

Prevalence of HBsAg and HIV among blood donors in Osogbo, Osun State, Nigeria

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ABSTRACT

Important among the transfusion transmissible infection are hepatitis B (HBV) and HIV virus infections. Also, co-infection of these two viruses is a rapidly growing issue of public health concern. This study is embarked upon to determine the prevalence these two viruses and their co-infection among blood donors in our environment. HBsAg was detected in each serum sample by means of an immuno-chromatographic mini strip (Clinotech Diagnostics, Richmond, Canada). Antibodies to HIV-1 and 2 were detected in each serum sample by means of an immuno-chromatographic test strip (Abbot Determine HIV 1 and 2, Boehringer, Germany) strictly following the manufacturer's instructions in all the processes. Of 624 donors screened (age range 18 to 65 years), 124 donors (19.9%) were positive for HBsAg; 19.6% males and 21.0% females ($P = 0.7080$, 95% CI 0.5654 to 1.493). Twenty one (3%) donors were positive for HIV-1 antibody; 3.4% males and 3.2% females ($P=1.000$, 95% CI 0.3488-3.196) and 3 donors (0.5%) were positive for combined HBsAg and HIV-1 antibodies, 0.4% males and 3.8% females ($P = 0.4861$, 95% CI 0.0444 to 5.495). HIV-2 antibody was not detected in any of the sample and there was no invalid result with both the HBsAg and HIV test kits. The result of this study shows that the prevalence of hepatitis B and HIV infections is high among apparently healthy blood donors of all gender and age groups and therefore the need to mandate all organization involved in blood banking to ensure proper screening of blood units prior to transfusion in order to reduce the risk of HBV and HIV infections among recipients of donated blood and the community at large.

Keywords: Sero-prevalence, HBsAg, HIV, blood donor, Osun State.

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INTRODUCTION

Millions of lives are saved yearly through blood transfusion, however transfusion transmitted infections (TTI) are of great concern since the inception of blood transfusion in 1940s. The magnitude of TTI varies from country to country depending on the TTI load in that population from where the blood units are source. HIV and HBV are among the major viruses transmitted by transfusion (Choudhury, 2010).

Hepatitis B virus (HBV) is the most common cause of serious liver infection worldwide. It is estimated that more than two billion people have been infected by HBV and about 350 million have chronic infection (Drosten et al., 2004). HBV is highly contagious and relatively easy to transmit from one infected person to another by blood

contact, during childbirth, unprotected sexual intercourse and by sharing needles. The prevalence of HBV in Africa is estimated to be 10 to 20% (Lule, 1997).

In Nigeria, HBV infections constitute a major public health concern. The country is highly endemic for the infection with about 75% of the population reported likely to have been exposed to HBV at one time or the other. In Ibadan, Olubuyide et al. (1997) reported HBsAg prevalence rate of 12% among doctors and dentists while Otegbayo et al. (2003) reported HBsAg prevalence rate of 21.3% among blood donors. Transmission of HIV and other blood-borne infections can occur during transfusion of blood or blood components from the blood of an infected individual (Donegan et al., 1994). Depending on

Table 1. Gender distribution of donors in relation to HBV and HIV infections.

Gender	No screened (%)	No +ve for HBsAg (%)	No +ve for HIV (%)	No +ve for both (%)
Male	500 (80.9)	98 (19.6)	17 (3.4)	2 (0.4)
Female	124 (19.1)	26 (21.0)	4 (3.2)	1 (3.8)
Total	624 (100)	124 (19.9)*	21 (3.8)**	3 (0.5)***

* $P = 0.7080$, ** $P = 1.000$, *** $P = 0.4861$

the production process used, blood products derived from pooled plasma can also transmit HIV (Berkman and Groopman, 1988).

Co-infection of HBV and human immunodeficiency virus (HIV) is a rapidly growing issue of public health concern. It has been observed that HBV and HIV co-infection interferes with the natural history of HBV infection and is associated with higher HBV DNA levels (Gibson et al., 1997; Colin et al., 1999). Also, a more common progression to cirrhosis, despite milder histological necro-inflammatory activity, has been reported in cases of HBV and HIV co-infection (Colin et al., 1999).

Although the prevalence of HBV and HIV infections have been reported in both gender and across age groups, the age group 20 to 29 years are more affected (Umolu et al., 2005; Okonko et al., 2012). This age group constitutes the main bulk of prospective blood donors, hence the need to determine the prevalence of HIV and HBV infections and co-infection of the two viral infections among blood donors in our environment.

MATERIALS AND METHODS

Study population

The study population included consenting apparently healthy blood donors at the Ladoke Akintola University (LAUTECH) Teaching Hospital and two neighbouring health facilities with blood bank in Osogbo, Southwest Nigeria. A total of 624 blood donors were recruited; 510 from LAUTECH Teaching hospital; 50 from Ideal Medical Diagnostic and Research Centre and 54 from Osun State Board Blood Bank Services, Osogbo. Donors less than 18 years old and older than 65 years were excluded.

Method

Five milliliters of venous blood was collected from the antecubital vein of each donor. The blood was allowed to retract and then centrifuged at 1500 rpm. The sera were stored at -20°C until tested.

HBsAg was detected in each serum sample by means of an immuno-chromatographic mini strip (Clinotech Diagnostics and Pharmaceuticals, Richmond, Canada) with specific monoclonal and polyclonal antibodies directed against HBsAg (relative sensitivity 99.8% and relative specificity 100% compared to WHO international standard reference panel). The test device was dipped into the serum sample for 3 s and read after 10 min. Sample positive for HBsAg showed colour band at the test and control lanes while negative sample showed colour band at the control but none at the test lane. Invalid result was read when there was either colour band

in the test but not in the control lane or no band in the test and control lanes.

Antibodies to HIV-1 and 2 were detected in each serum sample by means of an immuno-chromatographic test strip (Abbot Determine HIV 1 and 2, Boehringer, Germany) coated with recombinant HIV-1/2 antigens/synthetic peptides and has a sample pad containing selenium colloid conjugate. Strictly following the manufacturer's instruction, 50 μl of serum sample was added to the sample pad of the strip and placed on the bench for 15 min to allow chromatography occur. A positive serum sample showed 2 red bars; one in the test and the other in the control region of the strip. A negative serum sample showed one red bar at the control region of the strip. An invalid result occur when there is either no red bar in the test and control regions or a red bar occur in test but not in the control regions of the strip.

Data analysis

Demographic data collected from each donor by direct interview were entered into a Window 2007 laptop computer with GraphPad statistical package (GraphPad Software Inc., San Diego, USA). Frequency tables were generated for the variables and test of significance between categorical variables performed using Fisher exact, with P value set at 0.05.

RESULTS

Of the 624 donors (age range 18 to 65 years), 505 (80.9%) were males while 119 (19.1%) were females; 510 were from LAUTECH Teaching hospital; 60 from Ideal Medical Diagnostic and Research Centre, Osogbo and 54 from Osun State Board Blood Bank Services, Osogbo.

One hundred and twenty four donors (19.9%) were positive for HBsAg; 19.6% males and 21.0% females ($P = 0.7080$, 95% CI 0.5654 to 1.493). Twenty one (3%) donors were positive for HIV-1 antibody; 3.4% males and 3.2% females ($P = 1.000$, 95% CI 0.3488 to 3.196) and 3 donors (0.5%) were positive for combined HBsAg and HIV-1 antibodies, 0.4% males and 3.8% females ($P = 0.4861$, 95% CI 0.04440 to 5.495) (Table 1). HIV-2 antibody was not detected in any of the sample and there was no invalid result with both the HBsAg and HIV test kits.

The highest prevalence for HBsAg and HIV were seen in donors within the age group 56 to 65 years (Table 2). Within the age group 18 to 25 years the prevalence rate for HBsAg and HIV was 21.9 and 3.9%, respectively. Three of the donors within the age group 18 to 25 years

Table 2. Age group distribution of donors in relation to HBV and HIV infections.

Age group (years)	No screened	No +ve for HBsAg (%)	No +ve for HIV (%)	No +ve for both (%)
18 – 25	201 (32.2)	44 (21.9)	8 (3.9)	3 (1.5)
26 – 35	214 (34.3)	40 (18.7)	8 (3.7)	0
36 – 45	127 (20.4)	27 (21.3)	2 (1.6)	0
46 – 55	68 (10.9)	8 (11.8)	2 (2.9)	0
56 – 65	14 (2.2)	5 (35.7)	1 (7.1)	0
Total	624 (100)	124 (19.9)*	21 (3.4)**	3 (0.5)

* $P = 0.2092$, ** $P = 0.6939$

had HBsAg/ HIV co-infection.

DISCUSSION

The result of this study indicates an HBsAg and HIV prevalence rates of 19.9 and 3.4% respectively and a co-infection rate of 0.5% for both viruses. Majority of the donors (66.5%) are in the age group 18 to 35 years with high proportion of them positive for HBsAg (40.6%) and HIV (7.6%) including the 3 donors (0.7%) with co-infection of both viruses.

The result in this study is similar to that by Fiekumo et al. (2009) where they obtained an HIV prevalence of 3.1% in blood donor in a similar environment as ours, south-west Nigeria, but much higher than that of Olokoba et al. (2010) in Yola, north-eastern Nigeria where an HIV prevalence of 0.7% was seen also in blood donors.

The increased risk of HBsAg related advanced liver disease in people with HIV infection makes early detection of HBsAg a priority (Amin et al., 2004). Unfortunately, not much attention has been paid to this area in Nigeria largely due to inadequate information about HBsAg and HIV infection.

In this study, there was no significant difference in the occurrence of both viruses among the gender of the donors and all age groups were affected. In this regard, our study disagrees with that of (Uneke et al., 2005), who recorded a higher rate of HBsAg in males (14.6%) than females (12.9%), but agrees with Otegbayo et al. (2003) who reported no sex or age differences in HBV infection among blood donors in Ibadan, a centre in the same geographical zone as ours.

As most of the donors denied previous history of blood transfusion, acquisition of HBV may have resulted from sharing of blades or use of sharp instruments, which many of the donors consented to have done. This may explain the almost equal distribution in both gender and age groups as these factors are neither age group nor gender specific (Otegbayo et al., 2003). For HIV, the route of acquisition was mainly from sexual exposure. High proportions of the donors (66.5%) positive to HIV are in the sexually active and reproductive age period (18 to 35 years).

The HIV sero-prevalence of 3.4% among blood donors

reported in our study is higher than the 1.2% sentinel survey on healthy adult population reported by the National Action Committee on AIDS (NACA) in Nigeria for Osun State in 2005 (NACA 2005). This suggests that blood donors constitute significant risk group for the transmission of HIV and should be incorporated in future sentinel surveys by NACA. In conclusion, there is need to intensify efforts in the control of these viral infections by routine screening of the entire populace for HBV and voluntary counseling and testing of individuals for HIV.

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