

Original Article

Comparison of Human T- cell Leukemia Virus Type-1 (HTLV-1) Seroprevalence in High Risk Patients (Thalassemia and Hemodialysis) and Healthy Individuals from Charmahal - Bakhtiari Province, Iran

Ali Karimi, Mohamed-Reza Nafici, Reza Imani

Cellular and Molecular Research Center, Shahre-Kord University of Medical Sciences, Shahre-Kord, Iran

Kuwait Medical Journal 2007, 39 (3): 259-261

ABSTRACT

Objective: To compare the seroprevalence of Human T-lymphotropic virus type 1 (HTLV-1) in high risk group patients (such as those with thalassemia or those who are on hemodialysis) with normal healthy individuals.

Design: Prospective study

Setting: Charmahal - Bakhtiari province, Iran.

Subjects: A total of 357 serum samples from the patients (case) and 800 from the healthy individuals (control) were tested for HTLV specific antibody.

Interventions: Enzyme linked immunosorbent assay (ELISA). All ELISA positive samples were assayed by Western blotting analysis. The individuals in the two groups were both age and sex matched ($p > 0.05$).

Main Outcome Measures: Seroprevalence of HTLV-1

Results: The ELISA results showed that 27 out of 357 (7.6%) samples from the the case and five out of 800 (0.62%) from the control group tested positive for HTLV-1 specific antibody. The Western blotting results showed that 24 of 27 (89%) ELISA-positive samples from the case and five out of 800 (0.62%) from the test group were HTLV-1. The mean age of the patients in the two groups was almost the same.

Conclusion(s): The seroprevalence of HTLV-1 among both the high risk patients and the healthy individuals from this province was significantly high and was almost similar to that in another endemic region in the country. Therefore, this province may be considered an endemic area for this virus in Iran.

KEYWORDS: ELISA, HTLV-1, thalassemia, Western blotting

INTRODUCTION

Human T-lymphotropic virus type 1 (HTLV-1) is a retrovirus which was first identified in humans in 1980^[1] and then in 1982^[2]. It causes two distinct human diseases, adult T-cell leukemia or lymphoma^[3] and a chronic, progressive demyelinating disorder known as HTLV-1-associated myelopathy/tropical spastic paraparesis^[4]. Like human immunodeficiency virus (HIV), infection with HTLV 1 and 2 are persistent retroviral infections and are life-long. Less than 5% of those infected progress to one of the HTLV-related diseases, but these are debilitating with few treatment options and a poor prognosis and they are often fatal^[5].

The virus is transmitted through breastfeeding, sexual contact, blood transfusion and contaminated needles among drug abusers. Transplacental transmission is also suspected^[6,7]. Cellular blood products are the main source of transfusion-associated HTLV transmission, whereas fresh frozen plasma, cryoprecipitate, or coagulation factor

concentrates appear not to cause infection^[8,9]. Although this virus is distributed worldwide it is endemic in certain parts of the world such as southwestern Japan, the Caribbean basin, Africa, part of South America, southern Italy, Taiwan, and the United States^[10]. In Iran, the first case of adult-T-cell leukemia (ALT) was reported in 1986^[11] and subsequently Mashhad has been recognized as an endemic area for HTLV-1 infection^[12-14].

Patients with thalassaemia and those on hemodialysis are at high risk for HTLV-1 infection due to their need for repeated blood transfusion^[15-19]. It was reported that 1.25% and 1.6% of thalassaemic patients in Shiraz^[20] and Zahedan^[21], respectively were seropositive for HTLV-1 infection. Another study in Shiraz indicated the high prevalence of this virus (25.6%) among thalassaemic patients^[22].

This might suggest that this virus could be present in other areas of Iran and Mashhad may not be the only city in this country where HTLV

Address correspondence to:

Dr. Ali Karimi, Ph. D, Department of Microbiology and Immunology, Faculty of Medicine, Shahre-Kord University of Medical Sciences, Shahre-Kord, Iran. Tel: (#98-381) 333 4691, Fax: (#98-381) 333 4911, E-mail: alikarimi72@yahoo.co.uk

infection is endemic. Therefore, this study was conducted to determine seroprevalence of HTLV-1 in both thalassemic and hemodialysis patients and compare it with that in healthy individuals from a central province of Iran (Charmahal-Baktiari).

SUBJECTS AND METHODS

Subjects: Three hundred and fifty-seven serum samples from both thalassemics and hemodialysis patients (case) and 800 healthy blood donors (control) were tested for HTLV specific antibody from 2005 to 2006. The patients comprised of almost all the hemodialysis and thalassemics existing in this province. The individuals in both groups were well matched as regards age and gender.

Serological assays: Serum samples were screened for HTLV-1 specific antibodies using enzyme-linked immunosorbent assay (ELISA; Vironostika HTLV I/II, Organon Teknica). All of the ELISA positive samples were confirmed by Western blotting analysis (WB; HTLV blot 204 kit; Gene Lab Diagnostic, Ltd).

Demographic data: A questionnaire including questions about socio-demographic status, history of disease and the number of transfusion received was filled in by the patients. The data about sex and age of the individuals in the control group was obtained using a similar questionnaire.

Statistical analysis: The data was analysed using T test and SPSS software (Chicago. Lt. Version 12).

RESULTS

Demographic analysis of individuals in both the test and the control groups:

A total of 1157 serum samples from both the case (thalassemics and hemodialysis patients) and control (healthy individuals) were tested for HTLV-1 specific antibody. The percentage of females in the case and in the control group was 58% and 54%, respectively ($p > 0.05$). The age-range and their percentage in the case and control groups were well matched ($p > 0.05$) and included people from 0-10 to 81-90 years old.

Seroprevalence of HTLV-1 in both thalassemic and hemodialysis patients

A total of 357 serum samples from both thalassemics and hemodialysis patients (case) were tested for HTLV-1 specific antibody during March to October 2005. In the primary screening, 27 of 357 (7.6%) samples tested positive by ELISA. Eighteen out of 250 (7.2%) thalassemic and nine out of 107 (8.4%) hemodialysis patients were positive for the

antibody. Subsequently, the Western blotting results showed that of 27 ELISA positive samples, 24 (6.8%) were HTLV-1 and three (0.9%) were not confirmed.

Seroprevalences of HTLV-1 in healthy individuals

A total of 800 serum samples from the healthy individuals (control) were tested for HTLV-1 specific antibody. In the primary screening, five of the 800 (0.62%) samples tested positive by ELISA. Almost all of the five positive samples were confirmed using Western blotting (only one of them was suspect).

DISCUSSION

As the HTLV-1 infection is a chronic and untreatable disease, the adequate standards of diagnosis, prevention, care and support as well as surveillance should be provided^[12]. This infection is endemic in certain parts of the world^[5] as well as in the northern city of Mashhad in Iran^[6-8]. Both thalassemic and hemodialysis patients, who are blood transfusion dependent are at high risk of acquiring this infection^[15,16]. In Iran, there is some evidence suggesting a relatively high prevalence of this virus in these patients^[20,21]. This case-control study was conducted to provide some epidemiological data regarding the prevalence of this virus.

Using ELISA, the overall seroprevalence of HTLV in both thalassemic and haemodialysis patients (test) in our study was 7.6%. Based on the Western blotting confirmation, the vast majority of these samples (6.7%) tested positive for HTLV-1. This rate was greater than that shown in Tehran (unpublished result), Shiraz^[20], and Zahedan^[21]. Our results also showed that 6.2% of healthy individuals from the control group were HTLV-1 positive. This prevalence was almost similar to that reported from another endemic region in this country, Mashhad^[22]. Therefore, this region may be an endemic area for this virus and perhaps this is the best explanation for higher seroprevalence of HTLV-1 among the high risk patients in this region.

Surprisingly, in another study in Shiraz, 25.6% of thalassemic patients were seropositive for anti-HTLV-1 antibody^[23]. Although this finding is much higher than that found in our study, it does confirm our results. Also, these two findings are consistent with the suggestion that following transfusion, the anti-HTLV-1 antibody titer might increase in both thalassemic and hemodialysis patients^[17,18,23].

Western blotting is also used to distinguish HTLV-1 from HTLV-2^[22]. Based on the Mashhad report, we used the same methods and 4.82% of HTLV detected by ELISA were HTLV-2. Our

Western blotting results did not show any HTLV-2.

Based on our results, the prevalence of this virus is higher than that in some other countries^[15-19]. However, our findings are in agreement with the overall prevalence of this virus (10%) in endemic areas^[15,16,22]. The results of a seroprevalence study on serum samples from 20 different largest cities of Iran indicated that some areas of this country and particularly, Mashhad is an endemic region^[22,24].

In conclusion, all evidence suggests that in addition to Mashhad, this virus might be endemic in other parts of Iran. Also, the results of our study support the hypothesis that this province is another endemic region for the virus infection.

REFERENCES

- Poiesz BJ, Ruscetti FW, Gazdar AF, *et al.* Detection and isolation of type c retrovirus particles from fresh and cultured lymphocytes of a patient with cutaneous T-cell lymphoma. *Proc Natl Acad Sci* 1980; 77:7415-7419.
- Kalyanaraman VS, Sarngadharan MG, Poiesz B, *et al.* Immunological properties of a type C retrovirus isolated from cultured human T-lymphoma cells and comparison to other mammalian retroviruses. *J Virol* 1981; 38:906-915.
- Blattner WA, Takatsuki K, Gallo RC. Human T-cell leukemia-lymphoma virus and adult T-cell leukemia. *JAMA* 1983; 250:1074-1080.
- Gessain A, Barin F, Vernant JC, *et al.* Antibodies to human T-lymphotropic virus type-1 in patients with tropical spastic paraparesis. *Lancet* 1985; 2:407-410.
- Payne LJ, Tosswill JH, Taylor GP, Zuckerman M, Simms I. In the shadow of HIV-HTLV infection in England and Wales, 1987-2001. *Commun Dis Public Health* 2004; 7:200-206.
- Monplaisir N, Neisson-vernant C, Bouillot M *et al.* HTLV-1 maternal transmission in Martinique using serology and polymerase chain reaction. *AIDS Res Hum Retrovir* 1993; 9:869-874.
- Murphy EL, Figueroa JP, Gibbs WN, *et al.* Sexual transmission of human T-lymphotropic virus type I (HTLV-1). *Ann Intern Med* 1989; 111:555-560.
- Hjelle BR, Mills G, Mertz G, Swenson S. Transmission of HTLV-1 via blood transfusion. *Vox Sang* 1990; 59:119-122.
- Okochi KH, Hinuma Y. Aretrospective study on transmission of adult T-cell leukemia virus by blood transfusion: seroconversion in recipients. *Vox Sang* 1984; 46:245-253.
- Meytes D, Schochat B, Lee H, *et al.* Serological and molecular survey for HTLV-1 infection in a high-risk Middle Eastern group. *Lancet* 1990; 336:1533-1535.
- Tabei SZ, Rajabian R, Shirdel H, *et al.* Adult T-cell leukemia/lymphoma in the northern province of Iran. *Iran J Med Sci* 1986; 13:85-86.
- Dougan S, Payne LJ, Tosswill JH, Davison K, Evans BG. HTLV infection in England and Wales in-results from an enhanced national surveillance system. *Commun Dis Public Health* 2004; 7:207-211.
- Farid R, Poryamoth N, Godarzi A, *et al.* A familial seroepidemiological survey of HTLV-1 in Mashhad, Northeastern Iran suggested an important mother to child transmission. *J AIDS Hum Retrovir* 1995; 10:209-212.
- Farid R, Etemadi MM, Baradaran H, *et al.* Screening sera from adult populations of Mashhad and Gonbad for antibodies to HTLV-1. *Med J Islamic Rep Iran* 1992; 6: 85-86.
- Hathirat P, Iamslip W, Chiewsilp P. HTLV-I antibody screening in donated blood and thalassaemic patients. *J Med Assoc Thai* 1993; 2:103-105.
- Boturao NE, Covas DT, Zago MA. The frequency of blood-born viral infections in a population of multi-transfused Brazilian patients. *Rev Inst Med Trop Sao Paulo* 1993; 35:271-273.
- de Montalembert M, Costagliola DG, Lefrere JJ, *et al.* Prevalence of markers for human immunodeficiency virus types 1 and 2, human T-lymphotropic virus type I, cytomegalovirus, and hepatitis B and C virus in multiple transfused thalassaemia patients. The French Study Group On Thalassaemia. *Transfusion* 1992; 32:509-512.
- Agliano AM, Vania A, Gandini O, *et al.* Post-transfusional human retrovirus infection in 41 Italian beta-thalassaemic patients. *Haematologica* 1992; 77:54-59.
- Prati D, Capelli C, Rebulli P, *et al.* The current risk of retroviral infections transmitted by transfusion in patients who have undergone multiple transfusions. CooleyCare Cooperative Group. *Arch Intern Med* 1998; 27:1566-1569.
- Sotoudeh M, Tabei SZ. Detection of Human T-cell leukemia virus carriers in thalassaemia patients in Shiraz. *Iran J Med Sci* 1994; 29:4-12.
- Moradi A. Seroepidemiology of HTLV-1 in thalassaemia patients from both Zahedan and Zabol in 1380. *The Scient J Zanjan Uni Med Sci* 2004; 43:43-47.
- Abbaszadegan MR, Gholamin M, Tabatabaee A, *et al.* Prevalence of human T-lymphotropic virus type 1 among blood donors from Mashhad, Iran. *J Clin Microbiol* 2003; 41:2593-595.
- Ghaderi AA, Habib-Agahi M. High prevalence of anti-HCV and HTLV-1 antibodies in Thalassaemia major patients of southern Iran. *Iran J Med Sci* 1996; 21:62-64.
- Rezvan H, Ahmad J, Farhadi M. A cluster of HTLV-1 infection in northeastern of Iran. *Transfusion Today* 1996; 27:8-9.