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A MUNICIPAL LEVEL APPROACH TO THE MANAGEMENT OF SCHISTOSOMIASIS CONTROL IN PERI-PERI, MG, BRAZIL

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SUMMARY

A schistosomiasis control program was implemented between 1974/87 in Peri-Peri, MG (622 inhabitants). Molluscicide (niclosamide) was applied at three monthly intervals in water sources with **Biomphalaria glabrata**, and individuals eliminating **Schistosoma mansoni** eggs in the feces were treated annually with oxamniquine. From 1974 to 1983 the control measures were undertaken by staff of the "René Rachou" Research Center FIOCRUZ (CPqRR), and from 1984 to 1987 these measures were included in the Capim Branco basic health network activities. During both periods, the prevalence, incidence, intensity of infection and hepatosplenic form as well as the number of infected snails decreased significantly. The prevalence decreased from 43.5 to 4.4%, the incidence from 19.0 to 2.9%, the overall intensity of **S. mansoni** from 281 to 87 and of the hepatosplenic form from 5.9 to 0.0%. The results obtained suggest that the municipal management of control measures was as effective as the vertical program conducted by CPqRR staff.

KEY WORDS: Schistosomiasis control - Brazil; Chemotherapy; Molluscicide; Municipal management of actions.

INTRODUCTION

The Declaration of the International Conference on Primary Health care held in Alma Ata, USSR[1] agreed that to obtain "health for all by the year 2 000" it would be necessary for integrated health measures to be based on population demand, under a single health system and supported by a single financial source together with a planning system that would take into consideration the peculiarities of each area and disease[4].

In Brazil, this proposal was endorsed by the VIII National Health Conference that took place in 1986,and the agreed strategy based on the municipal management of primary health care actions[5].

In 1977, a Special Program for Schistosomiasis Control (PECE) was carried out in seven states in the northeast of Brazil by the Superintendência de Campanhas de Saúde Pública (SUCAM), a federal *Brazilian* agency. This program was based on vertical intervention, i.e., without any decision of the local health authorities. The standard procedures, fecal examination and mass treatment of infected individuals, were exclusively undertaken by SUCAM staff[12].

As early as 1971, BARBOSA et al.[2], when studying the results of a schistosomiasis control program in Pontezinha(PE) which consisted of seven years of vertical intervention (specific treatment, snail control, basic sanitation and health education), called attention to the necessity of developing pilot projects for schistosomiasis control managed by the primary health care system.

KATZ et al.[8] developed a schistosomiasis control program in Peri-Peri (Capim Branco, MG) based on an annual treatment of individuals infected with **Schistosoma mansoni,** together with a trimonthly molluscicide application. This program was carried out by René Rachou Research Center (CPqRR) staff until 1983, when the residents were informed that this project would be terminate. The local population approached the municipal council to discuss the possibility of continuing the program. Thus, the control measures were included in the

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routine of the basic health center network under municipal management. Control measures were then undertaken by the local staff (a general medical doctor, a health auxiliary, a laboratory technician and two local inhabitants trained by the CPqRR).

In this paper, the results obtained with the two types of intervention programmes are evaluated in terms of prevalence, incidence, intensity of overall S. **mansoni** infection and incidence of clinical forms.

MATERIAL AND METHODS

Peri-Peri is a district of Capim Branco, located in the state of Minas Gerais, 60 Km from Belo Horizonte, with about 600 inhabitants.

The area typically consists of 1-5 hectare plots, used for agricultural activities, on the banks of the Ribeirão da Mata river which is also used for domestic and leisure activities.

In 1983, although 91.6% of dwellings have latrines and 93.0% are provided with water (from the public system and/or wells), 57.5% of the latrine sewage goes directly into the river and 21.3% of individuals interviewed reported frequent contact with the stream or river water for leisure.

From 1974/83, the CPqRR staff spent fifteen days per year in the area to perform the demographic census and to collect material for fecal examination. Six months later, those ihabitants with S. **mansoni** eggs in their feces were clinically examined and treated.

From 1984 onwards, the local staff performed these activities, with the supervision of "Rene Rachou" Research center staff.

Parasitological diagnoses were performed by a single stool examination (2 slides each) using the Kato-Katz method[7]. Only in 1976 three stools examinations (2 slides each) were performed to evaluate cure rate in the treated group. For treatment, oxamniquine in a single oral dose of 20 mg/Kg for children (under 15 years old) and 15 mg/Kg for adults was administred.

Physical examinations were performed with the patients lying on their backs and also on their right sides. The liver and spleen were considered palpable when detected beneath the costal margin, with the breath held. The clinical classification used was that described by PESSOA & BARROS [11] with slight modifications[9].

A trimonthly malacological survey was performed in all water sources in Peri-Peri and molluscicide applied when snails were found. Malacological surveys were carried out in the area, using a perforated ladle and counting ten ladles every ten meters on both sides of the streams. In the laboratory, the collected alive snails were squashed between two glass plates, and examined under a stereoxopic microscopic[10]. Some samples were dissecated, analysed and classified. The molluscicide used was niclosamide at a 3 ppm concentration which was sprayed or dripped into water where snails were found[6].

Linear regression was used to evaluate prevalence and incidence and analysis of variance was used to evaluate the geometric mean of the number of S. **mansoni** eggs per gram of feces during the period[13]. Statistical significance was taken at 95%.

RESULTS

Table 1 shows the prevalence of schistosomiasis in Peri-Peri from 1974 to 1987. The control measures undertaken by the CPqRR staff significantly reduced the prevalence from 43.5 to 15.2% in 1984. Under the municipal management, a further significant reduction to 4.4% was achieved by 1987 (p=0.0122), (Table 1, Figure 1). The decrease in prevalence in the area was statistically significant in both sexes, but in the age group of 30 years and above, regression analysis did not show a significant decrease (p=0.0869) (Table 2).

The rate of annual incidence (new infections among people non-infected in the previous year) in 1975 was 19.0% and decreased significantly to 10.9% in 1984 (p=0.0002) and to 2.9% in 1987 (p=0.0022). These decrease were significant for all age group (Table 1 and 3, Figure 1).

The infecting intensity, estimated by the geometric mean of the number of eggs per gram of feces, was initially 281.2±4.5. After the first treatment, this decreased significantly, without significant variation between sexes, age groups and the two periods of the study (Table 1, Figure 1).

At the beginning of the program, 65.5% of infected individuals had the intestinal form (I) of the disease, 28.5% the hepatointestinal (HI) and 5.6% the hepatosplenic forms (HS). In 1978, the HS

Table 1

Results of some variables studied to evaluate the schistosomiasis control program in Peri-Peri between 1974 and 1987.

Year	Total population	With stool[a] examnation N (%)	Prevalence[b] N (%)	Incidence[c] (%)	Intensity[d] of infection G ± sd*
1974	622	596 (95.8)	259 (43.5)	-	281.2 ± 4.5
1975**	517	447 (86.5)***	123 (27.5)	19.0	87.4 ± 5.5
1976	512	256 (50.0)	71 (27.7)	34.2	46.4 ± 5.6
1977**	504	390 (77.4)	84 (21.5)	11.7	54.6 ± 5.1
1978	469	371 (79.1)	53 (14.3)	7.7	61.8 ± 3.6
1979	579	514 (88.8)	116 (22.7)	15.1	77.6 ± 3.6
1980	569	455 (80.0)	94 (20.6)	19.2	79.1 ± 3.9
1981	534	419 (78.5)	74 (17.7)	1.5	118.2 ± 2.8
1982	558	460 (82.4)	44 (9.6)	6.5	40.1 ± 3.1
1983**	575	465 (80.9)	42 (9.0)	6.8	93.9 ± 3.0
1984	547	447 (81.7)	68 (15.2)	10.9	50.7 ± 3.4
1985	598	500 (83.6)	57 (11.4)	10.2	53.7 ± 3.5
1986	657	517 (78.7)	31 (6.0)	3.8	68.9 ± 3.0
1987	598	549 (91.8)	24 (4.4)	2.9	136.9 ± 3.0

The regression analysis showed the following inclinations:
a: b= 0.40±0.71 p= 0.5833
b: b= -2.21±0.34 p= 0.0001
c: b= -0.98±0.10 p= 0.0001
d: F= 9.14 p= 0.0001
*geometric mean of **Schistosoma mansoni** eggs ± standart deviation
** without treatment
*** only people treated in 1975

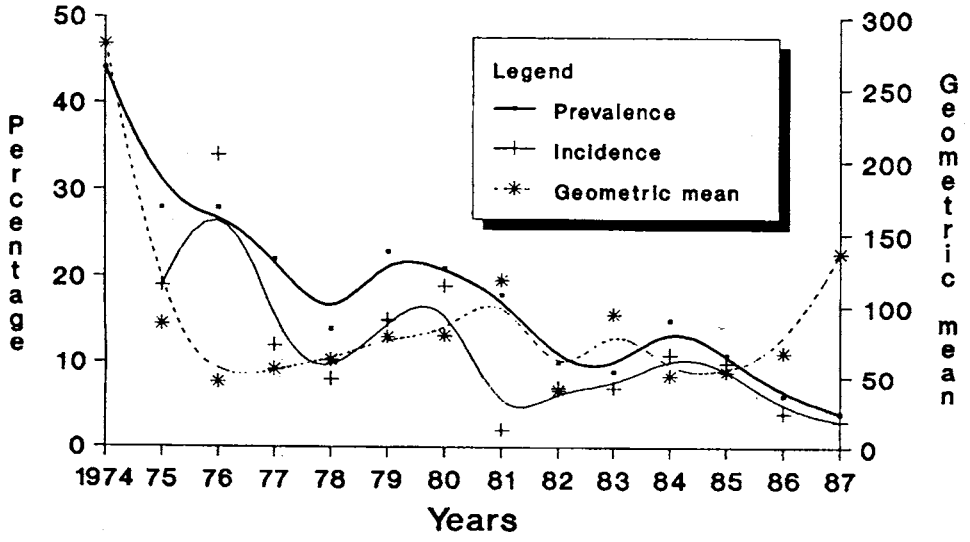

Figure 1 - Prevalence, incidence and geometric mean of Shistosoma mansoni eggs in Peri-Peri, MG between 1974 and 1987.

Table 2
Prevalence of **S. mansoni** infection, by age group in Peri-Peri, between 1974 and 1987.

Year	Age Groups				
	0 - 4[a]	5 - 9[b]	10 - 19[c]	20 - 29[d]	30 and above[e]
1974	13.4	35.6	67.5	58.3	26.5
1975	13.5	41.4	38.2	21.3	10.1
1976	9.1	28.6	34.4	28.6	10.0
1977	12.0	17.7	36.9	29.4	1.9
1978	0.0	17.7	21.6	26.7	2.8
1979	7.0	34.3	31.4	26.4	10.6
1980	6.9	23.5	30.4	23.7	12.7
1981	6.1	27.7	32.1	12.8	8.4
1982	0.0	10.6	13.0	13.5	7.2
1983	4.7	7.6	14.0	9.3	6.5
1984	11.4	22.9	15.8	17.0	12.0
1985	3.9	9.8	27.5	9.3	7.2
1986	1.6	5.2	15.2	5.7	4.0
1987	3.0	1.5	11.8	2.7	3.5

The regression analysis showed the following inclinations:
a: b= -0.69+-0.25 p= 0.0192
b: b= -2.39+-0.49 p= 0.0004
c: b= -2.80+-0.62 p= 0.0007
d: b= -2.82+-0.51 p= 0.0001
e: b= -0.70+-0.37 p= 0.0869

Table 3
Incidence of **S. mansoni** infection, by age groups in Peri-Peri, between 1975 and 1987.

Year	Age Groups				
	0-4[a]	5 - 9[b]	10 - 19[c]	20 - 29[d]	30 and above[e]
1975	11.1	64.1	32.5	12.9	6.4
1976	20.0	28.1	15.2	3.0	7.7
1977	4.8	16.1	25.2	14.9	3.1
1978	0.0	13.3	14.2	10.1	5.3
1979	2.4	13.0	14.2	9.2	3.6
1980	1.8	12.0	13.5	7.4	3.0
1981	2.3	10.9	9.5	4.8	3.2
1982	0.0	6.7	4.8	3.4	1.4
1983	4.4	6.1	3.3	0.7	0.0
1984	4.9	13.0	11.2	7.4	4.3
1985	4.0	5.8	10.1	3.6	2.7
1986	0.0	3.9	4.7	0.6	0.0
1987	0.0	1.6	1.9	0.7	0.0

The regression analysis showed the following inclinations:
a: b= -0.84+-0.35 p= 0.0375
b: b= -3.06+-0.85 p= 0.0042
c: b= -1.84+-0.37 p= 0.0005
d: b= -0.87+-0.25 p= 0.0051
e: b= -0.49+-0.12 p= 0.0011

form frequency was 2.5%, and 0.0% thereafter. From 1975 to 1987, no new hepatosplenic cases were observed.

Until 1984, the average cure rates for treated children and adults were similar, 72.0% and 88.0%, respectively. Between 1984/87 the average cure rate was 83.3% for children and 94.0% for adults. No significant difference occurred between the cure rates before and after the assumption of municipal management of the control measures.

During the ten years of vertical intervention and the three years of municipal management, the

Table 4
Malacological survey and applications of molluscicide in Peri-Peri, between 1974 and 1987.

Year	Nº of surveys	Number of snails			Molluscicide Application	
		Captured	Examined	Infected(%)	Number	Quantity (Kg)
1974	4	469	84	12 (14.3)	2	2.0
1975	5	125	108	0 (0.0)	6	12.1
1976	5	33	32	0 (0.0)	5	6.9
1977	8	798	231	11 (4.7)	7	16.4
1978	4	168	97	0 (0.0)	4	6.0
1979	10	3007*	201	7 (0.2)	7	10.4
1980	7	454	419	5 (1.7)	6	9.3
1981	7	175	175	0 (0.0)	6	5.5
1982	8	564**	550	1 (0.2)	6	9.3
1983	7	465	445	1 (0.2)	3	4.8
1984	4	143	136	0 (0.0)	3	4.0
1985	4	99	87	3 (3.4)	4	5.0
1986	4	67	67	0(0.0)	8	3.0
1987	4	345	275	7(1.8)	7	2.5

* collected in only one focus
** 48 samples were classified as **B. straminea.**In all other surveys **B. glabrata** was the only snail found

number of stool examinations undertaken and individuals treated were similar.

Snail specimens captured were **Biomphalaria glabrata** and **B. straminea.** Only **B. glabrata** were found to be eliminating **S. mansoni** cercaria. The index rate of infectec snails was significantly reduced after the first year of molluscicide application, but the population of snail did not vary during the total period of observation (Table 4). No statistically significant difference was observed when the vertical and municipal control measures were compared.

DISCUSSION

It is of interest to note that no significant difference was obtained in terms of prevalence, incidence and intensity of infection when two different approaches were used to apply the same control measures in the schistosomiasis endemic area of Peri-Peri. In fact, the continuous control measures of the project reduced the prevalence rate from 43.5 to 15.2% after ten years, when it was managed by the CPqRR staff, and to 4.4% when these proceedures became the responsability of the local basic health network, for the following 3 years.

Among studies of clinical epidemiology of schistosomiasis in Brazil, only a few have taken incidence as a measure of schistosomiasis, although the World Health Organization[15] has considered it ideal for representing the transmission of the disease. In Peri-Peri, incidence, as well as prevalence, was reduced both during the vertical and the municipally managed phases of the program. A sharp reduction in the hepatosplenic form was also observed. In fact, 77.0% of the hepatosplenic cases regressed to the hepatointestinal form after three consecutive annual treatments. Furthermore, no new case of the serious form of the disease occurred during the fourteen years of this project.

As in Taquarandi, BA[3], the members of the Peri-Peri community were capable applying the molluscicide with efficacy, when properly supervised.

For schistosomiasis control, it has previously been proposed that diagnosis, specific treatment, health education and a planing should be included in the basic health network. The provision of drugs, technical equipment, and means for intermediate hosts control, on the other hand have to be provided by State and/or federal agencies[14].

This present program was implemented as a result of a local political decision as well as the

capacity of the municipal authorities to continue the project.

The results obtained in this study show that it is possible to include successfully specific treatment and other control measures for schistosomiasis mansoni in the Primary Health Care System. Nevertheless, it would be ingenuous to suggest, at this stage, the extensive implementation of municipal management programs of schistosomiasis control, without first considering structural problems, the development of human resources, institutional and professional relationships involved in system unification as well as the means of transfering from the federal to the municipal authorities.

RESUMO

Avaliação de um programa municipalizado de controle da esquistossomose em Peri-Peri, MG -Brasil

Um programa de controle da esquistossomose foi desenvolvido em Peri-Peri, MG (município de Capim Branco) entre 1974/87. Foi aplicado moluscicida em intervalos de 3 meses nas coleções hídricas da área e indivíduos eliminando ovos de **Schistosoma mansoni** nas fezes foram tratados anualmente com oxamniquine. De 1974 a 1983 as medidas de controle foram realizadas pela equipe do Centro de Pesquisas "René Rachou" - FIOCRUZ, e de 1984 a 1987 foram incluídas nas atividades da rede básica de saúde de Capim Branco. Durante ambos períodos, a prevalência, incidência e intensidade da infecção e forma hepatosplênica assim como o índice de caramujos infectados decresceram significativamente.

A prevalência decresceu de 43,5 para 4,4 %, a incidência de 19,0 para 2,9%, a intensidade da infecção de 281 ovos por grama de fezes para 87 e a forma hepatoesplênica de 5,9 para 0,0%. Os resultados obtidos sugerem que a inclusão das medidas de controle nas atividades da rede básica de saúde local foi efetivada tanto quanto o programa vertical conduzido pelo CPqRR.

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