

**SEROPREVALENCE OF HBV, HCV AND HIV AMONG VOLUNTARY BLOOD DONORS AT A TERTIARY HOSPITAL IN BAUCHI, NORTHEASTERN NIGERIA**Alkali Mohammed<sup>1\*</sup>, Jibrin Bara Yusuf<sup>1</sup>, Okon Kenneth Okwong<sup>2</sup> and Mustapha Sabo Umar<sup>1</sup><sup>1</sup>Department of Internal Medicine, Abubakar Tafawa Balewa University Teaching, Bauchi, Nigeria.<sup>2</sup>Department of Medical Microbiology, Federal Medical Centre, Makurdi, Nigeria.**\*Corresponding Author: Dr. Alkali Mohammed**

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**ABSTARCT**

Background; Blood donation and transfusion are an integral part of effective healthcare delivery and transmissible infections remain a public health problem. Post transfusion infection has its consequential effect on transmission and morbidity and mortality rate. This retrospective study examined the seroprevalence of viral transfusion transmissible infections (TTIs) among voluntary donors in our hospital, **Methodology**;- 15,000 voluntary/ family replacement donors data over a 15 month period were extracted from the Blood bank record of ATBUTH. Screening was based on the WHO and FMOH guidelines. Biotest Hangzhou (HBV/HCV) Biotech, China and Determine (HIV 1/2) Abbott Japan test kits were used. SPSS version 20 was utilized for Data analysis. **Results**; Overall, 8.0% seropositivity of at least a pathogen was recorded, segregated as follows, HBV 7.0%(n=1072), HCV 0.7%( n=133) and HIV 0.2%(n=33) respectively. Male donors 98.3%(n=14997) dominate compared to female 0.02%(n=3). The seroprevalence of HBV and age-group( $p<0.0001$ ) and occupation of the donors( $p<0.0001$ ) were statistically significant. High frequency of donors was recorded within the age-group 21-30 and 31-40 years, HBV(48.3%, 31.4%), HCV(34%, 39.8%) and HIV(33.3%, 36.4%). 99.9% of the males were positive for HBV, 100% for HCV and HIV while one female tested positive for HBV. Businessmen and artisan displayed high rate of TTIs in contrast to farmers for HCV. Co-infections of HBV and HCV accounts for most cases recorded. **Conclusion**; The relatively high seropositivity of HBV, compared to HCV and HIV still constitute a public health problem considering the high request for blood transfusion, and support enforcement of mandatory screening and aggressive public enlightenment and prevention measures for TTIs.

**KEYWORDS:** Transfusion transmitted infection, HBV, HCV, HIV, Bauchi.**INTRODUCTION**

Blood transfusion is one of the major clinical practices necessary for corrective measure of homeostatic changes due to loss of blood, as a result of anemia, trauma or post-surgical operation. Safety of transfused blood units and blood products requires effective screening for transfusion transmissible infective pathogens. According to WHO and FMOH guidelines and recommendation.<sup>[1]</sup> Blood units and its components are routinely screened for the following transmissible disease, HBV, HCV, HIV and Treponema organism before use as post transfusion transmissions have increased transmissible infection prevalence from 5% to 10% further increasing the morbidity and mortality rate.<sup>[2-4]</sup> Globally, the prevalence of the causative agents continued to increase particularly in developing countries of sub-Saharan Africa and Asia, and varies with geographical location, socio-cultural activities, religious belief and methodology employed.<sup>[5-8]</sup> Available epidemiological data shows that in sub-Saharan Africa 350million people are affected with HBV, 170 million with HCV and 33million with HIV.<sup>[8]</sup> The shared route of transmission, co-infection and

predisposing risk factors tends to further increase the seroprevalence. In Nigeria, meta-analysis review of several studies conducted reported varied prevalence, with HBV prevalence and ranged between 1-46.8% (mean 14.1%).<sup>[9]</sup> Global report on HCV showed that 150 to 170 million are exposed and majority resides in sub-Saharan Africa and Asia. In Nigeria, the prevalence ranged between 0.4-8.1%.<sup>[10-13]</sup> Since the first report of HIV/AIDS in 1986, the pandemic has had negative impact and consequences on availability of safe blood. However, recent reports from the WHO and other agencies involved in public health aspects of HIV suggest a decline in the incidence in most countries. In Nigeria, HIVseroprevalence among donors ranged between 0.4 -8.7%.<sup>[14-19]</sup>

Epidemiological evidence indicates approximately 2 million peoples are exposed to unscreened blood components, which is one of the major obstacle to safe blood transfusion, primarily due to lack of skilled personnel, logistics and facilities in screening.<sup>[20]</sup> In sub-Saharan Africa, high level of conflict, road traffic

accident, malnutrition and infectious diseases impact negatively on the limited number of blood units in the bank, resulting in increased demand for blood components. The higher the demand for blood transfusion, the higher would be the possibility of transmitting these infections. The normal practice of blood donation as obtainable in most hospitals in Nigeria is the family replacement method.

Available data from a tertiary hospital involved in blood banking system remain a source for assessing the prevalence of TTIs among apparently healthy individuals involved in blood donation in the community.

Several studies have been conducted in the northern part of Nigeria on TTI, with varied data published<sup>[9, 13, 18, 21, 22 & 23]</sup>. To the best of our knowledge, this is the first report on TTIs in Bauchi and its environs. The findings will provide necessary data for evaluation and comparison of TTIs prevalence with other published works within and outside for better understanding and assessment of TTIs among voluntary blood donors in Bauchi, for public health education and intervention measures. This retrospective study therefore, evaluates the seroprevalence of blood transmissible infections among blood donors in the Hospital.

#### MATERIALS AND METHODS

The retrospective study was conducted at the blood bank unit, department of Hematology and Blood transfusion, Abubakar Tafawa Balewa University Teaching Hospital, Bauchi between July 2012 and October 2013. The hospital is a 650 bed size, which serves as major referral centre in the north eastern Nigeria. The hospital provides multi specialties services and training of health care professionals. Blood donation practice is mainly family replacement and a few voluntary donors. Based on the WHO and FMOH guidelines on blood donation, the donors were screened for the blood transmissible

infections (HBV, HCV and HIV) and made to sign consent form before donation.

Demographic variables extracted from blood bank record over the 15 months study period includes, occupation, age, sex and the serological result of HBV, HCV, HIV. Data of repeat blood donation were excluded from the study. A total of 15,000 data were extracted and entered into the study database for analysis.

Sero-detection of viral etiologies was carried out according to the manufacturer's instruction. The HIV screening was carried out using the Determine (HIV-1/2, Abbot-Japan) recommended by FMOH, while the HBV and HCV screening utilized the Biotest Hamgzhou (Biotech CO Ltd China) kit.

#### Data analysis

Demographic variables and laboratory data were entered into the study database and analyzed using SPSS version 20.0. Values were expressed in mean and percentages. Comparison of Categorical variables were determined by the chi-square test, with Significance difference expressed as  $p < 0.05$ .

#### RESULTS

Of the 15000 data extracted and analyzed, overall seroprevalence of 8.0% was recorded for at least one pathogen detected. The breakdown showed 7.08% (n=1062) positive for HBsAg, 0.7% (n=103) for HCV and 0.22% (n=33) for HIV antibodies respectively (figure 1). The demographic variables of the donors as presented in figure 2, Gender distribution, 14997 (98.28%) were males and 3 (0.02%) females, with a mean age of 27.9+1.81. Majority of the donors were within the age group 21-30 and 31-40 years 8383 (55.9%) and 3384 (22.6%) while Artisan and business accounted for 3908 (26.1%) and 3822 (25.5%) respectively.

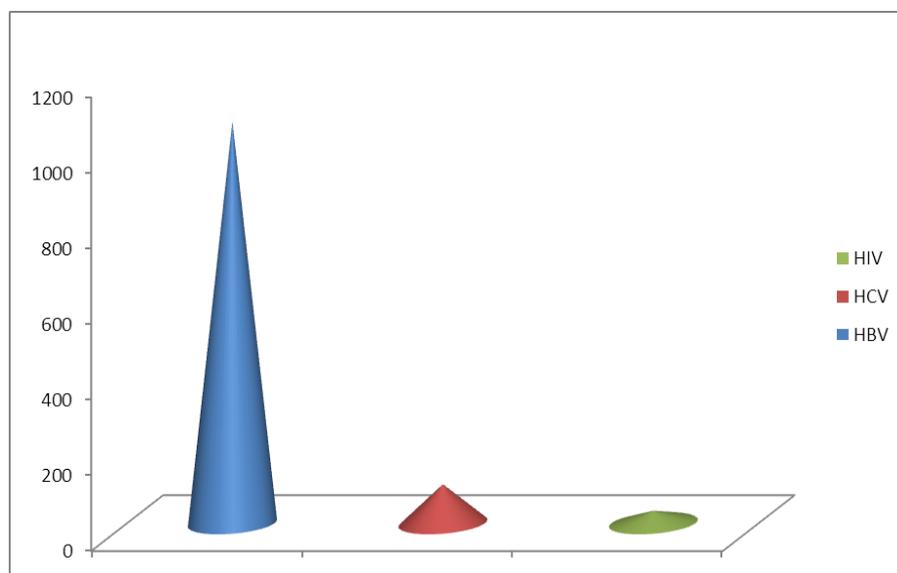


Figure 1: Seroprevalence of the TTIS.

Seropositivity of the TTIs versus demographic variables of the donors as presented in table 2; overall high rate was recorded with donors within the age-group 21-30 and 31-40, and the rate increased with age-group of the donors. The only female donor was positive for HBV.

Similarly, high rate was recorded between business and artisans for TTIs, except for HCV that showed high rate with farmers.

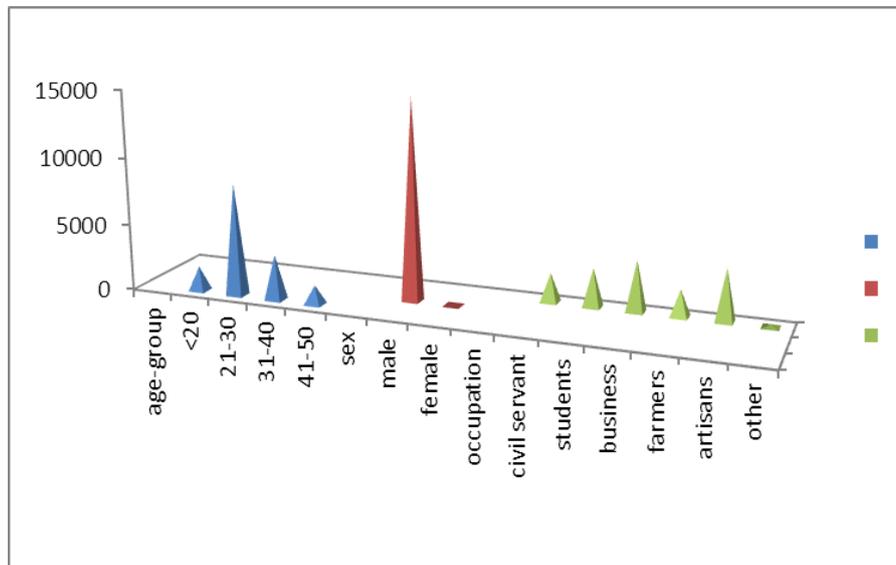


Figure 2; Demographic variables of the voluntary donors studied.

High statistical significant association was observed between age-group and occupation versus viral blood transmissible diseases. (P= 0.000). The high prevalence

of HBV, confection with HCV and HIV showed high statistically significant difference, HBV/HCV (p=0.015) and HBV/HCV/HIV (p=0.035).

Table 1; Demographic variables versus seropositivity of TTI indices(%)

	HbsAg(1062)	HCV(103)	HIV(33)
<b>Age-group</b>			
10-20	97(9.1)	9(8.7)	5(15.2)
21-30	513(48.3)	35(34.0)	11(33.3)
31-40	333(31.4)	41(39.8)	12(36.4)
41-50	119(11.2)	18(17.5)	5(15.2)
<b>Gender</b>			
Male	1061(99.9)	103(100)	33(100)
Female	1(0.09)	0(0)	0(0)
<b>Occupation</b>			
Civil Servant	224(21.1)	18(17.5)	1(3.0)
Students	161(15.1)	9(8.7)	6(18.2)
Business	308(29.0)	24(23.3)	14(42.4)
Farmer	141(13.3)	32(31.1)	1(3.00)
Artisan	217(20.4)	18(17.5)	10(30.3)
Other	11(1.0)	2(1.9)	1(3.0)

HBV vs age-group-p<0.0001  
 HCV vs age-group-p<0.0001  
 HBV vs occupation-p<0.0001

**DISCUSSION**

Post transfusion infection remains one of the factors responsible for increasing incidence of infectious diseases<sup>[2-3]</sup> and also a major limiting factor to availability of safe blood in a region of high demand for transfusion therapy. Therefore, periodic assessment of seroprevalence of TTIs among apparently healthy donors becomes an imperative tool for public health intervention

measures for safe blood units and its product in hospital setting.

In this study, a total of 15,000 donors were screened within a 15month study duration which highlights the high demand for safe blood in the study area. Overall, seroprevalence of 8.0% of at least one pathogen was recorded. Comparing this rate with similar studies

showed that it is lower to reports of 15.5% in Jos<sup>[24]</sup>, 19.3% Kano<sup>[23]</sup> 11.5% in Ethiopia<sup>[25]</sup> 19.5% in Ghana<sup>[26]</sup> and 21.2% in Cameroon.<sup>[27]</sup> This observed variation in the overall prevalence may be attributed to several factors including heterogeneity of viral TTI, the influence of geographical location, studied population and methodology of detection employed. Although, the seroprevalence of 8.0% recorded in our study may be considered to be low, it still constitutes a clinical and public health concern, due to the high demand for safe blood from apparently healthy individuals physiologically fit to donate blood but unaware of their infection status.

The breakdown of the TTIs detected in our study was HBV(7.0%), HCV(0.7%) and HIV(0.2%) respectively. The HBsAg rate of 7.0% recorded in our study was closed to the rate of 7.5% reported in studies conducted in Kano and Jos respectively<sup>[23,24]</sup>, but lower to 10.4% reported in the neighboring state of Gombe<sup>[22]</sup>, furthermore from other African countries, higher rate was reported in Ghana,(15.9%)<sup>[26]</sup> and in Ethiopia 10.9%.<sup>[25]</sup> but relatively low rate of 2.3%,1.4% and 0.8% in Egypt, Jordan and Libya.<sup>[28-30]</sup>

Globally, HCV has assumed a major public health problem, with increasing seroprevalence reporting in most documented studies and clinical implication in cases of hepatocellular carcinoma and other liver diseases<sup>[31]</sup> The global seroprevalence of HCV is 3.1%, with higher rates in sub-saharan Africa, and relatively lower rates in Europe<sup>[32]</sup> In Nigeria, HCV seroprevalence ranged from 0.4 to 14%<sup>[10,11,12,16,19]</sup>, but our study recorded a prevalence of 0.7%, which falls within the range reported in Nigeria. However, it is lower than the rate of 1.8% in Kano<sup>[23]</sup> and 2.0% in Sokoto<sup>[33]</sup> even though they share same socio-cultural background. While the Sokoto study was by ELISA method which has higher sensitivity, the Kano study was by a comparatively similar serological technique used in our study. It has less sensitivity and specificity than ELISA. Elsewhere, 6.0% was reported in south-western Nigeria.<sup>[34]</sup> In other African countries, higher rate of infection among donors has been documented, 13.9% in Mali<sup>[35]</sup> 8.7% in Burkina Faso<sup>[36]</sup>, 7.2% in Egypt<sup>[28]</sup> and 4.8% in Cameroon.<sup>[27]</sup> Nevertheless, these rates still signify the problem posed by HCV and HBV, infection, as they both share the same mode of transmission and associated with serious liver disease conditions. Since the first report of HIV/AIDS in 1986, the pandemic has impacted negatively on public health incidence in most sub-Saharan African countries, particularly on safe blood donation. However, the WHO initiatives and other non-governmental agencies advocacies at different levels have resulted in decline of the HIV/AIDS over the years. In our study, we recorded HIV seroprevalence of 0.2%, which is low compared to other studies among potential blood donors in Nigeria, 5.55% in Maiduguri<sup>[14]</sup>, 3.1% in Jos<sup>[24]</sup>, 1.8% in Kano<sup>[23]</sup> and 6.2% in Abeokuta<sup>[37]</sup> While the Maiduguri study was done about two decades ago

and could have reflected the period when control measures were not adequately in place, the other studies share similar times with our study. Interestingly, zero prevalence have been recorded in some studies conducted in Pakistan and Egypt.<sup>[28, 38]</sup> As this study was conducted in an area with a predominant Muslims population, the impact of religious belief cannot be ruled out, so also is the effect of public health education and awareness.

The WHO and FMOH recommendations for blood safety initiative which encourage voluntary blood donation by apparently healthy individual in the community, seems to be limited by screening for the TTIs, because positive result outcome remain a major fear. Rather, most donations are based on family/friends replacement practice and in some cases, remunerated donors. Demographic variables of these donors tend to affect the quality and quantity of blood units for transfusion purposes.

Similar to many previous studies, significant proportion of the donors in current study were within the age-group 21-30 years and 31-41years, with seropositivity of HBsAg(48.3%, 36.3%), HCV(34%, 39.8%) and HIV(33.3%, 36.4%).<sup>[23,-27]</sup> These individuals are apparently healthy and physiologically fit to donate, but also more prone to risky social and sexual behaviors which predispose them to possible acquisition of TTIs. The predominance of male donors as reported in other studies<sup>[23-27]</sup> is corroborated by our study. Religious beliefs and wrong perception about significant blood loss during regular monthly menstrual period may be responsible for the low number of potential female donors recorded.

In comparing the demographic variables of the donors with the seropositivity of the TTIs, high rate was recorded among the businessmen and artisan for HBV and HIV, and among farmers for HCV. The high HCV rate among farmers was also reported in a study conducted in Egypt<sup>[28]</sup>, but the reason for such is unclear. Nevertheless, it may be attributed to the following factors, polygamy, frequent, marriages and other risky sexual behaviors that could predispose to the infections since they have a regular source of income and lower educational attainment. Perhaps a more structured study could unravel the association. Co-infections with HBV and HCV as recorded in our study, posed a serious clinical and public health problem, because of compounded clinical complications and outcomes. These TTIs are the major cause of chronic liver disease and hepatoma with consequent morbidity and mortality.

Our study has its limitation. As a retrospective study, it is associated with documentation errors or incomplete information provided by the donors. The seroprevalence of TTI was based on serological tests with no follow up characterization and viral quantification as they are outside the scope of the study.

**CONCLUSION**

The findings of this study has revealed baseline seroprevalence of viral TTIs among voluntary donors in our hospital that can serve as template for further comprehensive surveillance study for policy formulation, and public health education and awareness as well as a step towards achieving the WHO and FMOH initiative of safe blood banking. It may also serve as a plausible reason for the establishment of a regional centre with laboratory that has facilities for detection of infections even at window period.

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