

Original Article

The seroprevalence of HTLV-1 in Neyshabour City, Northeast of Iran, during 2008-2009

Salehi M¹, Shokuhi SKh-M², Ghasemian A², Abdolrahim kazemi-vardeh*³

1. Medical Diagnostic Laboratory of Neyshabour, Center of Medical, Pathological and Genetic Diagnostic Services, Iranian Academic Center for Education, Culture and Research (ACECR), Mashhad Branch, Mashhad, Iran

2. Department of Microbiology, Islamic Azad University, Tehran, Iran

3. Researcher, Shahrekord University of medical sciences, Shahrekord, Iran

Abstract

Background and Aims: HTLV-1 is widespread worldwide and endemic in some areas such as Northeastern Iran. The present study aimed to determine the prevalence of HTLV-1 among individuals in Neyshabour City during the years of 2008-2009.

Materials and Methods: A total of 254 blood specimens were collected from participants in the great medical diagnostic laboratory of Neyshabour, Northeast Iran. Travelers to the city were excluded from this study. History of each patient was also assessed for the possible existence of virus before test and meanwhile each of patient's consent of inclusion was prepared. The history of patients syringe transfusion condition and literacy level of them was also prepared. From each individual, 5 ml of blood sample was collected. Serum samples were prepared through centrifugation and stored at -20°C. Sera samples were tested screened for the presence of specific anti- HTLV antibodies against HTLV-1 by the Enzyme-linked Immuno-sorbent Assay (ELISA) test (Dia.pro diagnostic bioprobes corporation, Italy) according to the manufacturer's instructions.

Results: HTLV-1 infection was positive in 5.5% (14/254) of the participants according to the results of ELISA test. The prevalence of total HTLV-1 in each year of 2008 and 2009 was 6.2%, 5.1%, respectively. The individuals with more than 40 years had a higher rate of infection (10% and upper).

Conclusion: The HTLV-1 infection was detected at a high rate in individual's blood donors in Neyshabour city during 2008-2009. The rate of infections showed a decrease state from far to the recent years.

Keywords: HTLV-1, Neyshabour, ELISA

Introduction

Human T-lymphotropic virus (including common HTLV-1 and HTLV-2) belong to the reteroviridae family (1-3). The virus prevalence is widespread all over the world and is endemic in several regions; such as North parts of Iran (4-6). According to

published previous studies, the rate of infection have been less than 0.26% in Mashhad North East of Iran. However, it does not exceed more than 0.34% in several other areas of the country (7). The transcontinental subgroup (TC) is the predominant HTLV-1 in Iran and other Middle Eastern countries (8). Among other countries such as Turkmenistan, Brazil, Spain, Korea and Japan the prevalence was 0.007 (9), 1.9 (10), 0.001 (11), 0.27 (12), and 0.12% (13), respectively. The HTLV-1 causes a lympho-proliferative malignancy of CD4 positive cells in adults (T-cell leukaemia/lymphoma or ATL) and a chronic myelopathy called tropical spastic

* **Corresponding author:** Researcher, Shahrekord University of medical sciences, Shahrekord, Iran

*Corresponding author: Tel: (+98) 394514760, Fax: +251 9882884555, E-mail address: bacteriology94@gmail.com

paraparesis/HTLV-1-associated myelopathy (TSP/HAM) (14, 15). HTLV-2 has 70% similarity with HTLV-1 genomic structure (16). Carriers of HTLV-1 and HTLV-2 infect in prolonged time asymptotically (17). As HTLVs are mostly transmitted through blood transfusion, the screening for antibodies and discarding seropositive units must efficiently prevent this transmission (18). The transmission routes of these reteroviruses vary and include: vertical; mostly from mother to child (through infected milk lymphocytes) (19), by cellular blood products transfusion (20), by sharing contaminated needles and sexual contact (bi-directional but higher from male to female) (21) and also rarely through liver, kidney, and lung transplants (22). The aim of the present survey was determination of prevalence of HTLV-1 and 2 among healthy individuals attending a great medical diagnostic laboratory in Neyshabour, Northeast of Iran during the years of 2010-2014.

Methods

Study population

A total of 254 blood samples were obtained from participants that were gone to the great medical diagnostic laboratory in Neyshabur Northeast Iran (each was stored in -20C). Travelers to the city were not included in the study. History of each patient was also gained for the possible existence of virus before test and likewise all the patients consent was prepared. In addition, the history of syringe transfusion and literacy of patients were also prepared.

Serological assay and confirmation tests

From each individual 5 ml of blood was gathered. Sera samples were prepared through centrifugation and stored at -20°C. Sera samples were screened for the presence of specific antibodies against HTLV-1 and HTLV-2 by the Enzyme-linked Immunosorbent Assay (ELISA) test (Dia.pro diagnostic bioprobes, Italy) according to the manufacturer's instructions.

Statistical analysis

All descriptive data were normalized as the mean, standard deviation and each percent. The SPSS software (version 20, copyright IBM Crop. 1989, 2011 (©) was applied for the data analysis using Chi Square and t-test. the variables I in this study were the equation age and sex of patients. The p value of <0.05 was considered statistically significant.

Results

The population that was studied here, consisted of 254 individuals that ranged in age from 1 to 90 years old. Thirty-five of them were males (14%) and 221 (86%) were females. The mean age of males and females were 44±3 and 53±3, years respectively. The distribution of patients based on the age and sex has been depicted in table 1. Total of repeatedly reaction against HTLV-1 specific antibodies was observed in 7% (18/254) of the participants in the ELISA test. Because of no previous syringe or blood transfusion among positive patients, no relationship found regarding this route of

Table 1: The age and sex distribution of patients and total positive cases of HTLV1.

Variable	No.	Positive cases (%)	Odd Ratio (OR)	OR95%CI	P value
Age (years)	0-19	29	13(3.03)	Baseline	<0.0001
	20-29	66	49(1.92)	0.625	
	30-39	18	88(4.36)	1.459	
	≥40	71	17(12.36)	4.512	
Sex	Male	35	3(8.6)	1.386	0.002
	Female	221	16(6.3)	1.128-1.704	

transmission. As shown, the age ranges of 30-39 and upper than 40 years old demonstrated more positive results. The prevalence of total HTLV-1 in each year included 19 cases in 2008 and 16 in 2009 respectively.

Discussion

Several previous studies from Northeast Iran have revealed that the both HTLV-1 and HTLV-2 were endemic in this area (23). However, the rate of sero-positivity of HTLV-1 has decreased gradually since 1996 to date from 1.97% to lower than 0.5% (24-26). Similarly, the results of the current study showed that the prevalence of HTLV-1 has decreased in Neyshabur since 2008 to 2009. In a survey in Mashhad in 2012, the rate of HTLV was 0.47% (27). Moreover, in a previous study by Safabakhsh, the seroprevalence of HTLV-1 not exceeded than 0.19% (7). The main reasons for the declining rate of HTLV-1 possibly include: improvement of donor selection in the Blood Transfusion and awareness increasing among blood donors. However, in Rafatpanah's study in Mashhad, although the prevalence of HTLV-1 was 20% (10 positive samples), no evidence of HTLV-II infection was determined among immunoblot samples together with Nested-PCR (28). However, in the present study more than 5% of healthy individuals were positive for HTLV-1 each year. To the best of our knowledge, the published data regarding HTLV-2 prevalence is not clear in Iran. In a study by Durojaiye in Nigeria, the seroprevalence of HTLV-1 was 0.5% among healthy blood donors (29). Reportedly, the seroprevalence of HTLV-1 has been very low in North America and Europe, for example 0.01-0.03% in USA and Canada (30, 31), 0.002% in Norway and 0.0056% in Greece (32). In the present survey, none of individuals had a history of previous transfusion and we could not find any relationship in this regard. There was a higher rate of positive HTLV-1 samples in the current investigation in comparison to some other studies from the country. The presumed reasons are possibly a more endemic region of study and the use of more careful techniques

such as western blot analysis and Polymerase chain reaction (PCR) in some of those studies. Furthermore, in this study the age group of upper 40 years had a higher prevalence of HTLV-1, suggesting a higher carrier state for the virus. The results depicted that the both HTLV-1 is present in Neyshabur city, Northeast of Iran and the seroepidemiology of the agent is decreasing similar to other previous studies from other Northern cities.

Conclusion

In this study the HTLV-1 was positive with a high prevalence among blood donors individuals of Neyshabur city in each year from 2008-2009. The prevalence of HTLV-1 was higher than previous in all the years of this study than other cities.

Acknowledgement

The authors thank the staffs of Mashhad-ACECR laboratory in Neyshabour for their kindly cooperation.

References

1. Chenari M, Norouzi M, Ghalichi L, Rezaee A, Yari A, Alavian SM, et al. Characterization of overt and occult hepatitis B virus infection among HTLV-1 positive healthy carriers in the Northeast of Iran; An HTLV-I endemic area. *Journal of medical virology*. 2014;86(11):1861-7.
2. Pohanka M, Pavlis O, Pikula J. Galantamine effect on tularemia pathogenesis in a BALB/c mouse model. *Iranian biomedical journal*. 2012;16(3):156.
3. Doan CC, Le TL, Hoang NS, Doan NT, Le VD, Do MS. Differentiation of umbilical cord lining membrane-derived mesenchymal stem cells into endothelial-like cells. *Iranian biomedical journal*. 2014;18(2):67.
4. Cook LB, Taylor GP. HTLV-1 and HTLV-2 Prevalence in the United States. *Journal of Infectious Diseases*. 2013;jit558.
5. Farid R, Farid F, Rezaee SA. Prevalence of HTLV-1 infection in northeast of Iran. *Retrovirology*. 2015;12(Suppl 1):O7.
6. Mahzounieh M, Ghorani M, Karimi A, Pourgheysari B, Nikoozad R. Prevalence of Human T-Lymphotropic Virus Types I and II in Patients

With Hematological Disorders in Isfahan, Iran. *Jundishapur journal of microbiology*. 2015;8.(٦)

7. Safabakhsh H, Jalalian M, Karimi G. Seroepidemiology of Human T-Cell Lymphotropic Virus Type-1 (HTLV1) in Mashhad. *Global journal of health science*. 2014;6(5):p99.

8. Gessain A, Cassar O. Epidemiological aspects and world distribution of HTLV-1 infection. *Frontiers in microbiology*. 2012;3.

9. Senyuta N, Syrtsev A, Yamashita M, Stepina V, Susova O, Scherbak L, et al. Sero-epidemiologic and phylogenetic studies of HTLV-I infection in 2 countries of the Caspian Sea region. *International journal of cancer*. 1998;77(4):488-93.

10. Carneiro-Proietti AB, Sabino EC, Leão S, Loureiro P, Sarr M, Busch M, et al. HTLV-1/2 prevalence in Brazilian blood donors: regional and demographic variation. *Retrovirology*. 2011;8(Suppl 1):A83.

11. Toro C, Rodés B, Aguilera A, Caballero E, Benito R, Tuset C, et al. Clinical impact of HTLV-1 infection in Spain: implications for public health and mandatory screening. *JAIDS Journal of Acquired Immune Deficiency Syndromes*. 2002;30(3):366-8.

12. Kwon SY, Lim AH, Park JY, Han SH, Cho NS. Seroprevalence of human T-lymphotropic virus type 1 and 2 in Korean blood donors. *Journal of medical virology*. 2008;80(10):1864-7.

13. Satake M, Yamaguchi K, Tadokoro K. Current prevalence of HTLV-1 in Japan as determined by screening of blood donors. *Journal of medical virology*. 2012;84(2):327-35.

14. Gru AA. *Pathology of T-Cell Lymphomas: Diagnosis and Biomarker Discovery*. Non-Hodgkin Lymphoma: Springer; 2015. p. 51-95.

15. Matsuura E, Yoshimura A, Nozuma S, Higuchi I, Kubota R, Takashima H. Clinical presentation of axial myopathy in two siblings with HTLV-1 associated myelopathy/tropical spastic paraparesis (HAM/TSP). *BMC neurology*. 2015(1):18.

16. Dutartre H, Boniface A, Ko NL, Gessain A, Cosset F-L, Suspène R, et al. ADAR1 enhances HTLV-1 and HTLV-2 replication through inhibition of PKR activity. 2014.

17. Tanajura D, Castro N, Oliveira P, Neto A, Muniz A, Carvalho NB, et al. Neurological Manifestations in Human T-Cell Lymphotropic Virus Type 1 (HTLV-1)-Infected Individuals Without HTLV-1-Associated Myelopathy/Tropical Spastic Paraparesis: A Longitudinal Cohort Study. *Clinical Infectious Diseases*. 2015:civ229.

18. Sobata R, Matsumoto C, Uchida S, Suzuki Y, Satake M, Tadokoro K. Estimation of the infectious viral load required for transfusion-transmitted

human T-lymphotropic virus type 1 infection (TT-HTLV-1) and of the effectiveness of leukocyte reduction in preventing TT-HTLV-1. *Vox sanguinis*. 2015.

19. Jain P, Lavorgna A, Sehgal M, Gao L, Ginwala R, Sagar D, et al. Myocyte enhancer factor (MEF)-2 plays essential roles in T-cell transformation associated with HTLV-1 infection by stabilizing complex between Tax and CREB. *Retrovirology*. 2015;12(1):23.

20. Nicolás D, Ambrosioni J, Paredes R, Marcos MÁ, Manzardo C, Moreno A, et al. Infection with human retroviruses other than HIV-1: HIV-2, HTLV-1, HTLV-2, HTLV-3 and HTLV-4. Expert review of anti-infective therapy. 2015;13(8):947-63.

21. Gilbert-Barness E, Spicer DE, Steffensen TS. *Infection Control and Biological Hazards. Handbook of Pediatric Autopsy Pathology*: Springer; 2014. p. 723-7.

22. Fishman JA, Grossi PA. Donor-derived infection [mdash] the challenge for transplant safety. *Nature Reviews Nephrology*. 2014;10(11):663-72.

23. Rezvan H, Abolghassemi H, Kafiabad SA. Transfusion-transmitted infections among multitransfused patients in Iran: a review. *Transfusion Medicine*. 2007;17(6):425-33.

24. Karimi G, Hatami H. The prevalence of HTLV-1 infection in blood donation volunteers in Mashhad. *Journal of School of Public Health and Institute of Public Health Research*. 2014;11(4):85-94.

25. Tarhini M, Kchour G, Zanjani DS, Rafatpanah H, Otrouk ZK, Bazarbachi A, et al. Declining tendency of human T-cell leukaemia virus type I carrier rates among blood donors in Mashhad, Iran. *Pathology*. 2009;41(5):498-9.

26. Sani AT. Serologic prevalence of HTLV among blood donors in Mashhad (northeastern Iran). *Archives of Iranian Medicine*. 2001;4(1):25.

27. Hatami H, Karimi G, Safabakhsh H. Seroepidemiologic prevalence of HTLV in voluntary blood donors in Mashhad. *Scientific Journal of Iranian Blood Transfusion Organization*. 2012;9.(٧)

28. Rafatpanah H, Fathimoghadam F, Shahabi M, Eftekhazadeh I, Hedayati-Moghaddam M, Valizadeh N, et al. No Evidence of HTLV-II Infection Among Immunoblot Indeterminate Samples Using Nested PCR in Mashhad, Northeast of Iran. *Iranian journal of basic medical sciences*. 2013;16(3):229.

29. Durojaiye I, Akinbami A, Dosunmu A, Ajibola S, Adediran A, Uche E, et al. Seroprevalence of

human T lymphotropic virus antibodies among healthy blood donors at a tertiary centre in Lagos, Nigeria. *The Pan African Medical Journal*. 2014;17.

30. Williams AE, Fang CT, Slamon DJ, Poiesz BJ, Sandler SG, Darr Wn, et al. Seroprevalence and epidemiological correlates of HTLV-I infection in US blood donors. *Science*. 1988;240(4852):643-6.

31. Chiavetta JA, Escobar M, Newman AM, He Y, Driezen P, Deeks S, et al. Incidence and estimated

rates of residual risk for HIV, hepatitis C, hepatitis B and human T-cell lymphotropic viruses in blood donors in Canada, 1990–2000. *Canadian Medical Association Journal*. 2003;169(8):767-73.

32. Stigum H, Magnus P, Samdal HH, Nord E. Human T-cell lymphotropic virus testing of blood donors in Norway: a cost-effect model. *International journal of epidemiology*. 2000;29(6):1076-84.