Acta Tropica 112 (2009) 228–230

Contents lists available at ScienceDirect

Acta Tropica

journal homepage: www.elsevier.com/locate/actatropica

Short communication

Prevalence of Chagas disease in the Latin American immigrant population in a primary health centre in Barcelona (Spain)

Antoni Soriano Arandes[a,*], Jose Muñoz Gutierrez[b], Mireia Vergés Navarro[c], Clara Castells Doménech[a], Montserrat Portús Vinyeta[c], Joaquim Gascón Brustenga[b]

[a] Consorci d'Atenció Primària de Salut de l'Eixample (CAPse), C/Rosselló, 161 Planta baja, 08036 Barcelona, Spain
[b] Centre for International Health, CRESIB, IDIBAPS, Hospital Clinic Barcelona, Barcelona, Spain
[c] Laboratory of Parasitology, Faculty of Pharmacy, Universitat de Barcelona, Barcelona, Spain

ARTICLE INFO

Article history:
Received 11 February 2009
Received in revised form 6 July 2009
Accepted 15 July 2009
Available online 22 July 2009

Keywords:
Chagas disease
Trypanosoma cruzi
Prevalence
Epidemiology
Immigration

ABSTRACT

A cross-sectional descriptive study was carried out to detect the seroprevalence of chagasic infection in children and women of child-bearing age in a primary care health centre in Barcelona (Spain). Serological screening was performed with an immunochromatography (IC) test (Stat Pak Chagas de Chembio®) and all positive and doubtful results were confirmed by two ELISA tests using recombinant and whole *Trypanosoma cruzi* antigens. Prevalence of 4.3% was detected in the child-bearing age group women.

General practitioners and paediatricians are concerned by Chagas disease, now an emergent health disease in non-endemic countries.

© 2009 Elsevier B.V. All rights reserved.

1. Introduction

The epidemiology of Chagas disease has undergone important modifications in recent decades as a consequence of the control programmes carried out in endemic areas that reduced vectorial transmission as well as transfusional transmission. The chronic nature of the disease and the change of patterns of internal migrations and migrations from America to other continents has also influenced this epidemiological change. Chagas disease is no longer limited exclusively to the poor rural areas of Latin America, but now affects urban areas in both endemic and non-endemic countries.

There were more than 1,800,000 Latin American immigrants registered in Spain in 2008 (Instituto Nacional de Estadística, 2008). Those infected with *Trypanosoma cruzi* could, with time, develop heart conditions, gastrointestinal complaints and, in the case of immunological suppression, neurological disorders. Despite the absence of the vector, it would be possible for *T. cruzi* to be spread in non-endemic areas by means of contaminated blood products (Piron et al., 2008) and by mother-to-child transmission.

Successful etiological treatment of CD has been reported in newborn babies and in the paediatric population (under 15 years old), with a lower incidence of side effects than in adults.

The aim of this study was to find out the prevalence of chagasic infection in children and women of child-bearing age originally from endemic areas, attended in the paediatric department of a Primary Health Care Centre in Barcelona (Spain).

2. Patients and methods

The study was carried out over a yearly period from March 2006 to March 2007.

Two population groups were studied: women of child-bearing age (15–45 years old) and the paediatric immigrant population (0–14 years old), from Latin America or born in Spain with their mothers coming from endemic areas, attended in the Consorci d'Atenció Primària de Salut de l'Eixample (CAPse). In the last cases, blood screening was only carried out if the mother had tested positive for *T. cruzi* infection or if children had travelled to an endemic area of Latin America.

Informed consent was signed by the participants in the study. An epidemiological questionnaire was given to them (regarding age, sex, country of origin, region and location of home village, length of time in a rural area and time spent living in a roughly built mud dwelling, as well as history of blood transfusions or donations of haematic derivatives). The resulting information was entered into

* Corresponding author at: Joan XXIII University Hospital Tarragona, c/Mallafré-Guasch 4, 43007 Tarragona, Spain. Tel.: +34 93 2038258/63 9712438.
E-mail address: tsorianoarandes@gmail.com (A. Soriano Arandes).

0001-706X/$ – see front matter © 2009 Elsevier B.V. All rights reserved.
doi:10.1016/j.actatropica.2009.07.014

a database (OMI-AP®). Screening was carried out in the same centre, using a quick qualitative immunochromatographic test (ICT) (Stat Pak Chagas de Chembio®), which detects IgG antibodies against recombinant antigens of *T. cruzi* in blood obtained by digital puncture. The test was considered positive when a reactive band, even faint, was observed.

A recombinant ELISA (Biokit®) (ELISAr) and an ELISA with whole *T. cruzi* epimastigote antigens (ELISAc), obtained by sonication from the epimastigote forms of the Maracay strains of *T. cruzi* and developed in the Laboratory of Parasitology (Riera et al., 2009), were performed for participants with positive screening results to confirm the diagnosis.

Patients showing two or more positive results, fulfilling the definition of *T. cruzi* infection by the World Health Organization, were considered infected. All infected patients were treated with benznidazole at 5–7 mg/kg/day, for 60 days. Women who screened positive were referred to the Department of Tropical Medicine, Hospital Clinic (Barcelona), for follow up, treatment and study of advanced stages of the disease.

3. Results

A total of 224 samples were analysed. 108 samples were collected from children aged between 0 and 14 years, with a mean age of 8.3 (ranging from 2 months to 14 years), and 116 samples from women of child-bearing age, with a mean age of 30.0 (ranging from 15 to 45 years). 36% (108/300) of Latin American paediatric people attended at CAPse were studied.

We obtained 25/224 (11.2%) samples reactive using the ICT testing. In the paediatric group, 13/108 (12.0%) were reactive by ICT, but only 3 of those were positive using both ELISA serological tests that were concordant in all cases. They were babies aged 2, 3 and 5 months, born in Spain. Their mothers came from Sucre and Santa Cruz, provinces of Bolivia. All of them were asymptomatic and physically normal. A second evaluation using the two ELISA tests at 8 months was negative in all cases, confirming that the former seroreactivity was the consequence of the passive transfer of antibodies from the mother and ruled out any active chagasic infection.

Women of child-bearing age showed a prevalence of 4.3%. Blood reactivity to *T. cruzi* antigen by ICT was detected in 10.3% (12/116) patients. Only 9 of those reactive patients attended the second appointment and the results were confirmed by both ELISA tests in 5/9 of them. Three women from Bolivia, Colombia and Ecuador (one of each nationality) were lost because they failed to provide a second blood sample. All the women with a positive result (5) were natives of Bolivia (Sucre, Santa Cruz and Cochabamba) and received treatment with benznidazole. Prevalence of 16.1% (5/31) was obtained in Bolivian women and 83.3% (5/6) of them reactive by ICT were also classified as infected by ELISA. Major side effects were headache, urticariform rash and anorexia 2–3 weeks after the beginning of the treatment.

4. Discussion

Studies published to date have looked into the prevalence of chagasic infection in the paediatric population and in women of child-bearing age in Latin America (Tortova et al., 2000; Vera et al., 1998; Biancardi et al., 2003) in endemic countries, but no research on it had been conducted in primary care in Europe.

Since the year 2000 (Instituto Nacional de Estadística, 2008), there has been a major increase in the number of Latin American immigrants in Catalonia (Spain) and (according to the population pyramid of 2003) especially in the number of female immigrants, the majority of whom are between 20 and 45 years old (of child-bearing age). It is therefore to be expected that Chagas disease will be diagnosed in Europe with certain frequency.

Early detection of *T. cruzi* infection can prevent the progression of the disease into its chronic stages which is highly important, mainly in children, where the cure rate is very high or, at least, allow for the provision of suitable symptomatic treatment in the event of complications (Schijman et al., 2003; Sosa Estani et al., 1998).

This study is complementary to others carried out in Spain (Del Pino and Coll, 2006; Vergés et al., 2006; Muñoz et al., 2006) and mainly limited to hospital centres. Despite this it does have limitations, as we are talking about a descriptive cross-sectional study restricted to one primary health care centre with a small sample size; it stresses the need for more research in this field in our country and in other European countries. The setting up of a more complete research project looking into different areas of primary care would give us a more precise idea of the impact that Chagas disease might have on our health care.

In this project, an ICT test was decided on for screening since it is easy to use and provides rapid results as it is processed in the centre itself. Furthermore, according to available data (Luquetti et al., 2003; Ponce et al., 2005), the sensitivity of the test is close to 100%. In a recent published paper (Roddy et al., 2008), Chagas Stat-Pak® tested in Bolivia yielded high specificity (99%, 95% confidence interval (CI) = 98.4–99.4%), with 18/1792 false positives results, but a low sensitivity (93.4%, 95% CI = 87.4–97.1%). Another study of the prevalence of Chagas disease in southern Bolivia (Chippaux et al., 2008) using Chagas Stat-Pak®, underestimated by 3.4% the overall prevalence in a sample of 995 people. Although the divergences between ICT and ELISA were not significant, the authors highlight the importance of carrying out a confirmation serological test.

The sensitivity and specificity of serological tests with a reading system at naked eye change with the reader criteria and this may be the cause of the different values obtained in different studies for ICT. In our series we found a large number of false positive results as a consequence of a very stringent reading. Any test used for screening Chagas disease needs to have a sensitivity nearest 100% and this has to prevail over specificity as all positive results in the screening have to be confirmed by other techniques allowing quantification as the ELISA tests. Our study was not designed to evaluate this ICT, but the results obtained question the accuracy of this rapid technique when a faint reactive band is observed. Taking this into account, ICT tests may be useful in epidemiological studies whenever all doubtful and positive results were confirmed by other more accurate techniques.

ELISAc developed in our Laboratory of Parasitology has been evaluated showing a sensitivity of 98.2% (95% CI = 93.2–99.7%) and a specificity of 100% (95% CI = 97.4–99.9%) accomplishing the established criteria to be applied in the diagnosis of *T. cruzi* infection (Riera et al., 2009).

Despite the small size of the sample, the 4.3% prevalence in women of child-bearing age, from Chagas disease endemic areas, is a significant figure in a European country. All infected women were Bolivian, which reflects the reality of a country where the prevalence of people with Chagas disease is very high (Chippaux et al., 2008; Brutus et al., 2008; Torrico et al., 2004). Although the number of Bolivian women tested is low and extrapolations to the Bolivian population in general cannot be made, the fact that in our series 16.1% of them tested positive does draw attention.

No infected children were detected in this study. This could be because of the small size of our sample and also the reflection of the lower vectorial transmission in endemic areas due to control programmes which have been implemented in those countries (Dias, 2002). Nevertheless, in Spain, several cases of congenital transmission of Chagas disease (Muñoz et al., 2007; Riera et al., 2006) have already been published. In a recent study of prevalence and vertical transmission of *T. cruzi* infection among pregnant Latin American women being attended in maternity clinics in Barcelona, the rate of seroprevalence was 3.4% and 7.3% of newborns were infected (Muñoz et al., 2009),

so we must be on the alert for the detection of new cases in the future.

Acknowledgements

To Dr. Pedro Albajar-Viñas and to Dr. Héctor Freilij for their advice and help in the design of this study.

To Dr Jaume Benavent, coordinator of the Consorci dĭAtenció Primària de lĭEixample, for his support in carrying out this study in a primary health care centre.

References

Biancardi, M.A., Conca Moreno, M., Torres, N., Pepe, C., Altcheh, J., Freilij, H., 2003. Seroprevalencia de la enfermedad de Chagas en 17 parajes del "Monte Impenetrable" de la provincia de Chaco. Medicina (Buenos Aires) 63, 125–129.

Brutus, L., Schneider, D., Postigo, J., Romero, M., Santalla, J., Chippaux, J.P., 2008. Congenital Chagas disease: diagnostic and clinical aspects in an area without vectorial transmission, Bermejo, Bolivia. Acta Trop. 106 (3), 195–199.

Chippaux, J.-P., Postigo, J.R., Santalla, J.A., Schneider, D., Brutus, L., 2008. Epidemiological evaluation of Chagas disease in a rural area of southern Bolivia. Trans. R. Soc. Trop. Med. Hyg. 102 (6), 578–584.

Del Pino, M., Coll, O., 2006. Enfermedad de Chagas, transmisión maternofetal y experiencia recogida en nuestro centro. Enf. Emerg. 8 (Suppl. 1), 37–39.

Dias, J.C.P., 2002. The impact of Chagas disease control in Latin America. Mem. Inst. Oswaldo Cruz 97, 603–612.

Instituto Nacional de Estadística, 2008. Spain census data, up-dated in January 2007. Available from: http://www.ine.es.

Luquetti, A.O., Ponce, C., Ponce, E., Esfandiari, J., Schijman, A., Revollo, S., Añez, N., Zingales, B., Ramgel-Aldao, R., Gonzalez, A., Levin, M.J., Umezawa, E.S., Franco da Silveira, J., 2003. Chagas' disease diagnosis: a multicentric evaluation of Chagas Stat-Pak, a rapid immunochromatographic assay with recombinant proteins of *Trypanosoma cruzi*. Diag. Microbiol. Infect. Dis. 46, 265–271.

Muñoz, J., Ávila, E., Alonso, D., Treviño, B., Gómez, J., Sanz, G., Gascón, J., 2006. Características clínicas de pacientes infectados por *Trypanosoma cruzi*. Enf. Emerg. 8 (Suppl. 1), 42–44.

Muñoz, J., Portús, M., Corachan, M., Fumado, V., Gascón, J., 2007. Congenital *Trypanosoma cruzi* infection in a non-endemic area. Trans. R. Soc. Trop. Med. Hyg. 101 (11), 1161–1162.

Muñoz, J., Coll, O., Juncosa, T., Vergés, M., del Pino, M., Fumado, V., Bosch, J., Posada, E.J., Hernandez, S., Fisa, R., Boguñá, J.M., Gállego, M., Sanz, S., Portús, M., Gascón, J., 2009. Prevalence and vertical transmission of *Trypanosoma cruzi* infection among pregnant Latin American Women attending 2 maternity clinics in Barcelona, Spain. Clin. Infect. Dis. 48, 1736–1740.

Piron, M., Vergés, M., Muñoz, J., Casamitjana, N., Sanz, S., Maymó, R.M., Hernández, J.M., Puig, L., Portús, M., Gascon, J., Sauleda, S., 2008. Seroprevalence of *Trypanosoma cruzi* infection in at-risk blood donors in Catalonia, Spain. Transfusion 48, 1862–1868.

Ponce, C., Ponce, E., Vinelli, E., Vinelli, E., Montoya, A., de Aguilar, V., Gonzalez, A., Zingales, B., Rangel-Aldao, R., Levin, M.J., Esfandiari, J., Umezawa, E.S., Luquetti, A.O., Franco da Silveira, J., 2005. Validation of a rapid and reliable test for diagnosis of Chagas disease by detection of *Trypanosoma cruzi*-specific antibodies in blood of donors and patients in Central America. J. Clin. Microbiol. 43, 5065–5068.

Riera, C., Guarro, A., Kassab, H.E., Jorba, J.M., Castro, M., Angrill, R., Gállego, M., Fisa, R., Martin, C., Lobato, A., Portús, M., 2006. Congenital transmission of *Trypanosoma cruzi* in Europe (Spain): a case report. Am. J. Trop. Med. Hyg. 75 (6), 1078–1081.

Riera, C., Vergés, M., López-Chejade, P., Piron, M., Gascón, J., Fisa, R., Gállego, M., Portús, M., 2009. Desarrollo y evaluación de una técnica ELISA con antígeno crudo de Trypanosoma cruzi para el diagnóstico de la Enfermedad de Chagas. Enf. Emerg. 11, 22–29.

Roddy, P., Goiri, J., Flevaud, L., Palma, P.P., Morote, S., Lima, N., Villa, L., Torrico, F., Albajar-Viñas, P., 2008. Field evaluation of a rapid immunocromatographic assay for detection of *Trypanosoma cruzi* infection by use of whole blood. J. Clin. Microbiol. 46, 2022–2027.

Schijman, A.G., Altcheh, J., Burgos, J.M., Biancardi, M., Bisio, M., Levin, M.J., Freilij, H., 2003. Aetiological treatment of congenital Chagas' disease diagnosed and monitored by the polymerase chain reaction. J. Antimicrob. Chemother. 52, 441–449.

Sosa Estani, S., Segura, E.L., Ruiz, A.M., Velazquez, E., Porcel, B., Yampotis, C., 1998. Chemotherapy with benznidazole in children in undetermined phase of Chagas disease. Am. J. Trop. Med. Hyg. 59 (4), 526–529.

Torrico, F., Alonso-Vega, C., Suárez, E., Rodríguez, P., Torrico, M., Dramaix, M., Truyens, C., Carlier, Y., 2004. Maternal *Trypanosoma cruzi* infection, pregnancy outcome, morbidity, and mortality of congenitally infected and non-infected newborns in Bolivia. Am. J. Trop. Med. Hyg. 70 (2), 201–209.

Tortova, C., Bejarano, I., Dipierri, J., Alfaro, E., García, T., 2000. Seroepidemiología de la enfermedad de Chagas en escolares de Jujuy. Medicina (Buenos Aires) 60, 469–473.

Vera, N., Maldonado, M., Yaluff, G., Simancas, L., Rojas de Arias, A., 1998. Seroprevalence and sociocultural conditionants of Chagas disease in school aged children of marginal zones of Asunción. Rev. Soc. Bras. Med. Trop. 31 (4), 347–353.

Vergés, M., López, P., Maymó, R.M., Pirón, M., Fisa, R., Gállego, M., Riera, C., Portús, M., 2006. Análisis de los resultados de laboratorio en pacientes con enfermedad de Chagas. Enf. Emerg. 8 (Suppl. 1), 40–41.