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Prevalence Rate of Intestinal Parasites with Interaction of Other Factors Among Displaced People in Khartoum State

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ABSTRACT

This study was a randomized cross-sectional study and was carried out during the period from November 2008 - March 2009 in order to determine the prevalence of intestinal parasites among displaced people in two camps, Omdurman (Daralsalam camp) and Khartoum (Gabel Awlia camp).

A total of 300 individuals, (with age range between 5-60 years) were included in the present study. Fecal specimens, clinical and parasitological data were obtained and recorded. One hundred eighty nine out of three hundreds (63.0%) fecal specimens were positive for intestinal parasites (170 (90.0%) with protozoan parasites and 19 (10.0%) with helminthes parasites by using wet preparation method). The results showed a high prevalence of intestinal parasites in displaced people; 189 (63.0%). Protozoan parasites were more prevalent than helminthes. The most dominant parasite found was *Giardia lamblia* 127 (67.2%). Infections were more frequent in males 109 (57.7%) compared to females 80 (42.3%).

Moreover, the present study showed higher prevalence of intestinal parasites among the age group less than 15 years, with a total of positive cases of 75 (39.7%).

Poor hygiene and sanitation in displaced camps was found to be a high risk factor for the prevalence of intestinal parasitic infection ($P < 0.05$). In Gabel Awlia camp, 53 positive cases were detected with a percentage of (28.0%), while in Dar Alsalam 136 positive cases were detected with a percentage of (72.0%). In Gabel Awlia camp, the residents have cleaner water and more hygienic environment which are lacking in Dar Alsalam camp and that was reflected on their health status represented by the high burden of intestinal parasitic infections as shown in this study.

The study indicates that the area under investigation is endemic for intestinal parasites.

المستخلص

أجريت هذه الدراسة في الفترة من نوفمبر 2008 - مارس 2009 بمعسكرين للنازحين : دار السلام بأم درمان و جبل اولياء بولاية الخرطوم.

وهدفت هذه الدراسة لمعرفة انتشار الأمراض الطفيلية التي تصيب الجهاز الهضمي عند300 شخص في مختلف الاعمار تم تشخيصهم بطرق الفحص الروتينية . اظهرت الدراسة الآتي:

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ارتفاع معدلات الاصابة بالأمراض الطفيليه بنسبة (63.0%) وان اكثر الامراض الطفيليه شيوعا هي تلك الناتجة عن الإصابة بوحيدات الخلية اكثر من الديدان, وأكثر الطفيليات شيوعا هي طفيليات القارديا بنسبة (67.2%) وان اكثر الإصابات كانت في الرجال 109 (57.7%) مقارنة بالنساء 80 (42.3%)
خلصت الدراسة الي ارتفاع نسبة انتشار الامراض الطفيلية في معسكرات النازحين بأم درمان والخرطوم وبصفة خاصة في الفئة العمرية أقل من سنة 15 بنسبة (39.7%) .
في معسكر جبل اولياء وجد أن عدد الاصابات الموجبة 53 (28.0%) في حين أن عدد الاصابات الموجبة في معسكر دار السلام كانت 136 (72.0%) .
خلصت الدراسة الى أن البيئة الصحية المتردية في معسكرات النازحين تتسبب في نقل الأمراض الطفيلية المعوية حيث ظهر هذا بوضوح في المعسكرين موضوع الدراسة إذ إن وجود مياه نظيفة للشرب في معسكر جبل أولياء قلل من عدد الاصابات بالأمراض الطقيلية المعوية مقارنة بعدد الاصابات بمعسكر دار السلام بأم درمان.

KEYWORDS: *Intestinal parasites, displaced camps, , Khartoum, Sudan*

INTRODUCTION

Intestinal parasitic infections are endemic world wide and have been described as constituting the greatest single world wide cause of illness and disease [(1)]. In addition to health effects, intestinal parasitic infections impair physical and mental growth of children, educational achievement, and economic development [(2)]. Poor hygiene, lack of water, hot and humid climate are main factors associated with intestinal parasitic infections, thus, climates determine and affect the incidence of disease [(1)]. The refugees and displaced population are at risk for poor health status worldwide, most of them are from countries where their health status was already defected. The problem of population displacement appears to be increasing, the number of people affected as dependant refugees increased from 5 million in 1980 to almost 32 million in 1994. The total population of refugees and displaced is reported to be increased between 1990-1994 from 30-48 million [(3)] The death rate of newly arrived refugees in Thailand, Somalia and Sudan is estimated to be 30 times the death rate in the country of origin. Displacement and refugee camps provide a true situation about transmission of intestinal parasitic infections [(3)] Different studies regarding parasitic infections in displaced populations in different parts of the world showed high prevalence of intestinal parasitic infections as in Sierra Leone [(4)]. in the rural Ecuador [(5)], in Karachi [(1)], in Mexico [(6)], and in Southern Sudan [(7)] , where both helminthes and protozoan parasites were identified in different ratios. Displacement and refugee camps provide ideal environment for the transmission of parasites and increase the risk of acute diarrheal diseases, and intestinal parasitic infections. This study aimed to determine the prevalence of intestinal parasitic infections among displaced people and the most dominant parasites**.**

MATERIALS and METHODS

This study a randomized cross-sectional study carried out in two Camps of displaced people in Dar Alsalam in Omdurman city and Gabel Awlia in Khartoum city; Khartoum state in the period from November 2008 to March 2009. All ages and gender of the population resident in displaced camps with or without intestinal symptoms were the target of this study. Three hundred stool samples were collected randomly from target population, from each camp, 150 study subjects were included. All study subjects were given their informed consent, that the purpose of the study was explained to the enrolled

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subjects or the parents in case the age eof the participant is less than 18 years old. Demographic data was collected by filling questionnaire to show the gender, age and the general health status of the study subject. Part of the questionnaire also describes the appearance of the stool sample and the rest of the form about microscopic examination and parasite content was filled after the laboratory examination. Each collected stool sample was investigated for intestinal parasitic organisms by both direct fecal examination and concentration techniques as described by Cheesbrough, 2009 [8] . Each sample was stained with iodine and eosin to identify intestinal protozoan and helminthes organisms. Direct examination was made by wet preparation while both formal-ether and floatation were used as concentration techniques[8]. Data was analyzed by SPSS for windows version 11.0

RESULTS

Out of the 300 study subjects, stool samples were collected from 168 males and 132 females and examined, 189 (63.0%) were found positive for different intestinal parasites by wet preparation, formal ether concentration and zinc sulphate floatation techniques (Table1). Among the 300 studied subjects, 150 were from Dar Alsalam camp in Omdurman and 150 were from Gabel Awlia in Khartoum. From the study subjects, 136 positive cases were from Dar Alsalam camp, this represents, (90.7%) of Dar Alsalam study population, (72.0%) of all infected and (45.3%) of the total study population. In Gabel Awlia camp, 53 positive cases were observed which represent (35.3%) of Gabel Awlia study population, (28.0%) from all infected and (17.7%) of the total study population (Table 1).

Table 1:Overall prevalence of intestinal parasites in Dar Elsalam and Gabal Awlia camps

Area	Sample number examined	Positive	Percentage
Dar Alsalm	150	136	72.0%
Gabel Awlia	150	53	28.0%
Total	300 100.0%	189 63.0%	100.0%

The study subjects were categorized into different age groups as follows; <15, 15-30, 30-45 and 45-60 years, (Table 2). The highest prevalence rate of intestinal parasitic infections was found among the age group <15 years (75 cases, this represent 25.0% of the total population and 39.7% of all infections) and the lower rate of infection was observed among the age group 45-60 years (10 cases, this represent 3.3% of the total population and 5.3% of all infections) (Table 2).

Table 2: Prevalence of intestinal parasites according to age groups

Age groups (years)	Sample number Examined	Giardia lamblia	Entamoeba histolytica	Hymenolieps nana	Schistosoma mansoni	Taenia species	Total positive
<15	128 42.7%	53 17.7%	18 6.0%	4 1.3%	0 0.0%	0 0.0%	75 25%
15-30	86 28.7%	34 11.3%	13 4.3%	9 3.0%	1 0.3%	1 0.3%	58 19.3%
30-45	61 20.3%	33 11.0%	10 3.3%	2 0.6%	1 0.3%	0 0.0%	46 15.3%
45-60	25 8.3%	7 2.3%	2 0.6%	1 0.3%	0 0.0%	0 0.0%	10 3.3%
Total	300 100.0%	127 42.3%	43 14.2%	16 5.2%	2 0.7%	1 0.3%	189 63%

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Within the 75 positive cases among the age group (<15 years, the most prevalent species was *Giardia lamblia* 53 (28.0%), followed by *Entameoba histolytica* 18 (9.5%). Among the age group (15-30) years the dominant species was *Hymenolieps nana,* 9 (4.8%). In addition to *Schistosoma mansoni* 1 (0.5%) subjects, and one subject was found infected with *Taenia* species (0.5%). *Schistosoma mansoni* was also found in one subject 1 (0.5%) in the age group (30-45) (Table 2).

When gender was considered, higher prevalence rate was observed in males 109 (57.7%) than females 80 (42.3%), All the parasitic species where found in higher prevalence in males (Table 3).

Table 3: Distribution of intestinal parasites according to gender

Gender	Number Examined	*Giardia lamblia*	*Entamoeba histolytica*	*Hymenolieps nana*	*Schistosoma mansoni*	Taenia species	Total infected
Males	168 56.0%	71 23.7%	25 8.3%	10 3.3%	2 0.6%	1 0.3%	109 57.7%
Females	123 44.0%	56 18.6%	18 6.0%	6 2.0%	0 0.0%	0 0.0	80 42.3%

Regarding the prevalence of intestinal parasitic infections in the two camps, *Giardia lamblia* was designated as the most dominant species as it was found in 127 (67.2%) of total positive cases, followed by *Entameoba histolytica* 43 (22.7%) then *Hymenolieps nana* 16 (8.5%), followed by *Schistosoma mansoni* 2 (1.1%) and finally *Taenia* species 1(0.5%) (Table 4).

Table 4: Prevalence rate of different parasites in each camp (out of total population)

Area	Examined	Giardia lamblia	Entamoeba histolytica	Hymenolieps nana	Schistosoma mansoni	Taenia species
Omdurman	150	91	39	5	-	1
Khartoum	150	36	4	11	2	-
Total	300	127	43	16	2	1
Percent	(100.0%)	(42.3%)	(14.3%)	(5.3%)	(0.7%)	(0.3%)

Consistence of stool samples was presented in (Table 5). The relationship between the appearance of stool samples and the presence of parasites was investigated. It was found that stool with normal appearance that contain *Giardia lamblia* were 39 samples, those with diarrhea were 47 samples, mucoid were15, samples with blood and mucous were10 and 16 samples with constipation. In *Entameoba histolytica* infection, 9 stool samples were normal, 4 stool samples were with diarrhea, 6 were mucoid, 20 were with blood and mucous and 4 were with constipation. Regarding *Hymenolepis nana,* 7 samples were normal and 9 with diarrhea. One diarrhea case with *Taenia* species and 2 diarrhea cases with *Schistosoma mansoni* infection were observed (Table 5).The statistical analysis of the results showed that, there was a relationship between positive cases and the age group <15 years having the highest prevalence ($P<0.05$) (Table 2), while no relationship between positive cases and gender was found ($P>0.05$) (Table 3). Also there was a relation between the type of infection and age as *Giardia lamblia* was the most dominant parasitic infection and was most prevalent among the age group <15. ($p <0.05$) (Table 4), while no relation between the type of infection and gender was observed ($P>0.05$) (Table 5). When stool appearance was considered, there was a significant relation between infection and the appearance of stool sample; diarrhea were associated with *Giardia lamblia* and blood and mucous were most related to *Entamoeba histolytica* infection ($p <0.05$) (Table 5).

Table 5: Prevalence of intestinal parasites among population according to consistence of stool sample.

Consistence	Giardia lamblia	Entamoeba histolytica	Hymenoleips nana	Taenia species	Schistosoma mansoni	negative	total
Normal	39	9	7	-	-	47	102
Diarrhea	47	4	9	1	2	33	96
Mucoid	15	6	-	-	-		18
Blood and Mucous	10	20	-	-	-	4	34
Constipation	16	4	-	-	-	30	50
Total	127	43	16	1	2	111	300

DISCUSSION

The study showed high prevalence of intestinal parasitic infection in displaced people, with total positive cases of 189 (63.0%). The study was achieved in two camps, Dar Alsalam in Omdurman which registered high prevalence of infection, with a total of 136 (72.0%) positive cases which was considered as a hazard point that may lead to outbreak of disease, while Gabel Awlia in Khartoum registered relatively lower prevalence rate of infection, with 53 (28.0%) positive cases. The variation in the results between the two camps was related to the significant difference in sanitation, water sources and the type of houses in each camp. In Daralsalam camp, the sources of drinking water were wells and water is stored in the dam for a long time. The houses were opened with, no doors, no latrines facilities, they were not healthy and un protected houses, while in Gabel Awlia camp, water sources were wells but water was obtained by pumps, so it is much cleaner water. The houses there were closed and with good ventilation, so better hygiene and sanitation was observed. The major age group infected was <15 years. The high rate of infection in this age group may be because it was the age of school so more activities in contact with water and earth. Moreover, they were target for intestinal parasitic infection. The most dominant parasite in this age group was *Giardia lamblia* followed by *Entamoeba histolytica*. In age group (15-30), 9 (3.0%) were infected with *Hymenolieps nana*. Two cases of *Schistosoma mansoni* (0.7%) were also found in age group (30-45) in Gabel awlia camp, which were due to contact with water during swimming. One positive case for *Taenia* species (0.3%) was observed among the age group (15-30), in Dar Alsalm camp. Most of the positive cases were observed in males 109 (57.7%) rather than females 80 (42.3%). Males were exposed to infection more than females since they work and stay out doors for long time where they are subjected to contaminated environment. In addition they have their meals outside the house most of the time; which may prove to high risk of infection. The most dominant intestinal parasitic infections in this study are protozoa which were more than helminthes, and the most dominant parasite was *Giardia lamblia* followed by *Entamoeba histolytica* then *Hymenolepis nana*, *Schistosoma mansoni* and *Taenia* species. Protozoan parasites cause rapid infection when present in soil and multiply rapidly inside human body, while helminthes parasites needs certain environmental

conditions to develop such as climate, intermediate host and vector; factors that would limit helminth infections in certain areas. Study findings agreed with a study previously conducted in Karachi [(1)] and observed higher prevalence of protozoan parasites than helminth in children. The most dominant parasites was *Giardia lamblia* followed by *Entamoeba histolytica*. Similar results were obtained in Mexico [(6)] and reported high prevalence of *Giardia lamblia* in children in the age ranged (2-14) years followed by *Entamoeba histolytica* then the helminth *Hymenolieps nana* (10%). Similar results were also obtained in a study among displaced people in Sierra Leone [(4)], and in young children in the rural Ecuador[(5)]. However, the results of this study disagreed with a previous study in Southern Sudan [(7)] where the author indicated high prevalence of helminth parasites compared to protozoa, he reported a prevalence of, (28.4%) for hook worm followed by (13.1%) for *Strongyliode stercoralies*, then (9.8%) for *Entamoeba histolytica* followed by (3.3%) for *Giardia lamblia*. This variation may be due to differences in sanitation and environmental condition, Southern Sudan is much rainy which provides environmental conditions suitable for development of helminthes parasites. In this study, when consistence of stool samples was considered, it was found that stool sample with the most abnormal appearance contains parasites. The negative cases with abnormal stool appearance were suffering from malnutrition or gastro intestinal disturbances, as was concluded from the information in the questionaire. This is in agreement with a Nigerian study where the relationship between the prevalence of intestinal parasites and the nutritional status of the children showed that (74.8%) of infected children were malnourished [(9)] However, the prevalence and intensity of soil- transmitted parasites was estimated among third year school children of Sahar, Yemen, there was no positive association found between infection and nutrition status [(10)]. Most of infected cases were not treated, this related to low educational level as well as low income of all people residents in the two camps, this results may increase transmission of intestinal parasites.

Conclusion and recommendation: Based on this study, it was concluded that high prevalence of intestinal parasitic infections in displaced people is due to their poor environmental condition and bad sanitation especially in Dar Alsalam camp. In addition, infection rate was higher among males than females especially in children and the most dominant parasite was *Giardia lamblia*. Moreover, microscopic examination and formal ether concentration technique remains the gold standard methods for diagnosis

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