Prevalence of human T-lymphotropic virus type I and type II antibody among blood donors in Eastern Saudi Arabia

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ABSTRACT

Objective: Human T-cell leukemia/lymphoma virus type I and type II (HTLV-I/II) infections can be transfusion associated, leading to tropical paraparesis, myelopathy and other neurological disorders. The aim of this study is to circumvent the risk of transmission through blood transfusion and to describe the prevalence of HTLV-I/II antibody among blood donors of Al-Hasa region and the cost effectiveness of screening blood donors.

Methods: The study was conducted at the Department of Laboratory and Blood Bank, King Fahad Hospital, Al-Hofuf, Al-Hasa, Kingdom of Saudi Arabia during the period of 1997 to 2003. A total of 47426 blood donors were screened for HTLV-I/II antibody by enzyme-linked immunosorbent assay test, during the 7 years of study period. The positive samples were confirmed by western blot analysis.

Results: Overall, HTLV-I antibody positivity (confirmed by western blot) was 3/47426 (0.006%). Out of 3 donors positive for HTLV-I antibody during 1997 to 1998, 2 were expatriates (Indian) and one was native Saudi donor. Human T-cell leukemia/lymphoma virus type I antibody positivity among the native Saudi donors was 1/47426 (0.002%) (2/100000 blood donors). None of the donor were positive for HTLV-II antibody. During the last 5 consecutive years of the study period (1999-2003), none of the donor was positive for HTLV-I/II antibody.

Conclusion: Al-Hasa region is non-endemic for HTLV-I/II virus infections. Screening of native Saudi blood donors for these viruses does not appear to be cost effective.

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Human T-lymphotropic virus type I (HTLV-I) since its identification in early 1980 is associated with tropical spastic paraparesis and myelopathy.[1] Though it has a worldwide distribution, it is endemic only in South-Western Japan, West and Central Africa, Caribbean basin, South America and Taiwan.[2] Higher seroprevalence (3-15%) of this virus has been observed in these regions.[3-5] Human T-lymphotropic virus type II (HTLV-II) identified in 1982 is closely related to HTLV-I, causing various neurological disorders, is much less prevalent and has been predominantly reported from the native American population, intravenous drug users from United States of America (USA) and Europe.[6,7] The HTLV-I virus is primarily sexually transmitted or there can be vertical transmission especially through breast feeding. Human T-lymphotropic virus type I/II viruses become incorporated in the DNA of lymphocytes of the infected patient and they exist in the lymphocytes as provirus. The transmission of infection may occur with high probability (20-60% times) after transfusion of cellular blood products from the HTLV positive donors and survival time of

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these viruses in the stored blood at 4^0C is only up to 14 days.[8,9] While the transmission of infection is not commonly associated with transfusion of the non-cellular blood products such as fresh frozen plasma, cryoprecipitate and coagulation factors concentrates.[10] The modern transfusion, medicine have a very limited indications of fresh whole blood transfusion and mostly the component therapy and leucodepleted transfusion is advocated, which reduces the chances of transfusion associated transmission of HTLV-I/II viruses infections.[9]

Transfusion associated transmission of HTLV-I/II infection can be avoided by screening blood donors for anti HTLV-I/II antibody. This screening has been mandatory in many countries such as Japan, USA, Canada, Caribbean basin, Netherlands, Sweden, Iran, Portugal, Greece and Kingdom of Saudi Arabia (KSA). The screening of donors is still under debate in many other countries due to low prevalence of HTLV-I/II infection in the community, high cost involved in screening and high sensitivity with low specificity of the screening enzyme-linked immunosorbent assay (ELISA) test. The present study endeavors to describe the prevalence of HTLV-I/II antibody among blood donors of Al-Hasa region and the cost effectiveness of screening blood donors.

Methods. The study was conducted at the Department of Laboratory and Blood Bank of 500 bedded King Fahad Hospital and tertiary care center, Al-Hofuf, Al-Hasa, KSA. Al-Hofuf is an ancient town and Al-Hasa is the biggest oasis of KSA, with native population of approximately 1 million. The blood bank records of all donors who donated blood at this blood bank during the period of January1997 to December 2003 were retrospectively reviewed. All donors were aged 18-55 years and with a body weight of >55 kg. Donors were selected after complete physical examination and answering the donor's questionnaire. The criteria of exclusion of donors was: age <18 years or >55 years, weight <55 kg, hemoglobin <13 g, history of jaundice, sickle cell disease, glucose-6-phosphate dehydrogenase deficiency, diabetes, hypertension, history of recent fever, visit to the malaria endemic area within last one year. None of the blood donor was on immunosuppressive drugs or had a history of organ transplant. Donors were predominantly male, with a very insignificant number of female donors who donated for their families. Expatriate donors were encouraged to donate blood for their families and as volunteer donors. Most of the blood requirements were met out of the blood donations by native Saudi donors. All donors were tested for hepatitis B virus, hepatitis C virus, human immunodeficiency virus, malaria and syphilis. Serum samples from all donors were screened for HTLV-I/II by ELISA according to the instructions of the manufacturer of the kits (Abbott Diagnostics, USA, Genelabs Diagnostics, Singapore). All the ELISA positive samples were rechecked in duplicate. The ELISA positive samples were confirmed by western blot (Genelabs Diagnostics, Singapore) at the Regional Virology Laboratory of Eastern Province, Dammam, KSA.

Results. During 7-years of study period, 47426 blood donors were screened for HTLV-I/II antibody and 31 (0.06%) were positive by ELISA and only 3 (0.006%) of them were confirmed positive for HTLV-I antibody by western blot. None of the donor was positive for HTLV-II antibody. Only one donor was confirmed positive by western blot in 1997 and 2 in 1998. During the last consecutive 5 years (1999-2003) of the study period, no HTLV-I antibody positive donor was identified (**Table 1**). Out of 3 HTLV-I antibody positive (confirmed by western blot) donors, 2 (0.004%) were expatriates (Indian) and one (0.002%) was a 45-year-old male, and a native Saudi. The HTLV-I antibody positive native donor remained positive during the one year of follow up and the 2 expatriate donors were not available for the follow up. Two of donors had indeterminate results with western blot and both of these donors were expatriates of Indian origin, both of them remained indeterminate during one year follow up period. Prevalence of HTLV-I positivity among native Saudi donors was 0.002% (2/100000

Table 1 - Prevalence of human T-cell leukemia/lymphoma virus type I/II (HTLV-I/II) antibody among blood donors.

Year	N of donors	HTLV-I/II positive ELISA positive	HTLV-I/II positive Western blot positive
1997	7260	3	1
1998	6802	5	2
1999	6758	2	nil
2000	6749	7	nil
2001	6132	3	nil
2002	7001	5	nil
2003	6724	6	nil
Total (%)	**47426**	**31 (0.06)**	**3 (0.006)**

Out of 3 western blot positive donors, 2 (0.00004%) were expatriates of Indian origin and one (0.00002%) native Saudi.
nil - nothing, ELISA - enzyme-linked immunosorbent assay

blood donors) in this region and none of the donors was tested HTLV-II positive during 7-years of study period.

Discussion. Human T-lymphotropic virus type I/II infections leading to chronic carrier state can be transmitted by blood transfusion. In order to avoid the risk of transfusion associated infection, screening of the blood donors is mandatory in many countries. High prevalence of HTLV-I antibody among blood donors has been reported from Caribbean basin (2.1%), Brazil (0.4%), Japan (1%), Iran (0.8%), suggesting high risk of transfusion associated transmission of infection. While the prevalence is low in the United Kingdom (0.002%), USA (0.004%), France (0.004%), Lebanon (0%) and other regions of the world.[2,11] In KSA 0.003% seroprevalence of HTLV-I was observed among the native Saudi blood donors in Riyadh region.[12] Another report from the same region describes the prevalence of 0.008% among the multinational blood donors and all the 3 positive donors were expatriates and HTLV-I antibody was negative among the native Saudi donors.[13] Similar observations have been reported from other regions of KSA.[14,15] However, slightly higher prevalence of 0.02% and 0.04% have been reported from the Eastern Province of KSA.[16,17] In the present study HTLV-I antibody prevalence of 0.002% was observed among the native Saudi blood donors of this region. None of the donors was positive for HTLV-II antibody. The HTLV-II virus infection is mostly prevalent among the intravenous drug users, which are almost non-existent in this country due to socio-cultural and religious reasons. This is in contrast to the reports from USA, where high seroprevalence of HTLV-II among blood donors has been reported.[18] In Europe, seroprevalence of HTLV-II is lower than reported from USA.[19]

A study from Sweden reports 2/100000 prevalence of HTLV-I antibody among the blood donors. The cost of screening every donor was reported 18 times higher than testing only the new donors. The donor screening for HTLV-I was estimated to prevent one death in every 200 years at the minimum cost of 36 million dollars, taking into account the per test cost of screening by ELISA as 5 dollars and cost of confirmatory western blot test as 300 dollars. Based on these estimates the Swedish National Board of Health decided that only the new donors should be screened for HTLV-I virus infection.[20] In KSA, the per donor screening cost of 7.2 dollars, by ELISA test and 65 dollars per western blot confirmatory test have been worked out recently.[16] The estimated cost of donor screening in this region, during 7-years of study period, was 341,467 dollars (approximately 48,781 dollars per year) .

In this region, among the native Saudi blood donors, the prevalence of HTLV-I is only 0.002% (2/100000 blood donors), as only one native Saudi donor was confirmed positive for infection with this virus during 7-years of study period. The HTLV-II virus infection was not prevalent, and during the last consecutive 5 years (1999-2003) of the study period none of the donors was tested positive for HTLV-I antibody, which suggests that this area is non-endemic for these viral infections. Now, sufficient numbers of native Saudi blood donors are coming forward for volunteer blood donation to meet the ever increasing requirements of the blood banks. The practice of screening all the donors for HTLVI/II does not seem to be cost effective. Screening of expatriate donors for HTLV-I/II would be more cost effective for the areas where sufficient numbers of native donors are not able to donate or the requirement of blood is very high, which cannot be managed from the native donors. The screening of all the donors for HTLV-I/II in KSA should be reviewed, in light of its cost effectiveness.

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