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Current Prevalence of Intestinal Parasites Emphasis on Hookworm and Schistosoma Mansoni Infections among Patients at Workemeda Health Center, Northwest Ethiopia

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Abstract

Infection of intestinal parasitic infections especially hookworm and *Schistosomiasis mansoni* are considerable medical and public health problems in Ethiopia. However, information is limited on the epidemiology of these parasitic infections in different areas, it is very important to plan effective prevention and control measures. The objective of this study was to review and document the situation of hookworm and *Schistosoma mansoni* infections among clinically suspected patients who examined stool at the Workmeda Health Center. Institution based retrospective data were collected to determine the prevalence of hookworm and *Schistosoma mansoni* infections among patients who had stool examination from September 2012 to August 2013. A total of 2102 participants (46.7% males and 43.4% females) were included in the study. The overall prevalence of any parasitic infection was 27.7%. The prevalence of hookworm, *Schistosoma mansoni* and *Ascarias lumbricoids* were 21.1%, 3.5% and 3.9%, respectively. Patients in the age range 6-14 years had higher 34.6% prevalence. The total distribution of dual infections was 0.67%. The prevalence of *S. mansoni* and soil-transmitted helminthiasis needs periodic deworming program urgent to reduce morbidity and mortality. Provisions of sanitary facilities, clean water supply, mass treatment as well as health education are also critically needed to minimize the impact of helminthic infection.

Keywords: Prevalence; Intestinal parasite; Deworming; Hookworm; *Schistosoma mansoni*; Jawe

Introduction

Intestinal parasitic infections which are caused either by protozoa or helminths or both are among the most widespread of human infections. Most of the World's population is infected with intestinal parasites which may play significant role in morbidity [1]. It is estimated that nearly 3.5 billion people are affected, and 450 million are ill due to parasite infections, the majority being affected are children [2].

Intestinal schistosomiasis and helminthiasis are among the major public health problems in resource poor countries especially in Sub Saharan countries. About two billion people are affected, and 300 million are ill as a result of these infections based on the world health organization (WHO) report [3]. The recent global prevalence estimate shows that *S. mansoni* infects 67 million, *A. lumbricoides* 1.221 billion, *T. trichiura* 795 million and hookworm 740 million people [4]. Schistosomiasis is a parasitic disease that leads to chronic infection. Globes 500–600 million people are at risk of infection; and 85% of the cases are found in 41 countries of Africa [5].

Prevalence of intestinal helminths and other intestinal parasites have been studied in different countries of the tropics and subtropics including Ethiopia [6,7]. In Ethiopia, many surveys carried out on intestinal parasites have shown that helminthic infections represent a major public health concern [8,9].

Although many studies previously conducted in Ethiopia to assess the distribution of different intestinal parasites on different altitudes in different community groups, the prevalence of hookworm and *S, mansoni* infection was not well addressed in different parts of Ethiopia including our study area. Therefore, the aim of this study was to determine the prevalence of intestinal helminths emphasis on Hookworm and *S. mansoni* infection among clinically suspected patients in Northwest Ethiopia.

Materials and Methods

Study population

An institution based retrospective study was conducted from clinically suspected of intestinal parasite infection cases (living in Jawe Woreda) who attended the Workmeda Health Center from September 2012 to August 2013. The area has an elevation of about 1000-1050m above sea level. The study subjects engaged in this study were 2102 clinically suspected of intestinal parasite infection cases, who visited the outpatient department (OPD) of the Workmeda Health Center. Eligible study subjects for the study were those patients clinically suspected of intestinal parasitic infection.

Clinical and laboratory diagnosis

One year prevalence of *S. mansoni* and other intestinal parasite infection were collected from the Workmeda Heath Center. In this Health Center, direct stool examination of a well-prepared test is used in confirming the presence of Schistosomiasis and intestinal parasites. In Ethiopia, detection of intestinal parasites in stool was conducted according to a standard operating procedure (SOP) in each Health Center throughout the country. Therefore, for this study purpose we have collected one year (September 2012 to August 2013) Schistosoma

and other intestinal parasites data, Socio-demographic information and environmental related factors at the Workmeda Health Center in November 2013.

Statistical methods

Data were entered into excel and transported to SPSS. Analysis was performed by SPSS version 16 statistical software package. Frequency and percentage were calculated for the study variable. Chi-square, p value and two tail Fisher's exact test was used to calculate and determine significance. In all statistical tests, the differences were considered to be statistically significant if p-value less than 0.05.

Ethical consideration

The department ethical review committee of Microbiology, immunology and Parasitology, College of medicine and Health Science, Bahir Dar University approved the project. The researchers obtained informed consent from the Workmeda Health Center.

Result

Socio-demographic characteristics of study subjects

A total of 2102 clinically suspected of intestinal parasitic infected cases who attended Workmeda Health Centre were enrolled in this study. The mean age of the attendants was 12.24 years with a standard deviation (SD) of 4.05 ranging from 1 to 80 (Table 1). There were more males (53.3%) than females (46.7%). About 12.1% of the cases were under six, 18.6% of the cases were between 6 and 14, 10.1% of the cases were in the age range of 15-18, the rest 59.2% were >18 years old and the majority of the study group were >18 years old (Table 1).

Character		Frequency			χ2, P
		Total No	Positive	Negative	
Age	1-5	255 (12.1)	35 (6)	220 (14.5)	99.63, 0.000
	6-14	390 (18.6)	135 (23.2)	255 (16.8)	
	15-18	212 (10.1)	57 (9.8)	155 (10.2)	
	>18	1245 (59.2)	355 (61)	890 (58.5)	
Sex	Male	1120 (53.3)	339 (58.2)	781 (51.4)	20.595, 0.081
	Females	982 (46.7)	243 (41.8)	739 (48.6)	
Address	Urban	110 (5.2)	25 (4.3)	85 (5.6)	1.259, 0.585
	Rural	1992 (94.8)	557 (95.7)	1435 (94.4)	

Table 1: Prevalence of parasitic infection at the Workmeda Health Center in relative to their age, sex and address [n, %].

The overall prevalence of intestinal helminthic infections was 27.7%. Among the parasites shown in Table 2, hookworm (76.1%) was the most prevalent parasitic infection identified followed by *S. mansoni* (12.7%) and *A. lumbricoid* (3.1%) (n=582) Table 2. The distribution of dual infections was 10 (1.7%) in hookworm and *S. mansoni*, 3 (0,5%) in Hook worm and *Ascaris lumbricoides* and 1 (0.17%) in hookworm and *G. lamblia* among the positive cases (n=582) (Table 2). The prevalence of Each Taenia species and *E. vermicularis* accounted 1 (0.17%) (Table 2). The distribution of helminths (25.6%) is higher than the intestinal protozoa (2.1%) (n=2102).

	Address			
Parasite	Total	Urban	Rural	Total
	Positive	Positive	Positive	Negative
Hookworm	429 (73.7)	20 (80)	409 (73.4)	1673 (79.6)
S. mansoni	64 (11)	2 (8)	62 (11.1)	2038 (97)
E.histolytica/dispar	26 (4.5)	0 (0)	26 (4.7)	2076 (98.8)
G. lamblia	18 (3.1)	2 (8)	16 (2.9)	2084 (99.1)
A. lumbricoides	15 (2.6)	0 (0)	15 (2.7)	2087 (99.3)
H.W + S. mansoni	10 (1.7)	0 (0)	10 (1.8)	2092 (99.5)
S. stercolaris	9 (1.5)	0 (0)	9 (1.6)	2093 (99.6)
H. nana	4 (0.7)	1 (4)	3 (0.54)	2098 (99.81)
H.W + A. lumbricoides	3 (0.52)	0 (0)	3 (0.54)	2099 (99.86)
E. vermicularis	1 (0.17)	0 (0)	1 (0.18)	2101 (99.95)
Taenia species	1 (0.17)	0 (0)	1 (0.18)	2101 (99.95)
T.trichiura	1 (0.17)	0 (0)	1 (0.18)	2101 (99.95)
H.W + G. lamblia	1 (0.17)	0 (0)	1 (0.18)	2101 (99.95)
Total	582 (27.7)	25 (1.2)	557 (26.5)	1520 (72.3)
*H.W = Hook worm				

Table 2: Prevalence of intestinal parasites in relation to their address at Workmeda Heath Center, 2013 [n, %]

Prevalence of hookworm and *S. mansoni*

The prevalence of hookworm in this study was found to be 76.1% (n=582), respectively (Table 3). The distribution of hookworm 64.6% was higher among age group >18 and followed by 20.8% among the age group 6-14 (n=443). Hookworm infection was statistically associated with high prevalence in age group >18 (χ^2 = 16.00, P<0.05) (Table 3). Relatively high prevalence of *S. mansoni* (44.6%) was obtained from age group 6-14 but *S. mansoni* infection was not statistically associated with high prevalence in the age group 10-14 (n=74) (Table 3).

		Age					χ2, P
		1-5	6-14	15-18	>18	Total	
Result	hookworm	25 (5.6)	92 (20.8)	40 (9)	286 (64.6)	443 (76.1)	16.00, 0.014
	S. mansoni	4 (5.4)	33 (44.6)	10 (13.5)	27 (36.5)	74 (12.7)	3.99, 0.262

Table 3: Distribution of hookworm and S. mansoni based on their age, at the Workmeda Health Center in 2013 [n, %].

Discussion

In the present study we determined the distribution of intestinal parasite infections in the population of Jawe woreda Northwest Ethiopia. The overall prevalence of helminths infection in this study was 27.7%. High prevalence in the present study is comparable with those previously reported 33.7% in Eastern Ethiopia [10], 62.3% in Northwest Ethiopia [11] (24.78%) in Pakistan [12], and (57,1%) in Tanzania [13] but lower results of the present study was found (9.6%) in Eastern Ethiopia [9], and (6.63%) in India [14]. The prevalence of intestinal helminth observed in this study, confirm that intestinal helminthiases are prevalent among patients attending the Workmeda Health Center in its catchment area.

On the other hand, distribution of hookworm and S. mansion was very high in the study area when compared to the other parasites. High prevalence of hookworm (76.1%) obtained in this study was comparable to 60.2% in Southeast of lake Langano [15], 45% in North Ghana [16], and 41.7% in Sierra Leone [17], but low previous results were reported 4.9% in South Ethiopia [18], and 3.2% in Nigeria [19]. High prevalence in the present study indicated that the population has less knowledge about hookworm which is transmitted through skin penetration. Most of the people are walking with bare foot. The distribution of hookworm was varying in different age categories in the current study. High prevalence of hookworm obtained in age range >18 in this study was comparable previous reported in Southern Ethiopia [18].

In Ethiopia, most *S. mansoni* infections and transmission sites are in agricultural communities along streams between 1300 and 2000 m altitude [19].The prevalence of *S. mansoni* (12.7%) in the present study was comparable to 10.1% in Northwest Ethiopia [20], and 5.6% in North western Tanzania [13] but higher than 3% in Southwestern Ethiopia [21]. In contrast to the present study, high prevalence of *S. mansoni* infection was reported 73.7% in Southern Ethiopia [22], 27.1% in Northern Ethiopia [23], and 23.1% in South Cotedivoire [24].

The low prevalence of *S. mansoni* in the present may be due to the direct diagnosis method applied in the Ethiopian health system. The best diagnosis method for S. mansion is the Kato Katz test which is not used as a routine diagnostic method in Ethiopia [25]. On the other hand, the prevalence and intensity of *S. mansoni* and other parasites in the present study may be attributable to walking on bare foot, unhygienic conditions, insufficient provision of safe water, inappropriate utilization of latrine, crossing the river when going to their field work and use river water for washing, swimming and playing. The magnitude of the problem emphasizes the need to take immediate intervention measures. Combined mass chemotherapy and focal snail control using primary health care systems may have an effect on the prevalence and intensity of parasitic infections in the study area.

The distribution of *S. mansoni* infection in the present study was high in the age range 6-14. High prevalence of *S. mansoni* among age groups 6-14 (44.6%) in this study was in agreement with the previous reports 19.5% in Northwest Ethiopia [26], and 25.6% in Northern Ethiopia [27]. The prevalence of *S. mansoni* infection was also higher among males than females. A similar high prevalence of *S. mansonai* in males than females was reported previously in Southwest Ethiopia [28]. This may be due to males are mostly engaged to manipulate the farming activity so that they can be exposed to river water in washing, crossing and swimming more frequently than females. In addition, there are two main rivers (Burabur and Asewe) which are used for a source of water in the study area. Males do not have any problem to swim and wash in these rivers but females are culturally influenced in swimming and washing in a community.

In the present study, only 1 to 2 parasites were identified in a single patient; however, multiple infections are common in Ethiopia [29]. The majority of the co-infections were between *S. mansoni* and hookworm. Prevalence of co-infection of *S. mansoni* and hookworm (1.7%) in the present study was in agreement with previous 7.4% in North Ethiopia [30]. This may be because of the higher prevalence of each parasite and/or their similar mode of transmission which favors dual infections.

Conclusion

The prevalence of intestinal parasites were high in Jawe Woreda Northwest Ethiopia. Factors such as low awareness of schistosomiasis, swimming, washing, bathing and crossing the river water, and walking on bare foot might be associated risk factors for Hookworm and *S. mansoni* infection in the study area. This calls for periodic deworming program to reduce transmission, worm burden and morbidity. Deworming for both *S. mansoni* and soil transmitting helimenths should be supplemented with improved sanitation and access to clean water, appropriate health education and environmental measures to have a lasting impact on transmission. The impact of each measure would be maximized through a health education program directed to school age children in particular, and to communities in general.

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