Prevalence of Human T Cell Leukaemia Virus amongst Blood Donors

Surg Cdr CN Chaudhari*, T Shah*, Surg Capt RN Misra[#]

Abstract

Background: Human T cell leukaemia virus (HTLV) I/II are retroviruses implicated in transfusion transmitted infection. Present study was undertaken to assess seroprevalence of HTLV in voluntary blood donors along with pattern of blood utilisation.

Methods: A total of 258 healthy blood donors who were free from infectious markers in transfusion as per current transfusion guidelines were enrolled. They were screened for HTLV-I/II antibodies by commercially available enzyme immuno assay (EIA) and their blood utilisation data was analysed.

Result: Five (1.9%) donors were found seropositive for HTLV-I/II of which 1.2 % were first time and 0.9% were repeat donors. Blood utilisation data revealed 20.9% and 38.8% units were utilised within 5 and 6-14 days of collection respectively. 45.9% recipients were transfused with single blood unit. 42.9% recipients were immunosuppressed due to underlying disease.

Conclusion: The high prevalence of HTLV in blood donors, coupled with single unit transfusion, use of fresh blood, non availability of acellular blood products and immunosuppression in recipients can lead to significant transfusion transmitted HTLV infection. We suggest judicious use of blood products and screening of blood donors in prevention of transfusion transmitted HTLV-I/II.

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Key Words : HTLV-I/II, Blood donors; Transfusion transmitted infection; Retrovirus

Introduction

Human T cell leukaemia virus type I (HTLV-I) is associated with an aggressive condition called adult T cell leukaemia/ lymphoma (ATL) and HTLV-I associated myelopathy (HAM) or tropical spastic paraparesis (TSP) [1-3]. Human T cell leukaemia virus type II (HTLV-II) is associated with disease such as hairy cell leukaemia and neurological conditions similar to HAM/TSP, bacterial sepsis in acquired immunodeficiency syndrome (AIDS) patients [1]. HTLV-I/II spreads by sexual contact, from mother to child including breast feeding and parenterally including blood transfusion. Infections of HTLV-I/II are lifelong with asymptomatic carrier state [1-3]. The life long risk of developing ATL is 2-5%, while of HAM is 4% in HTLV-I infected individuals [3,4]. Studies have shown transmission efficiency of 13-75 % in recipients of HTLV-I/II infected cellular blood products, which depends on shelf life of cellular blood components [5,6]. Highest HTLV transmission rate of 25-75% is reported in transfusion of cellular blood component in the first five days of shelf life [5,6]. Shorter incubation and rapid disease progression has been reported in transfusion transmitted HTLV infection due to immuno-suppression in transfusion recipients and neonatal blood transfusion [7,8].

It is estimated that about 15–20 millions persons live with HTLV-I infection worldwide [3]. The prognosis of ATL and HAM is poor, due to the rapid course of the disease, difficulty of confirming the diagnosis and undetected occurrence of ATL/HAM [3]. Various countries are screening blood for HTLV-I/II antibodies in prevention of transfusion transmitted HTLV infection [3,4,9]. In Japan incidence of HAM has declined following the universal blood screening for HTLV-I [10].

Indian studies have reported a strong association of HTLV-I/II with haematological malignancies, human immunodeficiency virus (HIV) infection and other disease groups [11-16]. HTLV-I/II has also been reported in blood donors [14,17,18,19]. The present study was undertaken to determine the sero-prevalence of HTLV-I/II in volunteer blood donors.

Material and Methods

The study was conducted at INHS Asvini, Mumbai from period from 01 Jan to 30 April 2005. A total of 258 voluntary blood donors were enrolled for the study. All subjects were counselled pre-donation by a counsellor. None of them disclosed pre or post marital promiscuity or any risk factor for HIV/ AIDS. The standard blood bank questionnaire, medical examination and screening for transfusion safety were undertaken as per present National Blood Policy on all subjects. They were medically fit and negative for routinely

*Classified Specialist (Microbiology), INHS Jeevanti, Vasco-Da-Gama-403802. *Ex-Post Graduate Student (Microbiology), INHS Asvini, Colaba, Mumbai.-400005. [#]Commanding Officer, INHS Kalyani, Visakhapatnam.

screened infection markers in transfusion safety. The serum samples were stored at -35°C until the test was undertaken. Serum specimen of all subjects was tested for anti HTLV-I/II antibody using commercially available EIA Kit (M/S MBS Srl Milano, Italy) having sensitivity and specificity of $>98\%$. The test kit used microwells coated with synthetic peptides specific for HTLV-I/II and anti human IgG & IgM antibody labelled with peroxidase as conjugates. The test was carried out as per the manufacturer's instruction. Tests on sera found positive (absorbance more than 20% of cut off)/grey zone (absorbance more than cut off but less than 20% of cut off) were repeated in duplicate. Sera consistently positive in repeat test were reported as positive.

The data in respect of these 258 blood units was analysed to assess the average age of blood units being transfused and broad categories of recipients from the issue register.

Results

All the 258 donors were males in the age group of 18 to 54 years (mean 27.6 years) and 121(46.9%) were married. Of these 149 (58%) were first time donors. Five (1.9%) donors were seropositive for HTLV-I/II antibodies and their mean age was 28.2 years. Three (1.2%) HTLV seropositive subjects were first time donors, while two (0.9%) were repeat donors.

All blood units collected from these subjects were used as whole blood. Blood utilisation data revealed that 54 (20.9%), 100 (38.7%) and 104 (40.3%) units were utilised within 5 days, 6-14 days and after 15 days from the date of collection respectively with mean and median time of 13 days. Two hundred and fifty eight blood units were transfused to 98 patients. Of these 45 (45.9%) patients received single unit transfusion. 42 (42.9%) transfusion recipients were immunosuppressed due to underlying diseases such as haematological malignancies, chronic renal failure (CRF), renal transplant recipient on immunosuppressive drugs, burn patients and low birth weight new born babies requiring exchange transfusion.

Discussion

A strong association of HTLV-I and haematological malignancies has been reported in India [11]. High prevalence of HTLV-I and HIV has been reported by various workers [12, 13], while others have reported HTLV in TSP, unclassified dermatitis and family members of HTLV associated haematological malignancies [11,14,15]. Another study reported overall HTLV-I seroprevalence of 10.6%, where authors evaluated 124 antenatal cases, 144 blood donors and nine patients attending sexually transmitted diseases clinic [16]. Both vertical and horizontal mode of transmission of HTLV has been implicated in Indian population [11]. Phylogenetic study of HTLV-1 from Southern India revealed that Indian strain is a member of subgroup A of cosmopolitan group with high genetic heterogeneity [20].

HTLV I/II has also been reported in blood donors

from various parts of the country. Kelkar et al [17], reported HTLV seroprevalence of 0.8% in blood donors, while others reported a prevalence of 2.9% [18]. Malhotra et al [13], reported HTLV seroprevalence of 6% in HIV seronegative blood donors as against 32% in HIV seropositive blood donors. Kumar et al [19], reported HTLV-I/II seroprevalence of 0.18% amongst predominantly male blood donors. The variation in HTLV-I/II seroprevalence in India could be due to geographic location, socio-demographic composition of the population studied and individual risk behaviour's [3]. Brazil has highest number of HTLV-I/II seropositive individuals. In a cross sectional study to assess the seroprevalence in blood donors from 1995 to 2000, mean prevalence ranged from 0.04% in south to 1.0% in north-east urban part of Brazil [21]. Before implementation of HTLV screening programme in blood donors, a nation-wide study in Japan in 1984 reported seroprevalence ranging from 0.08-8% amongst blood donors between 40-64 years of age from different geographic areas within the country [22]. Higher age, female and lower socioeconomic status including education are associated with higher HTLV-I infection in both endemic and nonendemic areas [3]. In addition, small sample size of few studies [13,18] including ours may also be factor in variation of seroprevalence rate. However, there is broad agreement amongst all studies [16-19] that HTLV-I/II infection is not uncommon in blood donors in India.

Japan was the first country where screening of donors for HTLV-I was implemented in 1986 [9]. The seroprevalence of HTLV-I/II amongst blood donors in other countries is 0.01–0.03% in USA, 0.004-0.011% in France, 0.005% in Britain, 0.002% in Norway, 0.0056% in Greece and 2% in Brazil [2-4,9]. Cost effective model in Norway reported benefit of donor screening, if seroprevalence of HTLV-I in blood donor is more than 8/100000 [4], which may not be applicable to our country. In this background, HTLV-I/II seroprevalence in blood donors of India needs serious thought by all stake holders of transfusion services.

The transmission rate of HTLV-I/II ranges from 13-28% in transfusion of HTLV infected red cell /whole blood products with shelf life of 14 days, which increases to 25-75% in transfusion of HTLV infected platelets or cellular products of less than six days [5,6]. The mean utilisation of blood units was 13 days. Further 20.9% and 38.7% units were transfused within five days and 6 to 14 days of collection respectively. The study also highlighted a trend of single unit transfusion, raising question on judicious use of blood! Thus high prevalence of HTLV with use of relatively fresh blood and practice of single unit transfusion is indicative of high transmission

rate of HTLV in transfusion recipients in our setting.

One of the arguments for not screening HTLV could be long incubation period and slow HTLV disease progression. However it has been reported that immuno-suppression in transfused patients shortens the incubation period leading to rapid progression to HTLV disease. Two ATL cases have been reported after six months and eleven years of HTLV infected transfusion [7]. ATL has been reported in two children following neonatal blood transfusion [8]. Similarly rapid onset of HAM with transfusion-acquired infection is well documented [23]. In addition blood transfusion itself leads to immuno-modulation with negative effects on the immune system, thus increasing risk of progression to HTLV disease [24]. Other argument in not screening blood donors is high cost of imported HTLV-I/II test kits [19]. The cost is a dynamic variable of demand and supply. We have noticed dramatic fall in the investigation cost of HIV/AIDS with time and the same should apply for HTLV-I/II. Thus, a multi-centric study representing all geographic regions of the country and cost benefit analysis is the need of the hour in formulating policies for prevention of Transfusion Transmitted HTLV-I/II.

Conflicts of Interest

None identified

Intellectual Contribution of Authors

Study Concept : Surg Cdr CN Chaudhari

Drafting & Manuscript Revision : Surg Cdr CN Chaudhari

Statistical Analysis : Surg Cdr CN Chaudhari, T Shah

Study Supervision : Surg Cdr CN Chaudhari, Surg Capt RN Mishra

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