# Prevalence of antibodies to human T-lymphotropic viruses types I and II among healthy blood donors

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## ABSTRACT

**Objectives:** To assess the prevalence of human T-cell lymphotropic virus type I and type II antibodies in blood donors donating blood for various reasons in a University hospital and to compare the results with other reports from the Kingdom of Saudi Arabia (KSA), and elsewhere.

**Methods:** A 7-year retrospective review of blood bank records for results of serological tests at the King Fahd Hospital of the University, Al-Khobar, KSA, from January 1995 to December 2001 was conducted. The study included review of blood donor questionnaire cards as well as extraction of any other relevant information.

**Results:** The results showed that the total number of blood donor units drawn during the 7- year period was 23493 units. A total of 50 units were found repeatedly reactive by enzyme immunoassay screening test (0.2%). Only 12 (0.05%) were confirmed reactive by western blot test and 4 were found to be indeterminate. Nine (0.04%) of the confirmed samples were from Saudi nationals. All 3 non-Saudi confirmed reactive donors were Indian nationals, while the 4 indeterminate cases, 2 were Saudis and 2 were Egyptians. A statistical estimate of the maximal risk of finding a positive donor in this donor population subgroup is in the order of 0.05%. The number of Saudi blood donors during this study was 16434 (80.3%) and non-Saudi donors was 4027 (19.7%).

**Conclusion:** Based on these results it is shown that the prevalence of this virus is still low among blood donors in the Eastern region of Kingdom of Saudi Arabia.

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Human T-cell lymphotropic virus type I (HTLV-I), the first discovered human retrovirus, is the etiologic agent for adult T-cell leukemia or lymphoma, chronic progressive myelopathy and certain other HTLV-I associated diseases.[1] Human T-cell lymphotropic virus type II (HTLV-II), a close relative to HTLV-I, has a lower incidence worldwide and has been associated with neurodegenerative disorders and some cases of Hairy cell leukemia.[2-4] Human T-cell lymphotropic virus type I is genomically similar to HTLV-II and both viruses are cross-reactive serologically.[5] Though HTLV-I is remotely related to HIV, it has been claimed that HTLV-I could accelerate the HIV disease progress to acquired immunodeficiency syndrome (AIDS).[6,7] Serosurveys worldwide has documented that HTLV-I and HTLV-II are transmitted via sexual contact, breast feeding, intravenous drug users and normal blood donors.[8] There has also been a report of transmission of HTLV-I by a kidney transplant.[9] Transfusion of whole blood, or cellular blood products have been recognized as means of transmitting HTLV-I or HTLV-II.[8,10,11] Cellular blood components transmit HTLV-I with a 20-63% efficiency.[10-12] Due to the asymptomatic character of the viruses, infected persons may donate

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blood without knowledge of their infection. Blood is often a life saving therapeutic measure in the practice of medicine, and the quality and quantity depends on human donors. Improvements in the battery of screening tests have further contributed to the safety of donated blood. In the Kingdom of Saudi Arabia (KSA) routine screening of blood donors for HTLV-I and HTLV-II was first pioneered at King Faisal Specialist Hospital and Research Centre, in Riyadh, KSA and no reactive cases were reported among Saudis in the first 2 years of screening.[13] Other studies from various hospitals and blood banks in KSA reported low HTLV-I and HTLV-II prevalence rates among multinational donor populations including Saudis.[13-19] Several other studies have documented transfusion transmission rates of 14.4% to 30% (United States), 44% (Jamaica) and 63 % (Japan).[20-21] Certain risk factors for transmission have been reported including younger recipient age, persons receiving multiple transfusions, short storage time for donor units.[21] Kleinman et al[21] also reported that the risk of transmission of HTLV-II by transfusion may be lower than that of HTLV-I, due to different biological properties. In this 7-year-study, donor serum samples obtained from a multinational donor population in a University Hospital in the Eastern region were screened by enzyme immunoassay (EIA) and confirmed reactive by western blot (WB) assay. The study was designed to 1) assess HTLV-I and HTLV-II seroprevalence, 2) study specific risk factors in the donor population, 3) propose measures to improve the safety of donated blood and blood components in the Eastern region, 4) examine the cost effectiveness of HTLV screening in the Eastern region and 5) compare the results with those from other studies in KSA.

Methods. This study was carried out at the King Fahd Hospital of the University, Al-Khobar, KSA, between January 1995 and December 2001. Samples were obtained from 23,493 apparently healthy multinational individuals, donating blood for various reasons with an average age of 33.8 years. All the samples were screened for HTLV-I and II antibodies by EIA from Abbott Diagnostics (Chicago, United States of America). All repeatedly reactive samples by EIA, were retested by WB assay (Gene Labs Diagnostic Pte Ltd, Singapore) at Dammam Regional Laboratory for HTLV-I and HTLV-II antibodies. Interpretative criteria of WB according to the American Association of Blood Banks is as follows: a) Negative - No viral band present. b) Indeterminate - viral bands present but criteria for a positive result not met. c) Positive - criteria for viral bands present. The criteria for positive results are summarized as follows: a) HTLV-I - p19 or p24, Plus GD21 and rgp 46-1. B) HTLV-II - p24, GD21 and rgp 46-II. C) HTLV - p19 or p24, Plus GD 21. [The presence at least of bands for envelope p21 (with or without gp46) and core (p24, p19 or both) is considered suggestive for diagnosis].

Results. After screening 23,493 samples of donated blood 50 (0.2%) were found repeatedly reactive for HTLV-I and HTLV-II antibodies by EIA. Western blot revealed 12 (0.05%) repeatedly reactive and 4 repeatedly indeterminate samples. Nine (0.03%) of the confirmed reactive samples were from Saudi nationals and 3 were Indian nationals, while the four indeterminate cases, 2 were Saudis and 2 were Egyptians. The approximate cost of reagents for the EIA was 27 Saudi Riyals (SR) (approximately $7.2) per donor unit screened. This is equivalent to approximately SR551,961 ($147,190) during the period covered, and does not include staff costs for what is a relatively labor intensive assay. The cost of WB analysis was SR244.00 ($65) per test. **Table 1** compares our results with various other studies from KSA.

Discussion. In many countries, blood donor services test apparently healthy donors for serologic evidence of infection by HTLV-I and HTLV-II however, few countries, including Japan and the United States, have enforced screening of all donated blood for HTLV-I and HTLV-II antibodies. Screening has been enforced in Japan in 1986,[21] in USA in 1988[8] and in Taiwan since 1996.[22] In KSA, routine screening of blood donors for HTLV-I and HTLV-II was first adopted at King Faisal Specialist Hospital and Research Center in Riyadh in 1989,[13] and a preliminary survey was conducted by the Ministry of Health in 1994.[14] Screening of donated blood was adopted by most of the Saudi blood banks by the end of 1995. This study started in January 1995 to estimate the incidence of HTLV-I

Table 1 - Different seroepidemiological studies conducted in the Kingdom of Saudi Arabia to assess the prevalence of HTLV-I and HTLV-II among blood donors.

| Place of study | Year | n studied | Prevalence rate |
|---|---|---|---|
| Riyadh | 1991 | 12,851 | 0.017* |
| Eastern Province | 1994 | 910 | 0.1* |
| King Khalid University Hospital, Riyadh | 1994 | 9,690 | 0.021* |
| King Abdul-Aziz University Hospital, Riyadh | 1990-1996 | 5,900 | 0.03† |
| Riyadh | 1989-1995 | 102,753 | 0.003* |
| Jeddah | 1996 | 7,628 | 0.026* |
| Eastern Province | 1995-1997 | 40,013 | 0.022* |
| Present Study | 2003 | 23,493 | 0.05* |

*multinational donors, †Saudi blood donors
HTLV-I - human T-lymphotropic viruses type I,
HTLV-II - human T-lymphotropic viruses type II

and HTLV-II antibodies in blood donors and in 7 years we had screened 23,493 donors, 80.1% of them were Saudis and 19.9% expatriates. Twelve donors were confirmed positive by WB, and 4 were indeterminate. Nine of the confirmed positives were Saudis and none of them had traveled outside the KSA and were asymptomatic (blood bank questionnaire) and 5 were positive to hepatitis B core antibody. It has been recently reported in a similar study that the samples, which gave indeterminate results by WB, gave negative results when re-tested by PCR.[19] Two previous studies, one from Jeddah, KSA and the other from Riyadh, KSA have reported negative HTLV results in Saudi blood donors.[13,15] Assuming that our results are indicative of the prevalence of HTLV-I and HTLV-II carrier in our donor population, we arrive at a frequency of 0.05% which correlates well with the frequency reported in the Dammam, KSA donor population study.[17] Many of the EIA positive results in the different studies were indeterminate by WB. Careful interpretation of WB indeterminate patterns can avoid the unnecessary generation of excess false-positive results.[23] We recommend using polymerase chain reaction (PCR) assay for further confirmatory testing; however, it has not been carried out in this study, due to the unavailability of PCR investigations in our institution. However, WB results were compatible with PCR results as has been reported lately.[23] Polymerase chain reaction detects the viral nucleic acid sequences and constitutes a very useful addition to antibody testing, as it reflects viral replication.[23] There have also been some reports discussing other risk factors for HTLV-I and HTLV-II infection.[24,25] Risk factors for HTLV-I and II in those studies, were reported to be advancing age, positivity for hepatitis B virus core antibodies and hepatitis C virus antibody. In the donors who were found to be HTLV-I and HTLV-II EIA screening positive but WB negative, we found that some were positive for other serological markers which include hepatitis B virus core antibody positive, among these, 8 were HTLV-I and HTLV-II WB negative and one was WB indeterminate. Seven were Saudis, one Indian and one Filipino. One of the Saudi donors was also hepatitis B surface antigen positive in addition to positivity for hepatitis B core antibody. The association of HTLV-I and HTLV-II and positivity to hepatitis B core antibody in this study is difficult to correlate as positivity to hepatitis B Virus core antibody is a common cause for discarding blood in our institution with an overall prevalence rate of 17.4%[26] among Saudis. Comparative figures from other centers in KSA range between 14% and 28%.[26] In previous studies,[13,15,18,19] no positive results were found among Saudi nationals, which lead to statements that HTLV-I and HTLV-II prevalence in KSA is negligible, and that there seems to be no reason to check Saudi blood donors. Further reporting of cases and continued monitoring will help in estimating the real incidence in KSA. The various reports have given ranges between 0.04-0.05%. We recommend that each hospital should enforce strict policies to ensure safety of both the donor and recipient and that these policies and standards follow most of the American Association of Blood Banks (AABB) standards but with appropriate modifications for KSA.

We conclude that, although HTLV-I and HTLV-II is rare among Saudi blood donors, screening for it among blood and other organ donors should be mandatory as HTLV-I and HTLV-II are confirmed to cause diseases. Continued testing and surveillance is needed to know the real prevelence of these infections in KSA as well as to provide the safest blood for recipients in need of blood.

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