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Prevalence of Intestinal Parasitic Infections and Associated Factors among Debre Elias Primary Schools Children, East Gojjam Zone, Amhara Region, North West Ethiopia

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Abstract

Background: Intestinal parasitic infection is one of the ten top major public health problems in developing countries including Ethiopia. Children being major victims, therefore effective prevention and control of intestinal parasitic infections require the identification of local risk factors, particularly among high risk groups.

Objective: The aim of this study was to assess the prevalence of intestinal parasitic infections and associated factors among Debre Elias woreda primary school children, North West Ethiopia.

Methods: Institution based cross sectional study was conducted in Debre Elias Woreda primary school children from March 17-29, 2013. Study subjects were selected by using multi stage sampling technique. A total of 541 school children were enrolled in this study. Socio-demographic data of the study participants and possible factors for the occurrence of intestinal parasitic infection were collected using pre-tested structured questionnaire. Approximately 2 gram of stool specimen was collected and examined for the presence of intestinal parasite using wet mount and formal ether concentration technique. Data was entered in to Epi data version 3.5.1 and exported to spss version 16 for analysis. Bivariate and multi variate analysis was computed. In all cases p value less than 0.05 was considered statistically significant.

Results: the overall intestinal parasite in the present study was 486/541(84.3%). Multiple intestinal infections were identified; among this dual infection were 55(14.2%). The most prevalent intestinal parasite were Hookworm 385(71.2%), *Entameoba histolitica/dispar* 36(6.7%) and *Strongloides stercolaris* 13 (2.4%). In this study the most significantly associated factors for the occurrence of intestinal parasite infection were unavailability of safe water supply, absence of Shoe wore during interview, educational grade level (P<0.05).

Conclusion: Intestinal parasitic infection in Debre Elias Woreda was highly prevalent and this is a public health problem. Therefore, the woreda health office in collaboration with other stake holders should work on targeted health education and provision of adequate and safe water supply.

Keywords: Intestinal parasitic infection; Children; Debre Elias woreda; North West Ethiopia

Background

Intestinal Parasitic Infections (IPIs) constitute the greatest single worldwide cause of illness and disease. 3.5 billion Individuals have been infected with intestinal parasites, of these 450 million individuals developed diseases [1,2].Parasites are one of the important casual agents of diarrhea, loss of weight, abdominal pain, nausea, vomiting, lack of appetite, abdominal distention and Irondeficiency anemia [3]. Africa, more specifically Sub-Saharan Africa, parasitic infections are the major public health problem and most of the victims are children [1,2].

Currently, the protozoan parasite (*Entameoba histolitica* and *Giardia intestinalis*) and the soil transmitted helminthes (*Ascarislum bricoides, Trichuris trichiura*, and Hookworm) are the leading intestinal parasites which cause significant morbidity and mortality in the world [4,5]. For instance, recent estimates indicated that approximately 1472, 1298 and 1049 million people have round worm, hookworm and whip worm infection, respectively [6]. However, the incidence and prevalence of intestinal parasitic infections varies within and across the countries due to environmental, social and geographical factors [5-8].

In children, soil-transmitted helminthiasis is the cause of common health problems. In most instances, associated with stunting of linear growth, physical weakness and low educational achievement. These is due to their immune systems are not yet fully developed and they also habitually play in faecally contaminated soil.

Those problems are predominant in tropical areas [8].

Scholars claimed that factors such as low household income, poor personal and environmental sanitation, over-crowding, limited access to clean water, tropical climate and low altitude significantly associated with the occurrence of high intestinal parasitic infections especially in tropical and sub-tropical areas [5]. In Ethiopia, intestinal parasitic infection is sixth of the top ten causes of morbidity amongst children [9]. Different studies conducted in different regions depicted that the prevalence and possible associated factors are different [10-14].

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For instance, *Tadesse* et al. in Babile town indicated that the overall prevalence of intestinal parasite was 27.2% and the predominant parasites were *Hymenolopsis nana* (10.1%), Hook worm (6.7%) and (4.3%). Poor personal hygiene and children who eat food items sold on the street were the possible associated factors [11].

Moreover, Asrat *et al.* in North Gonder showed that the overall prevalence of intestinal parasite was 79.8%.

The most prevalent intestinal parasites identified were *Ascarislum bricoides* (48%), *Giardia lamblia* (41.9%), *Entamoeba histolytica/dispar* (27.3%), *Schistosoma mansoni* (15.9%), Hookworm (11.5%).

Intestinal parasite prevalence was higher in children with less educated mother, in children who have habit of eating raw/ unwashed vegetables, drinking unprotected well/spring water and who do not have hand washing practice before meal [12].

Debre Elias woreda is located in Amhara regional state. The predominant inhabitants are farmers. It has 4 health centers and 19 primary schools. According to the Woreda Health office report, intestinal parasitosis has been one of the ten top infectious diseases [15-16]. Hence, the prevalence of intestinal parasitic infection is different among various communities; there is a need for the periodical prevalence evaluation for future prevention and control programme. So the aim of the present study was to assess the prevalence of intestinal parasitic infections and associated factors among Debre Elias woreda primary school children, North West Ethiopia.

Material and Methods

Study area

Debre Elias is located 340 kms away from the capital city, Addis Ababa with an altitude of 2300 above sea level and an average temperature of 27oC. It has 4 health centers, 16 health posts and 19 primary schools. The area is predominantly rural and most residents live in villages as agriculturalists [17-19].

Study design and period

Institution based cross sectional study was conducted among Debre Elias Woreda primary schools children (grade 1-8) from March 17-29, 2013.

Source and study population

The source population was all primary school students found in Debre Elias Woreda whereas the primary school children found in the four randomly selected primary school that are seems healthy and did not take any anti-helminthic drug before 2 weeks were our study population.

Sampling method and procedure

Four primary schools (Gofchima, Genet, Guay and Yekegat) in the woreda were selected randomly and multi-stage sampling technique was used. The sample size was determined using single population proportion formula by considering the prevalence of intestinal parasites in primary school children (79.8%) [17], 95% CI, and design effect of 2 that give a final sample size of 546. Proportional allocation for each grade was determined and the desired sample was obtained by systematic sampling technique using the class roster.

Data collection and laboratory procedures

Data about the socio demographic characteristics and other associated factors were collected using a semi structured based questionnaire. Onsite training was given for interviewers. The interviewers also inspected whether they wore shoe or not. Approximately 2 gram of stool specimen was collected using clean, tightly corked, leak proof containers. Small amount of the sample was analyzed using wet mount technique and the remaining portion was concentrated using formal - ether concentration technique and examined microscopically [17].

Data quality control

To assure the reliability of data collected in the study the questionnaire was prepared in English and translated to the local language (Amharic) and retranslated to English to assure consistency. Before the questionnaire was used in the actual data collection it was pre tested on 30 primary school children. Stool sample collection and investigation was made according to a standard procedure according to annex 9.3 without any delay for more than 30 min after collection of the samples. Microscopic reading was made by two laboratory technologists and results were confirmed by a senior technologist.

Statistical analysis

Data was entered in to Epi data version 3.5.1 and exported in to SPSS version 16 for analysis. The base line characteristics of the study population were summarized using frequencies (percentage) used to summarize categorical variables and continuous variables were summarized using mean (+_SD). Bivariate and multivariate logistic regression was used to assess the association between the dependent variables and independent variables and odds ratio was used to assess the strength of association. In all cases p-values less than 0.05 were considered statistically significant.

Ethical considerations

Ethical clearance was obtained from the Ethical review committee of Debre Markos University. Communication with the Woreda administrators was made through formal letter obtained from Debre Markos University. After the purpose and objective of the study were informed, verbal consent was obtained from each study participants and written ascent was also obtained from each Participant parents or Guardians. In order to keep confidentiality of any information provided by study subjects, the data collection procedure was anonymous. Study participants who were positive for intestinal parasitic infection were treated with appropriate treatment protocol by nurse.

Results

Socio-demographic characteristics

Of the total expected 546 participants, 541 were participated in the study making the response rate of 99.1%. The mean age of the respondents was 12.4 with a standard deviation of 2.08. Most of the study participants were female, rural resident and orthodox Christian 331 [61.1%], 467 [71.5%] and 538 [99.4%], respectively [Table 1] (Figure 1).

Prevalence of intestinal parasite infection

The prevalence of intestinal parasites to at least a single infection was 456 (84.3%). The most prevalent parasites were *H.worm* (71.2%), *E. histolytica/dispar* (6.6%) and *S. stercoralis* (2.4%).Mixed infection was observed in 56 (14.4%) among study participants who had intestinal parasitic infection. Of these, proportion of double infection was the highest 55(14.2%).

Variable		Frequency	Percentage (%)
Age	5-9	33	6.1
	10-14	425	78.6
	>15	83	15.3
Sex	Male	210	38.8
	Female	331	61.1
Religion	Orthodox	538	99.4
	Muslim	3	0.6
Grade	1-4	148	27.4
	5-8	393	72.6
Mothers educational status	Can't read and write	289	53.4
	Read and write	191	35.3
	Regular education	61	11.3
Residence	Urban	74	13.7
	Rural	467	86.3

Table 1: Socio Demographic Characteristics of Primary School Children in *Debre Elias* Woreda March, 2013.

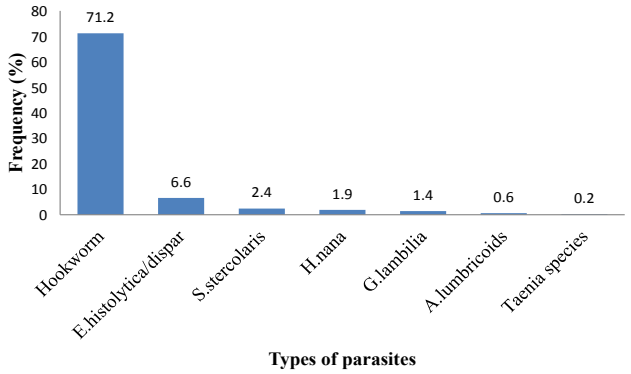

Figure 1: Statistical analysis of Frequency and Types of Parasires.

Factors associated with intestinal parasite infection

After Bivariate analysis significant factors were analyzed and entered in to multivariate analysis to remove confounders so that unable to wear shoe, unavailability of safe water supply and educational grade had statistical significant association with the occurrence of intestinal parasitic infection (P<0.05).

Discussion

The overall prevalence of intestinal parasite in the present study was 456(83.4%).This finding is comparable with the study conducted in South East Ethiopia close to Langano (83.8%) [13], South West Ethiopia (83%) [14] and Wondo Genet (85.1%) [20].How ever our finding was higher than a study conducted in different regions of Ethiopia including Babile town (27.2%) [10], and Jimma (47.1%) [11]. While it was lower than studies conducted in Nigeria (94%) [21,22] and Madagascar (94.4%)[19]. Possibly the difference might be, due to the geographical difference, the living and the socio economic nature of the study subjects [Figure 2].

The leading intestinal parasite in the present study was Hookworm 385 (71.2%) which was found to be higher than studies conducted in North West Ethiopia (11.5%) [12], South West Ethiopia (17.5%) [14] and other countries such as Nepal (4.4%) [23,24]. The reason might be the geography of the place or the socio economic condition of the study area and the habit of the study participants in relation to shoe wearing.

The second and the third most prevalent intestinal parasites in our study were *E. histolitica/dispar* 36 (6.7%) and *S. stercolaris* 13(2.4%), respectively. The prevalence of *E. histolitica /dispar* was lower than other studies done in North West Ethiopia (27.3%) [12], South East Ethiopia (12.7%) [13] and South Omo (11.4%) [25]. Our finding was also higher than the study conducted in Wondo Genet (0.35%) [21]. Moreover, the prevalence of *S. stercolaris* was lower than a study conducted in South East Ethiopia close to Lake Langano (5.8%) [26] and South Ethiopia Gamo (5.9%) [25]. While it was higher than Wondo Genet (0.69%) [21]. This could be due to difference in environmental and living conditions of the study participants.

In the present study, *H.nana*, constituted about 10 (1.8%). This finding was lower than the study conducted in Wondo Genet (4.5%) [21],Babile (10.1%) [10] and Jimma (5.0%) [14]. However, the finding was higher than studies conducted in Gamo (0.6%) [25].similarly the prevalence of *G. lamblia* in this finding was 8(1.5%). This finding was lower than studies conducted in Lake Langano (6.2%) [27-30], in Jimma (13.9%) [14] and Gonder, (41.9%) [12]. The possible explanation for this difference might be due to the time gap, geographical and environmental difference of the localities.

The prevalence of multiple intestinal parasitic infections was 56 (14.4%) [n=388], which was much lower than that was reported from North West Ethiopia (43.9%) [12].Variation in the environmental and geographical condition mightexplain the observed difference in thetwo study localities.The first most important significant associated factor with the occurrence of intestinal parasitic infection was shoe wore during interview. Those school children who do not wore shoe during interview had 1.38 [AOR=1.38, 95 CI: 1.15 - 3.12 P value 0.005] times more likely to be exposed to parasitic infection than those school

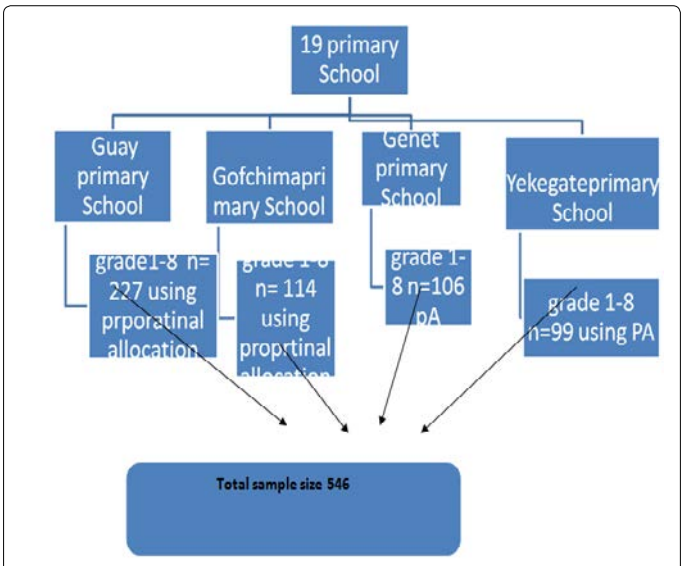

Figure 2: Prevalence of intestinal parasites among *Debre Elias Woreda* primary school children march, 2011.

Type of infection	Frequency (n=388)	Type of parasite
Single infection	332 (85.6%)	H.worm
Double infection	55(14.2%)	H.worm +E.histolytica/dispar
Triple infection	1(0.26%)	H.worm+H.nana+A.lumbricoides

n = total number of infection identified on children from 541 study participants enrolled

Table 2: The type of infection in Debre Elias Woreda school children March, 2013.

Risk factors		Intestinal parasites	COR(CI)	AOR(CI)	P value	
		positive	negative			
Grade level	1-4	113(20.9%)	35(6.5%)	1.00		
	5-8	343(63.4%)	50(9.2%)	.47(0.29,0.76)	0.38(0.22,0.58)	0.021
Water supply	Pipe water	243(44.9%)	14(2.5%)	1.00		
	Spring/pond	111(20.5%)	31(5.7%)	4.85(3.31,7.22)	3.58(2.19,6.75)	
	River	102(18.9%)	40(7.5%)	6.81(5.16,8.99)	4.38(3.14,7.93)	0.005
Antihelminthic < 6 monthes	Yes	265(48.9%)	22(4.1%)	1.00		
	No	191(35.4%)	63(11.6%)	3.97(1.89,6.83)	2.87(.85,4.45)	0.351
Shoe wore During interview	Yes	219(40.5%)	28(5.1%)	1.00		
	no	237(43.8%)	57(10.6%)	1.88(1.12,4.42)	1.38(1.15,3.12)	0.005
Swimming in the river or pond	Yes	157(29.0%)	19(3.5%)	1.82(1.06,3.15)	1.35(0.78,2.78)	0.092
	No	299(55.3%)	66(12.2%)	1.00		

Table 3: Bivariate and multivariate logistic regression analysis for factors associated with Intestinal parasite infection among *Debre Elias Woreda* school children, March, 2013.

children who wore shoe. The finding was in agreement with a study conducted in Babile town [10]. Probably those students who do not wear shoe might be infected by soil transmitted helminthes through intact bare foot penetration.

The other significant factor associated with parasitic infection was educational grade level. Those from grade 5 to grade 8 were 0.38 (AOR=0.38, 95 CI: 0.22-0.58, p value 0.021) times less likely to be exposed to parasitic infection than those school children from grade 1 up to 4. The possible explanation might be the level of awareness about personal hygiene in children whose grade become (1-4) was lower than those whose grade become 5-8. The other reason might be those students whose grade from 1 to 4 was less immuned compared to grade 5 to 8.The last significant associated factor for intestinal parasite infection in this study was source of water supply. Students who consume spring/pond water and river water were 3.58 (AOR=3.58, 95 CI: 2.19-6.75] and 4.38 (AOR=4.38, 95 CI: 3.14-7.93 P value 0.005) times more likely to be exposed to parasitic infection compared to those who consume pipe water, respectively. This might predisposes to children for different types of water borne parasites. This finding has an agreement with the study done in North Gonder [12].The possible reason could be contaminated water with animal and human waste could be entered in to to the river or unprotected spring [Table 2 and Table 3].

Conclusion and Recommendation

A high proportion of intestinal parasitic infection was observed in Debre Elias Woreda primary school children. Factors such as grade level, unable to wear shoe and unavailability of safe water supply were significantly associated with the occurrence of intestinal parasitic infection in our study area (P<0.05). Therefore, the woreda health office in collaboration with other stake holders should work on targeted health education (advocacy on shoe wearing habit) and provision of adequate and safe water supply.

Competing Interests

This work was supported by podoconiasis project programme in collaboration with Amhara region health Bureau. No future financial aid was received from any organization for publication or other interest. There is no any competing of interest.

Author's Contributions

TW: conception and initiation of the study, design, implementation, analysis and writing. AE and MA: design, implementation, analysis and co-writing. All authors read and approved the final manuscript.

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