Intestinal Parasites in Wadi Al-Shati Region

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Abstract:

Background: Intestinal parasites cause significant morbidity and mortality throughout the world. The prevalence of intestinal parasites is not recorded so far in the population of Wadi Al-Shati province of Libya.

Objectives: to determine the prevalence of intestinal parasites among random population of different rural localities of Wadi Al-Shati province, south-west, Libya.

Materials and Methods: a total of 1192 stool samples (during the period from 1st of August 2007 to end of April 2008) were collected from randomized population of seventeen rural localities of Wadi Al-Shati province. All stool specimens were examined by direct-smear microscopy, and formalin-ether concentration for the detection of intestinal parasites in normal saline and Lugol's iodine preparations.

Results: Out of 1192 stool samples, 284 (23.82%) were found positive by the direct smear microscopy, and 294 (24.66%) by the formalin-ether sedimentation method. There was no significant difference (P>0.05) between direct smear and concentration method for the detection of intestinal parasites in stools. Prevalence of intestinal parasites between males and females was not statistically significant (P>0.05). Highest prevalence rates (5.70%) were found among 21 to 30 years old age group. Older age group (81 to 90 years) had a lower infected rate with intestinal parasites (0.08%). *Blastocystis hominis* was the commonest (20.21%) parasite found among the population. *Cryptosporidium* spp. (2.5%), *Giardia lamblia* (1.76%), *Entamoeba histolytica*/ *E. dispar* (1.17%) and *Entamoeba coli* (0.92%) were also detected in stool samples. Other intestinal parasites present included were *Trichomonas hominis* (0.80%) and *Ascaris lumbricoides* (0.80%).

Conclusion: the helminthic infections are uncommon in Wadi Al-Shati province, probably due to climatic conditions (dry, hot and sandy soil) of this region. Prevalence of intestinal parasites would provide the baseline data to clinicians and health authorities for the treatment of parasitic infections in community of this region.

Introduction:

The high frequency of intestinal parasites in a population of a region indicates low socio-economic development or conditions, poor medical care, occupational exposure and low standard of hygiene[1,2] Libyan Arabia Jamahiriya is a developing country, and people in communities usually have high standard of cleanliness, general good health, clean water supply and proper sewage disposal.[3] An enormous increase in the number of expatriates is a result of economic growth of Libya. The prevalence of intestinal parasites has been found higher in expatriates arriving from developing countries.[4-7]

Full information about intestinal parasites in Libyan Arab Jamahiriya is lacking, despite few reports.[8-10] The commonest protozoal infections are *Blastocystis hominis* followed by *Entamoeba histolytica* / *Entamoeba dispar* or *Giardia lamblia* and *Entamoeba coli* among Libyan population.[9,11] Moreover, *Cryptosporidium* spp infections have been reported in Libya among patients particularly in children with diarrhea.[12-15] The detection of *Cryptosporidium* spp is not routinely done in laboratories. For this reason, frequency of cryptosporidiosis and source of infections are not fully known in Libya.

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Relatively low infection rates of helminthes have been reported in this country.[9,16-18] Saleh[11] and Ben Mousa and Ibrahim[19] did not find helminthic infections among outpatients in Sebha and school aged children in Tripoli respectively. However, Ben Mousa[10] in an other study reported helminthes in the stool samples of school aged children in Tripoli.

In the present study, attempts were made to find out prevalence of Intestinal parasites among random population of Wadi Al-Shati using direct smears and formalin sedimentation.

Materials and Methods:

Study area:

Zone of Wadi Al-Shati municipal branch, approximately at 27-28 N latitude in the corner of Libya (Fig. 1). The area of this Zone measures about 160 km^2 with a population over seventy eight thousands five hundreds thirty two.

The stool samples were collected from seventeen rural localities of Wadi Al-Shati. Extended from east to west are (Ashkidah, Qirah, Brack, Al-Zauia, Zuwayah, Tamzawah, AQar, Mahrugah, Al-Qardah, Tarut, Qutta, Berqen, Zahra, Wanzarik, Tamssan, Mansurah and Idri).

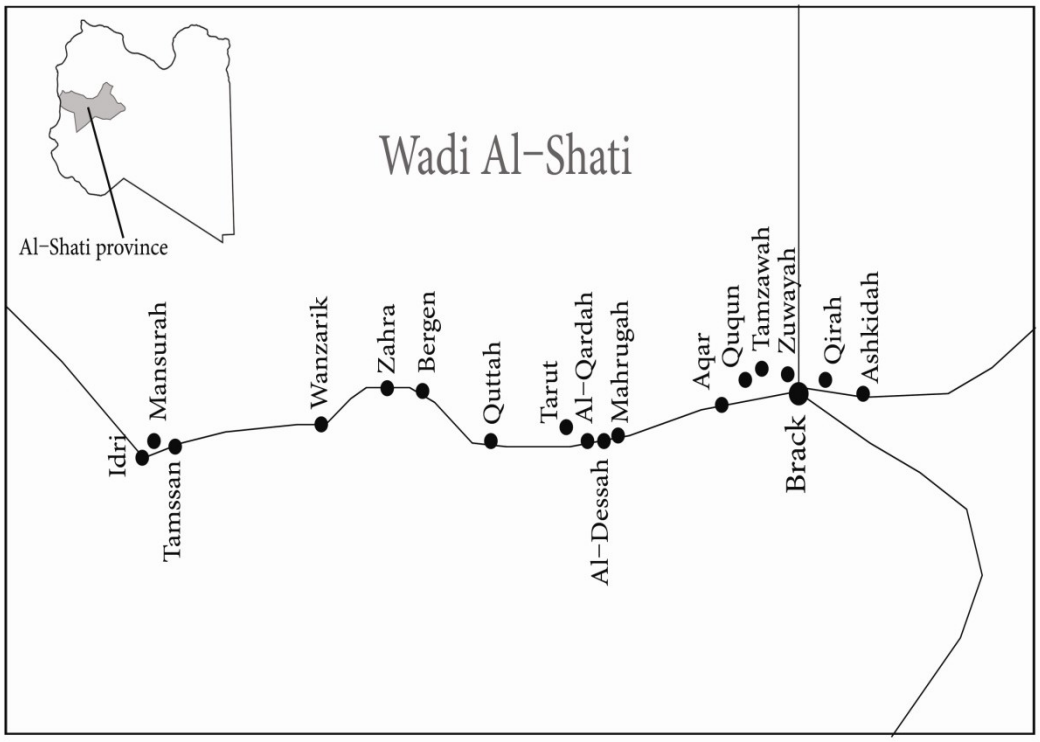


Fig. 1: Geographic location of Wadi Al- Shati in Libya and its different rural localities.

Samples:

During the period between first of August 2007 to end of April 2008, a total of 1192 stool samples (22 from Ashkida, 60 from Qirah, 238 from Brack, 37 from Al-Zauia, 53 from Zuieia, 101 from Tamzawah, 96 from Aqar, 91 from Mahrugah, 120 from Al-Qardah, 15 from Tarout, 96 from Qattah, 39 from Barqan, 114 from Zahra, 51 from Wanzarik, 8 from Tmessan, 34 from Mansoura and 17 from Idri) were randomly collected from individuals, who lived in Wadi Al-Shati region for the detection of intestinal parasitic infections. Out of 1192, 509 were males and 683 were females. The population aged from less than one year to ninety years. Stool samples were collected in closed and labelled disposable plastic containers. Data about age, sex and place of residence were obtained from questionnaire given to all individuals.

Direct saline wet preparation:
The direct saline smear was prepared by mixing a small amount of feces with a drop of normal saline (0.85%). These mixtures provide a uniform suspension under 22X 22 mm cover slip. The entire cover slip area was examined using low power (10 X) then high power objective (40X).

The iodine wet preparation was made by using Lugol's iodine solution. A drop of iodine solution was placed on a glass slide. By using piece of stick, small amount of feces was mixed with iodine and covered by glass cover slip. The preparation examined under microscope using low power then high power objective.

Concentration method:
Formalin-ether sedimentation method:
Formalin-ether sedimentation concentration technique was performed for the concentration of intestinal parasites as described by Chessbrough.[20]

Modified acid-fast stain:
Modified Ziehl-Neelsen (ZN) acid-fast stain was used to identify the oocysts of Coccidian parasites in the fecal specimens following the procedures described by Garcia et al (21) and Baxby et al.[22]

Results:
A total of 1192 stool samples were collected, screened for the presence of intestinal parasites using direct smear microscopy, and formalin-ether sedimentation in the Parasitology Laboratory of Medical Technology, Brack. Of 1192 subjects investigated, the positive rate of intestinal parasites in stool specimens was 24.66% (294/1192). All the stool specimens found positive in direct smear microscopy (saline and iodine smears) were also found positive in concentration technique for intestinal parasites. Formalin-ether method detected 10 more number of positive samples which were negative in direct smear microscopy. Table 1, shows the comparison of direct smear microscopy and formalin-ether sedimentation for the detection of intestinal parasites in the fresh stool samples, collected from various localities of Wadi Al-Shati province. No significant difference (P>0.05) was found between smear microscopy and concentration method for the detection of intestinal parasites.
The results of this study showed, that females (14.17%) were found to have higher prevalence rates than males. (10.48%). However, there was no significant difference between them (P>0.05). The higher (5.70%) and lower (0.08 %) positive rates were found among 21 to 30 years aged and 81 to 90 years old age group respectively. The positive rate of parasites according to their residency of population in rural localities of Wadi Al-Shati is presented in Table 2. The prevalence rate varies from 0. 08 to 4.36%. Intestinal parasites were not recorded in the stools of random population of Tarout and Ashkida villages of Wadi Al-Shati province.

The infection with a single parasite was higher 22.56% (269/1192), followed by double infection 2.01%, and triple infection 0.08%. The results of present study are compared with other studies carried out in Libyan Arab Jamahiriya in Table 3. *Blastocystis hominis* was most frequently recorded (20.21%) in the stool specimens of population of Wadi Al-Shti region. The other protozoal seen in the fecal samples were *Cryptosporidium* spp, (2.51%), *Entamoeba histolytica* / *Entamoeba dispar* (1.17%), *Giardia lamblia* (1.76%), *Entamoeba coli* (0.92%) and *Trichomonas hominis* (0.08%). Out of 1192 stool samples examined, only one (0.08%) was found to be positive for *Ascaris lumbricoides*. No other helminthes were recorded in the stool of random population of Wadi Al-Shati.

Table 1: Comparison of methods for the detection of intestinal parasites.

No. examined	No. positive by:	
1192	Direct smear microscopy	Concentration
	Saline / Iodine	Formalin-ether sedimentation
	284 (23.82)	294 (24.66)*

*P= > 0.05
Figures in parentheses indicate percentages.

Table 2: Prevalence of intestinal parasites according to localities among random population of Wadi Al-Shati province.

Area	No. examined			No. Positive			Prevalence (%)
	Male	Female	Total	Total	Male	Female	
Ashkidah	12	10	22	Nil	Nil	Nil	Nil
Qirah	33	27	60	15	8	7	1.25
Brack	121	117	238	52	27	25	4.36
Al-Zauia	14	23	37	6	3	3	0.50
Zuwayah	34	19	53	10	9	1	0.83
Tamzawah	47	54	101	23	10	13	1.92
Aqar	37	59	96	16	4	12	1.34
Mahrugah	45	46	91	16	7	9	1.34
Al-Qardah	32	88	120	41	14	27	3.43
Tarut	10	5	15	Nil	Nil	Nil	Nil
Quttah	39	57	96	37	15	22	3.10
Berqen	19	20	39	7	2	5	0.58
Zahra	15	99	114	35	5	30	2.93
Wanzarik	33	18	51	17	11	6	1.42
Tamssan	2	6	8	1	Nil	1	0.08
Mansurah	11	23	34	14	7	7	1.17
Idri	5	12	17	4	3	1	0.33
Total	509	683	1192	294	125	169	24.66

Discussion:

A total of 1192 stool samples were collected for the detection of intestinal parasites from seventeen rural localities. Overall the prevalence of intestinal parasites was 24.66% and there was no significant difference (P>0.05) in the positive rates between males and females, residing in the rural localities of Wadi Al-Shati province. The results are almost similar to the studies of Dar et al[8] and Al-Fellani et al,[9] who reported overall prevalence rates of 27.57 and 27.60% in school children in Benghazi and outpatients in Sebha city respectively. The results differ from those of Sadaqa and Kassem[18] and Ben Mousa,[10] who reported positive rates of 30.0% among primary school children in Derna and 42% in school aged children in Tripoli respectively and suggested that infection of intestinal parasites was related to the education and socio-economic status of the family, source of water for human consumption and size of family. However, lower prevalence rates of intestinal parasites (12.0%, 12.88% and 14.2%) have been found in Al-Baida,[23] Benghazi[3] and Tripoli[24] respectively.

Results also differ from Dar and Friend,[16] who reported comparatively higher prevalence of intestinal parasites (78.0%) among children in closed communities in Benghazi city (orphans, mental institutes and prisons). The high incidence of intestinal parasites in these communities probably due to lack of standards of environmental sanitation, personal hygiene and selection of samples, and the transmission of parasites was being maintained locally through contamination of food and water and soiled fingers. Moreover, Salem et al[25] also determined higher prevalence of intestinal parasites (76.0%) among Libyan patients in Sirt city.

The data of the present study showed a higher prevalence rate of *Blastocystis hominis* (20.21%) compared to other intestinal parasites. This finding is almost in accordance with other studies made in Sebha city 18.55%,[9] 22.69%[11] and 26.61%[26] prevalence of *B. hominis*. However, a higher prevalence (29.6 %) of *B. hominis* has been found among Libyan patients in Sirt city.[25] Moreover, lower positive rate of *B. hominis* has been also reported in Libya, 6.7% in Derna[18] and 12.57% in Sirt.[27]

Al-Fellani et al[9] reported commonest incidence of *B. hominis* among the outpatients in Sebha city, and suggested that dry and hot weather of this region favoring the survival and transmission of this organism in the population of Sebha.

The results are also consistent with the findings of Mohammed et al,[28] who reported that the prevalence of *B. hominis* in Sebha was significantly more in summer than in winter season. Prevalence of *B. hominis* has also been

found higher during warm and hot season compared to pre monsoonal month, spring and winter of the years in the other parts of the world.[29-31] Moreover, dry season and warm weather favor the development of intestinal protozoan parasites in Nigeria and Turkey.[32,33] Moreover, oocysts of protozoan are relatively more resistant against adverse environmental conditions.[34,35] Thus, dry and hot weather conditions in conjugation with sandy soil of Wadi Al-Shati province might be suitable for the viability, survival and transmission of *B. hominis* in this region.

In Libya, infections of *B hominis* are mentioned on Hospital based studies among the patients and epidemiology and transmission is completely not understood.

The results of this study showed a lower positive rate of *E. histolytica / Entamoeba dispar* (1.17%) and *G. lamblia* (1.76%) in the stools of random population in various rural localities of Wadi Al-Shati province. These results are almost similar to those of Dar et al,[8] Ali et al,[14] AL-Fellani et al,[9] Ben Mousa,[10] Saleh,[11] who reported lower prevalence rates of *E. histolytica / Entamoeba dispar* (2.4% in Benghazi) and *G. lamblia* (1.2% in Zlieten), (1.62% in Sebha), (1.28% in Sebha) and (4.0% in Tripoli) respectively. However, Dar and Friend[16] and Salem et al[25] reported *E. histolytica / Entamoeba dispar* commonest protozoan (44.4% and 35.9% in closed communities in Benghazi and Libyan patients in Sirt respectively). Ali et al[14] also reported a higher prevalence of *E. histolytica / Entamoeba dispar* (11.8%) among children in Zlieten city. In accordance with the present findings, Ahmad,[36] Ben Mousa[10] and Ben Mousa and Ibrahim[8] also reported lower prevalence of *G. lamblia* among general population of Sebha city and in school aged children in Tripoli respectively. However, Dar et al[8] and Sadaga and Kassem[18] reported *G. lamblia* was most common in Northern, Libya (11.4% in Benghazi and 12.7 % in Derna city respectively).

Prevalence of non pathogenic protozoan*, E. coli* and *T. hominis* was found to be low in the various localities in Wadi Al-Shati region. Similar findings have been reported by others in Libya.[3,9-11,25]

The prevalence of *Cryptosporidium* spp is higher in tropical regions (up to 10%) than temperate regions and varies from 0.5% to 19.1% among hospitalized pediatric diarrheal cases in the different parts of the world.[37-39]

In Libyan Arab Jamahiriya, limited studies are carried out for the diagnosis of cryptosporidiosis[12-15] which describes the incidence of *Cryptosporidium* spp range from 3.19% to 13.0% in the patients.

Cryptosporidiosis is considered a form of zoonosis,[13,40] reported among patients living in areas of farms, where cattle are reared and houses with poor disposal.

Regarding *Cryptosporidium* spp., in the present study, out of 1192 stool samples examined, only 30 samples (2.5%) showed positive results.

Cryptosporidium is transmitted in feces, and infections are thought to spread from animal to human as well as human to human in Wadi Al-Shati province as some people have animals in the farm houses. Although, a municipal system of water collection exists near their houses in rural localities and may be favorable for the transmission of *Cryptosporidium* spp. in the random population.

In the literature, most of the studies made in Libya showed data only on the prevalence of protozoanl parasites in the population or patients.

In the present study, out of 1192 stool specimens examined, only one sample was found positive for *Ascaris lumbricoides*. No other helminthic infections were recorded in Wadi Al-Shati region. These results are consistent with data obtained in a study carried out in Sebha city,[11] out of 1868, none of stool sample showed helminthes. Moreover, lower prevalence of helminthic infections were also reported in Sebha.[9] This is probably due to weather condition (dry and hot) of Wadi Al-Shati province, which may be determining an unfavorable environment for the survival and development of helminthes in this region. Lower prevalence rates of helminthic infections also have been found in Benghazi,[16,41] in Tripoli[17,24] and in Derna.[18] However, contradictory results were reported by Ben Mousa,[10] who found that prevalence of *A. lumbricoides* (20.0%) was much higher than the other parasites detected (6% *H. nana*, 2% *Taenia saginata*, 14% *T. trichiura*, 4.0% *E. vermicularis*, 4.0% *Entamoeba histolytica / Entamoeba dispar*, 4.0% *E. coli* and 2.0% *G. lamblia*) among school aged children in Tripoli.

Table 3: Prevalence of intestinal parasites in Libyan Arab Jamahiriya

References	Category / locality	Parasites (%)									
		Entamoeba histolytica / E.dispar	*Entamoeba coli*	*Giardia lamblia*	*Blastocystis hominis*	*Cryptosporidium* spp	*Ascaris lumbricoides*	*Hymenolips nana*	*Enterobius vermicularis*	*Trichuris tichuira*	*Ancylostoma duodenale*
Dar *et al* (1979).	School children in Benghazi.	2.4	NR	11.4	NR	NR	NR	NR	NR	NR	NR
Dar and Friend (1979).	Closed communities in Benghazi.	44.4	NR	NR	NR	NR	2.3	1.6	0.8	1.6	NR
Bolbol *et al* (1981).	Outpatients in Tripoli.	8.3	NR	8.7	NR	NR	1.7	0.38	NR	0.38	0.19
El-Buni *et al* (1998).	Expatriates in Benghazi.	27.0	15.1	7.8	NR	NR	2.8	3.4	NR	2.2	0.7
El-Buni and Khan (1998).	Children attending Hospital in Benghazi.	3.9	2.62	6.2	NR	NR	NR	NR	NR	NR	NR
Bugharara *et al* (1999).	Children with gastroenteritis in children Hospital in Benghazi.	7.44	2.12	5.85	NR	3.19	NR	NR	NR	NR	NR
Al-Tawaty *et al* (1998-2002).	Children with diarrhea in children Hospital Benghazi.	2.82	NR	3.77	NR	7.54	NR	NR	NR	NR	NR
Al-Fellani *et al* (2005).	Outpatients in Sebha.	6.63	0.35	1.62	18.55	NR	0.06	0.11	0.17	NR	NR
Ali *et al* (2005).	Children with diarrhea in Zileten.	11.8	NR	1.2	NR	13.0	NR	NR	NR	NR	NR
Salem *et al* (2007).	Libyan patients in Sirt.	35.9	4.7	7.2	29.5	NR	NR	NR	NR	NR	NR
Sadaqa and Khassem (2007).	Primary school children in Derna	6.6	3.2	12.7	6.7	NR	0.1	0.1	NR	NR	0.6
Saleh (2007)	Out patients in Sebha	5.24	0.21	1.28	22.69	NR	NR	NR	NR	NR	NR
Ben Mousa (2007)	School aged children in Tripoli	4.0	4.0	2.0	NR	NR	20.0	6.0	4.0	14.0	NR
Present study	Random population of Wadi Al-Shati	1.17	0.92	1.76	20.21	2.51	0.08	NR	NR	NR	NR

NR= Not recorded.

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