

CLINICAL-EPIDEMIOLOGIC STUDY OF SCHISTOSOMIASIS MANSONI IN PONTE DO PASMADO, A VILLAGE IN THE MUNICIPALITY OF ITINGA, STATE OF MINAS GERAIS, BRAZIL, 1992

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SUMMARY

A clinical-epidemiologic study of schistosomiasis mansoni was conducted in the population of Ponte do Pasmado, a village in the municipality of Itinga, state of Minas Gerais, Brazil. Faecal parasitology by the Kato-Katz method and clinical examination were performed in 93.8% and 82.8% of the local population, respectively. A socioeconomic survey was also made and the signs and symptoms presented by the patients were recorded, as well as their contacts with natural waters. The rate of *Schistosoma mansoni* infection was 50.3%; the peak of infection occurred during the second decade of life; there was a predominance of low egg counts in faeces (85.89% of positive patients eliminated less than 500 eggs per gram of faeces); the splenomegaly rate was 1.23%. When the risk factors for *S. mansoni* infection were studied, significant risks were detected in activities such as fetching water, washing dishes, bathing, and crossing streams.

KEYWORDS: Schistosomiasis mansoni; Epidemiology.

INTRODUCTION

Schistosomiasis mansoni is an endemic disease in an extensive area of the Brazilian territory, including the Jequitinhonha Valley, Minas Gerais, one of the poorest regions in the country¹⁴. Through information provided by local authorities, we became aware of the existence of several suspected cases of schistosomiasis, including splenectomised patients with upperdigestive hemorrhage, in Ponte do Pasmado, a village in the municipality of Itinga. Since no official records of the occurrence of parasitosis at this site were available, we conducted a pilot study on children at-

tending the local school using parasitologic examination of faeces by the Kato-Katz method. The study showed 87.65% prevalence of schistosomiasis, with 22.2% of the patients presenting egg counts above 500 per gram. On the basis of these data, we decided to conduct the present clinical-epidemiologic study on the entire population of the village, in order to clarify the situation of the disease at this site in terms of prevalence, morbidity, and risk factors for infection, and then provide treatment and orientation to the local population.

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MATERIALS AND METHODS

Study Area

The municipality of Itinga is located in the microregion of Pastoril de Pedra Azul (164, recorded as municipality 41 by the Brazilian Institute of Geography and Statistics, IBGE), in the Jequitinhonha Valley, Northeastern region of Minas Gerais, 647 km from the state Capital (Belo Horizonte), Brazil. The municipality consists of three districts, Itinga, Jacaré and Santana do Araçaí, with a total population of 22,595 by the Census of 1991¹⁶. The basic activities are represented by the extraction industry (feldspar), animal husbandry and agriculture. The health network consists of four health stations, two health centers basically working with immunization, and a laboratory for clinical analyses. The available health staff consists of one physician, two nurses and one laboratory technician (FIBGE, 1992).

According to a census taken during the study, the population of Ponte do Pasmado is 391.

Parasitology of faeces and intradermal test

Each person in the area under study received a tin box for faeces collection labelled with his/her name and control number. Faeces examination was performed by the Kato-Katz method. Two slides were prepared with the faecal sample from each patient and the examination was considered positive when at least one of the slides presented *S. mansoni* eggs. The geometric mean of the egg counts obtained for the two slides was considered to be the number of eggs per gram of faeces of that patient.

All patients were submitted to intradermal reaction. Adult worm antigen (0.05 ml of solution at the concentration of 40 µg nitrogen/ml) was applied to the lateral region of the middle third of the forearm and the results were read 15 minutes later. Patients who did not eliminate *S. mansoni* eggs in their faeces and with a negative intradermal reaction (papule < 1cm²) were considered to be negative¹¹.

Clinical examination

Clinical examination was performed with no knowledge of the results of faeces parasitology. The patients were questioned about the signs and symptoms they had experienced during the 180 days preceding the interview: abdominal pain, diarrhoea, haematemesis, blood in the stool (fresh blood in any amount), and melena. Patients who did not present any of these signs and symptoms were considered to be "asymptomatic".

Abdominal palpation was performed with the patient in dorsal decubitus and in the Chuster position. The liver and/or spleen were considered to be palpable when they could be felt immediately below the costal margin, with resting respiration.

Determination of contact with natural waters

The occurrence of contact with natural waters during the 180 days preceding the application of the questionnaires was determined by questioning adult patients and people responsible for children about their habits. The information was obtained without knowledge about the results of the faecal tests.

The frequency of contact with natural waters was classified as daily (at least once a day), weekly (at least once a week), fortnightly, and monthly or less. The reasons for contact were classified as washing clothes, fetching water and/or washing dishes, bathing (personal hygiene), swimming (leisure), fishing, crossing streams, working in the fields, watering domestic or community vegetable gardens, and transporting extracted minerals.

Socioeconomic survey

A standardized questionnaire was applied door to door in the dwellings of the village. The following variables were considered: occupational sector of the head of the family, occupation and place of birth of the patient, presence or absence of a cesspool and a cistern into the dwelling, presence of water piped from the cistern into the house, location of the dwelling in relation to the stream, and housing quality.

Statistical analysis

Student's t-test was used to determine the significance of the differences between means and the chi-square test (with Yates' correction) was used to determine the differences between frequencies. The odds ratio, with Cornfield's CI, was calculated when differences between frequencies were significant. P values less than 0.05 (5%) were considered to be statistically significant.

Ethical considerations

We followed the recommendations of the World Health Organization and of the Declaration of Helsinki of 1975 in terms of protecting the rights and well-being of the people studied. At the end of the study, all patients were informed about the results of the examinations performed and received appropriate recommendations, treatment and referrals.

RESULTS

Of the 391 inhabitants of the village, 367 (93.8%) were submitted to faeces parasitology and 324 (82.8%) to clinical examination. The rate of *S. mansoni* infection was 50.3%, the geometric mean for the number of eggs was 418.34, with 85.88% of the patients eliminating less than 500 eggs/g faeces, and the splenomegaly rate was 1.23% (Table 1). Infection was more prevalent in the 10 to 15 year age range and 32.7% of positive patients were less than 20 years old (Table 2).

TABLE 1

Rate of infection, *S. mansoni* egg counts in faeces and distribution by sex of the population of Ponte do Pasmado (municipality of Itinga, Minas Gerais, 1992)

Variables	No. of patients	% and/or mean \pm SD
Infection rate		
Positive/ examined	163/324	50.3%
Egg counts		
8 - 468	140	85.89
516 - 960	12	7.36
> 1,056	11	6.75
Total	163	100
Geometric mean		418.34 \pm 1115.89
Sex		
Male		
Positive/ examined	84/163	51.53
		234.93 \pm 980.14
Female		
Positive/ examined	79/161	49.06
		185.68 \pm 612.74

TABLE 2

Infection rate and *S. mansoni* egg counts in faeces according to age range in the population of Ponte do Pasmado, 1992

Age range year	Infection rate n ^o	(%)	Egg counts/g faeces Mean \pm SD
0 — 5	3.09	(10)	18.78 \pm 48.77
5 — 10	10.80	(35)	464.11 \pm 1458.74
10 — 15	12.35	(40)	337.32 \pm 1068.32
15 — 20	6.49	(21)	266.97 \pm 415.36
20 — 25	4.01	(13)	56.00 \pm 86.01
25 — 30	1.54	(5)	27.65 \pm 56.32
30 — 35	1.85	(6)	261.78 \pm 912.66
35 — 40	2.78	(9)	306.82 \pm 657.04
40 — 45	1.54	(5)	100.09 \pm 148.74
45 — 50	1.54	(5)	33.75 \pm 81.77
50 — 55	0.31	(1)	26.77 \pm 96.52
55 — 60	1.54	(5)	53.00 \pm 147.01
\geq 60	2.46	(8)	33.00 \pm 37.05
Total	50.30		152.77 \pm 1115.89

Of the patients who did not eliminate *S. mansoni* eggs in the faeces, 83 had a negative intradermal reaction and 75 a positive intradermal reaction.

Table 3 shows the signs and symptoms presented by positive and negative patients. No statistically significant difference was observed between the two groups.

TABLE 3

Signs and symptoms according to positivity for *S. mansoni* infection, Ponte do Pasmado (Municipality of Itinga, Minas Gerais, 1992)

Signs and symptoms	Positive (n)% or x \pm s	Negative (n)% or x \pm s
<i>A. Complains related or attributed to the gastrointestinal tract</i>		
Abdominal pain	(78) 47.80	(76) 47.20
Diarrhoea	(34) 20.90	(32) 19.20
Blood in stool	(30) 18.40	(20) 12.40
Obstipation	(5) 3.06	(19) 11.80
Melena	(10) 6.10	(11) 6.80
Haematemesis	(8) 4.90	(5) 3.10
Dizziness	(66) 40.50	(62) 38.50
Headache	(77) 47.20	(71) 44.10
Weakness	(87) 53.30	(88) 54.60
"Asymptomatic"	(25) 15.30	(28) 17.30
<i>B. Liver @</i>		
1. Right lobe #		
palpable	(39) 23.90	(56) 35.20
not palpable	(124) 76.10	(103) 64.80
2. Left lobe ‡		
palpable	(17) 10.40	(15) 9.40
not palpable	(146) 89.60	(144) 90.60
<i>C. Size of the left* liver lobe (cm)</i>		
	(17) 3.06 \pm 1.30	(19) 3.47 \pm 2.44
<i>D. Spleen size (cm)*</i>		
palpable	(3) 1.86	(4) 2.53
not palpable	(158) 98.14	(154) 97.47
Total	(161) 100.00	(158) 100.00

* Two pregnant patients were excluded

@ 1 and 2p < 0.05

OR = 0.58 (0.35 - 0.97) Non significant

‡ OR = 1.12 (0.51 - 2.46) Non significant

With respect to contact with natural waters, 299 patients (92.28% of those interviewed) reported contact during the last 60 days. Statistically significant risks for *S. mansoni* infection were obtained for persons who had contact with natural waters in order to fetch water and/or wash dishes and to bathe, and who crossed streams (Table 4).

The results of the socioeconomic questionnaire are presented in Table 5. *S. mansoni* infection was significantly more frequent among patients who used water from the stream (OR = 1.70) and among patients who

TABLE 4

Univariate analysis of *S. mansoni* infection among inhabitants of the Ponte do Pasmado village (Itinga, Minas Gerais, 1992) according to reason for and frequency of contact

Variables	Infected (n = 163)	Controls (n = 161)	Odds Ratio (95% CI)
<i>Washing clothes</i>			
Yes	54	54	0.98 (0.60-1.60) ^{NS}
No	109	107	
<i>Fetching water and washing dishes</i>			
Yes	122	91	2.29 (1.39-3.77) [#]
No	41	70	
<i>Bathing</i>			
Yes	150	123	3.56 (1.74-7.40) [#]
No	13	38	
<i>Swimming</i>			
Yes	6	24	0.22 (0.08-0.58) ^{NS}
No	157	137	
<i>Fishing</i>			
Yes	13	19	0.65 (0.29-1.44) ^{NS}
No	150	142	
<i>Crossing streams</i>			
Yes	148	132	2.17 (1.06-4.45) [#]
No	15	29	
<i>Working in the fields</i>			
Yes	42	41	1.02 (0.60-1.72) ^{NS}
No	121	120	
<i>Watering the garden</i>			
Yes	16	31	0.46 (0.23-0.91) ^{NS}
No	147	130	
<i>Transporting extracted minerals</i>			
Yes	6	15	0.37 (0.13-1.66) ^{NS}
No	157	146	
<i>Other reasons</i>			
Yes	6	14	0.40 (0.13-1.15) ^{NS}
No	157	147	

[#]p<0.05.
NS, non significant.

were born in the municipality of Itinga (OR = 2.90). No statistically significant difference was observed between positive and negative patients with respect to the use of water from a cistern or from a well in the backyard, or with respect to the presence or absence of a cesspool in the dwelling.

DISCUSSION AND CONCLUSIONS

Several studies have been conducted in areas endemic for schistosomiasis, both in Brazil ^{1, 3, 7, 12} and abroad ¹⁰ in order to determine the intensity of infection, its clinical manifestations and the risk factors for acquiring the disease, thus obtaining a better understanding of the transmission process and attempting to achieve better control of this endemic disease.

TABLE 5

Results of the socioeconomic questionnaire according to *S. mansoni* positivity among the inhabitants of the Ponte do Pasmado village (municipality of Itinga, state of Minas Gerais, 1992)

Variables	Positive (n)%	Negative (n)%	Odds ratio (95% CI)
<i>Origin of water</i>			
Stream	(150) 92.0	(128) 79.5	2.97 (1.44-6.25)
Cistern	(13) 8.0	(33) 20.5	
<i>Cesspool in the dwelling</i>			
Absent	(90) 55.2	(76) 47.2	0.73 (0.46-1.15) ^{NS}
Present	(73) 44.8	(85) 52.8	
<i>Patient place of birth</i>			
Itinga	(65) 39.9	(30) 18.6	2.90 (1.70-4.96)
Other Municipalities	(98) 60.1	(131) 81.4	

^{NS}, non significant.

The relationship between socioeconomic situation and the risk of *S. mansoni* infection has been emphasized in the literature. BARBOSA ¹, in a study carried out in the state of Pernambuco, observed that *S. mansoni* infection was related to the sector of patient activity, to the quality of housing or to the absence of a cesspool in the dwelling. GUIMARÃES ⁸, in a study carried out in Tuparecê (Minas Gerais), noted that the rates of *S. mansoni* infection were higher among rural workers and among individuals who had been residing in the area for more than 10 years. The same author, in a study in Arcos (1985), showed that infection was more frequent among schoolchildren than among rural workers, among those who lived in dwellings of poorer quality and among those whose families were headed by an illiterate person ⁹. CURY ⁷ found that in Comercinho (Minas Gerais) the type of housing and the lack of piped water in the dwelling were not factors associated with *S. mansoni* infection. In the present study, the absence of a cesspool in the dwelling was not associated with *S. mansoni* infection, in contrast to the origin of the water used in the dwelling.

As to gastrointestinal signs and symptoms, no statistically significant difference was detected, in agreement with previous reports ^{1, 4, 7, 9}. However, this topic continues to be controversial, since other studies have shown that the presence of blood in the faeces and/or abdominal pains are more frequent among infected patients ^{3, 5, 6, 8, 17}. Other reports have also shown a relationship between increased size of the left liver lobe and presence of infection ^{2, 3}, a fact that, however,

was not observed among the inhabitants of Ponte do Pasmado.

Several investigators, using univariate analysis, have studied the reasons for contact with natural waters in zones endemic for schistosomiasis^{1, 3, 7}. Among them, GUIMARÃES³ detected statistically significant risks for swimming and/or playing, fishing, and working in the fields. CURY⁷, using multivariate analysis, detected risks for fetching water/washing dishes and fishing. In the Ponte do Pasmado population, significant risks were detected for fetching water and washing dishes, bathing and crossing streams.

The present study showed that the Ponte do Pasmado region has a high prevalence of schistosomiasis mansoni and requires sanitary measures for the control of this endemic disease. While this does not occur, a large-scale treatment of all positive patients will be performed, with later evaluation.

RESUMO

Estudo clínico epidemiológico da esquistossomose mansoni no povoado de Ponte do Pasmado, município de Itinga, Minas Gerais (Brasil), 1992

Foi realizado estudo clínico-epidemiológico da esquistossomose mansoni na população do povoado da Ponte do Pasmado, município de Itinga, Minas Gerais (Brasil). Foram feitos exame parasitológico de fezes pelo método de Kato-Katz e exame clínico em, respectivamente, 93,8% e 82,8% da população local. Foi realizado levantamento sócio-econômico e pesquisados os sinais e sintomas apresentados pelos pacientes, assim como seus contatos com águas naturais. O índice de infecção pelo *Schistosoma mansoni* foi de 50,3%; o pico da infecção ocorreu na segunda década de vida; predominaram as baixas contagens de ovos nas fezes (85,89% dos pacientes positivos eliminaram menos de 500 ovos por grama de fezes); o índice de esplenomegalia foi de 1,23%. Foram estudados os fatores de risco para a infecção por *S. mansoni*; riscos significativos foram encontrados para buscar água e lavar vasilhas, tomar banho e atravessar córregos.

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Recebido para publicação em 24/05/1994
Aceito para publicação em 25/08/1994