves and young children only with parental supervision or due to children in this age group usually move around over a wider territory, increasing the possibility of acquiring infections from contaminated environment.

CONCLUSION: Intestinal parasitic infections (helminthes/protozoa) constitute a global health burden in many developing countries (Harhay, et al.; 2010). The present study showed only five protozoa parasites were prevalent in school

children, while the helminthes infections are uncommon in this study, probably due to climatic conditions (dry, hot and sandy soil) of this region.It wasrevealed that, the infection with intestinal parasites still pose a public health problem to schoolchildren and provides the baseline data to clinicians and health authorities for the treatment parasitic infections in community of the region.

Treatment combined with health education of teachers, students and parentsand other interventions in schoolchildren is recommended as a way of controlling intestinal parasites transmission. In addition, more studies are needed to provide data on epidemiological risk factors of intestinal parasites to improve environmental sanitary conditions to protect children from the infection of this parasite in Libya.

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