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Seroprevalence of Human T-Cell Leukemia Virus Type-1 (HTLV-1) in High Risk Patients

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Abstract

Background: Human T-lymphotropic virus type I is the etiologic agent of two distinct human diseases, adult T-cell leukemia or lymphoma and a chronic, progressive demyelinating disorder. The aim of this work was to investigate the seroprevalence of HTLV-1/2 among high risk patients (thalassemic and hemodialysis) in Charmahal-va-Baktiari Province, center of Iran.

Methods: Using ELISA, a total of 357 serum samples from the patients were tested for HTLV specific antibody during first 6 month of 2005. Seventy percent of samples were thalassemics and 30% were hemodialysis patients. All of the ELISA positive samples were confirmed by Western blotting (WB) analysis.

Results: Using ELISA, 27 of 357 (7.6%) serum samples tested positive for HTLV-1 specific antibody of which 18 (7.2%) were thalassemic and 9 (8.4%) were hemodialysis patients. The WB results showed that of 27 samples tested positive by ELISA, 24 (89%) were HTLV-1 and 3 (11%) were not confirmed.

Conclusion: The relatively high seroprevalence of HTLV-1 among both thalassemic and hemodialysis patients was determined in this province. This might indicate this region as an endemic area for this virus. However, to approve this hypothesis, the prevalence of this virus in the blood donors has to be determined.

Keywords: *HTLV-1, ELISA, Western blotting, Iran*

Introduction

Human T-lymphotropic virus type 1 (HTLV-1) is a retrovirus was first identified in humans in 1980 (1) and 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), both HTLV I and II are retroviruses that cause life-long persistent infection in humans. Although less than 5% of infected individuals progress to one of the HTLV-related diseases, the infection is debilitating with few treatment options and poor prognosis and is often fatal (5).

It is transmitted through breastfeeding, sexual contact, blood transfusion and injecting drug use. 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 but is endemic, in certain parts of the world such as southwestern Japan, the Caribbean basin, Africa, part of South Amer-

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ica, southern Italy, Taiwan, and the United States (10). In Iran, the first case of adult-T-cell leukemia (ALT) was reported from Mashhad in 1986 (11) and subsequently this city has been recognized as an endemic area for HTLV-1 infection (12-14).

Both thalassemic and hemodialysis patients are of the most high risk groups for HTLV-1 infection due to their need for blood transfusion (15-19). Again in Iran, it was reported that 1.25% and 1.6% of thalassemic 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 thalassemic patients (22).

These evidences, together, 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 infection is endemic. Therefore, this study was conducted to determine the seroprevalence of HTLV-1 in both thalassemic and hemodialysis patients from Charmahal-va-Baktiari Province, center of Iran.

Materials and Methods

Subjects

A total of 357 serum samples from both thalassemic and hemodialysis patients were tested for HTLV specific antibody during Mar to Oct 2005. The patients were 250 (70%) thalassemic and 107(30%) hemodialysis. They comprise almost all of the hemodialysis and thalassemic patients in this province.

Serological assays. Serum samples were screened for HTLV1/2 specific antibodies using ELISA (Vironostika HTLV I/II, Organon Teknica). The test detects HTLV infection without distinguishing between HTLV-1 and HTLV-2. All of the ELISA positive samples were confirmed by Western Blotting analysis (WB; HTLV blot 2.4 kit; Gene Labs Diagnostics, Ltd), which can confirm ELISA positive results, besides the distinguishing HTLV-1 from HTLV-2.

Demographic data and statistical analysis

A questionnaire including questions about socio- demographic status, history of disease and the number of transfusion in each patient was prepared.

Statistical analysis

Descriptive results were presented as crude frequencies. Statistical analyses were carried out by using Chi-square test in SPSS.

Results

Thalassemic patients were 38% female, with a mean age of 25 yr, ranging from 1 to 45 yr. In the primary screening, 18 of the 250 (7.2%) patients were positive for HTLV specific antibody. All the positive samples were confirmed by Western blotting and the results showed that 17 of the 18 (94%) of samples were HTLV-1 but 1 (6%) was not confirmed. There was no significant relationship between HTLV seropositivity and gender of the patients ($P > 0.05$).

Hemodialysis patients were 42% female with a mean age of 65 yr, ranging from 18 to 90 yr ELISA results showed that 9 of the 107 (8.4%) patients were positive for this antibody. Western blotting of ELISA positive samples showed that 7 of 9(78%) were HTLV-1 but 2 of 9(22%) were not confirmed. There was no significant relationship between HTLV seropositivity and gender of the patients ($P > 0.05$).

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 a northern city of Iran, Mashhad (6-8). Both thalassemic and hemodialysis patients, who are blood transfusion dependent, are of the most high risk groups for this infection (15, 16). In Iran, also, there is some evidence suggested relatively high prevalence of virus in these patients.

Using ELISA, the overall seroprevalence of HTLV in both thalassemic and hemodialysis samples found in our study was 7.6%. Based on the WB confirmation, the vast majority of these samples (6.7%) tested positive for HTLV-1. This rate was greater than that seen in Tehran (unpublished result), Shiraz (20), and Zahedan (21). Therefore, our results may indicate a relatively higher prevalence of this virus in our province and this difference could be due to use of a different screening test or different public health.

Surprisingly, in Shiraz, 25.6% of thalassemic patients were seropositive for anti-HTLV-1 antibody (23). Although this finding was much higher than of our study, it would confirm our results. In addition, 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 also distinguishes HTLV-1 from HTLV-2 (22). Based on Mashhad report, which used the same methods, 4.82% of HTLV detected by ELISA were HTLV-2. Our WB results did not show any HTLV-2. This may be due to technical problem or lack of this virus in our samples.

Based on our results, the prevalence of this virus was higher than that of in some other countries such as Thai, Brazil and Italy which used the same method as we used in this study (15-19). However, it is in agreement with 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 were endemic regions for this infection (22, 24). Conclusively, all evidences suggest that in addition to Mashhad, this virus might be endemic in other parts of Iran. Moreover, the results of our study support this hypothesis and this province could be the other endemic region for this infection. However, more comprehensive study has to be conducted to approve this hypothesis.

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References

1. Poiesz, BJ, Ruscetti FW, Gadzar AF, Bunn PA, Minna JD, Gallo RC. 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 USA*. 1980; **77:** 7415-19.
2. Kalyanaraman VS, Sarngadharan MG, Poiesz BF, Ruscetti W, Gallo RC. Immunological properties of a type C retrovirus isolated from cultured human T-lymphoma cells and comparison to other mammalian retroviruses. *J Virol.* 1982; **38:** 906-15.
3. Blattner WA, Takatsuki K, Gallo RC. Human T-cell leukemia-lymphoma virus and adult T-cell leukemia. *JAMA.* 1983; **250:**1074-80.
4. Gessain AE, Barin JC, Vernant O, Gout L, Maurs A, Calender G. Antibodies to human T-lymphotropic virus type-1 in patients with tropical spastic paraparesis. *Lancet*. 1985; **2:** 407-10.
5. 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(3):** 200-6.
6. Monplaisir NV, Neisson C, Bouillot M. HTLV-1 maternal transmission in Martinique using serology and polymerase chain reaction. *AIDS Res Hum Retrovir*. 1993; **9:** 869-74.
7. Murphy EL, Figueroa JP, Gibbs WN, Brathwaite AM, Holding-Cobham D, Waters, B *et al*. Sexual transmission of

human T-lymphotropic virus type I (HTLV-1). *Ann Intern Med.* 1989; **111:** 555-60.
8. Hjelle B, Mills R, Mertz G, Swenson S. Transmission of HTLV-1 via blood transfusion. *Vox Sang*; 1990; **59:** 119-22.
9. Okochi K, Sato H, Hinuma Y. A retrospective study on transmission of adult T-cell leukemia virus by blood transfusion: seroconversion in recipients. *Vox Sang*. 1984; **46:** 245-53.
10. Meytes D, Schochat B. Serological and molecular survey for HTLV-1 infection in a high-risk Middle Eastern group. *Lancet.*1990; **336:** 1533-35.
11. Tabei SZ, Rajabian R, Shirdel H. Adult T-cell leukemia/lymphoma in the northern province of Iran. *Iran J Med Sci.* 1986; **13:** 85-6.
12. 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(3):** 207-11.
13. Farid R, Poryamoth N, Godarzi A. A familial seroepidemiological survey of HTLV-1 in Mashhad, Northyestern Iran suggested an important mother to child transmision. *J AIDS Hum Retrovirol.* 1995; **10:** 209-12.
14. Farid R, Etemadi MM, Baradaran H. Screening sera from adult populations of Mashhad and Gonbad for antibodies to HTLV-1. *Med J Islamic Rep Iran*. 1992; **6:** 85-6.
15. Hathirat P, Iamslip W, Chiewsilp P. HTLV-I antibody screening in donated blood and thalassemic patients. *J Med Assoc Thai.* 1993; **76(2):** 103-5.
16. Zago MA, Boturao Neto E, Covas DT. The frequency of blood-born viral infections in a population of multitransfused Brazilian patients. *Rev Inst Med Trop Sao Paulo.* 1993; **35(3):** 271-3.
17. Lombardo T, Cornu G, Lefrere JJ, Costaglioa DG, Montalembert M, Girot R, 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 multiply transfused thalassemia patients. The French Study Group On Thalassaemia. *Transfus*. 1992; **32(6):** 509-12.
18. Albonici L, Napolitano M, Gradilone A, Gandini O, Vania A, Agliono AM, et al. Post-transfusional human retrovirus infection in 41 Italian beta-thalassemic patients. *Haematologica*. 1992; **77 (1):** 54-9.
19. Bosoni P, Mozzi F, Rebulla P, Capelli C, Prati D, Sirchia G, 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; **158 (14):** 1566-69.
20. Sotuodeh M, Tabei SZ. Detection of Human T-cell leukemia virus carriers in thalasemia patients in Shiraz. *Iran J Med Sci* 1994; **29:** 4-12.
21. Moradi A. Seroepidemiology of HTLV-1 in thalasemia patients from both Zahedan and Zabol in 1380. *Scienti J Zanjan Univ of Med Sci*. 1381; **43:** 43-7.
22. Abbaszadegan MR, Gholamin M, Tabatabaee A, Farid R, Houshmand M, Abbaszadegan M. Prevalence of human T-lymphotropic virus type 1 among blood donors from Mashhad, Iran. *J Clin Microbiol*. 2003; **41(6):** 2593-95.
23. Ghaderi AA, habib-Agahi M. High prevalence of anti-HCV and HTLV-1 antibodies in Thalasemia major patients of southern Iran. *Irn J Med Sci*. 1996; **21:** 62-6.
24. Rezvan H, Ahmad J, Farhadi M. A cluster of HTLV-1 infection in northeastern of Iran. *Transfu Today*. 1996; **27:** 8-11.