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Original Research Article

Intestinal Parasitic Infections and Associated Risk Factors among School Age Children in Refugee Camps in El-Fashir, North-Darfur

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Abstract

Intestinal parasites are the most prevalent infections causing significant morbidity and mortality in developing and tropical countries. Such infection occurs in rural areas where water supplies are not enough to drink and use, absence of environmental sanitation and when other wastes were increased, and sewage and wasted water are not properly treated. The high rates of prevalence in some communities are usually attributed to inadequate hygiene. The effective prevention and control of intestinal parasitic infections requires identification of local risk factors, particularly among high-risk groups. The Aim of This study is to determine the prevalence of intestinal parasitic infections among school age children in refugee's camps. Descriptive cross-sectional study design of 207 fecal specimens were collected in clean, wide-mouth plastic container with a tight fitting. Stool specimen containers placed in plastic bags when transported to the laboratory for testing. Fresh specimens were mandatory for the recovery of motile trophozoites (amebae, flagellates, or ciliates). The specimens placed in a 10% Formalin fixative. All stool samples were examined by direct wet mount preparation with saline iodine and sedimentation concentration methods. The overall prevalence of intestinal parasitic infections was 57%, the most predominant parasite was Giardia lamblia 44 (37.3%), followed by H. nana 23 (19.5%) and E. histolytica/ E. dispar 19 (16.1%). In addition to the Mixed infections by (G. lamblia and H. nana 17 (14.4%)), (G. lamblia and E. histolytica/ E. dispar 12 (10.2%)) and lastly (E. histolytica/ E. dispar and H. nana 3 (2.5%)), were this study showed higher prevalence among female 60 (50.8%) than male 58 (49.2%). Infection among females showed higher prevalence than in males. The most frequent parasite among those children was Giardia lamblia.

Keywords: El-Fashir, Intestinal Parasitic Infections, North-Darfur, Refugee Camps, Associated Risk Factors, School Age Children

INTRODUCTION

Intestinal parasites are the most prevalent infections causing significant morbidity and mortality in developing and tropical countries (Imam et al., 2015). Such infection occurs in rural areas where water supplies are not enough to drink and use, absence of environmental sanitation and when other wastes were increased, and sewage and wasted water are not properly treated (Abossie and Seid, 2014). The high rates of prevalence in some communities are usually attributed to inadequate hygiene. The effective prevention and control of intestinal

parasitic infections requires identification of local risk factors, particularly among high-risk groups (El-Sherbini and Abosdera, 2013). The fecal oral route is significant in the transmission of parasitic infections to human via poor personal hygiene and environmental conditions (Hussein et al., 2017). Intestinal parasite infections lead to several complications, however, most of cases were being asymptomatic carriers and usually tend to be chronic. Helminthic infestation lead to nutritional deficiency and impaired physical developments which will have negative consequences on cognitive function and learning ability (El-Sherbini and Abosdera, 2013). Regardless of the underlying protozoan parasites, diarrhea is usually mild and self-limited in immunocompetent person. Nevertheless, severe and protracted diarrhea has been reported in immunosuppressed patients (Yousry et al., 2015). Diagnosis of intestinal parasitic infections routinely based on microscopy. Preparation of stool samples for microscopy performed by the direct wet mount method or the concentration methods (sedimentation and flotation) (Magdi et al., 2016).

MATERIALS AND METHODS

Data collected by using questionnaire to obtain demographic data this questionnaire contain two parts: As for the first part which contain socio-demographic data and this data include Age that identified to the nearest years of children if his age it is below six months that mean he belong to the same year and if his age six months and above that is mean, he belong to the next year. Weight and height for BMI measurement to measure the growth rate of children, as for education of mothers and occupation of father. With regard to the second part which contain risk factors that include washing hands, eating row or under cocked meat, source of water, sharing clothes with other and present of bathrooms. Fecal specimens were collected in clean, wide-mouth plastic container with a tight fitting. Stool specimen containers placed in plastic bags when transported to the laboratory for testing. Fresh specimens were mandatory for the recovery of motile trophozoites (amebae, flagellates, or ciliates). The specimens placed in a 10% Formalin fixative. All stool samples were examined by direct wet mount preparation with saline iodine and sedimentation concentration methods (Monica, 2005).

Wet mount

1 drop of normal saline placed on the left side of the slide and 1 drop of iodine on the right side of the slide. Small amount of fecal specimen taken and emulsified in the saline and iodine preparations. Cover slip placed on each suspension. Systematically scan both suspensions with the 10 x objective. Then used 40 x objective for more details study (Monica, 2005).

Formal-ether concentration method

1 g of stool sample was emulsified in 7 mL of 10 % formal water. Then strained through a strainer and the filtrate was collected in a centrifuge tube. 3 mL of ether was added to it, and the mixture was shaken well for 1 min. Then it was centrifuged at 3000 rpm for 1 min (Crompton and Nesheim, 2002).

The faecal debris was loosened with an applicator stick, and together with formal water, was carefully decanted, leaving 1 or 2 drops. The deposit, after shaking, was transferred to a glass slide, and a cover slip placed over it, examined microscopically by using 10 x, and confirmed by 40 x (Crompton and Nesheim, 2002).

Data analysis

Statistical analysis data was tabulated and analyzed using the version 25-Statistical Package for Social Sciences (SPSS) software were presented as frequencies. Chi-square analysis (χ^2) was used in findings on comparison of positively UTI cases according to individual characteristics. Evaluations were carried out at 95% confidence level and $P < 0.05$ was considered statistically significant.

RESULT

A total of 207 participants were included in this study. The age ranged between 6 - 12 years old. About 97 (46.9%) of participants were Males and 110 (53.1%) were females. In the study the 123 (59.4%) of mothers were illiterate, 111 (53.6%) of fathers were farmers and 99% of participants Underweight as shown in Table (2). Frequencies of participants habits were 142 (68.6%) they did not wash their hands before eating, 121 (58.5%) washing hands after using toilet, 180 (87%) did not washing hands after touching dirty material and different part of the body, 201 (97.1%) did not eat raw meat, 142 (68.6%) other source of water and 178 (86%) have a bathroom. Table (3). Out of 207 stool samples examined, 118 (57%) participants were positive for intestinal parasites. Table (4). The techniques identified two protozoan parasites, Giardia lamblia 44 (37.3%) which is the most prevalent parasite detected in this study, Entamoeba histolytica/dispar 19 (16.1%), and only one helminthic species, Hymenolepis nana 23 (19.5%) beside that there is Table (5).There is relationships were revealed between parasite prevalence and possible risk factors such as Hand washing, habit of eating raw or undercooked meat and source of water, and the

Table 1. Mean age

	Number	Minimum	Maximum	Mean	Std. Deviation
Age	207	6	12	9.15	1.77

Table 2. Demographic variables

Demographic variables		Frequency	Percent
Gander	Males	97	46.9
	Females	110	53.1
	Total	207	100
Education of Mother	Illiterate	123	59.4
	Primary	71	34.3
	Secondary	13	6.3
	Total	207	100
Occupation of father	Farmer	111	53.6
	Dealers	58	28
	Free business	38	18.4
	Total	207	100
BMI	Short stature	2	1
	Underweight	205	99
	Total	207	100

Table 3. Risk factors

Risk factors		Frequency	Percent
Do you wash your hand by water and soap before eating?	Yes	65	31.4
	No	142	68.6
	Total	207	100
Do you wash your hand by water and soap after use toilet?	Yes	121	58.5
	No	86	41.5
	Total	207	100
Do you wash your hand after touching dirty material and different part of the body?	Yes	27	13
	No	180	87
	Total	207	100
Do you eat row or under cocked meat?	Yes	6	2.9
	No	201	97.1
	Total	207	100
What is the source of drinking water?	Pipes	65	31.4
	Others	142	68.6
	Total	207	100
Are you sharing your clothes with others?	Yes	17	8.2
	No	190	91.8
	Total	207	100
Presence of the bathroom:	Yes	178	86
	No	29	14
	Total	207	100

Table 4. Prevalence of Intestinal infections among children

Intestinal infection	Frequency	Percent
Infected	118	57
Non infected	89	43
Total	207	100

Table 5. Types of Intestinal parasitic infections

Parasites	Frequency	Percent
G. lamblia	44	37.3
H. nana	23	19.5
E. histolytica/ E. dispar	19	16.1
G. lamblia and *H. nana*	17	14.4
G. lamblia and *E. histolytica/ E. dispar*	12	10.2
E. histolytica/ E. dispar and *H. nana*	3	2.5
Total	118	100

Table 6. Association of demographic variables with intestinal infections

Demographic variables		Intestinal infection			P. value
		Infected	Non infected	Total	
Gander	Male	58	39	97	0.447
	Female	60	50	110	
	Total	118	89	207	
Education of Mother	Illiterate	73	50	123	0.095
	Primary	42	29	71	
	Secondary	3	10	13	
	Total	118	89	207	
Occupation of father	Farmer	67	44	111	0.377
	Dealers	33	25	58	
	Free business	18	20	38	
	Total	118	89	207	
BMI	Short stature	1	1	2	0.676
	Underweight	117	88	205	
	Total	118	89	207	

statistically significant relationship was demonstrated ($p<0.05$) Table (7). No statistically significant differences were detected between the prevalence of intestinal parasites and factors such as gender, education of mothers, Occupation of fathers, BMI, Sharing clothes and presence of bathroom ($p>0.05$) as shown in Tables (1, 2).

In this study females participant more than males this due to males they works with fathers in farms to help them. Moreover, illiterate mothers are more than educated mothers. Besides that, the majority of fathers are farmers that mean have low income. Beside that interpretation of BMI results, it was according to interpretation of the WHO and CDC growth charts for children from birth to 20 years in the United States.

The most infected group was females this due to females have more soil contact during growing vegetables in house and eat raw vegetable with prepared food more often than males. Moreover, educational level of mothers is directly proportional with infection of their children by intestinal parasite. In addition to that, occupation of family father and his income it also has in direct role with infection. All of these results are statistically insignificant ($P>0.05$).

Table 7. Association of risk factors with intestinal infections

		Intestinal infection			P. value
Risk factors variables		Infected	Non infected	Total	
Do you wash your hand before eating?	Yes	15	50	65	0.000*
	No	103	39	142	
	Total	118	89	207	
Do you wash your hand after use toilet?	Yes	34	87	121	0.000*
	No	84	2	86	
	Total	118	89	207	
Do you wash your hand after touching dirty material and different part of the body?	Yes	0	27	27	0.000*
	No	118	62	180	
	Total	118	89	207	
Do you eat row or under cocked meat?	Yes	0	6	6	0.006*
	No	118	83	201	
	Total	118	89	207	
What is the source of drinking water?	Pipes	18	47	65	0.000*
	Others	100	42	142	
	Total	118	89	207	
Are you sharing your clothes with others?	Yes	10	7	17	0.874
	No	108	82	190	
	Total	118	89	207	
Presence of the bathroom:	Yes	97	81	178	0.071
	No	21	8	29	
	Total	118	89	207	

*P<0.05 was considered statistically significant.

DISCUSSION

The overall prevalence of parasitic infections in this study was 57%, this high percentage might be due to the un-healthy environmental condition of the area and poor sanitation and hygiene. or may be due to high contact of children in this age to the environment, they usually play in ground and less aware of important personal hygiene activities such as hand washing habit before meals and after defecations or after playing. this finding was lower comparable with study discover that the prevalence was 71.7% (Abdelmoneim et al., 2017) in Khartoum - Sudan, 64% (Abdelsafi and Mohammed, 2014) in Khartoum - Sudan, 66% (Marnell et al., 1992) in South - Sudan and 81% (Abossie and Seid, 2014) in Ethiopia. In addition, higher than results carry out in Khartoum - Sudan (Abd Elhafiz et al., 2017), Yemen (Al-Mekhlafi et al., 2016), India (Muzaffari, 2015), Nepal (Ram et al., 2013), 30% 54% 34% 18.5% respectively. The most frequently parasite in this study were G. lamblia, this finding is similar to what reported in Khartoum - Sudan (Eltayeb, 2015), and Nepal (Ram et al., 2013) and disagrees with different studies performed in India (Muzaffari, 2015), south Sudan (Magambo et al., 1998; Marnell et al., 1992), whose found the Hookworm is the most frequent parasite. The most infected group were females this may be due to females habitats they have more soil contact during growing vegetables and eat raw vegetable with prepared food more often than males, and this finding agree with study conducted in South Sudan (Marnell et al., 1992) and disagree with study conducted in Khartoum – Sudan (Abd Elhafiz et al., 2017) and in South Sudan (Magdi et al., 2016).There is no association (P>0.05) was found between the frequency of parasites infections with gender, education of mothers and occupation of fathers. This result agree to study conducted by Ram et al in Nepal (Ram et al., 2013) and disagree with result performed by Mulat Alamir in Eithiopia (Mulat et al., 2013). There was statistical significant (P < 0.05) between intestinal parasitic infections and risk factors that was disagree with study conducted in Khartoum Sudan (Eltayeb, 2015) which found Intestinal Parasitic Infections and risk factors statistically insignificant. Parasitic infection is one of the main cause that lead to poor growth and malnutrition (P> 0.05). This result similar to study conducted by Ajayi MB

in Nigeria (Ajayi et al., 2017) record high degree of malnutrition among the children.

CONCLUSION

The prevalence of intestinal parasite infection in school age children was high, and this high prevalence among those children indicates that the environment where they live is un-healthy.

Ethical consideration

Approval to carry out research was obtained from the Sudan Ministry of Health-research and Ethics Committee in El-Fashir, North-Darfur. Written informed consent was obtained from parents of the children who fit for inclusion in the study.

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