

SCHISTOSOMIASIS MANSONI IN THREE LOCALITIES OF WESTERN LOWLAND OF THE STATE OF MARANHÃO BEFORE AND AFTER MASS TREATMENTS

RAIMUNDO NONATO MARTINS CUTRIM & JOSÉ RODRIGUES COURA*

Departamento de Patologia, Universidade Federal do Maranhão, Praça Madre de Deus s/nº 65025-560
São Luis, MA, Brasil *Departamento de Medicina Tropical, Instituto Oswaldo Cruz,
Av. Brasil, 4365, 21045-900 Rio de Janeiro, RJ, Brasil

A cross-sectional study for schistosomiasis was carried out in the localities of Aliança, Alegre and Coroatá (districts of Cururupu, São Bento and São João Batista, respectively) in the lowland of the state of Maranhão, after respectively 13, 11 and 4 mass treatments with oxamniquine in the period of ten years (1977-1987).

The study included clinical and quantitative fecal examination, skin test for Schistosoma mansoni infection, evaluation of man-water contact of the total population (829 persons) in the three localities and other epidemiological investigations such as infection rate and dynamics of the snail population.

After 13 mass treatments in Aliança, the prevalence of S. mansoni infection was reduced from 57.9% to 7.4%. In Coroatá with 11 mass treatments the prevalence fell from 69.2% to 12.8% and in Alegre, with only 4 mass treatments there was practically no reduction in prevalence: 22.9% to 21%.

After mass treatments the type II hepatointestinal clinical form was 10.8% in Aliança, 17.9% in Alegre and 18% in Coroatá. The hepatosplenic (type III) form was not seen in Aliança and Coroatá but unexplainably it was 7.6% in Alegre. There was no correlation between the egg load elimination and the clinical forms.

Key words: schistosomiasis mansoni – mass treatments – Maranhão – Brasil

Schistosomiasis mansoni in the state of Maranhão was probably introduced by the slaves brought from Angola and Guiné in XVI century, to work in cotton, rice, manioc and sugar-cane farms in the coast and lowlands of the state.

A national survey for helminthiasis by fecal examination in children aged 7 to 14 years carried out by Pellon & Teixeira (1950), showed a prevalence of 0.86% for schistosomiasis in 13,720 school children examined in the state of Maranhão. In Cururupu and São Bento, in the lowlands of the state, the prevalence was higher than 4%, sufficient to point them as endemic foci.

In 1966 a survey done by DNERu (Depart-

ment of Endemic Diseases) the prevalence of schistosomiasis was found to be 11.24% in Cururupu and 3.96% in São Bento. In the same year Martins & Almeida (1966) identified 16 new foci in the state of Maranhão. In 1977 SUCAM (Public Health Campaign) identified 18 municipalities of the state with a prevalence of *Schistosoma mansoni* infection higher than 4%; in 1984 there were 24 and in 1986 30 municipalities infected, of which 14 were in the lowlands of the state.

The aim of this work is to evaluate the prevalence and morbidity of schistosomiasis in the three represented areas (Fig.) after ten years of several mass treatments.

METHODOLOGY

A cross-sectional study for schistosomiasis was carried out in 1987 in the three localities after 13 mass treatments done from 1977 in



Localization of the endemic areas in lowlands of the state of Maranhão.

Aliança, 11 in Alegre and 4 in Coroatá. Mass treatments were made with oxamniquine, single dose, 12 mg/kg for adults and 15/20 mg/kg for children by SUCAM in the total population of the three localities. The sectional study included clinical and fecal examination, skin test for *S. mansoni* infection, evaluation of man-water contact measured as absent, frequent and very frequent and other epidemiological investigations such as infection rate and dynamics of the snail population.

The three localities were initially represented in an individual map with residences, public and commercial buildings, rivers, lakes and other water collections. The residences were numbered and the residents were regis-

tered as to name, age, sex, race and family relations. The social and economic conditions of the family were also recorded.

Through an anamnesis the principal symptoms and signs of schistosomiasis were registered: diarrhea, constipation, hematemesis, melena, hepatosplenomegaly, collateral circulation, etc. The clinical forms were identified in three types, according to the classification of Pessoa & Barros (1953) modified by Barbosa (1966):

I – Schistosomiasis infection: with or without intestinal symptoms which, if present, were moderate and not necessarily attributed to the disease.

II – Schistosomiasis disease (hepatointestinal): frequent intestinal symptoms, dysenteric diarrhea, hepatomegaly,

III – Schistosomiasis disease (hepatosplenic): very frequent intestinal symptoms, dysentery, hepatosplenomegaly with or without hematemesis and melena.

The fecal examination was performed by the Kato quantitative method modified by Katz et al. (1972) and the skin test was carried out by the Kagan et al. (1961) technique, injecting 0.05 ml of *S. mansoni* antigen intradermally in the left ventral forearm, with reaction evaluated 15 min later.

RESULTS

A total population of 829 persons in the three localities was studied: 256 in Aliança, 403 in Alegre and 170 in Coroatá.

TABLE I

Prevalence of schistosomiasis by age group in three endemic areas, determined by fecal examination and skin test (ST) after several mass treatments in western lowland of Maranhão, Brazil

Age group (years)	Aliança		Alegre		Coroatá	
	Feces (%)	ST (%)	Feces (%)	ST (%)	Feces (%)	ST (%)
0 – 5	7.1	4.7	1.5	0.0	0.0	4.4
6 – 10	4.0	53.0	13.1	11.4	3.1	56.2
11 – 15	3.7	88.8	23.1	52.9	29.6	85.1
16 – 20	8.6	91.3	32.6	63.6	21.4	78.5
21 – 30	9.5	95.2	28.8	65.9	23.5	76.4
31 – 40	15.3	84.6	27.5	82.1	30.0	80.0
41 – 50	10.7	100.0	25.0	69.4	0.0	77.7
+ 50	5.0	90.0	28.8	69.2	18.7	81.2
Average	7.4	69.9	21.0	46.2	12.9	55.8

The prevalence of *S. mansoni* by fecal examination and by skin test in Aliança, Alegre and Coroatá is represented in Table I. After 13 mass treatments in Aliança from 1977 to 1987 the prevalence of *S. mansoni* infection was reduced from 57.9% to 7.4%. In Coroatá with 11 mass treatments in the same period, the reduction was from 69.2% to 12.9% and in Alegre, with only 4 mass treatments in the same period there was practically no reduction in prevalence: 22.9% to 21%.

Schistosoma mansoni egg load elimination by the studied population in the endemic areas can be seen in Table II. There are no information about the egg load elimination before the mass treatments. In 1987 the mean egg load elimination was 94.5 eggs/g of feces in the population of Aliança, 90.5 in Alegre and 115.8 in Coroatá.

TABLE II

Mean number of *Schistosoma mansoni* per g of feces by age group, determined by Kato-Katz technique after several mass treatments in three endemic areas in the western lowland of Maranhão, Brazil

Age group (years)	Aliança	Alegre	Coroatá
	Eggs/g feces	Eggs/g feces	Eggs/g feces
0 - 5	312	24	0
6 - 10	36	50	24
11 - 15	24	43	132
16 - 20	168	219	48
21 - 30	60	63	90
31 - 40	48	56	585
41 - 50	60	226	0
+ 50	48	43	48
Average	94.5	90.5	115.8

The clinical forms of schistosomiasis are represented in Table III. As can be seen, in Aliança and Coroatá the hepatosplenic form was not observed. Unexplainably 7.6% of that form was found in Alegre. All 15 patients with the hepatosplenic form in this locality were older than 20 years, males, hunters of fishermen with very frequent water contact.

There was no correlation between infection rate of the snails with the prevalence, egg load or clinical forms of the human disease in the three areas. The snails found in Aliança and Alegre were *Biomphalaria glabrata* and in Coroatá only *B. straminea* were detected.

TABLE III

Clinical forms of schistosomiasis after several mass treatments in three endemic areas of western lowland of Maranhão, Brazil

Clinical forms	Aliança %	Alegre %	Coroatá %
Type I	89.1	74.3	81.9
Type II	10.8	17.9	18.0
Type III	0	7.6	0

DISCUSSION

As shown in Table I there was an increase of the prevalence of *S. mansoni* infection from the first to the second decade of life in the three areas. This fact has been observed also by other authors in Brazil (Kloetzel, 1963; Barbosa, 1966; Conceição, 1976, Menezes, 1976; Santos, 1978; Katz et al., 1978; Mendonça, 1982; Coura et al., 1982, 1983, 1984) and elsewhere. In part, this is thought to be due to slow development of protective antibodies of the IgE class (Capron et al., 1977; Colley, 1987; Hagan, 1991; Dunne et al., 1991) and also to the earlier development of blocking antibodies to IgM, IgG2 and IgG4 (Damian, 1987; Dunne et al., 1987; Hagan, 1991) regulated, respectively, by secretion or suppression of the related cytokines.

Although several mass treatments have been done in the population of the three areas, 13 in Aliança, 11 in Coroatá and 4 in Alegre in a period of ten years (1977-1987), the prevalence of *S. mansoni* infection is still high: 7.4%, 12.9% and 21% respectively. This is due to the frequent reinfection because of the intensity of man-water contact in the overflowed lowlands. This shows also that the mass treatment as an isolated measure can not control schistosomiasis.

There was a great variation of the egg load elimination according to the age groups in the three endemic areas, from 0 (zero) e/g to 585 egg/g of feces in Coroatá (Table II). This variation depends on the man-water contact and on the protective immunity in each person in the group, number and frequency of treatments and on the pressure for reinfection in each endemic area in time and space. The average of the mean egg load elimination from 90.5 eggs/g of feces to 115.8 in the three endemic areas was considered low, probably in

this case because of the several mass treatments done in the period, as observed by Katz et al. (1978) and Prata et al. (1980) in other endemic areas.

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