SEROLOGICAL SURVEY FOR CHAGAS' DISEASE IN SCHOOL CHILDREN IN THE RIO DE JANEIRO STATE – BRAZIL*

Walter B. Petana, José Rodrigues Coura and Henry P.F. Willcox

A serological survey for Chagas' disease was carried out in school children in the Rio de Janeiro State, a zone considered as non-endemic for the infection. A total of 168 schools in 20 municipalities have been visited and 13,254 blood samples were obtained. The blood eluates were screened by the indirect fluorescence test (IFT), and all positive samples were checked and confirmed in sera by the complement fixation test (CFT). All serologically positive children were subject to a clinical scrutiny, and the houses where the children lived have been searched for triatomine bugs. Only in two municipalities, Magé and Araruama, there was a significant number of children found positive. The total number of reactive samples by IFT and CFT from 13,004 blood samples screened was 143 (1.00 per cent). No serious clinical symptoms suggestive of Chagas' disease have been found in any of the positive children, and no triatomine bugs were discovered in the dwellings where the children lived. The overall small percentage of children with positive serology postulates that the infection is not a serious health problem in the area investigated. It is recommended, however, to carry out a more detailed study in Magé and Araruama to find the reason for the relatively high percentage of serologically positive children encountered in these two municipalities.

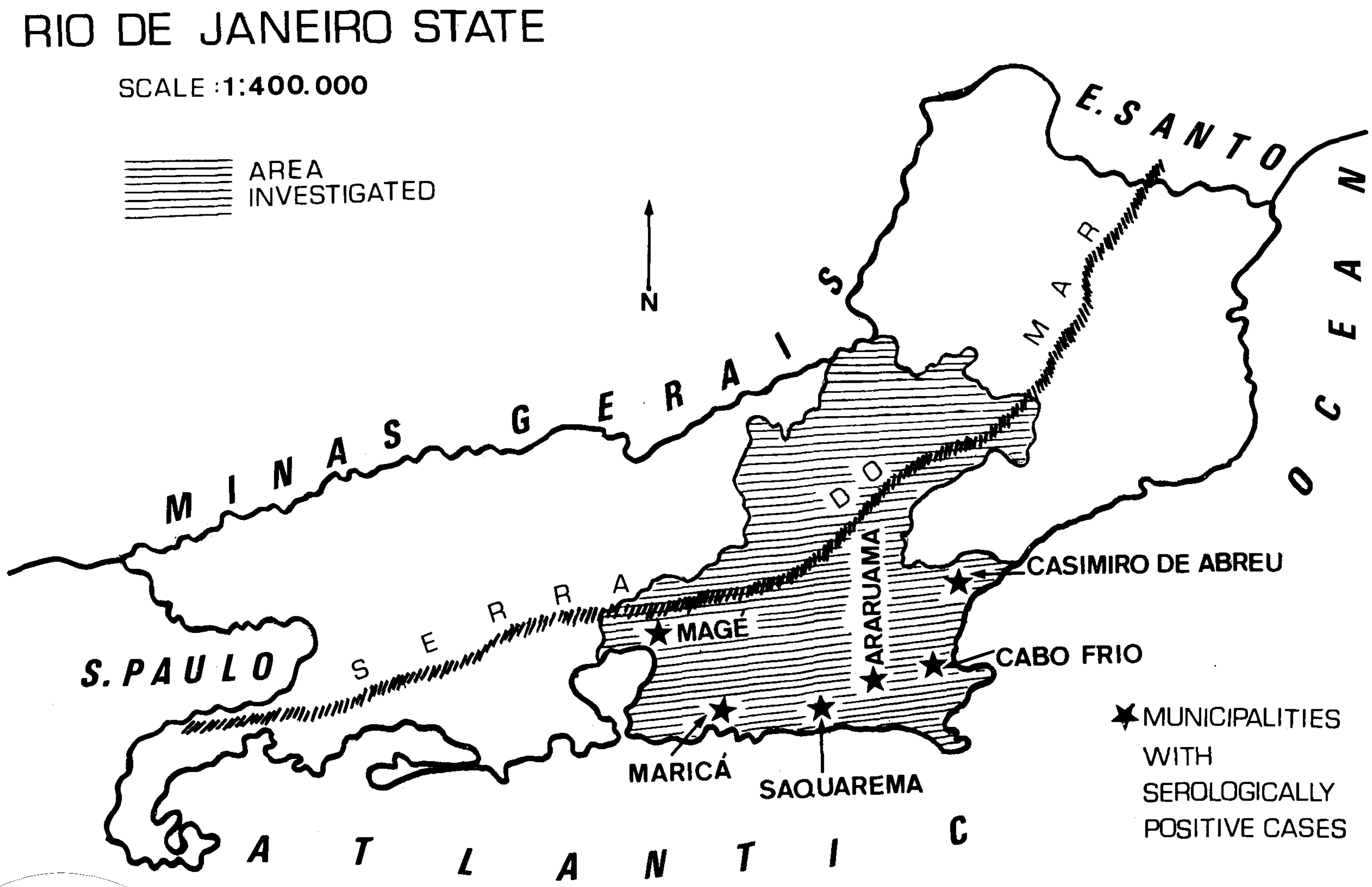
INTRODUCTION

Although the Rio de Janeiro State is not considered to be endemic for Chagas' disease, the presence of triatomine bugs, some infected with *Trypanosoma (Schizotrypanum) cruzi,* has been reported sporadically from various municipalities of the State in the past by Neiva & Pinto[12], Dias[7], Dias & Seabra[8], Lent[11], Bustamante & Gusmão[2], Coura[3], Coura *et al*[4,5], Coura and Petana[6], Aragão & Souza[1]. The serological incidence of the disease was also investigated in blood donors, and in a small segment of the population, in some of the municipalities[9,10,13,14,15]. However, these studies were on a small scale only, and furnished no sufficient or conclusive data of the epidemiological significance of the infection among the population.

A small focus of Chagas' disease was discovered recently in the village of Piranema, in the municipality of Duque de Caxias, about 30 Km distance from the city of Rio de Janeiro as described by Coura *et al*[5], Petana and Coura[13], and Coura and Petana[6]. Several houses in this village have been found infested by *Triatoma infestans,* of which many carried gut infection with *T. cruzi.* Human cases of Chagas' disease positive serologically and parasitologically (by xenodiagnosis), but with an asymptomatic form of the infection, were also discovered. It is believed that this isolated focus is autochthonous and of a little epidemiological importance.

---

* Departamento de Medicina Preventiva, Faculdade de Medicina, Universidade Federal do Rio de Janeiro, Caixa Postal 1859, Rio de Janeiro, Brasil
This work was supported by the Ministry of Overseas Development, London, the World Health Organization and the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) of Brazil.
Submitted to publication on 11.28.1975.


RIO DE JANEIRO STATE
SCALE :1:400.000
AREA INVESTIGATED
N
E. SANTO
MINAS GERAIS
SERRA DO MAR
S. PAULO
OCEAN
ATLANTIC
CASIMIRO DE ABREU
MAGÉ
ARARUAMA
CABO FRIO
MARICÁ
SAQUAREMA
MUNICIPALITIES WITH SEROLOGICALLY POSITIVE CASES

To gather more information on Chagas' disease, and its significance as a possible health problem in the Rio de Janeiro State, a meeting was arranged with the public health authority at Niteroi (former capital of Rio de Janeiro State), and it was decided to carry out a large-scale serological survey among school children in rural parts of the 3rd and 4th Health District of the State. The main purpose for the survey, however, was to establish the epidemiological importance of the infection in the juvenile segment of the rural population.

METHODS OF INVESTIGATION

The survey commenced in September 1973 and was concluded in July 1974. The collection of the blood samples was carried out by a medical field team from the Department of Endemic Diseases at Niteroi. The blood was obtained from a pierced finger tip and collected onto a filter paper disc. The samples were brought to our laboratory for screening by the indirect fluorescence test (IFT) for *T. cruzi* antibodies. After eluating the dried blood samples with phosphate-buffered saline solution (PBS), the samples were screened in batches of one hundred per day. Formolized culture forms of *T. cruzi* (strain Y-59) were used as antigen; the anti-human IgG immunoglobulin-isothiocyanate conjugate was obtained from the Wellcome Laboratory in England. Each sample found reactive by IFT was confirmed in serum by the complement fixation test (CFT). Each child with a positive serological test was subject to a detailed clinical scrutiny, and the house where the patient lived was searched for triatomine bugs. The team visited 168 schools in 20 municipalities and collected a total of 13,252 blood samples.

RESULTS

The number of schools visited in each of the municipalities, the number of blood samples taken, and the number found positive are summarized in table nº 1. The map of Rio de Janeiro State shows the area investigated; municipalities where serologically positive children have been discovered are marked with an asterisk.

Clinical examination of all the positive children revealed no symptoms suggestive of a clinical form of Chagas' disease in any of them, and in none of the houses where the patients lived have triatomine bugs been found.

CONCLUSION

The results obtained show that only in two of the municipalities, Magé and Araruama, there was a significant number of children with a positive serological test. It is of interest to note that a previous serological survey was carried out in these two municipalities by Dias *et al*[9] in 1953. From a total of 1,070 sera tested 6.16 per cent reacted positive, which is in close agreement with the results obtained from our investigation.

The overall small percentage of serologically positive children suggests that Chagas' disease in the Rio de Janeiro State is not a serious health problem, and it is most probable that the spread of the infection in the localities investigated has been halted, or possibly even eliminated. It may be assumed that the children have contracted the disease several years ago, when domestic triatomine bugs were known to occur in some of the localities, but were exterminated with insecticides and improved housing conditions.

ACKNOWLEDGEMENTS

We wish to thank the medical field team and the Department for Endemic Diseases at Niteroi, for the efficient and speedy collection of the blood samples. To the Ministry of Overseas Development in London, to the World Health Organization, and to the Conselho Nacional de Pesquisas of Brazil, we are gratefull for financial support. Our thanks are due to the laboratory staff for diligent assistance with screening of the blood samples.

Table 1 – Summarizing the results obtained from serological survey for Chagas' disease in school children in the Rio de Janeiro State.

Municipality	Total pupils	No. schools Visited	No. samples taken	No. positive
1 – Magé	11,843	12	2,005	57 (2.84%)
2 – Nova Friburgo	10,027	19	1,477	nil
3 – Itaboraí	7,833	12	1,041	nil
4 – Maricá	4,422	6	903	3(0.33%)
5 – Araruama	5,611	11	869	58 (6.67%)
6 – Cabo Frio	3,887	7	741	4 (0.53%)
7 – Cach. Macacu	4,856	10	740	nil
8 – Bom Jardim	2,758	13	654	nil
9 – S. P. Almeida	3,750	7	613	nil
10 – Saquarema	3,453	8	606	1 (0.16%)
11 – Casimiro Abreu	2,653	10	517	1 (0.19%)
12 – Rio Bonito*	5,142	8	593	nil
13 – Cantagalo	2,218	7	407	nil
14 – Cordeiro	2,153	8	394	nil
15 – Silva Jardim	2,357	11	328	nil
16 – Trajano Morais	2,082	5	287	nil
17 – S. Sebastião Alto	1,884	2	270	nil
18 – S. Maria Magd.	1,821	8	261	nil
19 – Duas Barras	1,298	2	191	nil
20 – Sumidouro	1,480	2	107	nil
Total	72,528	168	13,004	134 (1.0%)

Note* Additional 250 blood samples from the municipality of Rio Bonito were lysed by water, due to break of electrical power supply to the refrigerator, and unfit for the test.

RESUMO

Um inquérito sorológico pela reação de imunofluorescência indireta para doença de Chagas, foi realizado, incluindo 13.254 crianças de 168 escolas primárias sorteadas em 20 municípios do Estado do Rio de Janeiro. Os casos positivos pela imunofluorescência eram confirmados pela reação de fixação do complemento e submetidos a exame clínico, investigando-se em seguida suas residências quanto à existência ou não de triatomíneos.

Somente nos municípios de Magé e Araruama houve um número significativo de crianças com sorologia positiva. Do total de amostras estudadas somente 143 (1%) foram positivas pela imunofluorescência e confirmadas pela reação de fixação do complemento para doença de Chagas. Destas, 57 eram de Magé, 58 de Araruama, 4 de Cabo Frio, 3 de Maricá, 1 de Saquarema e 1 de Casimiro de Abreu..

Nenhuma das crianças examinadas clinicamente apresentava sinais ou sintomas importantes para a doença de Chagas e não foram encontrados triatomíneos em suas residências, admitindo-se que tenham sido infectadas acidentalmente ou pela existência no passado de triatomíneos domiciliares.

Embora a doença de Chagas não pareça um problema importante na região estudada, recomendam-se investigações em escala mais ampla, principalmente nos municípios de Araruama e Magé para esclarecer os percentuais de positividade sorológica alí encontrados e o mecanismo de transmissão da doença.

REFERENCES

1. ARAGÃO, M. B. & SOUZA, S.A. *Triatoma infestans* colonizando em domicílios da Baixada Fluminense, Estado do Rio de Janeiro, Brasil. *Rev. Soc. Bras. Med. Trop., 5;* 1971.

2. BUSTAMANTE, F.M. & GUSMÃO, I.B. – Sobre um foco de *Triatoma infestans* nos municípios de Rezende e Itaverá, Estado do Rio de Janeiro, *Rev. Bras. Mal. D. Trop., 5*: 23-28, 1953.

3. COURA, J.R. – Contribuição ao Estudo da Doença de Chagas no Estado da Guanabara. Thesis published in *Rev. Bras. Mal. D. Trop., 18:* 9-98, 1966.

4. COURA, J.R., TOSTA DA SILVA, C.E., VIÉIRA, W. & de FIGUEIREDO, N. – Um foco de doença de Chagas transmitida pelo *Triatoma infestans* na Baixada Fluminense, Município de Caxias, Estado do Rio de Janeiro, Brasil. *Rev. Soc. Bras. Med. Trop., 5:* 123-129, 1971.

5. COURA, J.R. FERREIRA, L.F. & RODRIGUES DA SILVA, J. – Triatomineos no Estado da Guanabara e suas relações com o domicílio humano. *Rev. Inst. Med. Trop. São Paulo 8:* 162-166, 1966.

6. COURA, J.R. & PETANA, W.B. – Additional data on the epidemiology of Chagas' disease in the municipality of Caxias, Rio de Janeiro State, Brazil. *Rev. Soc. Bras. Med. Trop.* (in press).

7. DIAS, E. – Presença do *Panstrongylus megistus* infectado por Schizotrypanum no Rio de Janeiro, D.F. *Mem. Inst. Oswaldo Cruz, 38:* 177-180, 1943.

8. DIAS, E. & SEABRA, C.A.C. – Sobre o *Trypanosoma conorrini* do rato transmitido pelo *T. rubrofasciata.* Presença do vetor infectado na cidade do Rio de Janeiro. *Mem. Inst. Oswaldo Cruz, 39:* 301-329, 1943.

9. DIAS, E., LARANJA, F.S., GUIMARÃES F.N. & BRANT, T.C. – Estudo preliminar de inquérito sorológico-electrocardiográfico em populações não selectionadas de zonas não endêmicas de doença de Chagas. *Rev. Bras. Mal. D. Trop. 5:* 205-210, 1953.

10. FERREIRA, L.F., COURA, J.R., NOGUEIRA, E.S., GALVÃO, F., LEME LOPES, M.B. & SILVA, J.R. – Inquérito sorológico sobre a doença de Chagas em doadores de sangue do Instituto de Hematologia Arthur Siqueira Cavalcante do Estado da Guanabara – *Vida Medica, 30*: 1-5, 1963.

11. LENT, H. – Transmissores da Moléstia de Chagas no Estado do Rio de Janeiro. *Rev. Flum. Med., 6:* 3-13, 1942.

12. NEIVA, A. & PINTO, C.F. – Dos Reduvídeos hemotófagos encontramos no Distrito Federal e Estado do Rio de Janeiro. *Bras. Med., 37:* 37-45. 1923.

13. PETANA, W.B. & COURA, J.R. – Experimental studies on *Trypanosoma (Schizotrypanum) cruzi* strains isolated from man, from animals and from triatomine bugs in Brazil. *Rev. Soc. Bras. Med. Trop., 8:* 315-323, 1974.

14. RODRIGUES DA SILVA, J. & QUEIROZ, G. – Investigações sobre a Doença de Chagas no Distrito Federal. Inquérito sorológico entre acadêmicos de Medicina. *J. Bras. Med. 2:* 483-488, 1960.

15. RODRIGUES DA SILVA, J., COURA, J.R. & QUEIROZ, G. – Investigações sobre a Doença de Chagas no Estado da Guanabara. Inquérito sorológico entre doadores de sangue e pacientes de ambulatório. *Arq. Bras. Med. 51:*35-38, 1961.