International Journal of TROPICAL DISEASE & Health
3(2): 169-174, 2013

SCIENCEDOMAIN *international*
www.sciencedomain.org

Prevalence of Antibody to *Trypanosoma cruzi* in Women Delivering Infants at Parkland Health and Hospital System, Dallas, Texas, USA

Paul M. Southern[1*]

[1]Departments of Pathology and Internal Medicine, University of Texas Southwestern Medical Center at Dallas, 5323 Harry Hines Blvd., Dallas, Texas 75390-9073, USA.

Author's contribution

The author was the designer of the study, and it was carried out by him, with the technical assistance of the persons listed in the acknowledgements.

Short Communication

Received 28th November 2012
Accepted 5th April 2013
Published 12th April 2013

ABSTRACT

Recent increases in the immigration of persons from Latin America into North America, particularly from regions endemic for Chagas disease, suggest the possibility that pregnant women may be latently infected with *Trypanosoma cruzi*. This study was undertaken to assess the magnitude of seropositivity in parturient women in our institution. Umbilical cord blood was collected from Hispanic surnamed women delivering infants at Parkland Health and Hospital System (PHHS), the public hospital serving Dallas County, Texas, and affiliated with UT Southwestern. When possible the specimens were collected from consecutive deliveries. Serum was tested for antibodies to *Trypanosoma cruzi* by commercial systems. Two hundred delivering women were tested as described. Of those tested, 4 were found to be positive for *T. cruzi* antibody (2%). This confirms a potential risk for transplacental transmission of *T. cruzi* in populations residing outside the traditional endemic zone, such as those seeking medical care at PHHS.

Keywords: Trypanosoma cruzi; chagas disease; maternal transmission; Dallas; Texas.

**Corresponding author: Email: paul.southern@utsouthwestern.edu;*

1. INTRODUCTION

Chagas disease, the condition caused by infection with *Trypanosoma cruzi*, is acquired via several routes: by transmission from infected triatomine bugs, by transfusion of blood products from infected donors, by the transplacental route, by transplantation of solid organs from infected donors, and by oral transmission via ingestion of products contaminated with infected triatomine bugs, or parts thereof [1-12]. Previous studies have documented that there are seropositive blood donors residing in North America, that a few cases of Chagas disease have been transmitted via transplanted organs, and that seropositive women have delivered infants in the United States [3-5,6-9,13,14]. Our data extend the latter group to include women residing in Dallas, Texas.

Chagas Disease due to infection by *Trypanosoma cruzi* is endemic in much of Latin America. Recent immigration patterns include translocation of persons from the endemic zones into various parts of North America and other endemic countries [1,2,16-20]. In Dallas, Texas the population is currently approximately 40% Hispanic, many of whom are relatively recent immigrants from Mexico, Central America and South America. According to the US Census Bureau, the population of Texas in 2012 was over 26 million, of which 38.1% were categorized as Hispanic. Figures for Dallas County (the population served by PHHS) revealed a population of nearly 2.5 million, of which 38.9% were Hispanic [U. S. Department of Commerce, US Census Bureau, 2012]. Various studies have confirmed that many such immigrants are seropositive for *Trypanosoma cruzi* [1,2,5,15,20]. The patient population of Parkland Health and Hospital System is over 50% Hispanic. Parkland Health and Hospital System (PHHS) is a large county facility affiliated with the University of Texas Southwestern Medical Center at Dallas. Annually there are 12,000 to 16,000 obstetrical deliveries at Parkland, the majority of which are by Hispanic surnamed women. We wished to ascertain the degree to which the women delivering infants in that institution could potentially transmit the infection via the transplacental route. The study was not designed to include socioeconomic data. In fact, the Institutional Review Board (IRB) approval for the study did not allow for that.

2. MATERIALS AND METHODS

Umbilical cord blood was obtained at the time of delivery of 200 Hispanic surnamed women at Parkland. As nearly as possible (determined by availability of research staff) the collections were from consecutive deliveries. All specimens were obtained within a period of two weeks. Specimens were immediately de-identified, and could not be linked to any specific individual subject. The blood specimens were centrifuged and the serum separated from the cellular elements on the day of collection. Sera were then refrigerated (5ºC) until antibody studies were performed (done within two weeks of collection). All sera were then subjected to assay for antibody to *T. cruzi* using the Hemagen Chagas Kit® EIA system as directed by the manufacturer. In addition, all sera giving a positive reaction to that test were retested using the Wiener Chagatest – ELISA – Recombinante v 3.0, and a random sample of 30 sera giving a negative reaction with the Hemagen Chagas Kit were retested with the Wiener Chagatest, as directed by the manufacturer. Both the Hemagen and Wiener tests were challenged with positive and negative control sera, supplied by the manufacturers.

3. RESULTS AND DISCUSSIONS

Of the 200 specimens of cord blood tested, 4 reacted positively using the Hemagen Chagas Kit. Each of those specimens also tested positively with the Wiener Chagatest. Similarly, each of the 30 specimens giving negative reactions with the Hemagen Chagas Kit that were also tested with the Wiener Chagatest, gave negative reactions with that test. Therefore, of the 200 women tested, 2% gave reactions that indicated previous infection with *Trypanosoma cruzi*, and thus potentially could have transmitted the infection to their infants. It was beyond the scope of this project to follow and retest the infants whose cord bloods were seropositive. Given the large number of Hispanic surnamed women delivering babies at Parkland, a significant number of the offspring are potentially infected, if these data can be applied to the general population of similar women.

This study was undertaken primarily to assess the approximate proportion of the population of Hispanic women giving birth at PHHS who are latently infected with *Trypanosoma cruzi*. It was intended to be a pilot study, and due to personnel and financial limitations could not be a large study. There are few published studies addressing the issue of the potential for maternal to fetal transmission of *T. cruzi* in the United States. Di Pentima and colleagues, more than a decade ago, found a seroprevalence of 0.3% in over 3,000 Hispanic women attending clinics in the city of Houston [10]. Since that time there has been increased immigration of persons from Latin America, especially in Texas. There are no other published studies regarding the seroprevalence of *T. cruzi* in the pregnant Hispanic population in Texas. Congenital transmission of Chagas disease to a boy in Virginia was documented in 2010 [4]. Other studies from the US suggest that there is suboptimal appreciation of the potential for other additional such events, but that it may be more than is appreciated [6-8,11,20]. Studies from Mexico are also limited [21-23]. Mar, et al, found that 3.5% and 5% of screened mothers were seropositive in Veracruz and Chiapas, respectively [21]. Jiménez-Cardoso, et al, studying pregnant women in Oaxaca, Jalisco and Mexico City, found a prevalence of infection in pregnant women of 4.4%, 12.02% and 4.12%, respectively [22]. Cruz-Reyes and Pickering-López, in a longitudinal study spanning 76 years, found a prevalence of Chagas disease, either from serological surveys, clinical manifestations, or blood bank reports, to range from 0.45% in Chihuahua, to 18.99% in Querétaro [23]. A significant percentage of the immigrants seen at PHHS are from the states of Guanajuato, Querétaro, Jalisco, Hidalgo, Michoacán, Aguascalientes, San Luis Potosí and Zacatecas, generally in that order (author's personal experience at PHHS for nearly 40 years). There are more data from Spain, doubtless reflecting immigration patterns. Immigrants to Spain tend to include more persons from Bolivia, much of which is a hyperendemic area [12,20,24-27]. Publications addressing the issues of congenital transmission of *T. cruzi*, and the mechanisms of that phenomenon, were from Latin American centers; none were from North America [28-30].

We believe our data suggest that there is a real potential for maternal transmission of *T. cruzi* to infants delivered in our institution.

4. CONCLUSION

Because of increased immigration of persons from Chagas disease endemic zones, the author conducted a serological survey of parturient Hispanic women at PHHS to determine the degree to which they were latently infected with *Trypanosoma cruzi*. There were 4% of 200 women with antibody in umbilical cord blood. That suggests that there was at least a

possibility of maternal-fetal transmission.

CONSENT

See below for the waiver of consent process.

ETHICAL APPROVAL

The Institutional Review Board (IRB) of the University of Texas Southwestern Medical Center approved this study. A waiver of informed consent of the subjects included in the study was granted by the IRB for purposes of this epidemiologic study.

ACKNOWLEDGEMENTS

The author wishes to acknowledge the technical assistance of Sujata Patel, MS, and Cedric Spak, MD. The study was funded in part by a grant from an anonymous donor. The author has no financial or other disclosures.

COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

1. Bern C, Montgomery SP. An estimate of the burden of Chagas disease in the United States. Clin Infect Dis. 2009;49:e52-54.
2. Bern C, Kjos S, Yabsley MJ and Montgomery SP. *Trypanosoma cruzi* and Chagas' disease in the United States. Clin Microbiol Rev. 2011;24:655-681.
3. Kun H, Moore A, Mascola L, Steurer F, Lawrence G, Kubak B, et al. Transmission of *Trypanosoma cruzi* by heart transplantation. Clin Infect Dis. 2009;48:1534-1540.
4. Lazarte RA, Litman-Mazo F, Crewalk J-A, Keim DE, Baram M, Klassen-Fischer MK, et al. Congenital transmission of Chagas disease – Virginia, 2010. Centers for Disease Control and Prevention, MMWR. 2012;61:477-478.
5. Leiby DA, Herron, Jr RM, Garratty G, Herwaldt BL. *Trypanosoma cruzi* parasitemia in US blood donors with serologic evidence of infection. J Infect Dis. 2008; 198:609-613.
6. Verani JR, Montgomery SP, Schulkin J, Anderson B, Jones JL. Survey of obstetrician-gynecologists in the United States about Chagas disease. Am J Trop Med Hyg. 2010;83:891-895.
7. Yadon ZE, Schmunis GA. Congenital Chagas disease: estimating the potential risk in the United States. Am J Trop Med Hyg. 2009;81:927-933.
8. Carlier Y, Torrico F, Sosa-Estani S, Russomando G, Luquetti A, Freillij H, et al. Congenital Chagas disease: recommendations for diagnosis, treatment and control of newborns, siblings and pregnant women. PLoS Negl Trop Dis. 2011;5(10):e1250. Doi:10.1371/journal.pntd.0001250.
9. Chippaux J-P, Salas-Clavijo AN, Postigo, JR, Schneider D. Santalla JA, Brutus L. Evaluation of compliance to congential Chagas disease treatment: results of a randomized trial in Boliva. Trans R Soc Trop Med Hyg. 2013;107:1-7.
10. Di Pentima MC, Huang L-Y, Skeeter CM, Edwards MS. Prevalence of antibody to *Trypanosoma cruzi* in pregnant Hispanic women in Houston. Clin Infect Dis. 1999;28:1281-1285.

11. Minneman RM, Hennink MM, Nicholls A, Salek SS, Palomeque FS, Khawja A, et al. Barriers to testing and treatment for Chagas disease among Latino immigrants in Georgia. J Parasitol Res. 2012; doi:10.1155/2012/295034.
12. Gascon J, Bern C, Pinazo M-J. Chagas disease in Spain, the United States and other non-endemic countries. Acta Tropica. 2010;115:22-27.
13. Murcia L, Carrilero B, Munoz-Davila J, Thomas MC, López MC, Segovia M. Risk factors and primary prevention of congenital Chagas disease in a nonendemic country. Clin Infect Dis. 2013;56:496-502.
14. Pérez-López FR, Chedraui P. Chagas disease in pregnancy: a non-endemic problem in a globalized world. Arch Gynecol Obstet. 2010;282:595-599. Doi: 10.1007/s00404-010-1553-7.
15. Arena R, Matthews CE, Kim AY, Lenz TE, Southern PM. Prevalence of antibody to *Trypanosoma cruzi* in Hispanic surnamed patients at Parkland Health and Hospital System. BMC Research Notes. 2011;4:132-137.
16. Hotez PJ, Botazzi ME, Dumonteil E, Valenzuela JG, Kamhawi S, Ortega J, et al. Texas and Mexico: sharing a legacy of poverty and neglected tropical diseases. PLoS Negl Trop Dis. 2012; 6(3):e1497.doi:10.1371/journalpntd.0001497.
17. Hotez PJ, Dumonteil E, Woc-Colburn L, Serpa JA, Bezek S, Edwards MS, et al. Chagas disease: "the new HIV/AIDS of the Americas." PLoS Negl Trop Dis. 2012; 6(5):e1498. Doi:10.1371/journal.pntd.0001498.
18. Hotez PJ. Tropical diseases: the new Plague of poverty. New York Times, 2012; August 19, 4 sr.
19. Navarro M, Navaza B, Guionnet A, López-Vélez R. Chagas disease in Spain: need for further public health measures. PLoS Neg Trop Dis. 2012;6(12):e1962. Doi:10.1371/journal.pntd.0001962.
20. Schmunis GA. Epidemiology of Chagas disease in non-endemic countries: the role of international migration. Mem Inst Oswaldo Cruz, Rio de Janeiro. 2007;102(Suppl.I):75-85.
21. Mar AO, Ortega FG, Vidal SC, Hernández-Becerril N, Galdamez EP, Concepción GC, et al. Serological and parasitological screening of *Trypanosoma cruzi* infection in mothers and newborns living in two Chagasic areas of Mexico. Arch Med Res. 2006;37:774-777.
22. Jiménez-Cardoso E, Campos-Valdéz G, Cortes-Campos A, de la Luz Sanchez R, Rivera-Mendoza C, Placencia-Hernández A, et al. Maternal fetal transmission of *Trypansoma cruzi*: a problem of public health little studied in Mexico. Experimental Parasitol. 2012;131:425-432.
23. Cruz-Reyes A, Pickering-López JM. Chagas disease in Mexico: an analysis of geographical distribution during the past 76 years-A review. Mem Inst Oswaldo Cruz 2006;101:no.4 (13 pages, not numbered).
24. Barona-Vilar C, Giménez-Marti MJ, Fraile T, González-Steinbauer C, Parada C, Gil-Brusola A, et al. Prevalence of *Trypanosoma cruzi* infection in pregnant Latin American women and congenital transmission rate in a non-endemic area: the experience of the Valencian Health Programme (Spain). Epidemiol Infect 2012;40:1896-1903.
25. Ramos JM, Milla J, Rodríguez JC, López-Chejada P, Flóres M, Rodríguez JM, et al. Chagas disease in Latin American pregnant immigrants: experience in a non-endemic country. Arch Gynecol Obstet 2012;285:919-923.
26. Muñoz J Portús M, Corachan M, Fumadó V, Gascon J. Congenital *Trypanosoma cruzi* infection in a non-endemic area. Trans Roy Soc Trop Med Hyg 2007;101:1161-1162.

27. Riera C, Guarro A, El Kassab H, Jorba JM, Castro M, Angrill R, et al. Congenital transmission of *Trypanosoma cruzi* in Europe (Spain): a case report. Am J Trop Med Hyg 2006;75:1078-1081.
28. Carlier Y, Torrico F. Congenital infection with *Trypanosoma cruzi*: from mechanisms of transmission to strategies for diagnosis and control. Rev Soc Bras Med Trop 2003;36:767-771 (Conclusions of round tables and synopsis of an International Colloquium).
29. Moretti E, Basso B, Castro I, Carrizo-Paez M, Chaul M, Barbieri G, et al. Chagas' disease: study of congenital transmission in cases of acute maternal infection. Rev Soc Bras Med Trop. 2005;38:53-55.
30. Fernandez-Aguilar S, Lambot MA, Torrico F, Alonso-Vega C, Córdoba M, Suarez E, et al. Placental lesions in human *Trypanosoma cruzi* infection. Rev Soc Bras Med Trop 2005;38(Suppl 2):84-86.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history.php?iid=208&id=19&aid=1245