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Evaluating the Frequency of Human T-Lymphotropic Virus Type 1 Infection in Iranian Population

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ABSTRACT

Background: Human T-cell lymphotropic viruses 1 (HTLV1) is endemic in specific regions. We aimed to determine the prevalence of HTLV I infection among blood donors in southeast Iran.
Methods: This cross-sectional study was conducted between April 2005 and March 2015. Sera were collected from blood donors and were tested for the presence of HTLV1 specific antibody using ELISA. Reactive samples were then tested by Western blot for confirmation.
Results: Of the 165,267 blood donors tested for HTLV 1 antibody, 45 (0.027%) donors were positive. Out of 45 positive donors, 41 were first time blood donors, 3 were repeat blood donors and 1 as regular donor. Most HTLV-1-positive donors were male and married. Co-infection with HBV was observed in one subject. The percentage of positive samples had increasing patterns from 0.016% in 2009 to 0.084% in 2010 and decreased after that to 0.014% in 2015.
Conclusion: The results indicated a low level of infection of HTLV1 in this part of our country.

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Introduction

Human T cell lymphotropic virus I (HTLV-I) has been identified as an agent involved in development of adult T cell leukemia.[1,2] The transmission of the virus through blood transfusion was first reported in Japan.[3] Leukoreduced blood products have been shown to reduce the risk of transmission of HTLV during transfusion;[4] however, the transmission of HTLV may not be completely preventable by leukodepletion.[5] For this reason, the screening of blood donors for HTLV is required in endemic areas. In the United States, the prevalence of HTLV infection among first-time blood donors is 22 per 100,000.[6] The seroprevalence of HTLV-1 among blood donors in Iran varies in the different geographical regions. For example, the seroprevalence is about 0.057% in Alborz province, 0.01% in Ardabil, 0.024% in Gilan, 0.2% in Khorasan Razavi and 0.068% in West Azarbaijan.[7] We aimed to evaluate the prevalence of HTLV-1 among blood donors in South Khorasan province (the third largest province), east of Iran.

Materials and Methods

This study was done at South khorasan Blood Transfusion Center, over a period of 10 years (between 2005 and 2015). Prior to blood donation, donors were assessed for their suitability to donate by following the standard donor selection guidelines of the Iranian Blood Transfusion Organization (IBTO). All the donors were provided informed consent before inclusion in the study. Serum samples were collected from the donors. The sera were screened for HTLV-I using enzyme-linked immunosorbent assay (ELISA; Adaltis Srl, via Durini,

Italy). All repeatedly reactive samples were confirmed by Western blotting test (MP Biomedical Asia Pacific Pte. Ltd., Singapore). All tests were performed according to the manufacturer's instructions. Other mandatory tests were also performed: hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV), and Treponema pallidum (syphilis). Donors were also classified according to the number of donations as first-time, repeat (donation ≤1 time per year), or regular (donation ≥2 times per year).

Statistical data analysis was done using SPSS version 22. Data regarding donor gender, age and blood donor's types were analyzed by the x^2 test. Values of P lower than 0.05 were considered to be statistically significant.

Results

The number of donations during the study period was 165267. A total of 152098 donors were male and 13169 were female. Mean age of donors was 29.5 and 32.8 years for males and females, respectively. The demographic characteristics of blood donors are summarized in Table 1. There was found to be 45 subjects (0.027%) with confirmed positive HTLV-1 in antibody screening tests; all of them were confirmed to be positive for HTLV-1 infection by the Western blot technique. The prevalence rate in female and male donors was 2/13169 and 43/152098, respectively (P=0.38, OR=1.862; CI: 0.45-7.69). The seropositivity rates among married and single donors were 62.22% and 37.78%, respectively (P=0.002, OR: 2.51; CI=1.37-4.59). Out of 45 positive donors, 41 were first-time blood donors, 3 repeated donors and 1 was a regular donor. Coinfection with HBV was identified in one donor. The yearly distribution of the HTLV-1 prevalence among the volunteer donors is shown in Table 2. The percentage of samples testing positive increased from 0.016% in 2009 to 0.084% in 2010. Moreover, there was a significant association between age and risk of infection (P<0.001).

Discussion

In the present study, prevalence of HTLV among blood donors was 0.027%. This prevalence is comparable to other parts of Iran such as Ardabil (0.01%) and Gilan (0.024%) and lower than blood donors in Alborz (0.057%), Khorasan Razavi (0.2%) [7] and Shiraz (0.2%).[8] In a study in Mashhad during 2011-2013,[9] 0.18% of donors (327 out of 174662) were confirmed to be infected with HTLV-I by Western blot assay. The prevalence of HTLV in our study was also lower than that described in some countries. In a study in Uganda,[10] a prevalence of 0.54% was reported. In China, prevalence of HTLV among blood donors was about 0.06%.[11] In a study from US,[12] 516 HTLV

Table 1: Demographic characteristics blood donors during a 10-year period

Demographic Characteristics		Donors (n, %)
Donation Status	First-time	48163
	Repeat	86413
	Regular	30691
Gender	Female	13169
	Male	152098
Marital status	Single	32162
	Married	133105
Education	Less than 12 years schooling	41935
	12 or more years schooling	123332
Age	≥18<25	7136
	≥25<35	61611
	≥35 <45	50826
	≥45<55	32553
	≥55<65	13141

Table 2: Frequency of HTLV-I according to the type of donor

Year	HTLV											
	No of Donations				No				PR/105			
	Total	First	Regular	Repeat	Total	First	Regular	Repeat	Total	First	Regular	Repeat
2005	10145	6864	78	3203	8	6	0	2	78.8	87.41	0	62.44
2006	11677	5684	992	5001	3	3	0	0	25.69	52.77	0	0
2007	13103	4573	1667	5863	3	3	0	0	22.89	65.60	0	0
2008	11730	4367	1909	5454	7	7	0	0	59.67	160.29	0	0
2009	11825	3627	2472	5726	2	2	0	0	16.91	55.14	0	0
2010	13078	3653	2900	6525	11	10	0	1	84.11	273.74	0	15.32
2011	17506	4208	3814	9484	3	3	0	0	17.13	71.29	0	0
2012	18028	4556	3609	9863	1	1	0	0	5.54	21.94	0	0
2013	19102	3154	4222	10785	3	2	1	0	15.69	63.41	9.27	0
2014	20386	3826	4479	12081	1	1	0	0	4.90	26.13	0	0
2015	20628	3651	4549	12428	3	3	0	0	14.54	82.16	0	0

seropositive samples were identified among 14,809,334 blood donations. Prevalence of HTLV-1 in blood donors varies in some other endemic regions such as Brazil (0.04%),[13] Arequipa, Peru (1.2%)[14] and Valdivia, Chile (0.24%).[15] Compared to some studies, the prevalence of HTLV in our population was higher. In a study by Manga and colleagues in Nigeria, seroprevalence of 6.5% (23/355) was obtained based on ELISA which was confirmed to be 0% following western blot testing.[16] In Saudi Arabia, 0.006% (3/47426) of blood donations were identified as HTLV-1 positive.[17]

It was reported that the incidence of infection is correlated with age, and it is higher in women.[18,19] We found that most HTLV-1-positive donors in South Khorasan province were men. This discrepancy could be explained by the dominance of male donors in this province. The same result was also obtained in a previous study.[10]

It is suggested that there appears to be an association between infection with HTLV and hepatitis B and C. An 11-year follow-up study conducted in Brazil highlighted the importance of HTLV coinfection with hepatitis B and hepatitis C virus.[13] Similarly, another study has identified anti-HBc as an independent risk factor for HTLV-1 infection.[20] In this study, coinfection was identified in only one donor.

In our study, the rate of HTLV infection showed an increasing trend from 0.016% in 2009 to 0.084% in 2010. Tarhini and co-workers found a decreasing trend in the seropositivity of HTLV-I among donors in Mashhad from 0.5% to 0.42% during years 2004–2006.[21] In another retrospective study from seven blood transfusion centers in Iran during 2009-2013, a gradual decline in overall prevalence of HTLV-1 was observed. The prevalence rate decreased from 0.13% in 2009 to 0.07% in 2013.[7]

In addition, our results showed that the prevalence of HTLV-1 infection among first-time donors was higher than that of repeated donors. It has been well documented that first-time donors pose a greater risk of infectious.[22]

Conclusion

The prevalence of HTLV-1 infection among blood donors in southeast Iran was 0.027% in this study among blood donors during 11 years. Moreover, since blood donors are considered as a healthy population, we estimate that the true prevalence of HTLV-1 seropositivity prevalence in the gene is higher in the general population.

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Conflict of Interest: None declared.

References

1. Abrams A, Akahata Y, Jacobson S. The prevalence and significance of HTLV-I/II seroindeterminate Western blot patterns. Viruses. 2011;3(8):1320-31. doi: 10.3390/v3081320. PubMed PMID: 21994781 PubMed Central PMCID: PMC3185804.
2. Gonçalves DU, Proietti FA, Ribas JGR, Araújo MG, Pinheiro SR, Guedes AC, et al. Epidemiology, treatment, and prevention of human T-cell leukemia virus type 1-associated diseases. Clin Microbiol Rev. 2010;23(3):577-89. doi: 10.1128/CMR.00063-09. PubMed PMID: 20610824 PubMed Central PMCID: PMC2901658.
3. 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(5):245-53. PubMed PMID: 6328765.
4. Hewitt PE, Davison K, Howell DR, Taylor GP. Human T-lymphotropic virus lookback in NHS Blood and Transplant (England) reveals the efficacy of leukoreduction. Transfusion (Paris). 2013;53(10):2168-75. doi: 10.1111/trf.12105. PubMed PMID: 23384161.
5. Pennington J, Taylor GP, Sutherland J, Davis RE, Seghatchian J, Allain JP, et al. Persistence of HTLV-I in blood components after leukocyte depletion. Blood. 2002;100(2):677-81. doi: 10.1182/blood.v100.2.677. PubMed PMID: 12091364.
6. Chang YB, Kaidarova Z, Hindes D, Bravo M, Kiely N, Kamel H, et al. Seroprevalence and demographic determinants of human T-lymphotropic virus type 1 and 2 infections among first-time blood donors—United States, 2000–2009. The Journal of infectious diseases. 2013;209(4):523-31. doi: 10.1093/infdis/jit497. PubMed PMID: 24068702 PubMed Central PMCID: PMC3903373.
7. Karimi G, Zadsar M, Pourfathollah AA. Seroprevalence and geographical distribution of human T-lymphotropic virus type 1 among volunteer blood donors in endemic areas of Iran. Virol J. 2017;14(1):14. doi: 10.1186/s12985-017-0693-9. PubMed PMID: 28137274. PubMed Central PMCID: PMC5282699.
8. Arjmandi F, Shahriari M, Sadeghi Hassanabadi M. A Comparitive study of the prevalence of HTLV–I infection in luekemia/non–hodgkins lymphoma patients, thalassemic patients and blood donors. Journal of Shahid Sadoughi University of Medical Sciences and Health Services 2003;10(4):25-8.
9. Safabakhsh H, Jalalian M, Karimi G. Seroepidemiology of human T-cell lymphotropic virus type-1 (HTLV1) in Mashhad. Glob J Health Sci. 2014;6(5):99-104. doi: 10.5539/gjhs.v6n5p99. PubMed PMID: 25168999. PubMed Central PMCID: 4825399.
10. Uchenna Tweteise P, Natukunda B, Bazira J. Human T-Cell Lymphotropic Virus Types 1 and 2 Seropositivity among Blood Donors at Mbarara Regional Blood Bank, South Western Uganda. Leukemia research and treatment. 2016;2016. doi: 10.1155/2016/1675326.
11. Ma Y, Zheng S, Wang N, Duan Y, Sun X, Jin J, et al. Epidemiological analysis of HTLV-1 and HTLV-2 infection among different population in Central China. PLoS One. 2013;8(6):e66795. doi: 10.1371/

journal.pone.0066795. PubMed PMID: 23826136. PubMed Central PMCID: PMC3691312.
12. Vahidnia F, Stramer SL, Kessler DA, Krysztof DE, Dodd RY, Notari E, et al. Risk factors and epidemiology of human T-lymphotropic virus types 1 and 2 in US blood donors. Retrovirology. 2015;12(1):P84. doi: 10.1186/1742-4690-12-S1-P84. PubMed Central PMCID: PMC4577738.
13. Pinto MT, Rodrigues ES, Malta TM, Azevedo R, Takayanagui OM, Valente VB, et al. HTLV-1/2 seroprevalence and coinfection rate in Brazilian first-time blood donors: an 11-year follow-up. Rev Inst Med Trop Sao Paulo. 2012;54(3):123-9. doi: 10.1590/s0036-46652012000300002. PubMed PMID: 22634882.
14. Quispe NC, Feria EB, Santos-Fortuna Ede L, Caterino-de-Araujo A. Confirming the presence of HTLV-1 infection and the absence of HTLV-2 in blood donors from Arequipa, Peru. Rev Inst Med Trop Sao Paulo. 2009;51(1):25-9. doi: 10.1590/s0036-46652009000100005. PubMed PMID: 19229387.
15. Chandía L, Sotomayor C, Ordenes S, Salas P, Navarrete M, Lopez M, et al. Seroprevalence of human T-cell lymphotropic virus type 1 and 2 in blood donors from the regional hospital of Valdivia, Chile. Med Microbiol Immunol. 2010;199(4):341-4. doi: 10.1007/s00430-010-0166-x. PubMed PMID: 20706847
16. Manga MM, Fowotade A, Yuguda S, Iya GA, Yahaya M, Sheriff YM, et al. Serosurvey of human T cell lymphotropic virus I/II among blood donors in Gombe (Nigeria). International Journal of Blood Transfusmeans of identifying the virusion and Immunohematology (IJBTI). 2016;512-9. doi: 10.5348/ijbti-2016-24-OA-4.
17. Ul-Hassan Z, Al-Bahrani AT, Panhotra BR. Prevalence of human T-lymphotropic virus type I and type II antibody among blood donors in Eastern Saudi Arabia. Saudi Med J. 2004;25(10):1419-22. PubMed PMID: 15494814.
18. 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):2593-5. doi: 10.1128/jcm.41.6.2593-2595.2003. PubMed PMID: 12791885 PubMed Central PMCID: PMC156501.
19. Rafatpanah H, Farid R, Golanbar G, Azad FJ. HTLV-I Infection: virus structure, immune response to the virus and genetic association studies in HTLV-I-infected individuals. Iranian Journal of Allergy, Asthma and Immunology. 2006;5(4):153-66. doi: 05.04/ijaai.153166. PubMed PMID: 17237568
20. Rouet F, Foucher C, Rabier M, Gawronski I, Taverne D, Chancerel B, et al. Human T-lymphotropic virus type I among blood donors from Guadeloupe: donation, demographic, and biologic characteristics. Transfusion (Paris). 1999;39(6):639-44. PubMed PMID: 10378845.
21. Tarhini M, Kchour G, Zanjani DS, Rafatpanah H, Otrock 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. PubMed PMID: 19900093.
22. Shang G, Seed CR, Wang F, Nie D, Farrugia A. Residual risk of transfusion-transmitted viral infections in Shenzhen, China, 2001 through 2004. Transfusion (Paris). 2007;47(3):529-39. doi: 10.1111/j.1537-2995.2006.01146.x. PubMed PMID: 17319836