

## Spontaneous reduction in *Schistosoma mansoni* infection in endemic communities of the lake Tana basin, north-western Ethiopia

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### Abstract

The prevalence and intensity of *Schistosoma mansoni* infections were studied in 3 endemic communities in north-western Ethiopia using the Kato-Katz stool examination technique to determine changes in the epidemiology of schistosomiasis in the absence of control programmes. The prevalence declined in Chwahit community by 21.6%, and in the villages of Jenda and Guramba by 43.2 and 100% respectively in the course of 15 years. This spontaneous reduction in schistosomiasis is perhaps the result of recurrent drought in the area. This finding has implications for public health programmes in the area and intervention measures against schistosomiasis.

### Introduction

It is estimated that 2.5 million Ethiopians have schistosomiasis (LO *et al.*, 1988). Some of the hyperendemic areas for this disease are in the Lake Tana basin in the Gondar region in north-western Ethiopia. Epidemiological and clinical studies in 1972 and 1973 (POLDERMAN, 1975; HIATT, 1976; HIATT & GEBRE-MEDHIN, 1977) have confirmed the occurrence of *Schistosoma mansoni* transmission in villages along the shores of Lake Tana, and the hills, plains and lowlands north and west of Gondar. Infested with *Bulinus pfeifferi* snails, the little streams in the hills around lake Tana are the main sites of *S. mansoni*. POLDERMAN (1975) recommended control of the disease through focal application of molluscicides, in combination with chemotherapeutic treatment of the most heavily infected people and the installation of handpumps. The implementation of these recommendations, using resources of the community and those of the Public Health College, were at the planning stage when the outbreak of the revolution in Ethiopia in 1974 interrupted the work. Since 1986 the Gondar College of Medical Sciences (formerly Public Health College) resumed community health practice programmes in the area and the control of schistosomiasis is a priority public health intervention area. In order to revive the work and recommendations of POLDERMAN (1975) and to apply for government funds, a re-appraisal of the schistosomiasis situation in some of the endemic areas was undertaken. This paper reports on the changes in the epidemiology of *S. mansoni* that have occurred during 15 years in which no control was undertaken.

### Materials and Methods

Chwahit is a small town, while Guramba and Jenda are farming villages in the lake Tana basin in the

Gondar region of north-western Ethiopia for which published information on schistosomiasis is available from previous surveys (POLDERMAN, 1975; HIATT, 1976; HIATT & GEBRE-MEDHIN, 1977). In the last 15 years virtually no change has occurred in the socio-economic conditions and health care facilities of these communities. In the present survey all families in Guramba were investigated. In Jenda every alternate house and in Chwahit every third house was surveyed. This sampling procedure was arrived at by calculating the sample size required using prevalence rates of schistosomiasis reported by previous investigators. This sampling method was also adopted to ensure comparability of this survey with previous ones.

In February 1988 faecal specimens were obtained from each person through house-to-house visits and processed by the Kato-Katz method (KATZ *et al.*, 1972). Repeated visits to homes were made if a person was unable to provide a stool specimen on the first visit due to absence from home or, in the case of some children, if mothers could not obtain specimens during previous visits. The geometric mean of the number of *S. mansoni* eggs on 2 slides per person was used in the determination of the intensity of infection, expressed as eggs per gram of faeces (epg). Examination of faecal specimens was performed by specially trained technicians (senior medical students). Quality control of faecal examinations was achieved by the author's random checking of slides examined by the technicians.

### Results

All study subjects in Chwahit (600), Jenda (518) and Guramba (473) provided faecal specimens. The prevalence rate of *S. mansoni* infection was 25.6%, 20.6% and 0% in Jenda, Chwahit and Guramba respectively. The age-specific infection rates showed that children in the age group 5-9 years had the maximum infection rates, after which there was a gradual decline in prevalence until the second and third decades of life.

The intensity of infection (epg) was 133, 124 and 0 in Jenda, Chwahit and Guramba, and was maintained at 50-60 epg throughout all decades of age.

Comparison of the prevalence rates of schistosomiasis obtained in this study with those reported in the 1970s (POLDERMAN, 1975; HIATT, 1976; HIATT & GEBRE-MEDHIN, 1977) shows that, in all 3 endemic sites, prevalence rates have declined markedly (Table 1). Data on intensity of infection were available from Guramba only as POLDERMAN (1975) used formal-ether concentration, not the Kato technique, and his quantitative results are therefore not comparable with those obtained by the Kato method in the present and the two other previous surveys.

**Table. Changes in prevalence and intensity of *Schistosoma mansoni* in the lake Tana basin, north-western Ethiopia, 1972–1988**

Site	Prevalence (%)		Intensity (epg)	
	1970s	1988	1970s	1988
Jenda <sup>a</sup>	68.8	25.6	NK <sup>b</sup>	133
Chwahir <sup>c</sup>	42.2	20.6	NK <sup>b</sup>	124
Guramba	10.7	0	259 <sup>c</sup>	0

<sup>a</sup>POLDERMAN (1975).

<sup>b</sup>Not known.

<sup>c</sup>HIATT & GEBRE-MEDHIN (1976).

## Discussion

The marked decline in the prevalence of schistosomiasis in the endemic areas investigated is interesting. I have visited the area several times each year since 1976, and certainly there were no improvements in water and sanitation in these communities, nor were clinics in the area provided with health personnel, equipment and drugs to diagnose and treat schistosomiasis. The coverage of health services in the endemic area is low—less than 20% (WOLDE-AB, 1988)—and is unlikely to have contributed significantly to the reduction of schistosomiasis morbidity in these communities. However, since 1979 the campaigns against illiteracy have increased the percentages of literates from 7.0% in 1974 to 63.4% in 1987 (NICHOLA, 1988). The impact of improvements in basic education on schistosomiasis in Ethiopia is therefore difficult to assess. However, in Brazil, where the prevalence of schistosomiasis in 'untreated comparison areas' declined by 43.0% during an 8-year period compared to 58.2% in intervention communities, BARBOSA & COSTA (1981) have suggested improvements in facilities of medical care and basic education as the probable cause of reduction in schistosomiasis prevalence. This phenomenon of spontaneous reduction in schistosomiasis has been well documented in untreated comparison areas in Ethiopia and elsewhere (BARBOSA *et al.*, 1971; LYONS, 1974; LEMMA *et al.*, 1978; BARBOSA & COSTA, 1981; AMIN *et al.*, 1982; JORDAN, 1985). Ecological changes, particularly climatic, have been responsible for the spontaneous decline in prevalence (JORDAN, 1985).

In Nigeria the drought in 1973 was responsible for the marked decline in incidence, prevalence, and intensity of infection with *S. haematobium* in 2 of 4 untreated comparison areas of the Malumfashi endemic diseases project area (PUGH & GILLES, 1978). Climatic changes in Ethiopia, including the Gondar region, are probable causes of the decline of schistosomiasis in our study area. The 5 cycles of drought that occurred in Ethiopia in recent years were indeed severe and have left their marks in the drying up of wells and streams and the loss of trees in most parts of Ethiopia, including the study area. In 1973 an annual average rainfall (2036 mm) was recorded for our study area, but only 844.6 mm and 1257.2 mm of rainfall were recorded in the same area in 1982 and 1983 respectively (CENTRAL STATISTICAL OFFICE, 1974, 1984). Inadequate precipitation leading to reduced human-water contact has been put forward as an explanation for the decline in the incidence of schistosomiasis in the highveld region of Zimbabwe (CHANDIWANA *et al.*, 1987).

The significance of spontaneous changes in schistosomiasis prevalence and incidence is that they complicate the interpretation of intervention measures (JORDAN, 1985). In terms of the objectives of this study additional surveys, including malacological studies, are being planned to confirm the present findings, so that public health priorities in the area can be redefined. It would also be informative to conduct studies to detect changes in the epidemiology of schistosomiasis in villages on the shores of lake Tana where transmission is maintained by the large body of water of the lake which has not been appreciably affected by the drought.

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