Prevalence of Intestinal Parasitic Infections Among Patients with Diarrhea at Wonago Health Center, Southern Ethiopia: A Retrospective Study

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Abstract Background: Intestinal parasitic infections are among the most common infections worldwide. High prevalence is found in people with low socio-economic status, poor living condition, overcrowded areas, poor environmental sanitation, improper garbage disposal, unsafe water supply and unhygienic personal habits. Thus, the objective of this retrospective study was to determine the prevalence of intestinal parasitosis among patients with diarrhea who visited Wonago health center Southern Ethiopia. Methodology: Institution based retrospective study design was employed. Stool examination records of all patients with diarrhea who visited Wonago health center from September 2010 to September 2012 were included. A total of 10694 stool examination results of those diarrheic patients were analyzed for this study. Samples were examined using direct saline wet mount technique. Statistical analysis was done by SPSS version 16 and results were shown in percent and prevalence rates. Results: The overall prevalence of intestinal parasite for at least one parasite in this retrospective study was 1776/10694(16.6%). Furthermore, 5.7% of those positive patients were infected by two species of parasites and 4.6% of patients had triple infections. The most prevalent parasites were *E. histolytica/dispar* 956/1776(53.8%) followed by *G. lamblia* 420/1776(23.7%) and *Taenia* species 140/1776(7.9%) respectively. Conclusion: Intestinal parasitosis is highly prevalent in varying magnitude among diarrheic patients who visited Wonago health Center, Southern Ethiopia. *E. histolytica/dispar* was the most prevalent parasite infecting patients followed by, *G. lamblia*, *Taenia* species and *H. nana*. Because of absence of molecular diagnosis for *E. histolytica*, over diagnosis might be possible for the high prevalence of amoebiasis.

Keywords Intestinal Parasitosis, Prevalence, Protozoa, Helminthes, Wonago Health Center

Human intestinal parasitic infections are among the most common infections in the world and are responsible for considerable morbidity and mortality (1). Apart from causing mortality and morbidity, infection with intestinal parasites has been associated with malnutrition, stunting of linear growth, mental function, verbal ability, physical weakness and low educational achievement in school children (2). Furthermore, chronic intestinal parasitic infections have become the subject of speculation and investigation in relation to the spreading and severity of other infectious diseases of viral origin, tuberculosis and malaria (3). The level of harm caused by intestinal parasite infection to the health of individual and communities depend on: the parasite species, the nature of the interaction between the parasite and the concurrent infections, the intensity and course of infection and nutritional and immunological status of the population (3,4). It is estimated that 3.5 billion people are affected globally and 450 million are ill as a result of these infections. Among the infections responsible for considerable morbidity and mortality in the world, more than 1.2 billion people are infected with *Ascaris lumbricoides*; 740 million people with hookworms; 795 million with *Trichuris trichiura* and 300 million with *Enterobius vermicularis* (5). The epidemiology of intestinal parasitic infections shows that these parasites are found in every age group and in both sexes. However, the incidence is high in some areas and in some age groups (6). Studies carried out in different countries have shown that the situation of an individual is an important cause in the prevalence of intestinal parasitic infection, having a greater rate in children (7). High prevalence is found in people with low socio-economic status, poor living condition, overcrowded areas, poor environmental sanitation, improper garbage disposal, unsafe water supply and unhygienic personal habits. These factors are the cause of major proportion of burden of the disease and death in developing countries (8, 9). In sub-Saharan African countries; up to 250 million people are estimated to be infected with at least one or more species of intestinal nematodes (10). In Ethiopia, few studies were conducted among different community to indicate the prevalence of intestinal parasitosis. Study Conducted on

1. Introduction

urban dwellers in south west Ethiopia has indicated an overall prevalence of 83%. The most prevalent intestinal parasites identified were *T. trichiura* (16.4%), *A. lumbricoides* (5.8%) and *S. mansoni* (1.5%) (11). Intestinal parasitosis could be highly prevalent in Ethiopia because of poor socioeconomic standards, poor environmental sanitation and ignorance of simple health promoting factors like hand washing practices, use of latrine and consumption of raw/undercooked vegetables or dairy and beef products (12). Although there are few studies conducted to assess the situation of intestinal parasitosis in different parts of Ethiopia, there are still several localities for which epidemiological information is not available including the present study area. Therefore, this retrospective study was aimed to assess the prevalence of intestinal parasitosis among diarrheic patients visited Wonago health center, southern, Ethiopia.

2. Methods and Materials

2.1. The Study Area

Wonago Woreda (N 6° 20' and E 38° 19') is located 380 km from Addis Ababa in Gedeo Zone, Southern Nations, Nationalities and Peoples Regional State (SNNPR) and bordering with Oromia to the west and northwest, Yirgachefee to the south and southeast, Dilla to the north and Bule to the east. It is approximately 248 sq. km (24,790 ha) and comprises of 19 Kebeles (Fig. 1).

The 2005 census indicates that Wonago Woreda has a total population of 162,663 of which 78,649 (48.3%) are males and 84,014 (51.6%) are females. The population density of the Woreda is 702 persons per km² at a national

growth rate of 1.07 percent. Seventy four percent of the population in the Woreda are the Gedeo people.

The present retrospective study was conducted at Wonago health Center in Wonago town, Southern Ethiopia. Institution based retrospective study design was used and the data's of stool examinations of all patients those with diarrhea who visited the health center from September 2010 to September 2012 were considered for the study. All patients those with diarrhea were sent to the laboratory for stool parasitological examination. Within this time frame, stool examinations were done for a total of 10694 patients and all the results were analyzed for the purpose of this study. Proper stool samples were collected throughout the year with labeled clean, dry and sterile plastic container. Direct stool examinations were done using saline wet mount technique within less than 20 minutes of stool sample collection. All stool samples were examined only with direct saline method primarily because of the lengthy procedures of concentration technique which is not routinely done in health care institutions. After stool examinations were completed, infected patients were treated based on the identified parasite species. Data entry and analysis was done using SPSS version 16 computer software. Data was summarized and presented in a descriptive measure such as a table, mean and percent. P value less than 0.05 was considered statistically significant. Records of patients were manipulated only by researcher. Appropriate treatment was given to those patients who were positive for intestinal parasitic infection by physicians. All patients involved in this report were provided a written informed consent prior to data collection. Furthermore, written informed consent was obtained from each patient for publication.

Figure 1. Location of Wonago Woreda in Gedeo zone; Southern Nations, Nationalities and Peoples Regional State (SNNPR).

3. Result

A total of 10694 diarrheic patients stool examination results were included for the purpose of this retrospective study. The age of patients' ranges from six month to ninety two years and 30% of the study population were children under the age of 15 years. Majority (76%) of patients was under the age of 30 years and female to male ratio of the patients were 1.3:1. Microscopic stool sample examinations had showed that infections with various intestinal helminthes and protozoan parasites were common in all age groups of patients. In this study, thirteen (13) species of parasites were identified. The overall intestinal parasite prevalence for at least one parasite in this study was 1776/10694 (16.6%). Furthermore, 102/1776 (5.7%) of those positive patients were infected by two species of parasites and 4/1776 (2.3%) of patients had triple infections. The most prevalent parasites were *E. histolytica/dispar* trophozoite and cyst stage 956/1776 (53.8%) followed by *G. lamblia* 420/1776 (23.7%) trophozoite and cyst stage and *Taenia* species 140/1776 (7.9%) respectively. Moderately prevalent parasites were *H. nana* 94/1776 (5.3%), *E. vermicularis* 38/1776 (2.1%), *A. lumbricoides* 36/1776 (2.0%) and *S. stercoralis* 24/1776 (1.4%). The least prevalent parasites were Hookworms 16/1776 (0.9%), both *T. trichiura* and *E. coli* infected 14/1776 (0.8%) patients each, *T. hominis* 12/1776 (0.7%), both *S. mansoni* and *Trichostrongyloide* species infected 6/1776 (0.3%) patients each. 986/1776 (55.5%) of those patients with intestinal parasitosis were female patients and *Taenia* species, *E. histolytica/dispar*

and *G. lamblia* were higher in females than males (Table 1)

Table 1. Distribution of each species of parasite based on gender among patients with diarrhea at Wonago health center, Northern, Ethiopia (Sept. 2010-Sept. 2012)

Parasite species	Parasite distribution among patients, Total=10694		
	Male, (N=2592, %)	Female (N=6102, %)	Total (%)
<i>E. histolytica/dispar</i>	434 (48.8)	522 (59.8)	956 (107.6)
<i>G. lamblia</i>	188 (21.6)	232 (26.2)	420 (47.4)
<i>E. coli</i>	8 (1)	6 (0.6)	14 (1.6)
<i>T. hominis</i>	2 (0.2)	10 (1.2)	12 (1.4)
<i>A. lumbricoides</i>	16 (1.8)	20 (2.2)	36 (4)
Hookworms	10 (1.2)	6 (0.6)	16 (1.8)
<i>S. stercoralis</i>	14 (1.6)	10 (1.2)	24 (2.8)
<i>T. trichiura</i>	2 (0.2)	12 (1.4)	14 (1.6)
<i>H. nana</i>	48 (5.4)	46 (5.2)	94 (10.6)
<i>E. vermicularis</i>	22 (2.4)	16 (1.8)	38 (4.2)
<i>Taenia</i> species	40 (4.6)	100 (11.2)	140 (15.8)
<i>S. mansoni</i>	4 (0.4)	2 (0.2)	6 (0.6)
<i>Trichostrongyloide</i> species	2 (0.2)	4 (0.4)	6 (0.6)
Total	790 (89)	986 (111)	1776

Table 2 shows that the distribution of each species of parasite among patients in age group interval and gender. 1376/1776 (77.5%) of patients were infected with *E. histolytica/dispar* and *G. lamblia* and they were highly

prevalent across all age groups. They were the most prevalent protozoal parasites in patients under the age of 15 years (223; 25.1%). *H. nana*, *A. lumbricoides* and Hookworms were also among the commonest helminthic parasite species in this age group (<15 years). However, Taeniasis was highly prevalent among adults typically in the age groups 16-30 and 31-45 years. In most age groups, the

numbers of parasite infected female patients were higher than males (Table 2). The most prevalent double intestinal infection observed was *E. histolytica*/dispar and *G. lamblia* (29 patients; 3.3%), *H. nana* and *E. histolytica*/dispar (3 patients; 0.3%), *G. lamblia* and *H. nana* (3 patients; 0.3%) and *Taenia* species and *E. histolytica*/dispar (2 patients; 0.3%).

Table 2. Distribution of intestinal parasites among patients with diarrhea in different age groups and gender at Wonago health Center, Northern, Ethiopia (Sept. 2010-Sept. 2012), (Note: M= Male, F= Female, yr. = Year)

Parasite species		Parasite infected patients in number by age group (N=10694)								Total
		<15yr		16-30yr		31-45yr		>46yr		
		M	F	M	F	M	F	M	F	
E.histoytica /dispar	Trophozoite	148	120	134	182	46	80	44	66	820
	Cyst	16	6	22	40	6	18	18	10	136
G.lamblia	Trophozoite	90	60	44	74	20	28	26	36	378
	Cyst	-	6	2	18	2	4	4	6	42
E.coli		4	-	2	-	-	2	2	4	14
T.hominis		-	2	-	-	-	2	2	6	12
A. lumbricoides		10	4	4	12	-	4	2	-	36
Hookworms		8	2	2	2	-	-	-	2	16
S. stercolaris		2	-	4	2	4	2	4	6	24
T. trichiura		-	-	2	8	-	2	-	2	14
H. nana		38	32	4	10	4	4	2	-	94
E. vermicularis		6	4	10	6	6	6	-	-	38
Taenia species		14	2	12	60	6	22	8	16	140
S. mansoni		2	-	2	2	-	-	-	-	6
Trichostrongyloide species		2	-	-	2	-	2	-	-	6
Total		340	238	244	418	94	176	112	154	1776

Table 3. Double parasitic infections (poly parasitism) among patients with diarrhea who visited Wonago health Center, Northern, Ethiopia (Sept. 2010-Sept. 2012) One patient was infected by three species of parasites (*A. lumbricoides*, *T. trichiura* and *S. mansoni*) and another one patient has a triple infection by Hookworms, *G. lamblia* and *H. nana* (Table3)

Parasite Species in Double	Frequency (N=1776)	%
<i>E. histolytica</i> /dispar and <i>G. lamblia</i>	58	6.6
<i>G. lamblia</i> and <i>H. nana</i>	8	1
<i>A. lumbricoides</i> and <i>S. mansoni</i>	8	1
<i>A. lumbricoides</i> and <i>Taenia</i> species	4	0.4
<i>Taenia</i> species and <i>E. histolytica</i> /dispar	4	0.4
<i>H. nana</i> and <i>E. vermicularis</i>	4	0.4
<i>A. lumbricoides</i> and <i>E. histolytica</i> /dispar	2	0.2
Hookworms and <i>E. histolytica</i> /dispar	2	0.2
<i>E. histolytica</i> /dispar and <i>E. vermicularis</i>	2	0.2
Hookworms and <i>G. lamblia</i>	2	0.2
<i>G. lamblia</i> and <i>S. stercoralis</i>	2	0.2
<i>S. stercoralis</i> and <i>T. hominis</i>	2	0.2
<i>E. coli</i> and <i>T. hominis</i>	2	0.2

4. Discussion

Intestinal parasitic infections are amongst the most common widespread of all chronic human infections worldwide. The present retrospective study aimed at determining the prevalence of different intestinal parasitic infections among diarrheic patients who visited Wonago health Center, for a period of two years (Sept. 2010- Sept. 2012). In this study the overall prevalence of intestinal parasites was 1776/10694 (16.6%) which was much lower than the previous studies conducted in different parts of Ethiopia; Jimma (83%) by Amare et al., Gondar (52.6%) by Getachew et al. and Hawassa (55.0%) by Shimelis et al. (11, 13, 14) and other countries; Vietnam (88.0%) by Verl et al. and Nigeria (52%) by Morenikeji et al. (15, 16). The result of this study is almost similar with the study conducted in Kashmir (18.02%) by Tariq Masood Malik (17). In contrast, the present study is very much higher when compared with the study conducted in Greece (12.02%) by Papazahariadou et al. (18). These differences in prevalence could be due to the place and living standard of study subjects or due to a reflection of the local endemicity and geographic condition of the study area. The low sensitivity of direct saline method could also be responsible for low prevalence in this study. *E. histolytica/dispar* (53.8%) was the highly prevalent of protozoan parasite in the present study which was higher as compared to the study done in different localities of Ethiopia; Jimma (5.6%), Gondar town (10.3%) and north Gondar (27.3%) and other countries; Myanmar district (6.2%), Parma Italy (4.1%), Thai (7.1%) and Kuala Lumpur (0.4%) (11, 13, 19, 20, 21, 22, 23). However, the prevalence in the present study was lower than in Kenya which was (74.1%) (24). Higher prevalence of *E. histolytica/dispar* in this study might be due to low sanitary condition, contamination of drinking water or vegetables. The high prevalence might also be due to *E. histolytica* over diagnosis because of absence of molecular based diagnosis to differentiate *E. histolytica* from *E. dispar*. *G. lamblia* (23.7%) was the second most prevalent intestinal parasites in this study which was higher than the study conducted in different part of Ethiopia; Jimma (18.2%), Gondar (3.8%) and other countries; Myanmar district (4.5%), Parma Italy (1.6%) and Cameroon (0.6%) (6, 11, 13, 19, 20). In contrast, it is lower than one study conducted in Delgi village children, northern Gondar Ethiopia which was 41.9% (22). The higher prevalence in this study is might be because of drinking water contamination and low socioeconomic status of study population. *Taenia* species (7.9%) and *H. nana* (5.3%) were the third and fourth most prevalent parasites in this retrospective study respectively. Especially, the result of *Taenia* species in this study was higher than other studies conducted in Jimma Ethiopia (5.8%) (22). However, it was lower than the findings of Mengistu Legesse and Berhanu Erko around Lake Langano, Ethiopia (13.9%) (25). Habit of eating raw and roasted (under cooked) meat in Ethiopia plays an important role for the higher prevalence rate of *Taeniasis*. *H. nana* infection was higher in children in this study and was higher when compared with the study of

Alemeshet et al in rural areas of Jimma Zone Ethiopia (2.1%) (26). However, it was lower than the study of Amare et al. in Jimma town Ethiopia (20.5%) and among Thai people (7.8%) (11, 21). In all cases, the high prevalence of *H. nana* is linked to its direct transmission and low hygienic status of children. The magnitude of the remaining intestinal parasitic infections in this retrospective study varies and/or comparable with other study areas. The differences in prevalence rate between the study areas might be due to culture, practice, living standard and category of the study population in addition to the period of study and the methods employed for stool examination. In areas where numerous kinds of intestinal parasites found, polyparasitism infections were common. In this study single, double and triple infection (16.6%, 5.7% and 2.3%) were respectively observed. *E. histolytica/dispar* and *G. lamblia* (3.3%) was the most frequent double infection. Triple infections were occurred by *A. lumbricoides*, *T. trichiura* and *S. mansoni* and Hookworms, *G. lamblia* and *H. nana* in the present study. This may be probably due to environmental conditions and methods of transmission that was favorable for parasites live together for the occurrence of high prevalence of the two parasites in this study.

5. Conclusions

Intestinal parasitosis was highly prevalent in varying magnitude among diarrheic patients who visited Wonago health Center for the past two year (Sept. 2010-Sept.2012). *E. histolytica/dispar* was the most prevalent parasite infecting patients followed by *G. lamblia*, *Taenia* species and *H. nana*. The absence of molecular diagnosis for *E. histolytica*, over diagnosis might be possible for high prevalence amoebiasis in this study.

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