

Seroepidemiology of Human T-cell Lymphotropic Virus 1 Infection in Hemodialysis Patients

Should We be Concerned About it?

Javad Ghaffari,¹ Mahbobeh Ebrahimi,² Atieh Makhloogh,³ Hamid Mohammadjafari,⁴ Zeinab Nazari⁵

¹Department of Immunology, Mazandaran University of Medical Sciences, Sari, Iran

²Molecular and Cellular Biology Research Center, Faculty of Medicine Mazandaran University of Medical Sciences, Sari, Iran

³Division of Nephrology, Department of Internal Medicine, Mazandaran University of Medical Sciences, Sari, Iran

⁴Division of Pediatric Nephrology, Department of Pediatrics, Mazandaran University of Medical Sciences, Sari, Iran

⁵Departments of Oncology and Gynecology, Mazandaran University of Medical Sciences, Sari, Iran

Keywords. human T-cell lymphotropic virus 1, seroepidemiologic studies, hemodialysis

Human T-cell lymphotropic virus 1 (HTLV1) is a lymphotropic virus which can be transmitted through unprotected sexual activity, breast feeding, and blood transfusion. Although most of HTLV1-infected individuals remain asymptomatic carriers, 1% to 5% and 3% to 5% develop adult T-cell leukemia and HTLV1-associated myelopathy/tropical spastic paraparesis, respectively. The aim of this study was to determine the prevalence of HTLV1 infection in hemodialysis patients in Sari and Ghaemshahr. This cross-sectional study was conducted on 160 patients using random samples selection, and included 80 men and 80 women (mean age, 59.1 ± 14.7 years). All the samples were screened for HTLV1 antibody by enzyme-linked immunosorbent assay and positive samples were confirmed by Western blot assay. Only 1 patient had a positive anti-HTLV1 enzyme-linked immunosorbent assay test, which was confirmed by Western blot. The overall prevalence of HTLV1 seropositivity was 0.6%. The patient was a 21-year-old woman with a history of multiple blood transfusions. She had a history of unsuccessful kidney transplantation and had been on hemodialysis before transplant, too. This study suggests that HTLV1 infection may not be prevalent in high-risk patients in Mazandaran province, and there is no need for HTLV1 screening of blood samples.

IJKD 2013;7:187-90
www.ijkd.org

INTRODUCTION

Human T cell lymphotropic virus 1 (HTLV1) is a member of retroviruses family of *Oncovirinae*. The infectious cause is human and is one of the main causes of lymphoma, T-cell adult leukemia HTLV1-dependent myelopathy, and several clinical syndromes, such as subsided immune system disorders, cutaneous pulmonary opportunistic infections (eg, *Strongyloides stercoralis*), and malignancy in other organs.¹⁻³ The virus is transmitted through infected blood cell by recurrent blood transfusion, sexual transmission, and breast feeding. Less than 3% to 5% of HTLV1-infected

individuals develop HTLV1-associated myelopathy/tropical spastic paraparesis or adult T-cell leukemia, and the majority remain asymptomatic carriers throughout their lives.⁴ Seroepidemiologic assessments have shown that about 15 to 20 million people in the world today are estimated to be infected by HTLV1.⁵ This virus is endemic in Latin America, Caribbean Sea, south and center of Africa, and Japan.⁶ It has been shown that north east of Iran has been recognized as a new endemic region of the virus and the prevalence of HTLV1 infection in Mashhad and Sabzevar cities is 2.2% and 1.6, respectively.⁷⁻⁹ We have previously reported that

in north of Iran, Mazandaran province is not an endemic region of the virus.¹⁰

Patients receiving hemodialysis are one of the high-risk groups for HTLV1 infection due to their requirement for blood transfusion.¹¹⁻¹³ According to the previous studies, a considerable proportion of its transmission is through infected blood products.¹⁴ The aim of this study was to investigate the seroepidemiologic status of HTLV1 in hemodialysis patients in Mazandaran province, north of Iran.

MATERIALS AND METHODS

This study included 160 patients who attended to the hemodialysis unit of Imam Khomeini and Fatemeh Alzahra Hospitals in Sari and Razi Hospital in Ghaemshahr, Mazandaran University of Medical Sciences, between April and July 2011. The study was approved by the Ethics Committee of Mazandaran University of Medical Sciences, and informed consent was taken from each patient. Five millilitres of blood sample was drawn from each patient and serum was separated and kept in -20°C. A detailed data collection form was filled out for each individual simultaneous to gathering blood samples.

All sera were screened for HTLV1 antibody by enzyme-linked immunosorbent assay commercial kit according to manufacturer's instruction (Dia Pro Diagnostic Bioprobes, Milan, Italy). To confirm the HTLV1 infection, the Western Blot method was used on all reactive samples (Gene Lab Diagnostic Ltd, Singapore).

RESULTS AND DISCUSSION

In this study, 160 patients (80 women and 80 men) with the mean age of 59.1 ± 14.7 years (range, 17 to 93 years), who were admitted at the hemodialysis units, were selected. Table 1 shows the age distribution of the study population. Among the participants, 103 (64.4%) had a history of blood transfusion (65% of men and 63.8% of women) and all of them had a history of minor surgeries (fistula and catheter insertion) at least one time. None of the patients had a history of high-risk sexual behavior or a history of human immunodeficiency virus infection or intravenous drug injection. Most of the patients were married (93.1%). A history of diabetes mellitus, positive hepatitis C virus, and positive hepatitis B virus

Table 1. Age Distribution in the Study Population

Age, y	Male (%)	Female (%)
< 20	0	1 (1.2)
20 to 40	8 (10.0)	10 (12.5)
40 to 60	27 (33.9)	25 (31.2)
60 to 80	41 (51.2)	38 (47.5)
> 80	4 (5.0)	6 (7.5)
All	80 (100)	80 (100)

were detected in 32.5%, 3.8% and 2.5% of the patients, respectively (Table 2).

In the primary screening by enzyme-linked immunosorbent assay and subsequent Western blot confirmation, only 1 case was found to be positive for HTLV1 (0.6%). The patient was a 21-year-old woman known as a case of end-stage renal disease due to glomerulonephritis who was under dialysis. This patient had a history of transplantation 3 years ago, which was not successful due to graft rejection. Furthermore, the patient had a history of arteriovenous fistula placement. She also had a history of several blood transfusion and negative results for hepatitis B and C viruses and human immunodeficiency virus infections.

Our results showed that the prevalence of HTLV1 in patients on hemodialysis is low (0.6%). Previous studies demonstrated that north east of Iran is a new endemic region of HTLV1 infection.⁷⁻⁹ Therefore, all blood products are routinely screened for this infection in Razavi province.¹⁵ In other investigations, the prevalence rate of HTLV1 infection in the general population and blood donors varies between provinces such as West Azarbayjan (0.34%), Bushehr (0.13%), and Chaharmahal and Bakhtiari (0.62%).¹⁶ Studies in different parts of Iran have shown that HTLV1 infection rate is relatively high among high-risk groups, including patients with thalassemia, end-

Table 2. Underlying Diseases by Sex

Disease	Male (%)	Female (%)	All (%)
Diabetes mellitus	12 (15.0)	13 (16.2)	25 (15.6)
Hypertension	37 (46.2)	33 (41.2)	70 (43.8)
Diabetes and hypertension	10 (12.5)	17 (21.2)	27 (16.9)
Lupus	1 (1.2)	2 (2.5)	3 (1.9)
Nephrotic syndrome	0	2 (2.5)	2 (1.2)
Unknown	12 (15.0)	11 (13.8)	23 (14.4)
Cancer	1 (1.2)	0	1 (0.6)
Urinary infection	4 (5.0)	2 (2.5)	6 (3.8)
Polycystic kidney disease	3 (3.8)	0	3 (1.9)
Total	80 (100)	80 (100)	160 (100)

stage renal disease, and hemophilia.^{11-13,17-19} Thus, it is necessary to screen the HTLV1 antibody in blood products. Consistence with this study, Ghaffari and colleagues found in their assessment of 1200 patients with various diseases over Mazandaran province a prevalence rate of 0.085% for HTLV1 infection. This implies that Mazandaran province is not an endemic region comparatively to Northeast regions of the country.¹⁰

One study in Jamaica on 63 patients on hemodialysis revealed that organ transplantation is one of the risk factors for HTLV1 transmission.²⁰ In Japan, which is an endemic region for HTLV1 infection, the prevalence of HTLV1 in kidney transplanted patients have been reported to be 8.3% to 9.9%.²¹ In another study from Urmia, north west of Iran (which is not an endemic region), the prevalence rate of HTLV1 infection in 91 transplant patients was 1.09%, which is lower than its prevalence rate among hemodialysis patients in this city.²² Thus, although organ transplantation is a risk factor for the virus transmission, it seems that HTLV1 is not considered as a blood-borne disease in nonendemic areas, such as Mazandaran province. We have reported (article in press) that the prevalence of HTLV1 infection is not high in patients with major thalassemia (1.4%) compared with other parts of Iran such as Golestan province (4.4%) and Tehran province (3.6%).^{11,16}

In conclusion, the present study showed that despite the multiple blood transfusions in hemodialysis patients in Mazandaran province, the prevalence rate of this virus is low in this region, and there is no need for HTLV1 screening of blood products.

ACKNOWLEDGMENTS

The authors would like to thank the staff of the hemodialysis centers of Imam Khomeini and Fatemeh Alzahra Hospitals in Sari and Razi Hospital in Ghaemshahr. This paper is the result of a medical degree thesis (by Dr Mahboobeh Ebrahimi), which was funded by Mazandaran University of Medical Sciences.

CONFLICT OF INTEREST

None declared.

REFERENCES

1. Poiesz BJ, Ruscetti FW, Gazdar 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 U S A*. 1980;77:7415-9.
2. Kalyanaraman VS, Sarngadharan MG, Poiesz B, Ruscetti FW, Gallo RC. Immunological properties of a type C retrovirus isolated from cultured human T-lymphoma cells and comparison to other mammalian retroviruses. *J Virol*. 1981;38:906-15.
3. Gallo RC. The discovery of the first human retrovirus: HTLV-1 and HTLV-2. *Retrovirology*. 2005;2:17.
4. Blattner WA, Takatsuki K, Gallo RC. Human T-cell leukemia-lymphoma virus and adult T-cell leukemia. *JAMA*. 1983;250:1074-80.
5. de TG, Kazanji M. An HTLV-I/II vaccine: from animal models to clinical trials? *J Acquir Immune Defic Syndr Hum Retrovirol*. 1996;13 Suppl 1:S191-S198.
6. Yamaguchi K. Human T-lymphotropic virus type I in Japan. *Lancet*. 1994;343:213-6.
7. Farid R, Etemadi M. Seroepidemiology and virology of HTLV 1. *Serodiagn Immunother Infect Dis*. 1993;5:251-52.
8. Azarpazhooh MR, Hasanpour K, Ghanbari M, et al. Human T-lymphotropic virus type 1 prevalence in northeastern Iran, Sabzevar: an epidemiologic-based study and phylogenetic analysis. *AIDS Res Hum Retroviruses*. 2012;28:1095-101.
9. Rafatpanah H, Hedayati-Moghaddam MR, Fathimoghdam F, et al. High prevalence of HTLV-I infection in Mashhad, Northeast Iran: a population-based seroepidemiology survey. *J Clin Virol*. 2011;52:172-6.
10. Ghaffari J, Naghshvar F, Nazari Z, Farid R, Torabizadeh J, Madani F. Seroprevalence of human T-cell lymphotropic virus type 1 infection (HTLV1) in different patients in the north of Iran. *Afr J Biotechnol*. 2011;10:10752-55.
11. Khameneh ZR, Baradaran M, Sepehrvand N. Survey of the seroprevalence of HTLV I/II in hemodialysis patients and blood donors in Urmia. *Saudi J Kidney Dis Transpl*. 2008;19:838-41.
12. Moradi A, Ahmadi A, Bakhshande Nosrat S, Sanei Moghadam S. Survey of HTLV-1 antibody among thalassemic patients in Gorgan. *Med Lab J*. 2007;1:22-6.
13. Anaraki G, Sadeghipur A, Vosugh P, Nurmohamadi E, Mirnateghi A. Seroprevalence of HTLV I among thalassemic patients with frequent blood transfusion in Tehran in 2003. *Iran Univ Med Sci*. 2005;47:19.
14. Proietti FA, Carneiro-Proietti AB, Catalan-Soares BC, Murphy EL. Global epidemiology of HTLV-I infection and associated diseases. *Oncogene*. 2005;24:6058-68.
15. Farid-Hoseini R, Parizadeh MJ, Gaffari J, Miri S, Nasirian A, Rafatpanah H. Seroprevalence of human T-cell lymphotropic virus type 1 infection (HTLV1) in Neishabur (Iran). *Med J Mashad Univ Med Sci*. 2005;47:417-24.
16. Pouliquen JF, Hardy L, Lavergne A, Kafiludine E, Kazanji M. High seroprevalence of human T-cell lymphotropic virus type 1 in blood donors in Guyana and molecular and phylogenetic analysis of new strains in the Guyana shelf (Guyana, Suriname, and French Guiana). *J Clin Microbiol*. 2004;42:2020-6.
17. Karimi A, Nafici MR, Imani R. Comparison of human T-cell

- leukemia virus type-I (HTLV-I) seroprevalence in high risk patients (thalassemia and hemodialysis) and healthy individuals from Charmahal-Bakhtiari province, Iran. *Kuwait Med J.* 2007;39:259-61.
18. Moradi A, Yaghubnejad Z, Mohagheghi A, et al. Seroepidemiology of HTLV1 in major thalassemia in Zabol and Zahedan cities. *Zahedan Univ Med Sci J.* 2003;11:43-9.
19. Pourkarim M, Khameisipour G, Hajiani G, Tahmasebi R, Ardeshirdavani N. Seroepidemiology survey of HTLV I-II infection in frequent blood transfusion in Bushehr. *Sci J Blood Transfus Organ.* 2003;4:99-104.
20. Morikawa K, Kuroda M, Tofuku Y, et al. Prevalence of HTLV-1 antibodies in hemodialysis patients in Japan. *Am J Kidney Dis.* 1988;12:185-93.
21. Nakamura N, Arakaki Y, Sunagawa H, et al. Influence of immunosuppression in HTLV-1-positive renal transplant recipients. *Transplant Proc.* 1998;30:1324-6.
22. Khameneh ZR, Sepehrvand N, Masudi S, Taghizade-Afshari A. Seroprevalence of HTLV-1 among kidney graft recipients: a single-center study. *Exp Clin Transplant.* 2010;8:146-9.

Correspondence to:
Atieh Makhlough, MD
Division of Nephrology, Mazandaran University of Medical Sciences, Sari, Iran
Fax: +98 151 223 4506
E-mail: makhlough_a@yahoo.com

Received April 2012
Revised September 2012
Accepted October 2012