Prevalence of intestinal parasites, associated risk factors and social background of street children in Khartoum State, Sudan

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Abstract

Background: The magnitude of the problem of homeless children or "street children" is escalating and this is related to increasing levels of poverty especially in developing countries.

Objectives: The aims of this study were to estimate the prevalence of intestinal parasites and associated risk factors among street children.

Methods: This was a descriptive, cross- sectional study conducted in Khartoum State during the period Ist June 2013 to Ist December 2013. Two hundred and seven street children were included in the study. Data collected included :socio-demographic characteristics and stool analysis.

Data was analyzed using Statistical Package for Social Sciences (SPSS). Chi square test was used for correlation between risk factors and abnormal stool result.

Results: Males were 187(90.3%) and females were 20(9.7%).Seventy two percent of the street children were illiterate. 89.4% of them were doing marginal jobs. Hundred fourty eight (71.7%) of the children had positive stool result. Seventy six (36.7%) were positive for Giardia lamblia, Thirty six (17.4%) were positive for Entamoeba histolytica, six(2.8%) were positive for Hymenolepis Nana. Correlation between source of drinking water and laboratory analysis of stool revealed significant association between source of drinking water and E. histolytica ($p = 0.017$) and also correlation between type of work and laboratory analysis of stool showed significant statistical correlation with Giardia lamblia infection ($p= 0.014$).

Conclusion: The study revealed high prevalence of intestinal parasitic infections among street children. Epidemiological information on the prevalence of various intestinal parasites among street children is very important to develop appropriate control strategies.

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Introduction

Street children comprise members of a vulnerable class of society with less access to consistent healthcare. This increases their risk of exposure to intestinal parasites. There is no standard definition for street children. However, they are considered a "hard to reach population" because they are difficult for researchers to access. Such groups should be included in research plans in order to develop appropriate services as deemed necessary[(1)]. The problem of street children is growing at an alarming proportion worldwide[(2)]. Population estimates of street children are unreliable[(3)]. However, the United Nations Organization estimates the population of children on the streets worldwide to be at 150 million, with daily number rising. Out of these, twenty million are in Africa, forty million are in Latin America, about thirty million in Asia; and twenty-five million in other parts of the world[(4)].

This phenomenon is often attributed to multiple

factors including: economic stagnation, unequal distribution of wealth, lack of welfare and social services, AIDS, and civil wars. Children interviewed in the street often refer to their household's economic and family problems[5]. There is ,however, very limited literature that describes specifically the views and characteristics of the families of these children[6- 7].

Intestinal parasites cause considerable morbidity and mortality, especially in developing countries and they are more prevalent among people who have less access to health care services and with low socio-economic status[8]. Therefore, parasitic infections, including enteroparasitic infections, are more prevalent among street children than non-street children[9]. Previous similar studies in Africa have shown that parasitic infections among street children in Africa are caused by worms such as: Ascaris lumbricoides and schistosomes, and protozoa such as Giardia lamblia and Blastocystishominis[10]. Research has shown that an increasing number of children are suffering from malnutrition and poor health globally, due to ongoing wars and armed conflicts and the economic and infrastructural strains from these situations[11- 12]. The numbers of street children seen on the streets of Khartoum State, Sudan's capital city is estimated by UNICEF to have risen from 2,000 in 1978 to 25,000 in 1990[13].

There is paucity of research on the health of street children. They are difficult to access and engage poorly with health services; consequently, there is little epidemiological data on them.

The aims of this research were to estimate the prevalence of intestinal parasitic infection among street children in Khartoum State. In addition, we sought to describe risk factors associated with infection ,as well as, the socioeconomic backgrounds of these children.

Materials and methods

This was a descriptive, cross- sectional study conducted in Khartoum State, the capital of Sudan during the period 1/6/2013 to 1/12/2013. Two hundred and siven street children were included in the study. Inclusion criteria were street children aged 5 to 16 years in Khartoum State; those outside the age range and from other states were excluded from the study as well as those who refused to participate in the study. A snowball sampling technique was used to recruit eligible children.

Data was collected using a survey tool and only verbal consent was obtained as the majority of them were illiterate. Stool samples were collected from many random public toilet areas in Khartoum for analysis. Samples of street children were taken from the central part of Khartoum as the peripheries are not accessible and might pose dangers to the researchers. Data collected included : socio-demographic characteristics of these street children which included age, sex, origin, residence, family background and level of education. Other data collected included : risk factors for intestinal helminthes like source of food and drink, place of defecation.

Stool is passed in a public toilet nearby in a sterile container and then sent to the laboratory immediately without delay. Samples were analyzed in the Central Laboratory of Khartoum Teaching Hospital and they were done absolutely free of charge. Laboratory analysis included microscopic examination, chemical tests and microbiologic tests. The stool was also checked for color, consistency, weight (volume), shape, odor, helminthes and the presence of mucus and blood. Other tests done on the stool included occult blood, fat, meat fibers, bile, white blood cells.

No cultures were done for stool samples. Those found with abnormalities in their stool analysis were given appropriate treatment and advice.

Data was analyzed using SPSS, version 20. Frequency analyses for background variables was conducted. Chi square test was used for correlation between the risk factors and abnormal stool result. P value was set at 0.05 level of significance.

Ethical approval for conducting this research was obtained from the Ethical Committee of

Sudan Medical Specialization Board. Consent for participation was obtained from individual candidates.

Results

A total of 207 children were included in this study. The majority of them were males (90.3%) and females were 9.7%; most of the children were between the age group 11-15 years (60.9%) and only 6.8% were above the age of 16 years (Table 1).

Table 1. Demographic data

	Number	Percentage
Age range in years		
5-<11	67	32.3%
11-<16	126	60.9%
>16	14	6.8%
Total	207	100%
Gender		
Males	187	90.3%
Females	20	9.7%
Total	207	100%
Type of work		
Street venders	72	34.7%
Collecting empty plastic bottles	33	15.9%
Beggars	21	10.1%
Car washing	15	7.2%
Cleaning car windshields	19	9.1%
Porters	11	5.3%
Shoe polishing	9	4.3%
Water sellers	2	0.9%
Working with women selling tea	2	0.9%
Not working	23	11.1%
Total	207	100.0

Regarding education, 72% of the children were illiterates and 27% received basic school education. The present study showed that most of the children (74.4%) spend part of the day on the street while 25.6% spent the whole day on the street.

The study also revealed that more than half (58%) of the study sample do not live with their family and all came from crowded family background with an average of 10 members per family. The majority of the studied population work (89.4%): 34.75% work as street venders, 15.9% collect empty bottles, 10.1% are beggars, and 9.1% clean cars windshields.

Regarding the source of drinking water: all studied children (100%) drank untreated water available on the streets. The study also revealed that 61.4% of the children bought food from the street while 38.6% ate remnants of food from restaurants.

Regarding areas of defecation: 66.7% used public toilets while 33.3% defecated in open areas.

As for the method of cleaning themselves: 85% used water, 13% used papers while a minority (1%) didn't clean at all. The majority of children had positive stool result (71.7%). 36.7% were positive for Giardia lamblia, 17.4% positive for Entamoeba histolytica, 2.8% positive for Hymenolepis Nana, 8.6% had significant pus cells and 6.2% had significant RBCs (table2).

Table 2. Distribution of the sample size according to stool result

Stool result	Number	Percentage
G. lamblia	76	36.7
Entamoeba histolytica	36	17.4
H. nana	6	2.8
Pus cells	18	8.6
RBCS	12	6.2
Normal result	59	28.3
	207	100%

Further analysis of the stool samples showed that 22.2% of Giardia lamblia cases were trophozoites and 14.5% were cysts. Regarding Entamoeba histolytica 12.1% were trophozoites and 5.3% were cysts.

Correlation between source of drinking water and laboratory analysis of stool revealed significant association between source of drinking water and E. histolytica (p = 0.017); but insignificant with Giardia lamblia (p= 0.32), and H. nana (p= 0.8) (table 3).

Table 3. Corelation between source of drinking water and laboratory analysis of stool.

Result of stool analysis	source of drinking water		Total
	Street	Restaurant	
RBCs	6.30%	0%	6.30%
Pus cells	8.70%	0%	8.70%
Giardia lamblia	22.20%	0%	22.20%
E.histolytica	12.10%	0%	12.10%
H. nana	2.90%	0%	2.90%

E. histolytica (p = 0.017); Giardia lamblia (p= 0.32), and H. nana (p= 0.8).

The correlation between type of work (beggars and those who collect empty plastic bottles) and laboratory analysis of stool was statistically significant correlation with Giardia lamblia infection (p= 0.014), E. histolytica (p=0.03); but insignificant with H. nana (p=0.12). There was statistically significant association between place of defecation and H. nana (p=0.008) but not statistically significant with Giardia lamblia (p= 0.21) and E. histolytica (p=0.92) as shown in table (4).

Table 4. Corelation between place of defecation and result of stool analysis

Result of stool analysis	place of defecation		Total
	open area	Toilet	
RBCs	2.90%	3.38%	6.28%
Pus cells	2.90%	5.80%	8.70%
Gardia lamblia	7.25%	14.98%	22.23%
E.histolytica	4.35%	7.73%	12.08%
H. nana	2.42%	0.48%	2.90%

H. nana (p=0.008), Gardia lamblia (p= 0.21) and E. histolytica (p=0.92).

The present study didn't show any statistically significant correlation between source of food consumed and how they cleaned themselves after defecation with result of stool analysis (p=0.26, p=0.23) respectively.

Discussion

Street children constitute a marginalized group and have poor access to education or health services. The present study revealed that most of the children were between 11-15 years which is quite consistent with other studies[14,15]. This is understandable as children in this age group assume more independence in their lives as this is a crucial period of life for personality development.. We think that children under the age of 5 years are rarely found on the street without the supervision of a family member.

In a survey of 872 street children in Khartoum State in 2000 by Kudrati et al, approximately half of the children were 14 years old or younger; of those surveyed, 83% of boys and 80% of girls reported that their families originally did not live in Khartoum[16].

Most of the children in our study were boys, 187 (90.3%). Almost all reports indicate a clear male preponderance in street children: 75–90% of Latin American and African street children are males[17,18]. Boys are frequently expected to work to survive and be independent in early life. These gender differences in roles and family perception that the streets are more dangerous for girls help to explain the higher prevalence of boys living on the street.

The present study showed that the majority of the street children, 184(88.9%), were engaged in unskilled activities such as begging and street vending, and this is similar to other reports[19, 20]. This is due to illiteracy and lack of support from family members. The majority of the participating street children, 149(72%) did not attend school and about 27% of them stopped schooling at primary levels. Other studies showed similar findings[8,21]. Reasons for leaving school could be explained by: poverty, need to work, lack of interest and migration.

Street children have limited access to health care, the reasons for this include :cost, minority status, stigmatization by providers and distrust of quality of care. The majority of children in our study had positive stool result which is comparable to the findings of previous studies[22,24]. with the possibility that food, water or both may be the source of infection and this highlights the public health implications for this population all over the world. Parasitic intestinal infections can cause symptoms that include : anorexia, diarrhoea, and abdominal pains, and ,if left untreated, can lead to malnutrition, cognitive impairment, and a failure to thrive[25].

The commonest parasite detected in our study was Giardia lamblia in 36.7% followed by Entamoeba histolytica. In our study only one stool sample was obtained per child, and therefore, the prevalence of Giardia lamblia reported may be an underestimate since the parasite is intermittently shed in stool[26].

In contrast to our study, other studies have shown different pattern of intestinal parasitic infections with Ascaris lumbricoides, hook worms and Trichuris trichuria accounting for the major share[27,28]. This high prevalence of Ascaris lumbricoides in other studies is a good indicator of improper faecal disposal while the high prevalence of Giardia lamblia in our study reflects the use of contaminated water and food.

Conclusions

Homelessness, inadequate housing, and the associated health problems remain a key public health problem. The study revealed high prevalence of intestinal parasitic infections and associated risk indicators which in turn could be a potential source of the contamination of soil, water and street-vended food in street children in Khartoum State. Epidemiological information on the prevalence of various intestinal parasites among street children is very important for the development of appropriate control strategies because if left untreated , can lead to cognitive impairment and failure to thrive.

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