



Original Research Article

Sero-Prevalence of Viral Transfusion-transmissible Infections among Blood Donors at Kosti Teaching Hospital, White Nile State/Sudan

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ABSTRACT

Keywords

Transfusion-transmitted infections (TTIs), Immunodeficiency virus (HIV), Hepatitis B virus (HBV), Hepatitis C virus (HCV)

This study aimed to determine the Sero-prevalence of viral transfusion-transmissible infectious diseases among blood donors, namely immunodeficiency virus, hepatitis B and C virus among blood donors. The study was carried out in the blood bank at Kosti Teaching Hospital, White Nile State, Sudan. Screening of blood samples for hepatitis B surface antigen (HBsAg), human immunodeficiency virus (HIV) and hepatitis C virus (HCV) antibodies were done using immune-chromatographic (ICT) strips. The study included 1204 blood donors. All were males. The overall prevalence of viral transfusion transmissible infections was 115 (9.6%). The sero-prevalence for antibodies against HIV and hepatitis C virus was positive in 8 (0.7%) and 41 (3.4%) donors respectively while HBsAg was detected in 66 (5.5%) donors. This study showed that the sero-prevalence of hepatitis B and C viruses was high in the community local to Kosti hospital, a situation that reaffirms the need for strict criteria for selection of blood donors and also methods of laboratory assays for detection of infectious agents must be improved. In addition; appropriate management must be ensured to prevent the further transmission of these infections.

Introduction

Blood donation saves millions of lives. This is due to its crucial role in the supportive care of medical and surgical patients. However, unsafe transfusion practices may increase the risk of transfusion-transmissible infections (TTIs like Hepatitis viruses (HBV, HCV), Human immune deficiency

virus (HIV) (A C Shrestha, P Ghimne, B R Tiwari, et al 2009). Proper monitoring and selection of voluntary donors and, testing the donated blood for specific antibodies for infectious agents, can largely reduce the risk of TTIs (Lt Col PK Gupta, Col H Kumar, Basannar, Brig M Jaiprakash, 2006). It is

generally accepted that the diagnosis of infection by HBV is based on the presence of HBsAg in the bloodstream (Badur S, Akgun A 2001), however, screening of blood donors for HBsAg does not totally eliminate the risk of HBV infections through blood transfusion (Brecht C, Thiers V, Kremsdorf D et al 2001). Routine blood donors screening for anti-HBC abs has been implemented in some countries resulting in a decrease in the risk of post transfusion HBV infection (Kleinman SH, Kuhns MC, Todd D Set al 2003). The greatest threat to the safety of the blood supply is the donation of blood by sero-negative donors during the infectious window period. In developed countries implementation of more sensitive tests that detect infection earlier, decreases risks of transfusion transmitted viral infection (Glynn SA, Kleinman SH, Schreiber G B et al 2000) . Demand for blood transfusion services is high in Sudan due to the endemicity of infections like malaria, nutritional problem and obstetrical emergencies associated with blood loss (Adam I, Mirghani O A, Saed O K et al 2004 and Ali AA, Khojali A, Okud A et al 2011). Little is known about the level of these infections in Sudan so; this study was conducted to investigate the sero-prevalence of transfusion transmissible viral infectious diseases in particular human immunodeficiency, hepatitis B and hepatitis C viruses.

HIV is an RNA retro virus belonging to the family of Lenti viruses that weakens the immune system and is the primary cause of AIDS. There are three types of HIV-1, 2 and 0. Hepatitis B virus (HBV) is a 42 nm double stranded DNA spherical particle with a double shell and Hepatitis C virus (HCV) is classified among the flaviviridae which is an RNA-single stranded virus. Both HBV and HCV cause viral hepatitis in humans. The mode of transmission for HIV, HBV

and HCV is the same and includes unsafe sexual contact, using sharp materials contaminated with body fluid, mother to child, and transfusion of blood and blood products. Laboratory diagnosis is based on serological tests to detect the specific antibody produced against the virus or directly detecting the antigen in body fluids and includes Enzyme Linked Immunosorbent Assay (ELISA), Radio Immunoassay (RIA), indirect immunofluorescence, immune-diffusion tests. Aside from HIV, HCV, and HBV, a number of other viral infections transmitted by transfusion of blood products have been described, even though not all have been associated with clinical manifestation. Human T cell Lymphotropic Viruses I and II (HTLV-I/II) are associated with adult T cell leukemia and HTLV-associated myelopathy/tropical spastic paraparesis. Both retroviruses have also been attributed a role in the increased risk for developing severe asthma, respiratory and urinary tract infections, uveitis and dermatitis (Tapko JP 2007).

Materials and Methods

This was a retrospective analysis of consecutive blood donors' records covering the period between January 2014 and April 2014 at Kosti Teaching Hospital which is a tertiary care hospital. Kosti city is located in the White Nile State, central Sudan, 300 km from the capital city, Khartoum; with a population of 459,991 people. Blood donors were either volunteer or relatives or friends of recipients. The first step in the blood bank for the potential donors is taking past medical history and to do physical examination by a trained doctor. Individuals are required to answer panel of questions on socio-demographic data (age, education, residence, etc.), previous illness, and chronic disease, history of blood transfusion and

history of jaundice. Those who are apparently healthy, their age range between 18 – 65 year and their weights above 45 kg are qualified for donation. Five ml of blood were drawn from each subject, sera were separated, and tested for HIV, hepatitis B surface antigen (HbsAg) and IgG antibodies for hepatitis C virus, using rapid Dip-strip (manufactured in the UK by fortress diagnostic LTD). The data were analyzed by SPSS. P value <0.05 was considered statistically significant. Ethical approval for this study was provided by the director of hospital.

Result and Discussion

Over a period of 4 months (January 2014 to April 2014) a total of 1204 donations were collected with an average of 301 donations per month. All of the donors were males belonging to those admitted to Kosti teaching hospital. Average age of the donors was 28 years (range 18 years to 65 years). The majority of the donors were in their third decade of life. The sero-positive prevalence of HBsAg was 66 donors (5.5%). However, the sero-positive prevalence of HCV is 41 donors (3.4%). There were 8 sero-reactive donors for HIV (0.7%) in the period of the data collection (Figures 1, 2, 3).

All donors with sero-positive HCV were between 20 and 40 years old (3.4%). The P-value was 0.09 (Table 1). All donors with sero-positive HBV were between 20 and 40 years old. P-value was 0.03 (Table 2). All those above 40 years old were sero-negative for both HCV and HBV (Table 1, 2).

There were only six donors with HIV sero-positive (0.6%). They were between 20 and 40 years old. Only one donor (0.1%) was more than 40 years old. P-value was 0.3 (table 3).

Our study was aimed at analyzing blood transfusion related issues. We examined the occurrence of HBV, HCV and HIV infections among blood donors in Kosti Teaching Hospital, White Nile State, Sudan by serological methods.

It is generally accepted that the diagnosis of infection by HBV is based on the presence of the HBsAg in the bloodstream (Badur S, Akgun A 2001). However, screening of blood bank donors for HBsAg does not totally eliminate the risk of HBV infection through blood transfusion (Allain JP 2004 and Conjeevaram HS, Lok AS 2001), since the absence of this marker in the serum does not exclude the presence of HBV DNA (Comanor L, Holland P 2001, Brechot C, Thiers V, Kremsdorf D et al 2001, Lai ME, Farci P, Figus A 1989 and Wang JT, Lee CZ, Chen PJ et al 2002).

In our study of 1204 donors, (5.5%) were positive for HbsAg, whereas study done at Kasala teaching hospital eastern Sudan showed 4.5% (Tajeldin M. Abdallah1 and Abdel Aziem A. Ali 2012). Another study done in Nyala, South Dar Fur State of Western Sudan it was found to be 6.25% (Mostafa Abou et al 2009). The studies in many Asian countries showed variation in the prevalence of HBsAg.

HBV DNA was detected among 16 of 131 (12.2%) anti-HBc positive donors in Iran, 7 of 250 (2.8%) in Lebanon and 5 of 167 (2.9%) in Pakistan (Behzad-Behbahani A, Mafi -Nejad A, Tabei SZ et al 2006, Bhatti FA, Ullah Z, Salamat N et al 2007 and Ramia S, Ramlawi F, Kanaan M et al 2005). We report (3.4%) donors with sero-positive for HCV and it was 2.7% in Kasala hospital (Tajeldin M. Abdallah and Abdel Aziem A. Ali 2012).

Table.1 HCV & Age cross tabulation p-value = 0.09

			HCV		Total
			(+ve)	(-ve)	
age	20-40 y	Count	41	1087	1128
		% within age	3.6%	96.4%	100.0%
	41-55 y	Count	0	76	76
		% within age	.0%	100.0%	100.0%
Total		Count	41	1163	1204
		% within age	3.4%	96.6%	100.0%

Table.2 HBV & Age crosstabulation

			HBV		Total
			(+ve)	(-ve)	
age	20-40 y	Count	66	1062	1128
		% within age	5.9%	94.1%	100.0%
	41-55 y	Count	0	76	76
		% within age	0.0%	100.0%	100.0%
Total		Count	66	1138	1204
		% within age	5.9%	94.1%	100.0%

Table.3 HIV & Age crosstabulation p=0.47

			H.I.V		Total
			(+ve)	(-ve)	
age	20-40 y	Count	7	1121	1128
		% within age	.6%	99.4%	100.0%
	41-55 y	Count	1	75	76
		% within age	1.3%	98.7%	100.0%
Total		Count	8	1196	1204
		% within age	.7%	99.3%	100.0%

Figure.1

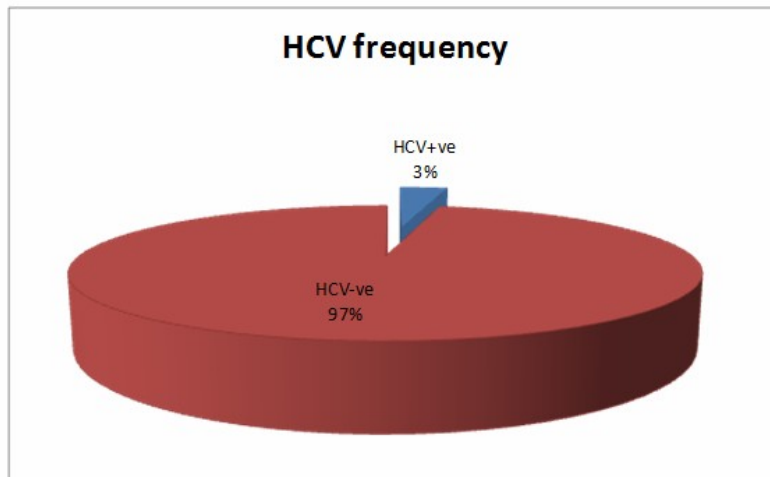


Figure.2

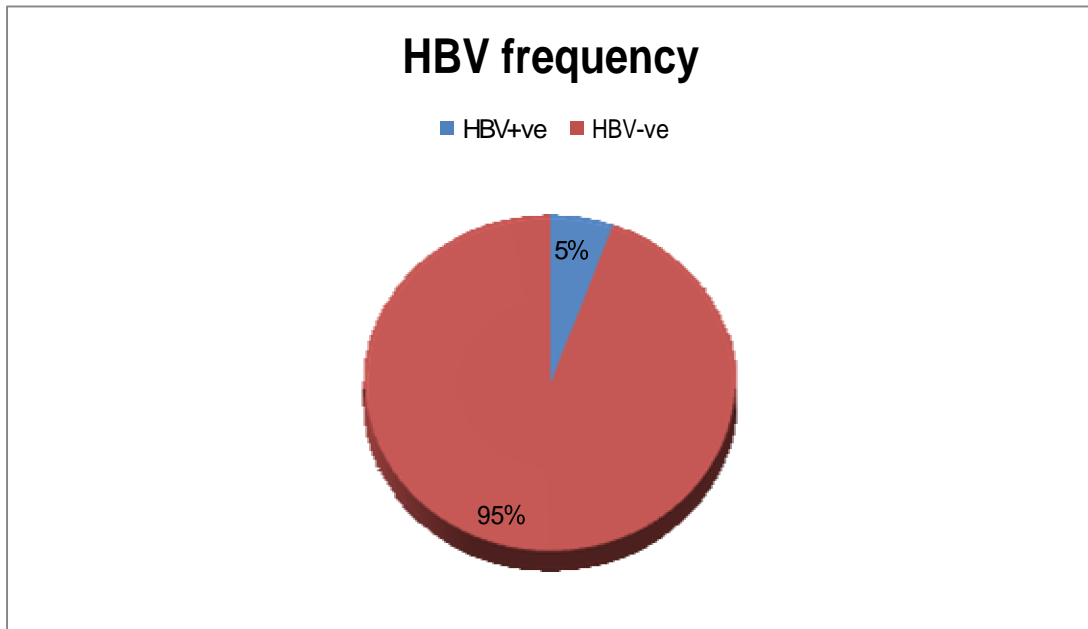
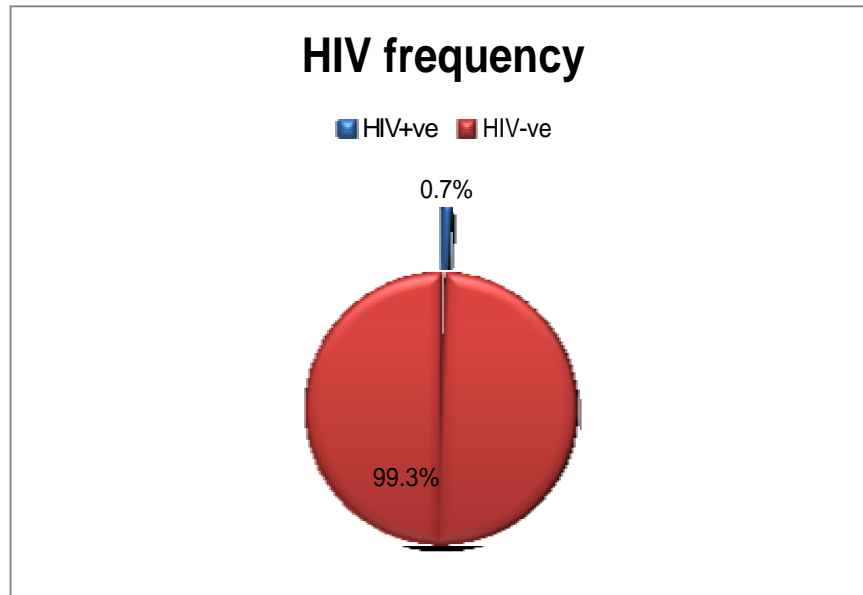


Figure.3



The prevalence is low in many countries. It is 0.1- 0.5% in the general US population and 0.02-0.04% in US blood donors but our result is similar to study done in Pakistan where the prevalence in children is around 3.6% and in adults it varies between 4-10% (Zuberi SJ 1983 and Kar P, Jain A 1981).

In our study we found the prevalence of HIV sero-positive was 0.7%. This result is similar to study done in West India where it was found 0.45% (S Garge, D R Mathur, D K Garg 2001) and in Pakistan (M.F. Khattak, N. Salamat, F.A Bhatti et al 2001). While in South Sudan the prevalence was very high

7.9% (Kenneth L L Sube et al 2013). This is due to great movement of people between South Sudan and neighboring countries and within South Sudan. Countries bordering South Sudan, such as Kenya, Uganda and the Democratic Republic of Congo, have high HIV prevalence rates of 6.3%, 6.5% and 1.6% respectively (UNAIDS. HIV/AIDS in Sub-Saharan Africa, 2012).

West Africa is a highly endemic area for viral infections. HBsAg was present at an equally high frequency (15%) in young volunteer (median age 18 years) and older replacement (median age 33 years) blood donors (F. Sarkodie, M. Adarkwa, Y. Adu-Sarkodie et al 2001). Whereas the study done in Turkey showed decrease in the prevalence of sero-positive donors in the last years (24) and this due to the high health education programs (Emekdas Gurol, Cavuslu Saban, Oncul Oral et al April 2006).

This study showed that the sero-prevalence of hepatitis B and C viruses was high in the community local to Kosti Teaching Hospital, a situation that reaffirms the need for strict criteria for selection of blood donors and also methods of laboratory assays for detection of infectious agents must be improved. In addition, appropriate management must be ensured to prevent further transmission of these infections.

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