

Original article

Schistosomiasis and intestinal helminthic infections in Delo Awraja, Bale administrative region south Ethiopia

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Abstract: A cross-sectional survey of schistosomiasis, intestinal helminthic infections and the snail intermediate hosts of schistosomiasis was conducted in Delo Awraja, Bale Administrative Region, South Ethiopia. Of 15 accessible communities studied, the prevalence of intestinal schistosomiasis exceeded 5% in five of them, reaching 48% in Meda. No *S. haematobium* infection was found except two imported cases diagnosed at Melkaaman at a temporary shelter for refugees returning from Somalia. Uninfected snail hosts of *S. mansoni* were collected from few water bodies. Other intestinal helminth parasites were also highly prevalent and widespread, the dominant ones being *Ascaris lumbricoides*, hookworm species and *Trichuris trichiura*, infection rates reaching 84%, 67% and 64% respectively in some communities located at altitudes of 1500-1600 m.a.s.l. The apprehension that schistosomiasis may further spread with future development plans and the need for initiation of surveillance and/or control programmes for schistosomiasis in particular and intestinal helminthic infections in general are discussed. [*Ethiop. J. Health Dev.* 1997;11(3):183-188]

Introduction

The distribution and prevalence of schistosomiasis and intestinal helminthic infection for parts of Ethiopia are quite well understood except for the southern regions where persistent security problems and/or lack of motorable roads have hindered thorough investigation (1). Of all, the Bale Administrative Region continues to be the least studied. Information on human schistosomiasis is limited to a survey of few towns conducted by the Institute of Pathobiology, Addis Ababa University, in the 1980s (2). Now that the security and communication problems have much improved few developmental activities are already underway and much more are in the planning phases. Norwegian Church Aid (NCA) in Ethiopia is implementing a multi-disciplinary development programme known as Dello Development project (DDP) in the area. The programme encompasses primary health care (PHC), water and agricultural development with the major objective of ensuring community selfhelp and nutritional status. Furthermore, the government was conducting a preliminary survey of the irrigation potential of the Wolmel-Dumel river basin located in the Awraja (Fig. 1). The objective of this study was to generate pre-development data especially on schistosomiasis since experience has shown that this disease is known to aggravate with water development and population settlement schemes (3, 5). Such baseline data are also necessary in planning disease prevention and/or control programs.

Methods

Study area: Dello is one of the five Awrajas (sub-regions) in Bale Administrative Region, southern Ethiopia (Fig. 1). It is divided into five woredas (districts) with a total population of about 100,000 people (6). The Awraja is bounded by the Genale and Mena River Basins to the west and east,

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respectively. From the Batu mountain chain to the north, the land falls undulating towards the plains in the southern part of the Awraja.

The Awraja has great natural potentials such as the Arena Forest Reserve, large livestock and game resources, big rivers, irrigable basins and unharnessed minerals prospects. It is said that the GenaleDawa basin alone has a gross potential of 600,000 ha of irrigable land (7). In spite of these potentials, however, the area remains isolated and under-developed. It is characterized by poor communication, inadequate health services and low level of living condition. There is only one health center located in Mena town, the capital city of the Awraja (Fig. 1). The rest of the Woredas (district) are served by only 9 clinics that are poorly staffed and equipped. Safe water supply and sanitary facilities are either poor or absent.

The inhabitants are traditionally nomads or semi-nomads dependent on livestock. About half of the land is still used for grazing and only about 0.6% has been cultivated, most of which is limited, by and large, to Mena, Berbere and Oborso districts (8). Recurrent drought, specially in the lower agroclimatic zone, has repeatedly affected the inhabitants forcing many into temporary shelters.

The Norwegian Church Aid for Ethiopia together with the Ministry of Health and the Ministry of Agriculture has initiated an integrated rural development program. This is essentially a PHC program which includes safe water supply through drilling deep wells and spring development and a package of agricultural inputs to the rural communities.

There now is a new road connecting the town of Mena with Goba to the north and with Neghele Borana to the west (Fig. 1). A commercial Bank is already in operation while a modest hydroelectric power construction was underway as major signs of government investment in the area.

Parasitological Examination: Stool and urine samples were obtained from school children and residents in accessible communities where



Figure 1: Map of Delo Awraja and sites of parasitological and malacological survey

NCA is undertaking and/or planning to undertake DDP. About ten percent of the population in each school or community was selected by systematic random sampling. The stool specimens, about 1 gm of faeces from each individual, were preserved in screw-capped vials pre-filled with 10% formalin which were then processed and examined by the Ritchie's concentration technique (9).

Examination of urine for schistosomiasis haematobium was undertaken since most of the people are nomads and might have travelled to lowlands such as Delo Odo or Somalia where the disease is suspected or known to occur.

Urine samples were examined on the spot by filtration method (10) for individuals living at lower altitudes. The examination was done only for one-fifth of those who provided stool except in Melkaaman and Genale where more people were included because of the lower elevation and history of peoples' travel to Somalia. Reagent strips were also used to detect haematuria and proteinuria due to schistosomiasis haematobium (10) in the urine collected.

Table 1: Results of stool examination by altitude, study subjects and community

Community	Alt. (m)	Study Subj.	No. Exams	Percent positive						Others
				Sm	Al	Tt	Ho	Ts	St	
Melkama	1100	R	99	0	2	3	0	0	0	0
Gomgoma	1200	R	148	2	0	3	16	3	1.4	0
Genale	1200	S	140	11	15	14	27	14	4	11
Burkitu	1300	R	159	8	6	21	56	4	5	5
Erba	1350	R	138	1.5	0.7	13	27	3	0	0.7
Mena	1350	R	199	6.5	11	14	29	7	3	1.0
Meda	1450	R	62	48	2	0	2	3	0	0
Angetu	1500	S	103	2	67	31	36	1	2	7
Soda Wolmel	1500	S	27	7	26	15	67	11	0	4
Uko Negesso	1600	R	184	0.5	49	21	54	11	11	2
Oborso	1600	S	77	0	84	64	62	5	17	2
Kerjule	1600	R	213	3	0	3	16	3	1.4	0
Ela Bidre	1650	R	102	2	0	1	5	4	0	1
Bidre	1700	S	63	0	40	25	8	8	0	4
Berisa	1700	R	73	3	0	3	8	11	0	4
Total	-	-	1787	5	18	13	30	16	3	3

Sm = Schistosoma mansoni

R=Residents

Al = Ascaris lumbricoides

S=Students

Tt = Trichuris trichiura

Ho = Hook worm species

St = Strongyloides stercoralis

Ts = Taenia saginata

Other = Faciola species, Enterobius vermicularis and Hymenolepis nana

Malacological Survey: Water bodies, including rivers, streams and temporary water pockets, were surveyed for snails, using a standard scoop. Furthermore, the altitude and water temperature and pH were also recorded.

The snails encountered were identified into species using appropriate keys; checked for schistosomal infection by dissection technique; and recorded with the name of the water body surveyed.

Result

Stool Examination: Altogether 1787 individuals provided stool samples in 15 communities. *Schistosoma mansoni* infected individuals were found in 80% (12/15) of the communities studied. In five communities the prevalence exceeded 5%, reaching 48%, 11%, 7% and 6.5% in Meda, Genale, Burkitu, Sodo Wolmel and Mena respectively (Table 1).

Other intestinal helminth parasites detected include: *Ascaris lumbricoides*, *Trichuris trichiura*, hookworm species, *Taenia saginata*, *Strongyloides stercoralis*, *Hymenolepis nana*, *Enterobius vermicularis* and *Fasciola hepatica* (Table 1). The most prevalent was *Ascaris lumbricoides*, reaching as high as 84% at Oborso followed by hookworm (67%) at Sodo Wolmel and *Trichuris trichiura* (64%) at Oborso. The prevalence of *Taenia Saginata* ranged from 1% at Angetu to 14% at Genale. The wormiest communities, particularly for *Ascaris*, *Trichuris*, hookworm and *Strongyloides*, are located at altitude of 1500-1600 meters above sea level. *Ascaris lumbricoides*, *Trichuris Trichiura* and hookworms appear to be coexisting in communities where they are prevalent.

Urine Examination: Five hundred and thirty seven urine specimens were examined for *Schistosoma haematobium* infection by filtration and reagent strip methods. Only two individuals at Melkaaman (male subjects of 7 and 16 years of age) were found passing the parasite egg in their urine. The intensity of infection was low in both individuals settling at only 2 and 6 eggs per 10 ml of urine.

Analysis of their birth places and history of

Table 2: **Results of urine examination by filtration and reagent methods**

community	Alt (m)	Study Subject	No. Examined by		No (%) positive		
			Urine filtration	Reagent Strip	Urine filtration	Reagent strip	
						haem.	protein
Melkaman	1100	R	77	77	2(2.6)	5(10)	2(12.5)
Gomgom	1200	R	29	29	0	1(2)	0(0)
Genale	1200	S	140	140	0	2(4)	2(12)
Burkitu	1300	R	33	33	0	2(4)	3(18)
Erba	1350	R	28	52	0	25(50)	2(12.7)
Mena	1350	R	43	43	0	3(6)	2(12.5)
Meda	1450	R	12	12	0	0(0)	1(6.2)
Angetu	1500	S	21	21	0	1(2)	1(6.2)
Soda Wolmel	1500	S	5	5	0	0(0)	0
Uko Negesso	1600	R	38	38	0	1(2)	0
Oborso	1600	S	16	16	0	1(2)	0
Kerjule	1600	R	42	42	0	2(4)	0

Ela Bidre	1650	R	27	27	0	3(6)	1(6.2)
Bidre	1700	S	13	13	0	2(4)	2(12.5)
Berisa	1780	R	15	15	0	2(4)	0
Total(%)	-	-	539	539	2(0.4)	2(0.4)	16(3.0)

Haem = haematuria; R = Residents; S = Students

travel showed that they had been in Somalia for over 5 years. The prevalence of haematuria and proteinuria detected by the reagent strips were also very low except at Erba where 50% was positive for microhaematuria (Table 2).

Malacological Finding: Of the 9 fresh water bodies surveyed only 3 contained one or another kind of snails. The snails recovered included: *Biomphalaria pfeifferi* (at Shewe and Burkitu streams), *Bulinus forskalii* (at Genale River) *Lymnea natalensis* (at Shewe and Wolmel Rivers) and small planorbids (at Shewe River) (Table 4). The environmental characteristics (water temperature and pH) were within normal values for breeding of the snails.

Discussion

It is not surprising to find that intestinal parasites are highly prevalent and widespread in the Delo Awraja since in Ethiopia and wherever poverty, ignorance, lack of safe water supply, inadequate sanitation and poor hygiene prevail such parasites are expected to be ubiquitous. Of interest is, however, the discovery of endemic localities of intestinal schistosomiasis in this hithertofore isolated part of Ethiopia. Previous survey of few communities in Bale Region (2) led to a general thinking that the Region would be free from schistosomiasis.

It is possible that local transmission of *Schistosoma mansoni* is taking place in the five communities (Meda, Genale, Burkitu, Sodo Wolmel and Mena) where the disease prevalence exceeded 5%. The high prevalence (48%) observed in Meda where agricultural development is underway by Norwegian Church Aid programme is of interest. Its proximity to the Ganale basin where large scale irrigation scheme is envisaged also gives adequate reason for worry in terms of disease spread. In general, the finding of positive patients and snail intermediate host of intestinal schistosomiasis in a number of communities warrants initiation of schistosomiasis surveillance and/or control measures in Delo Awraja, particularly if the development plans have to be realized.

Urinary schistosomiasis seems to be absent in the surveyed communities at least at the moment as indicated by the results of both urine examination and reagent strips.

Table 3: Findings of the malacological survey in Delo Awraja

Temperature Waterbody Air Water	Alt (m)			pH water Snail species	
Genale River	1200	30	20	7	2
Wolemel River	1200	29	25	6	Negative
Burkitu Stream	1300	20	20	6	1, 3
Gobale River	1500	24	24	6	Negative
Ridimo River	1500	22	22	6	"
Angetu Stream	1500	22	22	7	"
Shewe River (Meslo)	1500	19	19	7	1,3, 4
Kerjule Stream	1600	18	18	7	Negative
Oborso Stream	1600	16	16	7	"

1 = *Biomphalaria Pfeifferi*3 = *Lymnaea natalensis*2 = *Bulinus forskalii*

4 = Small planorbids

However, the lower portion of the Awraja bordering Somalia need to be surveyed to confirm the absence of urinary schistosomiasis. The two positive patients diagnosed at Melkaaman have history of travel to Somalia where urinary schistosomiasis is known to be endemic (11). Hence, they may be harbouring the Somalian strain of *S. haematobium*. Since the community is located at a lower altitude (about 1000 m) and is close to a permanent water body (Welmel River) the presence of infected individuals if coupled with the presence of the right snail species in the area may lead to the establishment of *S. haematobium* transmission. Refugees returning from Somalia should therefore be screened for *S. haematobium* infection and positive patients treated to avoid any possible introduction of a foreign parasite strain into this ecologically receptive area.

The relatively high positivity rate (50%) of microhaematuria among those examined at Erba could not be explained. Perhaps menstruating female subjects were examined although other causes of microhaematuria, which warrants further investigation, should not be ruled out.

The high prevalence of *Ascaris* and *Trichuris* at intermediate elevations (around 1500 m.a.s.l) in the area is quite typical of similar rural ecological settings in Ethiopia (12). However, the dominance of hookworm infection demands special attention since it causes chronic blood loss and depletion of the body's iron store, leading to iron-deficiency anemia particularly in children (13). Future study should aim at identifying the species of hookworm occurring in the area. According to Shibru Tedla and Leykun Jemaneh (14) and Leykun Jemaneh and Shibru Tedla (15) both *Ancylostoma duodenale* and *Necator americanus* may occur as sympatric species. Periodic de-worming of children with broadspectrum anthelmintic drugs coupled with health education on personal and environmental sanitation and improvement of water supply should be given high priority to control morbidity due to the soil-transmitted intestinal helminth parasites.

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