Revista da Sociedade Brasileira de Medicina Tropical 49(2):245-247, Mar-Apr, 2016
http://dx.doi.org/10.1590/0037-8682-0340-2015

Short Communication

New cases of Chagas disease in a rural area of Northeast Brazilian

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ABSTRACT

Introduction: Chagas disease is considered one of the 17 most neglected tropical diseases in the World, with the most common form of vector transmission. **Methods:** This structured cross-sectional study was conducted through an epidemiological survey in the Tobias Barreto municipality of Sergipe. **Results:** Of the 255 participants, 1 (0.4%) participant was positive for human Chagas disease. Approximately 30.2% of the participants found the triatomine bugs in their houses and outbuildings. **Conclusions:** The detection of a case indicated transmission, which was also evidenced by the presence of triatomines and poor housing conditions.

Keywords: Chagas disease. Triatominae. Serology.

The incidence of human Chagas disease in Latin American countries is estimated at 6-7 million people[1]. The high costs for its treatment in the chronic phase have been a burden on public health systems because of the progressive impairment of the cardiac and digestive forms of the disease[2].

Triatomines are the primary source of transmission and are the vectors responsible for maintaining the sylvatic cycle of the disease. An increased risk of vector-borne transmission is associated with rural areas where the proximity of humans to wild environments favors vector contact.

The risk of transmission is high in Sergipe due to the endemicity of triatomines infected by *Trypanosoma cruzi* in the region; entomological data from the Central Public Health Laboratory of Sergipe [*Laboratório Central de Saúde Pública de Sergipe* (LACEN-SE)] for the years 2005-2014 motivated the selection of the area. Approximately 168 triatomines sent from the Tobias Barreto municipality were examined. Of these, 81 (48%) were found in the villages of Poço da Clara and Alagoinhas, and 43 (25%) were infested. The regional epidemiologic background was that of a high prevalence of Chagas disease in State of Sergipe (5.9%) based on a national serological survey conducted in 1980; this prevalence is higher than the national average of 4.2%.

This study investigated the presence of human Chagas disease via a quantitative cross-sectional and structured epidemiological survey that was conducted in the villages of Alagoinhas and Poço da Clara, in the Tobias Barreto municipality, Sergipe State.

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Received 20 November 2015
Accepted 18 January 2016

Some areas in the villages were visited to evaluate the physical characteristics of the housing; some buildings had reformed physical structures. However, older facilities were maintained consisted of mud houses adjoined to the main houses, used as storage areas for food and materials or as shelter for small pets (**Table 1**).

TABLE 1 - Socioeconomic and demographic characteristics of the inhabitants who were serologically evaluated for Chagas disease in the Poço da Clara and Alagoinhas villages of Tobias Barreto in Sergipe, 2014.

Variable	Number	Percentage
Type of housing		
masonry walls	11	82.7
wooden walls	7	2.7
mud walls	4	5.5
mixed walls	6	2.3
did not answer	7	6.6
tile roof	63	64.0
straw roof	1	4.3
did not answer	1	31.7
Awareness of the presence of triatomines		
no	131	51.3
yes	123	48.2
did not answer	1	0.4
Living with domestic animals		
no	153	60.0
yes	99	38.8
did not answer	4	1.5
Total	**255**	**100.0**

After the educational lectures about the risks of transmission of disease and disorders, participants were randomly selected and voluntarily provided informed, written consent and completed a questionnaire about socio-economic and demographic factors, to identify the variables related with transmission risk. Blood samples collected by peripheral venous puncture were centrifuged at the collection site after ten minutes of sedimentation, stored in ice coolers, and transported to the laboratory for clinical analysis at the University Hospital - Federal University of Sergipe. Serum was pipetted and deposited in Eppendorf tubes and numbered according to the participant's identification number on the questionnaire. These samples were sent to LACEN and analyzed using enzyme immunoassay (ELISA) for immunoglobulin G (IgG) *anti-T. cruzi* qualitative analysis and indirect immunofluorescence antibody (IFA) testing in human serum according to the protocol[3][4][5][6][7]. All samples were analyzed by a single professional in LACEN, who strictly followed the manufacturers' instructions.

Nine samples were classified as indeterminate, and blood was collected from these cases again according to the protocol[5]. Three remained indeterminate and were sent by LACEN-SE to the Ezequiel Dias Foundation-MG, which is a reference laboratory, for analysis by three serological tests [enzyme-linked immunosorbent assay (ELISA) and indirect immunofluorescence (IFI)] and indirect hemagglutination (IHA).

Of the 700 inhabitants in both localities, the sample consisted of 255 individuals; of these, 145 (56.9%) women, 110 (43.1%) men, aged 0-85 years: n = 24 (9.4%), 0-10 years old; n = 47 (18.4%), 11-20 years old; n = 68 (26.7%), 21-40 years old; and 116 (45.5%), 41-85 years old. The average time residing in the localities was 27 years.

Approximately 81 (31.8%) of the participants found triatomines in their households and outbuildings; 55.8% of the insects were found in the house but outside the bedroom. Fifteen (5.8%) of the participants underwent a blood transfusion. Only one participant reported being bitten by the insect; this participant was living in a mud house in the Alagoinhas village, with animals in the household, had not had a blood transfusion, and reported finding triatomines inside the house but outside of the bedroom. His serology for *T. cruzi* was negative.

Based on the serology analysis in the first stage of the study, 1 (0.4%) participant was positive for Chagas disease, 3 (1.1%) participants had indeterminate results, and 251 (98.4%) participants were non-reactive. The infected participant was a 60-year-old male farmer who was illiterate, had not had a blood transfusion, lived with animals in the household, did not find triatomines inside the house, and was not aware of having been bitten by an insect. New samples were collected from this participant, which were indeterminate; the tested samples were sent to and tested in the reference laboratory and were negative for Chagas disease.

The three participants with indeterminate results from the first two samples were men with a mean age of 48.66 years; one each was a student, retired, and a farmer. One was illiterate, and two had completed elementary school. One of the participants had undergone a blood transfusion. All lived with animals in the household, resided for >5 years in the locality, and found triatomines inside the household and in the outside surroundings; none of these participants were aware of being bitten.

Despite the limited number of residents who were positive for Chagas disease in the study area, the findings demonstrate the existence of vector-borne transmission in one individual in the chronic phase of the disease. The estimated seroprevalence for the Northeast region of Brazil is 3 %[8]; the data obtained in the present study suggest disease underreporting that is evidenced by the presence of triatomines and poor housing conditions.

The correlations between the risk factors for disease transmission and sero-reactivity were significant for residing in the area >5 years, mixed housing, and coexistence with animals inside the household. Populations living in rural areas with low social and economic conditions, substandard housing, and triatomine movements from their wild environment are at an increased risk of infection[9]. These characteristics were observed in the surveyed villages in the present study **(Figure 1)**.

FIGURE 1 - Mud house.

The sero-reactive participant reported previously living in a mud house for >10 years, suggesting that housing type is a risk factor for disease transmission. This information was not collected through the questionnaire because the question about the type of housing was for current housing and not previous housing.

The presence of animals in the household, which increase the chance of vector exposure, was reported by 38.8% of the participants. The presence of small animals represents a permanent food supply for insects, maintaining the domestic cycle of the disease. A recent study demonstrated high infestation rates of *Panstrongylus megistus* (17.5%) captured in households in one municipality in the South Central region of Sergipe[10]. Another study showed an association between *Panstrongylus megistus* and small wild mammals, and the authors suggested that the proximity between dwellings and

natural foci vector infestation may have contributed to the presence of infected cases[11].

Vector-borne transmission, which is estimated as affecting approximately 400,000 cases/year worldwide, can be interrupted[12]. Only one case was detected in the present study; however, the involvement of wild and domestic reservoirs in the transmission in the region should be evaluated further.

Ethical Considerations

The present study is a sequence of another study of Chagas disease in the region and was allowed to continue under its previous approval (protocol number Certificate of Presentation for Ethical Consideration, CAAE - 6165.0.000.107-10) by the Research Ethics Committee of the *Hospital Universitário da Universidade Federal de Sergipe* (HU/UFS). It was conducted according to the established ethical standards. Regulatory guidelines and standards for research involving human beings were following according to the National Health Council Resolution 466/2012, to safeguard the rights and welfare of the participants.

ACKNOWLEDGMENTS

We thank all who contributed to the development of this study.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

FINANCIAL SUPPORT

The research was funded with the researcher's own resources.

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