

## A FOLLOW-UP EVALUATION OF CHAGAS' DISEASE IN TWO ENDEMIC AREAS IN BRAZIL

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The evolutive pattern of Chagas' disease is not yet completely defined and understood because: a) the clinical studies carried out in the endemic areas usually do not represent either a good sample of the infected population or a sufficient number of patients in different evolutive stages of the disease; b) the morbidity and mortality of the disease vary considerably from one area to another; and c) the methodology of the investigations and its follow-up are not comparable in all studies.

Several longitudinal evaluation of the morbidity and mortality of Chagas' disease have been conducted in Brazil by Laranja et al. (1956), Prata (1959, 1976), Porto (1964), Coura (1966, 1976), Rassi (1971), Macedo (1973, 1980), Abreu (1977) and more recently by Maguire et al. (1982), Dias (1982), Pereira (1983), Alcântara et al. (1983), Coura, Anunziato & Willcox (1983), Pereira, Willcox & Coura (1985) and Coura et al. (1985).

In the last twenty five years we have been studying more than five hundred chronic cases of Chagas' disease detected in Rio de Janeiro but coming from different endemic areas of the country. Although they cannot be considered as representative of the clinical forms prevalent in the areas of origin, they will be mentioned in this paper for comparison with the evolutive pattern of the disease in two endemic areas.

From the 510 patients observed in Rio de Janeiro, 39% were of the indeterminate (asymptomatic) form, 52% of the cardiac form and 14% had the digestive forms (megaesophagus, megacolon or both) (Fig. 1). An association of cardiopathy and "megas" was observed in 10.7% of the patients and megaesophagus with megacolon in 10.9%.

Two cross-section "case-control" type studies were performed in two endemic areas of Chagas' disease in the state of Minas Gerais with six and ten years intervals, respectively. The study included a total of 538 pairs of persons with same age and sex, one with a positive serology (complement fixation, hemagglutination and immunofluorescent tests) and the other with negative serology for Chagas' disease. In the first cross-section evaluation 264 pairs of persons investigated were from Iguatama and Pains, in the Northwest of Minas Gerais state and the other 274 were from Virgem da Lapa, in the Northeast of the state (Fig. 2).

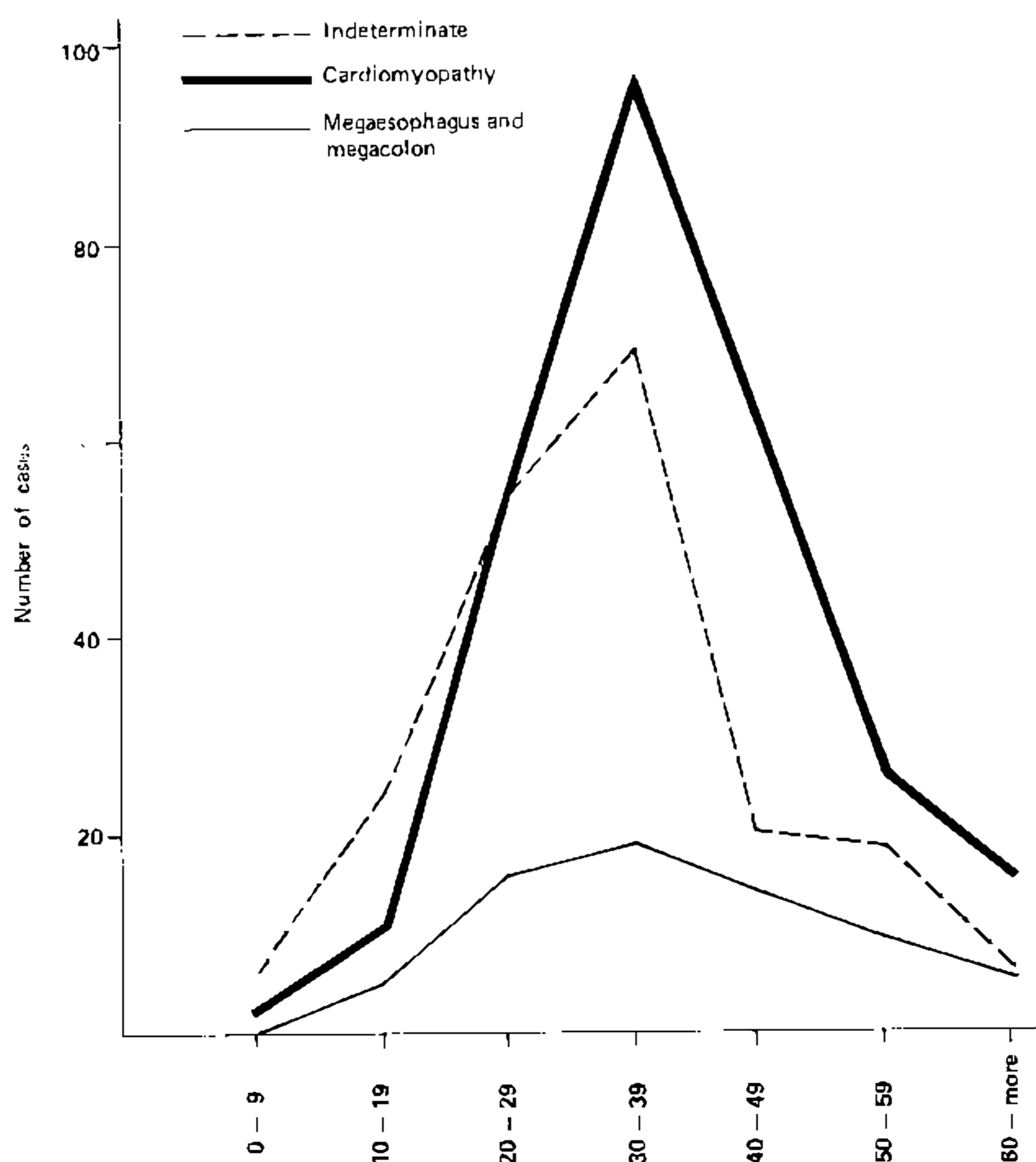


Fig. 1: distribution of clinical forms by age groups in 510 patients of Chagas' disease from different areas in Brazil.

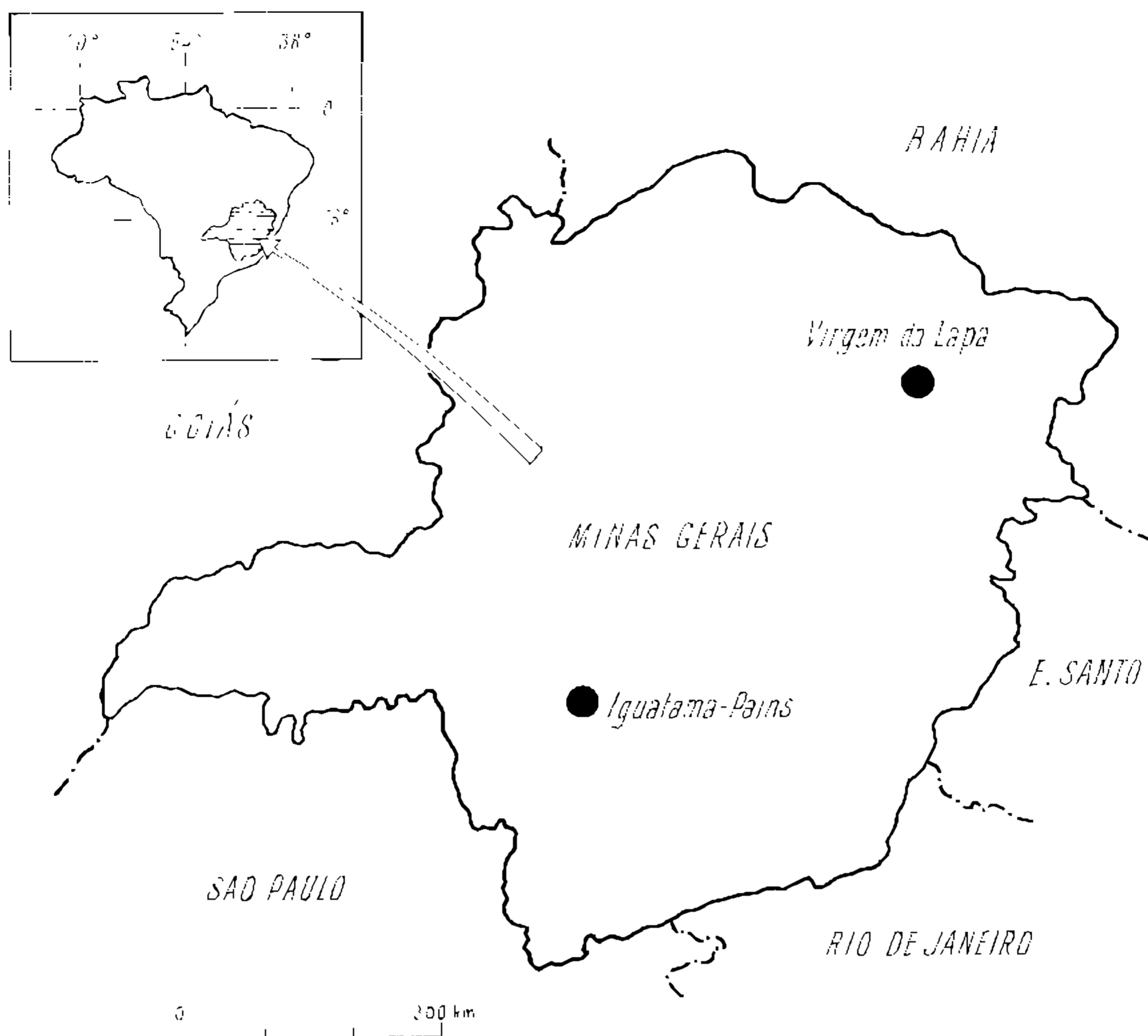


Fig. 2: location of Virgem da Lapa and Iguatama-Pains in Minas Gerais.

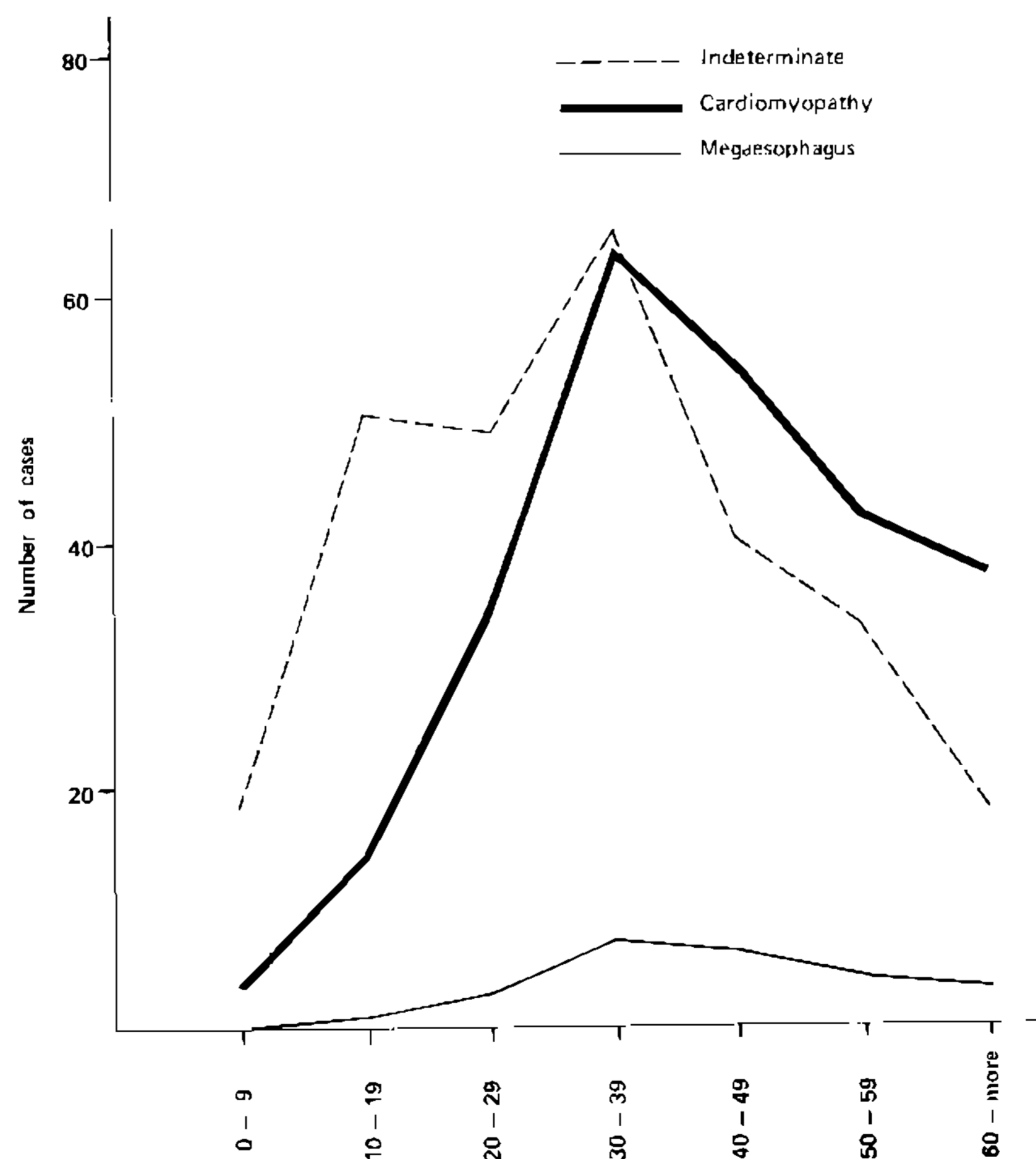


Fig. 3: distribution of the clinical forms by age groups in 538 patients of Chagas' disease from Virgem da Lapa and Iguatama-Pains.

All 538 pairs of persons investigated in the endemic areas were submitted to the same type of anamnesis, clinical examination, electrocardiogram (ECG) with twelve standard derivations and a chest X-ray, emphasizing the cardiac and digestive symptoms and signs. Fig. 3 shows the distribution of the clinical forms by age group in the 538 chagasic patients from the two endemic areas. Additionally, a xenodiagnosis test was carried out in the patients with positive serology for Chagas' disease using 40 third- or

fourth-instar nymphs of *Triatoma infestans* per patient. In a sample of the patients the xenodiagnosis was repeated monthly during three consecutive months to try to determine the presence of parasites in the blood.

A follow-up evaluation was carried out by a second cross-section study six years later in Virgem da Lapa and ten years later in Iguatama and Pains, with the same laboratory and clinical parameters used in the first study.

In a house by house visit we tried to locate all persons included in the first study. If they had moved within the same area we visited them in the new residence. If they had moved to a distant District or to another state, we tried to know from their parents or relatives if they were alive or not. If they had died, we tried to obtain the death certificate and to know the cause of death. By doing so we could have reliable information about 192 patients and 188 controls in Virgem da Lapa and from them we could count on 124 pairs of persons for the second evaluation. In Iguatama and Pains we had information on 235 patients and 216 controls but could only find 110 pairs of the persons previously studied.

Table I shows the distribution, by age groups, of the 234 pairs followed-up in the two endemic areas.

The electrocardiograms were performed in D1, D2, D3, aVR, aVL, aVF and V1 to V6 with the patients at rest; at least three complexes in each derivation were registered but when any arrhythmia was detected a long D2 was taken. The ECG interpretation was done according to the New York Heart Association criteria for diagnosis of heart diseases (1973) adapted for Chagas' disease by an Expert Committee from the Brazilian National Research Council (1974).

The grade of heart involvement was classified according to a Report of Scientific Group from WHO/PAHO (1974) which can be summarized thus: Grade I – Chagas' infection without any clinical, radiological or electrocardiographical indication of heart involvement; Grade II – moderate heart involvement; Grade III – important involvement of the heart and Grade IV – severe Chagas' heart disease.

The chest X-ray was performed with a portable apparatus adapted for 70 mm films. The films were taken in postero-anterior and lateral positions; in the latter position the films were taken at the beginning and one minute after the patient had swallowed 60 to 80 ml of barium-meal, according to the technique of Rezende, Oliveira & Luar (1959, 1960). The interpretation of megaesophagus can be summarized as follows: Grade I – esophagus with normal size but with slow transit of the barium-meal; Grade II – esophagus with small or moderate caliber enlargement, retention of the barium-meal and third peristaltic waves; Grade III – esophagus with great enlargement of caliber, hypotonic in the inferior portion and with great retention of the barium-meal; Grade IV – esophagus extremely dilated, atonic, distorted and with a great retention of the barium-meal.

TABLE I

Distribution, by age groups, of 234 pairs of persons with positive/negative serology for Chagas' disease followed-up in Virgem da Lapa and Iguatama-Pains, Minas Gerais state, Brazil

Age groups	Virgem da Lapa (six year follow-up)	Iguatama-Pains (ten years follow-up)	Total
0 – 9	5	–	5
10 – 19	11	7	18
20 – 29	14	13	27
30 – 39	43	26	69
40 – 49	27	28	55
50 – 59	13	25	38
60 – more	11	11	22
Total	124	110	234

The evolution of the disease was considered: a) unaltered; b) progressive; c) regressive and d) fatal.

The clinical evolution of Chagas' disease in the two endemic areas are summarized in Tables II, III and IV and the lethality ratio in Tables V, VI and VII.

From the 124 chagasic patients followed during six years in Virgem da Lapa, Minas Gerais state, 62.1% did not show any change, in 32.2% the disease progressed and in 5.6% the electrocardiogram returned to normal. In Iguatama and Pains 110 chagasic patients were followed for ten years and 57.3% of them remained in the indeterminate form, in 34.5% there was a deterioration of the heart condition and in 8.2% the situation improved. The incidence of cardiomyopathy (new cases) in Virgem da Lapa was 33.8% and in Iguatama-Pains 38.3% during the period considered, while the incidence of megaesophagus was, respectively, 4.5% and 2.9% in those areas.

TABLE II

Clinical evolution of Chagas' disease in two endemic areas in Minas Gerais state, Brazil

Evolution	Virgem da Lapa (six years follow-up)		Iguatama-Pains (ten years follow-up)	
	Nº patients	%	Nº patients	%
Unaltered	77	62.1	63	57.3
Progressive	40	32.3	38	34.5
Regressive*	7	5.6	9	8.2
Total	124	100	110	100

\* Normalization of ECG.

TABLE III

Evolution of indeterminate form of Chagas' disease in two endemic areas in Minas Gerais state, Brazil

Evolution	Virgem da Lapa (six years follow-up)		Iguatama-Pains (ten years follow-up)	
	Nº patients	%	Nº patients	%
Unaltered	44	57.9	31	54.3
Progressive				
- to heart disease				
Grade II	25	32.9	20	35.1
Grade III	2	2.6	3	5.3
- to megaesophagus	5	6.6	3	5.3
Total	76	100	57	100

TABLE IV

Evolution of Chagas' heart disease in two endemic areas in Minas Gerais state, Brazil

Evolution	Virgem da Lapa (six years follow-up)		Iguatama-Pains (ten years follow-up)	
	Nº patients	%	Nº patients	%
Unaltered	29	65.9	29	58
Progressive	8	18.2	12	24
Regressive*	7	15.9	9	18
Total	44	100	50	100

\* Normalization of ECG.

TABELA V

Lethality from Chagas' disease by age groups, in two endemic areas in Minas Gerais state, Brazil

Age group	Virgem da Lapa (six years follow-up)		Iguatama-Pains (ten years follow-up)	
	Nº patients	%	Nº patients	%
10 - 29	1	5.9	3	7.5
30 - 59	6	35.3	27	67.5
60 - more	10	58.8	10	25
Total	17	100	40	100

TABLE VI

Lethality from Chagas' disease according to the clinical forms, in two endemic areas in Minas Gerais state, Brazil

Clinical form	Virgem da Lapa (six years follow-up)			Iguatama-Pains (ten years follow-up)		
	Nº patients	Death		Nº patients	Death	
		Nº patients	%		Nº patients	%
Indeterminate	116	—	—	130	—	—
Cardiomyopathy						
Grade II	50	9	18	62	16	25.8
Grade III	16	8	50	32	19	59.4
Grade IV	...	...	...	5	5	100
Megaesophagus	10	—	—	6	—	—
<b>Total</b>	<b>192</b>	<b>17</b>	<b>8.9</b>	<b>235</b>	<b>40</b>	<b>17.0</b>

TABLE VII

Nature of death by Chagas' heart disease in two endemic areas in Minas Gerais state, Brazil

Nature of death	Virgem da Lapa		Iguatama-Pains	
	Nº patients	%	Nº patients	%
Sudden	11	64.7	31	77.5
Heart failure	6	35.3	9	22.5
<b>Total</b>	<b>17</b>	<b>100</b>	<b>40</b>	<b>100</b>

The general mortality in Virgem da Lapa was 11.2% in the chagasic group and 3.2% in the control group and in Iguatama and Pains, respectively, 23 and 10.6%. However, the specific mortality or lethality by cardiopathy was 8.9% in Virgem da Lapa and 17% in Iguatama-Pains, while the mortality due to heart disease in the non chagasic groups was respectively 0% and 2.3%.

The mortality was 3.6 times higher among the chagasic patients in Virgem da Lapa, with no difference between sexes but more premature among the males. In Iguatama-Pains the mortality was twice as high in males than in females, mainly in the age group from 30 to 59 years.

In our experience the prognosis was good for the patients with indeterminate and digestive forms and severe for patients with the highest degree of cardiopathy. Sudden death was more frequent than that caused by cardiac insufficiency.

The evolution of chronic Chagas' disease varies considerably from one case to another. Patients in the indeterminate form or with minimal lesions such as isolated branch block, or occasional one-focus extrasystoles tend to remain stable, usually dying of causes other than Chagas' disease. Patients displaying complex arrhythmias, multifocal ventricular extrasystoles, paroxysmal tachycardia, atrial fibrillation, third-degree Av block, or heart failure with extensive enlargement of the heart have a poor prognosis, usually dying suddenly within few years. A third group of patients with slight increase in the cardiac area, variability of electrocardiogram and clinical manifestations have a very uncertain prognosis. The prognosis of patients with digestive forms is usually good, except for those cases displaying complications such as cancer in megaesophagus, or fecalomas and volvulus in megacolon.

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