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Short Communication

Using a Chagas disease hospital database: a clinical and epidemiological patient profile

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Abstract

Introduction: Chagas disease (CD) prevention and control rely on studies of its distribution, characteristics of individuals affected and mode of transmission. CD data in Brazil are scarce; a retrospective analysis of the clinical characteristics of 80 patients treated at the Clinical Hospital of UNICAMP, Campinas, Brazil, was performed. **Methods:** Patient data records were analyzed. **Results:** Thirty percent of the patients probably got infected through vector-borne transmission, 65% came from endemic areas, a predominance of cardiac and cardiodigestive forms was found among males, and the cardiac form prevailed (51%). **Conclusions:** The results update the view on the epidemiology of CD in Campinas, Brazil.

Keywords: *Trypanosoma cruzi*. Chagas disease. Clinical forms.

Chagas disease (CD) is an illness caused by a protozoan, *Trypanosoma cruzi*. It is estimated that 8 million people are infected with this parasite worldwide[1]. CD is considered endemic in the American continent, being a major public health problem in Brazil and Latin America. Despite the significant number of people infected and at risk of acquiring the disease, CD is still considered a neglected disease. This fact is due to the lack of attention from governments and health agencies together with the fact that CD affects people living in low-income areas[1]. Due to the increase in immigration this disease has been reported in non-endemic areas, such as North America and Europe[2].

Vector-borne transmission is the most common mode of acquiring the disease, but CD can also be transmitted by blood transfusion, vertically from mother to child, contaminated food (such as *açaí* and sugar cane juice), organ or bone marrow transplant, and laboratory accidents[1,3]. In recent years, CD oral transmission has been a major concern, especially in the Amazon region of Brazil, where it is now the main form of transmission[3].

After 1 to 2 weeks, or 20 to 40 days after patient infection by vectorial transmission or blood transfusion, respectively, a rarely identified acute phase is seen[4]. The diagnosis in this phase is based on the direct observation of the parasites in the blood, due to their abundance in the peripheral blood[4,5]. After this period, there is a decrease in the amount of circulating blood parasites, which characterizes the chronic phase of the disease. At this stage, the illness is divided into four clinical forms: digestive, cardiac, cardiodigestive, and indeterminate[4]. During the chronic stage, in order to confirm the diagnosis anti-*T. cruzi* IgG has to be detected by two distinct serologic tests, which can be chosen from enzyme-linked immunosorbent assay (ELISA), indirect hemagglutination (IHA), or indirect immunofluorescence assay (IFA)[5]. Other methods can be used during this stage, such as molecular biology techniques in cases of doubtful serology results.

Since 1992, Brazil and other Southern Cone countries, such as Chile and Uruguay, began an initiative to eliminate the main insect vector, *Triatoma infestans*. Chilean and Uruguayan lands were certified as being free of vector transmission in 1999 and 1997, respectively[6]. Only in 2006 Brazil received the international certificate of elimination of CD transmission by this vector, which was awarded by the Pan American Health Organization. Studies on the prevalence rate of chronic CD cases are not abundant in Brazil and the few available have mainly focused on a single clinical form[7] or associated with patient characteristics[8]. Current information on the distribution of the disease in a country, the characteristics of individuals affected, and the clinical form and mode of transmission are of utmost importance to facilitate research, disease detection, and to provide data to increase disease control and prevention.

In this sense, the data records of 80 patients were randomly selected from scheduled appointments in the Chagas Disease

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Study Group (GEDoCh), which provides assistance to CD patients at the Clinical Hospital of UNICAMP, Campinas, São Paulo, Brazil. After approval by the Institutional Ethics Committee at UNICAMP (protocol number (35510214.7.0000.5404) data records were collected at the Medical Archives of the Hospital, organized in graphs, and analyzed descriptively. Statistical analysis was conducted using χ^2 tests, where the significance level was set at 5%. The patient inclusion criteria were having positive serology for CD and medical care from 2010 to 2015. The professionals followed procedures that are in accordance with standards and protocols previously established by competent bodies, such as the National Secretariat of Health Surveillance / Ministry of Health, Brazil[5]. Through medical care, electrocardiography, and radiographs of the chest, esophagus, and colon, the patients were classified into distinct CD clinical forms. The criteria used to evaluate the progression of the disease were also in accordance with standards and protocols previously established by competent bodies, such as the National Secretariat of Health Surveillance / Ministry of Health, Brazil[5].

Individuals were predominantly between 50–70 years old. It is understood that most patients sought treatment only when the symptoms began to arise, due to the high prevalence of symptomatic cases in the records of the patients analyzed. Those who remained asymptomatic (21%) reached GEDoCh through the blood banks of their respective birth regions or were referred from other hospitals.

Combined with their ages, the birth region of the patients was predominantly in Southeastern Brazil, most likely due to the proximity of Campinas to the region where these patients lived (65% of patients lived in or near Campinas, and most of them were from the endemic areas in São Paulo or Minas Gerais).

The predominance of advanced age among patients was probably due to the control practices of the triatomine vector, which occurred during the late 80s and early 90s. Oliveira-Marques et al[9] also showed that the age of infected people among 163 blood donors ranged from 18 to 63 years, in which 65% were male. Furthermore, Teixeira et al[10] evaluated the clinical profile of 43 patients, and found that 63% were over 40 years, and that 28% were female and 72% male. In this study, the higher proportion of male patients was attributed to the greater exposure and contact with the environment due to occupational activity, which requires them to enter and establish housing in natural habitat areas of CD vectors[10].

The majority of the patients reported that family members and relatives had also been diagnosed with CD. The information regarding contact with the vector, living in an endemic area, and type of residence was not found in all the records, although through the patient clinical interview, it was possible to determine that the majority of the patients were not sure how they got infected (**Figure 1**). Approximately 25% reported seeing the vector around their residence and only a few of them (around 5%) had contact with the vector (**Figure 1**).

However, only one patient remembered being bitten by a triatomine at the age of 5 years. Another patient reported being infected through blood transfusion at two months of age in 1987, prior to CD control in blood banks, as mentioned above. In the study conducted by Bozelli et al[11] in 32% of the records as the mode of transmission of the disease, 53% reported the presence of triatomines at home and 3% had previously received blood transfusion; however, 43% had not received blood transfusions and were unaware of the vector[11].

In relation to treatment, among the 80 patients analyzed, only 29% were treated with benznidazole, but 13% of them did not adhere to treatment due to the occurrence of side effects.

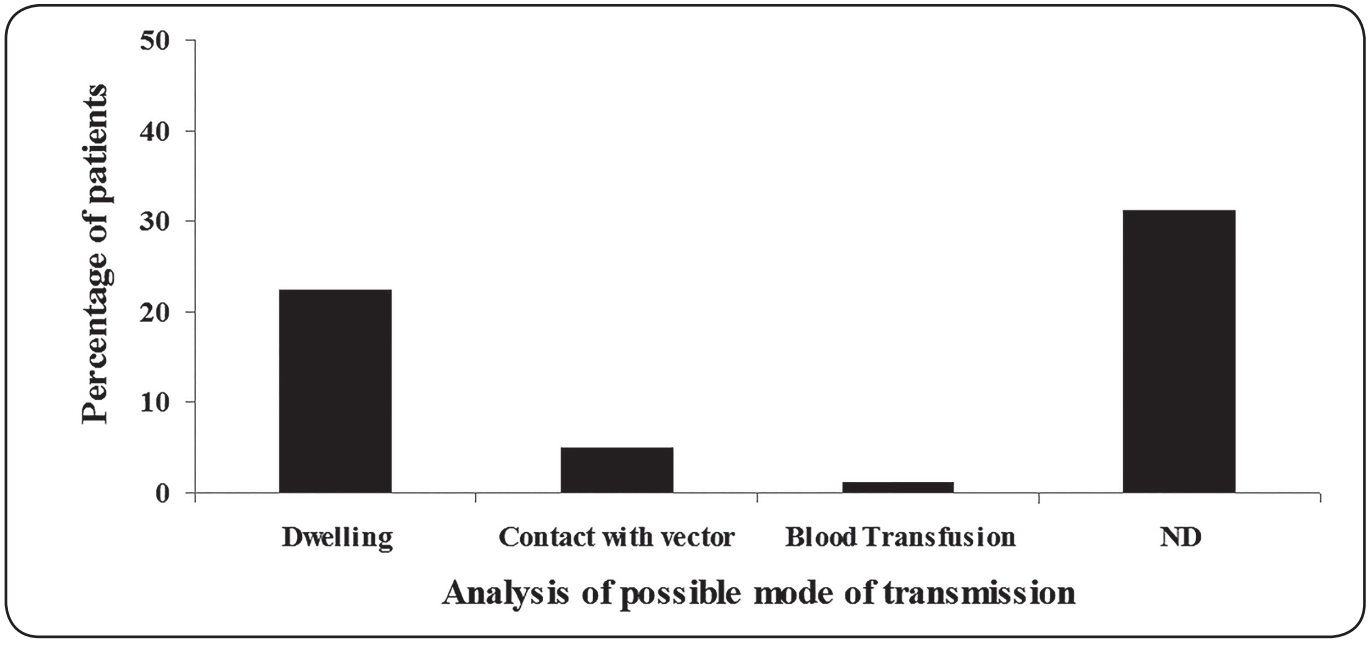

FIGURE 1: Data regarding possible mode of transmission according to the report of the patients analyzed. **ND:** not determined.

Unfortunately, benznidazole can lead to considerable collateral effects in some patients, especially older ones[12]. Benznidazole (manufactured nowadays by the Laboratório Farmacêutico Estatal / Brasil) is the only drug currently used in Brazil for the treatment of CD. Treatment is formally prescribed for patients with acute or congenital forms of the disease or reactivation, although for adults with the chronic phase, aged 19–50 years, treatment should also be prescribed. Interestingly, in patients with cardiomyopathy, the attenuation of clinical cardiac deterioration could not be observed. However, when benznidazole is used before the appearance of the clinical conditions, the treatment seems to prevent the occurrence of electrocardiographic alterations[13].

The diagnosis of CD can be made by several parasitological, serological, and molecular methods. In the chronic phase, characterized by low parasitemia, the diagnosis is essentially serologic and should use two tests with different principles: one with a high sensitivity such as ELISA or IFA, and another with high specificity, for example the IHA[5]. The results show that almost all the patients were diagnosed with the disease by ELISA/IFA. Analysis of the parasite in blood was performed in 3 patients; however, this diagnostic method is unusual because the incidence of acute infection has decreased substantially since the interruption of transmission by vectors and blood transfusions in most Latin American countries[14,15]. Among the analyzed medical records, three patients (4%) were subjected to a fresh direct blood test but, of those, only one returned positive. The three predominant sets of serological methods employed by the Hospital are ELISA / IFA, Carbonylmetalloimmunoassay (CMIA) / IFA, and complement fixation (CF) / IFA. The majority of the patients (81%) were diagnosed by ELISA/IFA (**Figure 2**). CMIA and IFA methods were used in fourteen (18%) of the patients studied. Among the total data records analyzed, 76 patients (95%) were considered reactive according to the serological tests adopted. In four cases (5%) of this study, the polymerase chain reaction (PCR) was essential to confirm the diagnosis. In a study analyzing 95 patient records, serology was confirmed in 28% by indirect immunofluorescence, 28% by ELISA, 7% by IHA and in 36% the method used were not described[11]. In case of doubt, as in the four cases described in the serological test, it is possible to perform the PCR[12], to access cure control in areas where there is no infestation by *Trypanosoma rangeli*, which shares 60% of its antigens with *T. cruzi*[5].

Analyzing the data records in the most recent diagnosis, 24% of the patients monitored had the indeterminate form of the disease. The cardiac manifestation of the disease was the most common clinical form found (51%), while the digestive form was found in only 10% of cases, and the cardiodigestive form in 15% (**Figure 3**). It was observed that on average, 18 years after being diagnosed with one of the CD clinical forms, some of the patients (11%) evolved to another CD manifestation. In this regard, among the 31% of the patients firstly diagnosed in the indeterminate form of CD, 12% progressed to cardiac, 8% to digestive, and another 8% to the cardiodigestive forms of the disease. However, most of them (72%) remained in the indeterminate form. Furthermore, of the patients diagnosed with the cardiac or digestive forms (59%), only 4% evolved to the cardiodigestive form.

Regarding clinical manifestation, it is known that the digestive form is mainly observed in countries of South America[14,15], and represented 10% of the analyzed records. In parallel, it is noteworthy that, to confirm the diagnosis, a clinical, epidemiological, and serological association has to be considered. In those cases that required PCR, epidemiology

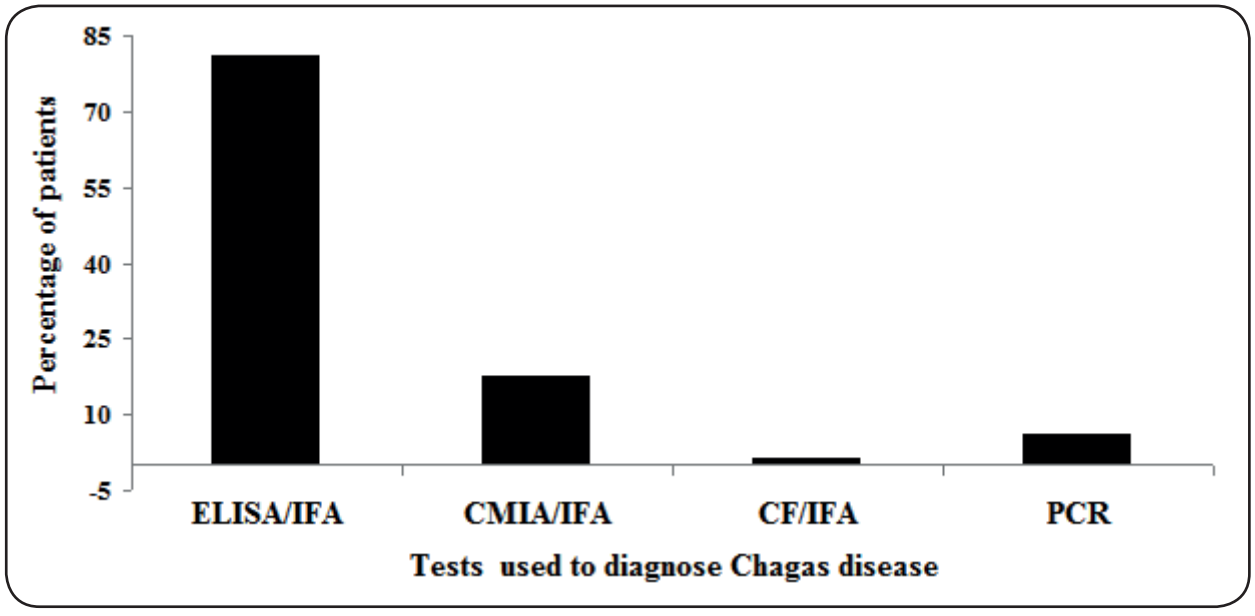

FIGURE 2: Tests used to diagnose Chagas disease according to the records analyzed. **ELISA:** enzyme-linked immunosorbent assay; **IFA:** indirect immunofluorescence assay; **CMIA:** Carbonylmetalloimmunoassay; **CF:** complement fixation; **PCR:** polymerase chain reaction.

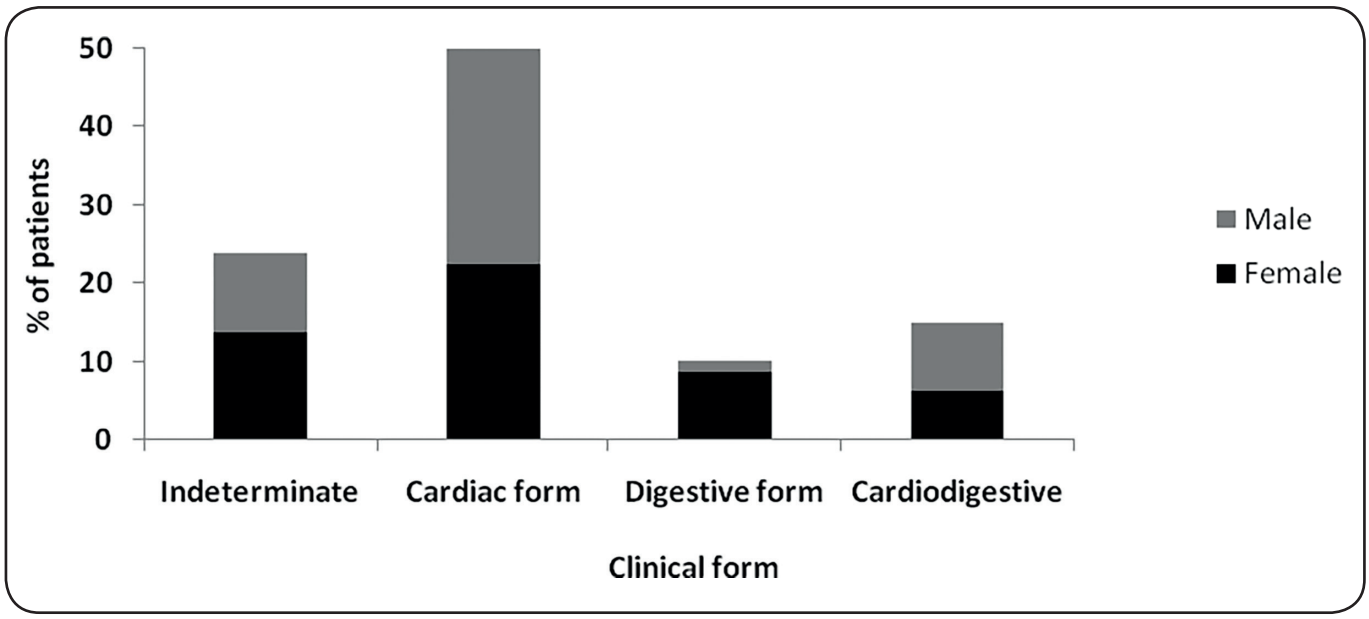

FIGURE 3: Correlation between gender and clinical form of Chagas disease among the patients whose data records were analyzed.

and clinical features indicated that the patients had the disease despite the negative serological tests. Bozelli et al[11] also found that the cardiac form was the most prevalent (39%), followed by digestive (26%), indeterminate (20%), and cardiodigestive (15%) forms. Nevertheless, in 57% of patients, the presence of comorbidities was identified[11].

Interestingly, when the difference in the gender of the 80 patients was analyzed, a significant correlation between the developed symptomatic clinical form and the gender of the patient was positively associated ($p<0.001$), where a predominance of the cardiac and cardiodigestive clinical manifestations was found among male patients (**Figure 3**). de Oliveira-Marques et al[9], when comparing the clinical forms of CD with age, observed that the chronic cardiac form had lower frequency in patients younger than 30 years (2%). Also, in this study, when the clinical form was compared to the gender, the chronic cardiac form was recorded in 33% of female patients and in 41% of male patients[9], corroborating our findings.

In summary, according to the data obtained, studies based on regional population are interesting to increase our knowledge on the disease and to estimate the affected population. Given the elimination of the main vector of the disease, this mapping provides information for understanding the new profile of patients bearing CD.

Conflict of interest

The authors declare that they have no conflict of interest.

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