Brief communication

Intestinal parasitoses among under-fives in two communities in Ethiopia

Hailu Birrie*, Fekade Balcha, Fekadu Abebe

Abstract: The prevalence of intestinal parasites was studied among under-fives from two communities: Metehara Sugar Estate, central Ethiopia, and Jigga town, northwest Ethiopia. In the former, 89% of the children were infected with one or more of 11 species of parasites while in the latter 82% were infected with one or more of 12 species. In Jigga town, *Ascaris lumbricoides* (67%) and hookworms (53%) were the dominant parasites while in the Metehara Sugar Estate *A. lumbricoides* and *Schistosoma mansoni* were the dominant ones. Overall, the mean number of parasite species per infected child in Jigga town was 2.6 and was significantly higher than that in Metehara which was 1.5 ($P<0.05$). The possible factors responsible for the differences between the two communities, the possible adverse effects of the parasites on the nutritional and health status of the children and the actions that need to be taken are discussed. [*Ethiop. J. Health Dev.* 1998;12(1):63-67]

Introduction

In Ethiopia, malnutrition and mortality among children below five years of age (under-fives) are estimated to reach 61% and 159 per 1000, respectively (1). Although the causes of these may be many and varied the role played by intestinal parasites is expected to be significant. Evidence is steadily accumulating to show that intestinal infection with intestinal protozoa (2, 3) and helminths (4, 5) can impair nutrition and growth of children, particularly when the socioeconomic status is low (6). It is hence recommended to give high priority to de-worming programmes in areas where mild to moderate underweight exceeds 25% and where parasites are widespread, especially among the vulnerable under-fives (7).

Previous studies of intestinal parasitoses in Ethiopia have focused mainly on school children (811). To our knowledge, only Seyoum Taticheff et al. (12) studied parasitoses among kindergarten children in Addis Ababa and reported that over 70% of the children harboured one of the 12 parasites encountered. This shows that the Ethiopian under-fives among whom malnutrition and mortality are both very high have not received due attention in the study of intestinal parasites, including schistosomiasis. The most probable reason for this neglect could be due to the fact that it is very difficult to obtain faecal samples from very young children. Much attention need to be focused on children less than five years old as this age group is considered to be particularly vulnerable (13). The objective of this study was to determine the prevalence and burden of intestinal parasites, especially schistosomiasis, among under fives living in different socio-ecological environments. Such information may help health workers consider intestinal parasites in the differential diagnosis of childhood malnutrition and morbidity.

From the Institute of Pathobiology, Addis Ababa University, P.O. Box 1176, Addis Ababa, Ethiopia
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Methods

Study areas: Two different ecological and socio-cultural settings were selected. Both areas are endemic for intestinal schistosomiasis.

a) Jigga town - It is a semi-urban setting with a population of a little over 5000 in 1984 (14). It is located at a distance of 375 km northeast of Addis Ababa at an altitude of 1800 meters above sea level (m.a.s.l.). The prevalence of schistosomiasis mansoni reaches 81% among school children (15). The source of transmission is a gently flowing stream very close to the town. Although there are few communal stand pipes in the town, due to the inadequacy of water supply, people use the stream water for almost all purposes (16). Sanitary facilities are also a lot less than desired (14).

b) Chore Camp. Metehara Sugar Estate - Metehara is an irrigation setting with a population of over 30,000 (16). It is located at a distance of 190km southeast of Addis Ababa at an altitude of 1000 m.a.s.l. The overall prevalence of schistosomiasis mansoni reached 40% in the population in 1994 (17). The source of transmission are mainly drainage canals bypassing plantation camps. Although there are communal stand pipes providing underground water, the population continues to use canal water due to the hardness of the under ground water and also in fear of fluorosis which is highly prevalent in the area. The Turkish type of toilet system installed in 1965 by the Dutch Sugar Company has completely dilapidated and as a result open defecation is extremely ubiquitous in the vicinities of homes. Chore Camp is one of the 11 plantation camps of the Sugar Estate and it has a population of about 2000 people (local information).

Stool Examination: In both places, trained field assistants went from house to house to identify households with under-fives, distribute screw-capped vials pre-filled with 6ml of 10% formalin and trained consenting mothers on how to collect the faecal matters of their under-fives and preserve them in the vials provided. All mothers were shown a piece of pebble to indicate to them how much faeces they should put in the vial for each child. In case of more than one under-five per household, instruction was given to mothers to keep the vials separately with identifying marks. On the next day field assistants went back to the households and collected the vials from mothers with age and sex information of each child. Some mothers returned vials without faeces giving a number of reasons, such as the faeces of their under- fives being too watery to handle. The specimens were transported to the laboratory in Addis where they were processed and examined by the formol-etherconcentration technique (18).

Statistical analysis: Prevalence, were computed by species of parasites. Parasite load was estimated from the mean number of parasite species diagnosed per infected child. Differential statistics were analyzed using Chi-square test.

Result

Jigga Town: The number of under-fives examined constituted about 5% of the population. The species and prevalence of intestinal parasites are presented in Table 1 while the level of polyparasitism is given in Table 2.

Twelve species of parasites (eight helminths and four protozoa) were encountered, the prevalence of *Ascaris lumbricoides*, Hookworm infection, *Trichuris trichiura*, Strongyloides stercolaris, Schistosoma mansoni and *Hymenolepis nana* reaching 67%, 53%, 23%, 16% and 10%, respectively (Table 1). Two percent of the children also harboured *Taenia saginata*.

The prevalence of *Entamoeba coli*, *E. histolytica*, *Giargia lambila* and *Iodamoeba butschelii* cysts reached 19%, 12% and 6%, respectively (Table 1).

Table 1: **Prevalence of intestinal parasites among under-fives in two communities in Ethiopia, 1993.**

Infection status	Percent positive	
	Jigga (n=241)	Metehara (n=106)
Schistosoma mansoni	16	29
Ascaris lumbricoides	67	40
Trichuris trichiura	37	12

Hookworm sp.	53	7
Strongloides stercolaris	23	5
Hymenolepis nana	10	17
Taenia saginata	2	2
Enterobius vermicularis	0.4	0
Entamoeba histolytica	12	9
Entamoeba coli	19	14
Giardia lamblia	12	8
Iodamoeba butschelii	6	5
Parasite free	11	18

Only 11% of the children were parasite free, ie. 89% of them were infected by one or more of the 12 parasites encountered. Of the infected children, the majority harboured 2-4 parasites at the same time, the minimum and maximum being 1 parasite (17%) and 6 or more (2.5%), respectively, (Table 2). Overall, the mean number of parasite species per infected child was 2.6 (Table 1).

Chore Camp, Metehara Sugar Estate: The number of under-fives examined constituted about 4%. The species and prevalence of intestinal parasites are presented in Table 1 while the level of polyparasitism is given in Table 2.

Table 2: **Polyparasitism among the under-fives (helminths and protozoa cysts combined) by locality, 1993**.

parasite load	Jigga (N=241)		Metehara (N=106)	
	No.	%	No.	%
0 Parasite	26	26	18	18
1 Parasite species	40	40	33	33
2 Parasite species	50	50	34	34
3 Parasite species	49	49	8	8
4 Parasite species	52	52	6	6
5 Parasite species	18	18	6	6
6 or more species	6	6	1	1
Mean*	2.6	2.6	1.5	
Total	241	241	106	100

Here, 11 species of intestinal parasites (seven helminths and four protozoa) were encountered among the under-fives, the prevalence reaching 40%, 29%, 17% and 5% for *A. lumbricoides, S. mansoni, H. nana, T. trichiura,* hookworm/sp and *S. stercolaris,* respectively (Table 1). *E. vermicularis* was not encountered while cases of *T. saginata* were found among 2% of the under-fives here too. The prevalence of *E. histolytica, G. lamblia* and *I. butschelii* cysts was 14%, 9%, 8% and 5%, respectively (Table 1). Here, 18% the children were parasite free indicating that 82% of the children were infected with one or the other of the 11 intestinal parasites encountered. Of the infected children, the majority harboured 1-2 parasites at the same time, the maximum being five or more parasite (1%) (Table 2). Overall, here the parasite load was 1.5 parasite spices per infected child (Table 1). The difference between Jigga and Metehara in the mean number of parasite species per infected child was significant ($P<0.05$).

Discussion

Our finding of 11 and 12 species of intestinal parasites among under-fives in Metehara and Jigga town respectively is in conformity with previous reports in Ethiopia (8-10, 12) which showed that children are infected with a plethora of intestinal parasites. In Ghana also, 11 species of parasites have been reported among pre-school children (19). This indicates the abundance of intestinal

parasites in the domestic and peri-domestic environments of young children in developing countries where water supply and sanitation are either inadequate or absent.

Intestinal parasites especially *Ascaris* is highly prevalent among under-fives in both socioecological environments. However, children in Jigga town, representing a stream ecology and an intermediate elevation are more significantly infected with both helminths and protozoa than their counterparts in Metehara, representing an irrigation ecology and a relatively low elevation. The prevalence of *A. lumbricoides* (67%), hookworm infection (53%) and *S. stercolaris* (23%) in Jigga town are extremely high by all standards. For *A. lumbricoides* the corresponding worm burden is dangerously high when the prevalence exceeds 60% (20). Given the high prevalence of polyparasites, infection with four parasite species at the same time reaching 21.6% in Jigga town, the adverse health effects imposed
on the under-fives at the crucial stage of their development should be of much concern. The high prevalence of hookworm infection especially in Jigga and schistosomiasis mansoni especially in Metehara are of even more concern since both are known to cause severe anaemia in Children (21). It is not surprising to find low prevalence of *Enterobius vermicularis* since the appropriate technique, the Scotch Tape method, for detection of the parasite was not used. Also, there could have been under estimation of the prevalence of protozoan parasites and *Strongyloides* because the method used does not pick trophozoites and is relatively less sensitive for the latter. However, it is of interest to observe cases of *Taenia saginata* (2% in each community) among under-fives. The age of these children ranged from 3-4 years and were perhaps exposed to inadequately cooked food. Both ascariasis and schistosomiasis are health problems of under-fives in both Jigga town and Chore Camp (Metehara). However in Jigga town, representing a stream ecology and an intermediate elevation, children are infested with more parasite species at the same time than their counterparts in Metehara, representing an irrigation ecology and a low elevation. The differences in the prevalence of polyparasitism especially in hookworm infection, strongyloidiasis and hymenolepiasis may be related to a number of factors ranging from altitudinal factors, soil types to familial and household characteristics, the educational and economic standing of parents. Metehara is a semiarid environment which may does not favour the transmission of hookworms and Strongyloides which have similar life cycle. Also, more children at Metehara may be wearing shoes that has protected them against hookworm infection. On the other hand perhaps because of the perennial drainage canals bypassing irrigation villages which encourages human-water contact and contamination the transmission of intestinal schistosomiasis appears to be more favoured in Metehara.

The key question is how do so young children who cannot swim or play in the infective waters get the infection in both Jigga and Metehara. Are they infected at home through bathing or do the relatively older children accompany their mothers who do laundry in the infective water bodies and thereby get the chance of infection while paddling in the shallow section of the water bodies? In either cases, there is too much parasitoses among the under-fives and this calls for urgent action. Perhaps it is necessary to integrate health education of mothers and d-worming of children with MCH and EPI programmes if this nation has to do justice to the most vulnerable group which constitutes over 18.5% the population (1). Ethiopia is one of the countries where there is high prevalence of moderate to severe stunting and mortality rates among the 24-59 mothers of age (7). Considering the adverse health and nutritional effects by these parasites high priority needs to be given to the de-worming programme.

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