BRIEF REPORT

Urbanization of Chagas' Disease: the SOSPEECHA Survey

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SUMMARY

Background
Urbanization of Chagas' disease is a consequence of the significant rural-urban migration to the capital of the country and to the province of Buenos Aires, which has taken place during the last 30 years, producing alterations in the vector transmission of the infection. Efforts should focus on preventing Chagas' disease transmission from infected patients living in non-endemic areas.

Objectives
The aim of this study was to conduct a school survey to assess the epidemiological status and the prevalence of Chagas' disease in non-endemic regions.

Material and Methods
From May to October 2006, eight public schools were surveyed. The statistical procedure was descriptive, indicating frequency and percentages, and statistical significance was determined by the chi-square test. A p value <0.001 was considered statistical significant.

Results
Data from 1,293 children and their households were obtained. Eighty four percent of students were born in the province of Buenos Aires. Among the mothers, 43.8% were native of endemic provinces and 9.8 % were born in endemic countries. According to the survey, the prevalence of the disease was 13.8%.

Conclusions
The survey confirmed the epidemiological impact of Chagas disease in the region. Discrepancies with other indexes suggest that each region should be evaluated individually as they depend on multicausality.

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Key words > Chagas Disease - Surveys - Epidemiology - Prevalence

BACKGROUND

It is almost 100 years since Carlos Chagas described this endemic parasitic disease, which affects millions of people in most Latin American countries, including the south of USA, and is the cause of 45000 deaths per year. (1) At present, it remains as an emblematic disease and one of the most compromising health care issues to solve. In our country "approximately", 2.500.000 people are infected and "probably" 625.000 are ill. (2, 3) It should be noted that the last surveys were conducted on citizens called for Compulsory Military Service. According to the last registries, the mean prevalence of positive serology for Chagas disease was 10.3%, giving an idea of the magnitude of the problem. (4) This situation is associated with a certain profile of the populations at risk. (5) These populations are extremely poor, and their inhabitants migrate to urban centers searching for better conditions of life or job opportunities. Large-scale population movements from rural to urban areas of the city of Buenos Aires and the province of Buenos Aires have occurred during the last 30 decades. In this way, the normal pattern of vectorborne transmission in endemic areas has changed towards the fourth cycle or urbanization of Chagas disease.

In response to these changes, we should focus our efforts on the patient with Chagas' disease; (6) in this way prevention seems an adequate strategy in non-endemic areas. The role of the educational community is to provide education to chagasic patients, make them become aware of their condition and help them participate in different activities in order to eradicate or control the disease (6). (7)

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The objectives of the present study were as follows:

1. To conduct a school survey in order to obtain information about the status of Chagas disease in the district of Pilar and its association with rural-urban migration. To estimate the prevalence of the disease in the region, and to compare the results with other indexes. To mark the epidemiological importance of different variables, such as the places and types of housings where the mothers were born, history of maternal blood transfusions, and to highlight their association with relatives with Chagas' disease who live together in the area of the study.
2. Data were retrieved from different schools, and the educational community was trained in order to work with the medical team to make students, their relatives and the whole population aware of the public health and social problems of Chagas disease.

MATERIAL AND METHODS

The survey was conducted in Pilar, a district localized at the north of the Province of Buenos Aires, 50 kilometers from the capital city of the country, with a population of 233.434 inhabitants according to the 2001 Population Survey and a school registration of 50.050 students in 2006. Students had to fill in a card named **SOSPEECHA (*Serie Originada Según Población Estudiantil Encuestada en CHAgas,*** Series from a School Population Survey in Chagas Disease) (Figure 1). Students with a relative with Chagas' disease were invited to bring the corresponding documentation certifying this condition; this requirement was useful to obviate expensive serological tests, avoiding difficult procedures at the Ministry of Education. Nevertheless, the survey would provide considerable information.

Statistical analysis

Descriptive statistical procedures were used, and frequencies and percentages were reported. Qualitative variables were expressed in percentages, and statistical significance was determined by Pearson's chi square test. A p value < 0.001 was considered statistically significant.

The analysis was performed with statistical programs SP55 version 12 and Med Calc.

SOSPEECHA Survey
(Series Obtained in a School Survey about Chagas Disease)

Date: ..... Order number: .....

1. Student:

Surname and name: .....

Age: ..... Gender: .....

Adress: .....

City: ..... Province: .....

Curse level: .....

School name and address: .....

.....

2. Epidemiological data (Student):

Place of birth

City: .....

Province: ..... Country: .....

Relative with Chagas' disease: No .... Yes(*) .

Kinship (**) .....

Can identify the kissing bug and is aware of its association with Chagas' disease: No .... Yes .....

3. Mother's place of birth:

City: ....

Province: ..... Country: .....

Chagas' blood test: No .... Yes(*) .

Relative with Chagas' disease: No .... Yes(*) .

Can identify the kissing bug: No . Yes .....

Has received a blood transfusion: No . Yes .....

Type of housing at place of birth:

Brick and cement house (masonry) .....

Adobe-walled house (clay) ..... Prefabricated house .....

* Present certificate. ** Parents, siblings, grandparents, uncles and aunts

Fig. 1. SOSPEECHA survey card

RESULTS

Data from 1293 students were obtained from March to October 2006. Mean age was 18.06 years and 63.3% were girls. The most relevant data are as follows: 84.9% of students are native from the province of Buenos Aires with 11% of families migrating from typically endemic provinces. Among mothers, 43.8% were born in endemic provinces (Table 1) and 9.4% in neighbor endemic countries. The prevalence of serological screening for Chagas' disease (performed for a pre-employment examination, migration procedures, or before donating blood) in mothers and households was 16.2%. Urbanization of Chagas' disease is evident as 13.8% of students and households confirmed this condition. The epidemiological impact of Chagas' disease in Pilar is important (Figure 2). We researched the place of birth of the mother and relative with Chagas' disease and we observed a close relationship and a grater proportion of chagasic relatives in mothers born in the northwest of the country. We also analyzed the relationship housing/Chagas' disease and we found a significant association ($p < 0.0001$) between the kind of housing in mother's place of birth and the presence of a "relative with Chagas' disease": 39.1% of mothers had lived in adobe-walled houses, 21.7% in prefabricated homes and only 12% in brick and cement houses. Another positive association ($p < 0.0001$) was found between mothers who had received a blood transfusion and the presence of a "rela-

Table 1. Mother's province of birth

	Frequency N =	Percentage	Cumulative percentage
Not available	190	14.7	14.7
Buenos Aires	538	41.6	56.3
Catamarca	7	0.5	56.8
Chaco	83	6.4	63.3
Córdoba	19	1.5	64.7
Corrientes	78	6.0	70.8
Entre Ríos	79	6.1	76.9
Formosa	16	1.2	78.1
La Pampa	6	0.5	80.1
La Rioja	3	0.2	80.6
Mendoza	16	1.2	80.8
Misiones	55	4.3	82.1
Neuquén	1	0.1	86.3
Río Negro	3	0.2	86.4
Salta	25	1.9	86.6
San Juan	6	0.5	88.6
San Luis	15	1.2	89.0
Santa Fe	36	2.8	90.2
Santiago del Estero	57	4.4	93.0
Tucumán	34	2.6	97.4
Total	**1.293**	**100.0**	**100.0**

tive with Chagas' disease": 26.9% versus 12.4% in mothers who had not received a blood transfusion and had a "relative with Chagas' disease". These numbers show that the risk of transmitting Chagas' disease is high in institutions where specific serological tests are not available or under certain situations of emergency. (8)

DISCUSSION

As similar surveys in the region are missing these results cannot be compared; the information available comes from studies of seroprevalence in students and is limited to that population; (9) other surveys were carried out in other highly endemic provinces and are therefore not comparable. (10)

Finally, do reference seroprevalence indexes used in blood banks reflect the epidemiological situation of an area? In this sense, we believe that the survey provides basic information useful for planning preventive measures that are adequate for the region assessed. The real dimension of Chagas' disease in a non-endemic region is clear by relating that half of the survey-respondents' mothers were born in endemic provinces or in high-endemicity neigbor countries; in addition, 13.8% of people confirmed to be carriers or ill.

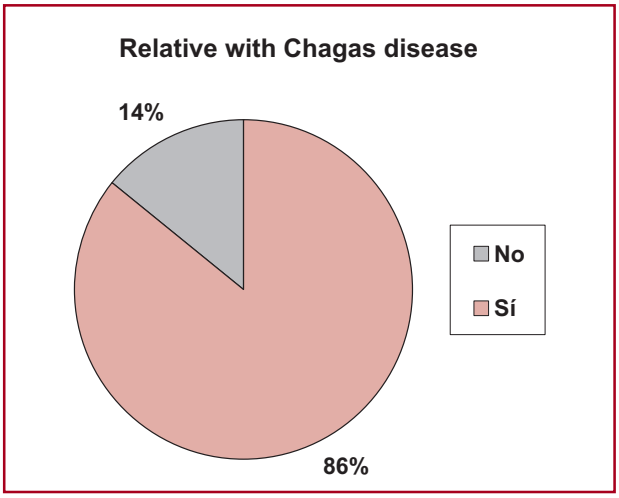

Fig. 2. Confirmed Chagas disease in students and households.

The diagnosis of a relative with Chagas' disease was confirmed with a medical certificate; however, the absence of serological testing in all the relatives for the diagnosis of undetected Chagas disease is a limitation of this study.

CONCLUSIONS

A school survey is useful to show the epidemiological profile of Chagas' disease in non-endemic regions and its relationship with urban-rural migrations. Regional blood bank registries report a prevalence of 4.3% that does not seem to be a valid number at the time of developing preventive programs. Discrepancies between both indexes suggest that each region should be evaluated individually as they depend on multicausality.

Finally, we should be concerned about the magnitude of these indexes and develop the corresponding programs to prevent the advent of vectorborne acute Chagas' disease, as the presence of triatomine bugs, a frequent finding in this region of the province of Buenos Aires, is a potential threat.

RESUMEN

Introducción

Las grandes corrientes migratorias que han poblado la Capital Federal y la provincia de Buenos Aires durante los últimos 30 años fueron alterando el patrón habitual de transmisión vectorial de las áreas endémicas para constituir el cuarto ciclo o urbanización de la enfermedad de Chagas. En respuesta a estos cambios, los esfuerzos deben centrarse en el paciente chagásico; de este modo, la prevención del sus-

ceptible surge como una estrategia adecuada en áreas no endémicas.

Objetivos
Obtener información de la situación epidemiológica de la enfermedad de Chagas en región no endémica a partir de una encuesta escolar y estimar su prevalencia.

Material y métodos
Se encuestaron ocho escuelas públicas, de mayo a octubre de 2006. El procedimiento estadístico fue descriptivo, con indicación de frecuencia y porcentajes; la significación estadística se determinó con la prueba de chi cuadrado. Se consideró de significación estadística un valor de $p < 0,001$.

Resultados
Se obtuvieron datos de 1.293 alumnos y su grupo familiar. El 84,9% (alumnos) nacieron en la provincia de Buenos Aires. El 43,8% (madres) son nativas de provincias endémicas y el 9,8% provienen de países endémicos. La prevalencia de acuerdo con la encuesta fue del 13,8%.

Conclusiones
La encuesta confirmó el impacto epidemiológico de la enfermedad de Chagas en la región. La discrepancia con otros índices sugiere que cada región se debe evaluar en forma individual, ya que responden a la multicausalidad de los factores que intervienen.

Palabras clave > Enfermedad de Chagas - Encuestas - Epidemiología - Prevalencia

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