Original article

Status of S. mansoni infection at Gorgora, Northwest Ethiopia

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Abstract: The study was conducted among school children in Gorgora town, located on the shore of Lake Tana. The objective was to determine the prevalence and intensity of infection. The result showed that, out of 472 students examined, the prevalence of S. mansoni was 29% (95% CI, 27 - 32%). The intensity of infection was moderate (Geometric _ epg = 289). Of the 137 positives, 21.2% had heavy infections (>800 epg). The prevalence and intensity of infection was high in the age group of 10-14 years. Reduction in morbidity is recommended as top priority in the control of schistosomiasis. [*Ethiop. J. Health Dev.* 1999;13(1):15-19]

Introduction

Schistosomiasis is an old as well as a new emerging disease. It is a disease of major economic importance and ranks second to malaria. The number of people affected with the disease globaly is estimated from 200 to 250 million. At present the disease exists in 76 countries (1).

Studies have shown that intestinal schistosomiasis is more widely spread than urinary schistosomiasis in Ethiopia. Infact, intestinal schistosomiasis is distributed in most administrative regions of the country (1, 2). At present, the disease is spreading and new transmission foci, including Addis Ababa, are being reported (1, 3).

The endemicity of S. mansoni in Gorgora is already established (4, 5). Nevertheless, these studies were done long time ago and as such they do not provide the current epidemiological situation of the disease in the study area. Also past studies had focused on prevalence only; as a result information on the pattern and intensity of infection was missing. Thus, the objective of this study was to determine the prevalence and intensity of infection among students. The study is believed to be useful inveiw of the area being a potential for tourism, trade and agricultural development.

Methods

The study was done during December 1994 to April 1995 in Gorgora, a town located on the shore of Lake Tana. The shore of the lake is rocky, sandy and in some areas swampy. In the swampy area, there are bushes of papyrus reeds. There is a 60 km all-weather road from Gonder to Lake Tana. The town lies on the edge of the Dembia Plain which is transversed by many streams.

Gorgora town has a population of 3100. The main ethnic group is Amhara. The Wayto, a small group of muslim hunters and fishermen, also live along the shore. Fishing as an activity is very limited, because eating fish is usually restricted only to the fasting season.

The study area has an altitude of 1700m above sea level. The rainy season usually starts in May and ends in September. The study subjects were school children. This age group is active and at risk of infection. School children represent the community in which they live. They share the same

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environment and reflect, with the exception of age, community practices. Students who were treated recently, as indicated by the patient registration book available at the clinic, were excluded from the study. Sample size was determined based on previous prevalence of the study. The minimum sample size required at analysis stage was calculated using the 95% level of confidence with a four percent margin of error. An additional 10% was allowed for non response. The school children were randomly selected from grades of three, five, and seven.

A pretested questionnaire was administered. Trained teachers were used as interviewers. The questionnaire contained information on the availability of latrines and type of water used by households. The information obtained on each student included age, sex, morbidity symptons, including history of gastro - intestinal bleeding, and treatment taken. In addition, the health facility where the respondent sought treatment while sick was noted.

For measuring prevalence and intensity of infection, the Kato cellophane thick smear method was used. The slides were examined by the same technician throughout the study. To minimize intraobserver variability the technician was trained on how to do the Kato method by an expert from the Pathobiology Institute in Addis Ababa. For quantitative assessment, the number of eggs per gram of stool (epg) was obtained by multiplying the number of eggs counted by an average Kato slide by 50. The egg count was categorised as light (< 100 epg), moderate (100 - 800 epg), and heavy (> 800 epg) infections (6) and were reported as geometric mean (the antilog of the arithmetic mean of the logs of the counts). The relative index of potential contamination (RIPC) for this age group was calculated by dividing the index of potential contamination (IPC) by the total RIPC multiplied by 100. The IPC was calculated by multiplying the student population size by the prevalence and by arithmetic mean of eggs per gram of stool. In this study, malacological survey was not done.

The health service, in terms of availability of diagnostic and treatment facilities, was assessed. Two Focus Group Discussions, each consisting 10 students, were held at the lake site where intense human water contact activities were taking place.

Students found positive for other intestinal parasites were treated on the spot. Among those infected with S. mansoni, those with serious abdominal complaints were refered to the nearby Kolladiba Health Center.

Information on rainfall and temperature was received from the National Meteorology Agency in Addis Ababa.

Results

Out of 1075 school children, 472 (43.9%) were examined for S. mansoni. Of the 472, the majority (47.2%) were in the age group of 10-14 years, 28.8% in the age group of 15-19 and the remaining 24% in the age group of 5-9 years. The ratio of males to females was 1:1.

Table 1: **Availability of water and sanitary facilities in Gorgora, April 1995.**

Source of water	No. of users	%
Lake	459	97.3
Stand pipe	13	2.7
Latrine		
Yes	245	52.0
No	227	48.0

The result shows that the majority of the students (97.3%) used the Lake as a source of drinking water. Availability of latrines in their homes or nearby was reported by 52% of them (Table 1). The overall prevalence of S. mansoni was 29% (CI 27-32). Higher prevalence (36.3%) (CI 34 - 37) was detected in the age group of 10-14 years. And both males and females were equally affected. However, in the age group of 15-19 years very low prevalence (5.8%) was found among females compared to males (28.4%) (Table 2).

Table 2: **Age and sex prevalence of S. mansoni among school children in Gorgora, shore of Lake Tana, April, 1995.**

Age(Yrs)	Male	Female	Total

	No. Exam.	%+ve	No. Exam.	% +ve	No. Exam.	% +ve
5-9	54	27.8	59	30.5	113	28.2
10-14	112	31.2	111	41.4	223	36.2
15-19	67	28.4	69	5.8	136	16.9
Total	233	29.6	239	28.4	472	29.0

The result showed the intensity of S. mansoni infection was moderate (Arithmetic _ epg = 519, Geometric _ epg = 289). Of the total positive for S. mansoni, 67.2% had

Table 3: **The degree of intensity of S. mansoni infection among positive school children in Gorgora, April 1995. (N = 137)**

Age (Yrs)	Light <100epg		Moderate 100-800 epg.		Heavy >800 epg	
	No.	%	No.	%	No.	%
5-9	7	5.1	23	16.8	3	2.2
10-14	6	4.4	50	36.5	25	18.2
15-19	3	2.2	19	13.9	1	0.7
Total	16	11.7	92	67.2	29	21.1

Arithmetic _ epg = 519 Geometric _ epg = 289

moderate and 21.1% had heavy infections. In addition, the prevalence and intensity of infection were highest in the age group of 10-14 years. The relative index of potential contamination was consistent with the age- specific prevalence. The highest egg count (_ epg = 375) was detected in the age group of 10 - 14 years (Table 3 and 4).

Table 4: **The relative index of potential contamination (RIPC) of each age group, April, 1995.**

Age (Yrs)	Pop. Size	No. Exam.	% Pos.	x EPG Geometric	RIPC
5 - 9	350	113	29.2	219	25.4
10 - 14	430	223	36.3	375	65.0
15 - 19	295	136	16.9	245	9.6
Total	1075	472	29.0	280	100.0

Of the 137 positives, 68 (49.6%) reported blood in their stool. Among the 16 with light infections, a lower percentage (31.2%) was reported when compared to those with moderate (53.2%) and heavy infections (72.3%). In addition, all those positive complained of abdominal pain.

At the clinic, drug for the treatment of schistosomiasis was not available on a continuous basis. The main reason was budget constraint. There was a lack of reagents to do basic laboratory examinations.

At the shore of Lake Tana, intense water contact activities such as swimming, bathing, fetching water, washing, and playing were observed. These human activities were more intense at particular sites of the lake area. Average travel time to collect water from the town was about 20 minutes. School children who participated during focus group discussions stated the following reasons as causes for their intense water contact activities:

- No pipe water available
- No adequate water at home

- School children who live in the town are protected from the disease and it is only dangerous to new comers.
- We are children and we like to swim.
- The climate is hot and we need to wash regularly as instructed by our teachers.

Table 5: **Average yearly rainfall in millimeters registered in Gonder town and the surrounding areas.**

Year	Rain in Millimeter
1967	124.5
1968	134.0
1969	137.7
1975	98.9
1976	121.2
1977	96.4
1978	85.7
1979	82.4
1980	110.4
1981	71.1
1982	59.3
1984	86.0
1985	93.7
1986	78.9
1987	94.5
1988	91.0
1989	87.6
1990	70.6
1992	83.5
1993	94.3
*1994	91.6

Meteorological report indicated a gen eral decrease in the average rainfall since 1975 although data were not available for the years between 1969 and 1975. Marked decrease in rainfall was noted in 1982 (Table 5). Slight temperature variation was also observed over the years (Table 6).

Discussion

The study indicated that the prevalence of S. mansoni in the study area was moderate. The prevalnce (29%) was much higher than those reported in Southwest Ethiopia (0.6%) and lower than those in Wonji (80%), Metahara (60%), and Lake Zway (58.1%) in Eastern Ethiopia (7 - 10). Our finding was also much lower than those found in Zeghie Peninusla (59.5%) near the town of Bahir Dar on the southern tip of Lake Tana (11). The variation in prevalence in the same lake could be as a result of differences in human behaviour, density of infected snails, and opportunity for human contact. Earlier findings in Gorgora showed a very low number of B.pfeifferi (4). However, more studies are needed to determine snail distribution and to identify high rates of transmission sites through analysis of reinfection patterns after chemotherapy along the shore of the lake.

Table 6: **Maximum and minimum temperatures, in centigrade**

Year	Max. Temp.	Min. Temp.
1967	25.6	10.2

1968	25.6	10.4
1969	26.5	11.8
1970	26.5	10.5
1982	26.3	13.2
1983	26.7	13.3
1984	26.5	13.6
1985	25.9	13.0
1986	25.7	13.6
1987	26.3	11.8
1988	26.2	12.8
1989	25.5	11.4
1990	26.8	12.4
*1992	26.8	14.1
**1993	25.9	14.1
**1994	27.2	14.2

* 8 Months report

** 11 Months report

Source: Meteorology Office, Addis Ababa

Reduction in S. mansoni prevalence from 77% to 29% was observed over the years, i.e, from 1972/73 to 1994/95 (4). This is quite different from what was reported in other parts of Ethiopia. In Wonji and Metahara, the prevalence increased from less than 2% during 1960 to 80% and 60%, respectively (8, 9). In the study area, no change was observed in water supply, sanitation, health service coverage, and socio-economic conditions over the years. Thus, it was unlikely that these factors might have accounted for parasite reduction among the study groups. Moreover, the focus group discussion showed lack of positive attitude by the respondents. This might indicate the absence of change in the pattern of human behaviour to S. mansoni transmission among the study population. Thus, this factor might not be taken as a reason for the decrease in the transmission of the disease. In the study area, a decline in the average rainfall, with little temperature variation, was observed. Whether this was a contributory factor in the reduction of the prevalence is not clear. In our opinion, since the determinants of infection of S. mansoni are many and varied, further studies are needed on human behaviour, snail density, and the question of acquired immunity in all localities surrounding the lake.

The finding showed that prevalence and intensity of infection were high in the age group of 1014 years compared to other age groups. This is due to difference in frequency of exposure to infected water body. This age- dependent infection rate was also observed in numerous studies done in endemic areas (10, 12, 13).

Although the prevalence was low, the intensity of infection was moderate. The reported mean egg count in our finding was similar to that found at Lake Zway (450 epg) in the Rift Valley (10). The moderate intensity of infection found in the lake area poses a considerable threat regarding transmission and health impact. Among those positive, 49.6% reported symptoms of blood in their stool. However, whether this was related to S. mansoni infection or to other gastro-intestinal bleeding could not be confirmed. Of the total positive in the age group of 15-19 years only one (0.7%) had heavy infection. This is possible as fishing is not considered as a predominant activity in the lake area. And this condition has been observed in other studies, too (10).

Although the prevalence and intensity of infection is low when compared to other parts of the country, the lake ecology may pose a considerable threat as a result of an increase in traditional and modern irrigation schemes. As part of the control strategy, periodic screening and treatments together with snail control; health education for latrine construction and its proper utilization could be recommended. There is a need also to improve the quality of the health service in terms of the provision of adequate diagnostic and treatment facilities. Budgetary readjustment is required to make the drug prazinquantel available on a continuous basis. The health workers ought to be trained to do sensitive parasitological examinations such as Ritchie or Kato methods. Moreover, further survey to indicate the actual burden and severity of the disease should be done. At the same time, the impact of the newly installed water supply in the town on the reducation of S. mansoni transmission needs to be studied in the future.

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