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Research Article

Seroprevalence of Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV) Hepatitis C Virus (HCV) and Syphilis Infections among Blood Donors at A Tertiary Hospital in Sokoto, Northwest Nigeria

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Abstract: Provision and judicious utilization of blood and blood products have improved medical practise by reducing morbidity and mortality in the varying sub-specialities of medicine. However, the occurrence of transfusion transmissible infections (TTIs) within the blood donor population has continued to pose threats towards ensuring availability of safe blood. Thus, improved donor selection and screening still remains pivotal towards provision of safe blood. We carried out a cross-sectional descriptive study at Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto North-western Nigeria involving 100 blood donors who were consecutively recruited and screened for seroprevalence rates of human immunodeficiency virus (HIV), hepatitis B virus (HBV) hepatitis C virus (HCV) and syphilis infections using Wondfo[R] one step Multi-infections Disease Tests Combo device. Data processing was performed using the Statistical Package for Social Sciences (SPSS) version 20. All the donors studied were found to be family replacement type of blood donors. Fourteen (14%) of the donors were infected with at least one pathogen while the seroprevalence rates of HIV, HBV, HCV and syphilis infections were 3%, 9%, 2% and 0% respectively. Co-infections of HIV with HBV and HBV with HCV were found to be 2% and 1% respectively. We concluded that the seroprevalence rates of TTIs could be high in our study area and advocate for improved donor education and screening while recruiting and retaining voluntary regular non-remunerated blood donors (VNRBD) as means of ensuring safety of blood for medical practice.

Keywords: Blood donor, TTIs, HIV, HBV, HCV, syphilis, Sokoto.

INTRODUCTION:

Globally, modern blood transfusion services have continued to improve medical care by reducing the attendant morbidity and mortality in clinical practise (Hassan A *et al.*, 2010). Despite advances in modern technology, an ideal substitute for blood has not been found and thus man is still dependent on blood donated by fellow humans (Dutta AB, 2006). Meanwhile there has been a concomitant increase in demand for blood in most countries largely due to rise in life expectancy and implementation of new and sophisticated surgical and therapeutic methods requiring large amount of blood (Riley W *et al.*, 2007). In Nigeria, scarcity of voluntary and regular non-remunerated blood donors (VNRBD) considered to be the safest source of blood has made provision of safe blood challenging (NBTS, 2006) and the picture has been further worsened by the high prevalence rates of transfusion transmissible infections (TTIs) among the blood donor base (Muktar HM *et al.*, 2006; Hassan A *et al.*, 2008; Hassan A *et al.*, 2010; Damulak *et al.*, 2013; Motayo BO *et al.*, 2005). Thus, our study highlighted on the prevalence rates of TTIs in our locality to underscore the need for improvement in donor education, selection and continued surveillance towards ensuring reduced seroprevalence rates of these TTIs among blood donors.

EXPERIMENTAL SECTION:

A total of 100 blood donors who presented at the department of Haematology and Blood Transfusion, UDUTH Sokoto North-western Nigeria in February 2019 were consecutively recruited for the study. Ethical approval was obtained from the Hospital Research and Ethics Committee of UDUTH Sokoto while informed consent was obtained from the study participants.

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Sociodemographic data of study participants were entered into an interviewer-administered questionnaire. Three millilitres (3mls) of blood were aseptically collected into a plain sample bottle, allowed to clot at room temperature over an hour and the serum harvested via centrifuging at 1200g for 5 minutes. Separated sera that could not be analysed within 4 hours of collection were stored at 2°C-8°C for a maximum period of 48 hours.

Serological screenings for HIV, HBsAg, HCV and syphilis were carried out using Wondfo[R] one step Multi-infections Disease Tests Combo device (Lot No: W50570105W Guangzhou Wondfo Biotech Ltd, PR China 2017). The sensitivity and specificity of the Combo device against the reference ELISA test were found to be 99.1% and 99.2% for HIV1/2; 96.2% and 99.3% for HBsAg; 99.0% and 99.8% for HCV respectively. While 100% and 98% were obtained for sensitivity and specificity respectively for syphilis when evaluated against a reference Treponema Pallidum Particle Agglutination (TPPA) method.

The following procedural steps were taken for the serological screening and reporting of results: The Combo device and sera were allowed to equilibrate to room temperature prior to testing. The testing devices were removed from the foil pouches by tearing at the notch and placed on a level surface. By holding the sample dropper vertically, 3-4 drops of the sera were added into each sample well for HIV, HBsAg, HCV and syphilis. Results were then read after 15 minutes. Positive results were indicated by visible coloured bands in both the control and test regions. Negative results were indicated by visible coloured bands only in the control regions with no colour band appearing in the test regions. Invalid results were indicated by no visible bands at all or there was a visible band in the test region but not in the control region.

Data obtained were entered into Statistical Package for Social Sciences (SPSS IBM Corp. Released 2011 version 20 Armonk, NY) for analysis. Results generated were presented in simple proportions frequencies and percentages.

RESULTS:

A total of 100 blood donors were recruited for the study with a mean ± SD age of 31.28 ± 8.39 years and an age range of 19-55 years. While only 2 (2%) of the donors were female, all were family replacement type of blood donors and 48(48%) were first time blood donors. Other sociodemographic features of the blood donors are as depicted in Table I.

Table I: Socio-demographic features of blood donors

Variable	N=100 n (%)
Age distribution	
<20 years	2
20-29 years	38
30-40 years	48
>40 years	12
Marital Status	
Single	30
Married	70
One wife	28
Two wives	38
Three wives and above	04
Level of Education	
Informal	22
Primary	16
Secondary	26
Tertiary	36
Occupation	
Civil Servant	18
Farmer	44
Business	14
Student	10
Artisan	12
Housewife	2
Type of Blood Donor	
Family Replacement	100
Voluntary	0
Paid/Commercial	0
No of previous blood donations	
0	48
1-2	26
3-4	16
>4	10
Blood donation	
First donation	48
Repeat donation	52

Fourteen (14%) of the donors were infected with at least one pathogen while the seroprevalence rates of HIV, HBV, HCV and syphilis infections were 3%, 9%, 2% and 0% respectively. Co-infections of HIV with HBV and HBV with HCV were found to be 2% and 1% respectively. Table II further highlights on the distribution of the TTIs according to some characteristics of the blood donors.

Table II: Distribution of Transfusion Transmissible Infections (TTIs) according to some blood donor characteristics

Characteristic	Total	HIV infection n (%)	HBV infection n (%)	HCV infection n (%)	HIV and HBV co-infection n (%)	HBV and HCV co-infection n (%)
Age group						
<20 years	2	0	2	0	0	0
20-29 years	38	2	4	1	1	0
30-40 years	48	1	3	1	1	1
>40 years	12	0	0	0	0	0
Level of education						
Informal	22	0	2	0	0	0
Primary	16	2	5	1	1	1
Secondary	26	1	2	1	1	0
Tertiary	36	0	0	0	0	0
Occupation						
Civil Servant	18	0	1	0	0	0
Farmer	44	1	2	1	1	0
Business	14	2	2	1	1	1
Student	10	0	1	0	0	0
Artisan	12	0	1	0	0	0
Housewife	2	0	2	0	0	0
Type of donor						
First time donor	48	3	8	2	2	1
Repeat donor	52	0	1	0	0	0

DISCUSSION:

According to a survey by the Nigeria's National Blood Transfusion Service (NBTS, 2006) majority of the blood donors in Nigeria are commercial or family replacement donors while voluntary regular non-remunerated blood donors (VNRBD) had insignificant contribution to the national blood donor base; this finding is corroborated by our study which found nil contribution made by the VNRBD as all the blood donors encountered were family replacement donors. Our finding may probably be related to the fact that procurement of family replacement donors is less expensive and fits well with the African culture of extended family support (Tagny *et al.,* 2010). Other workers have found varying degree of contribution to the donor pool by the different types of blood donors (Damulak *et al.,* 2013; Motayo BO *et al.,* 2015). Such varying findings reflect level of knowledge, attitude and practice of blood donation by different societies (Kaoje AU *et al.,* 2017). Blood donation by VNRBD is considered the ultimate goal for sustained provision of blood safe from TTIs and in line with this, countries are encouraged to achieve this via a nationally organised, coordinated and regulated blood programme (NBTS, 2006; WHO, 2009).

It has been observed that African blood donors tend to be 10-15 years younger than their counterparts in European countries and this has been attributed to the large scale involvement of secondary schools and university students in the VNRBD drive in African countries (Tagny *et al,* 2010). Similarly, donor ages have been observed to be related to the donor type as depicted by the works of Allain *et al.,* 2008 who found median donor ages of 18, 25 and 32 years for secondary school, public blood donors and family replacement donors respectively. The fact that majority of the donors in our study are within the productive age range of 20-40 years with a mean age of 31 years and being all family replacement donors further lends credence to this observation. In the review by Tagny *et al.,* 2010, there is a male dominance in blood of African setting which has been attributed to the general belief that men are healthier as they are not burdened by pregnancy and lactation; while others posit that women do also donate blood to nature via their monthly menstrual cycle. It is therefore not surprising for the dismal contribution of blood donation made by the female gender in our study. Recently, some workers in Nigeria have found an increasing number of female participation in blood donation practice (Damulak *et al.,* 2013) emanating from improved donor education.

In the recent past, efforts by the Nigerian government in ensuring adequate supply of safe blood led to the formulation of Nigerian National Blood Policy which ensures that all donor blood are screened for specified TTIs including HIV, HBV, HCV and syphilis (NBTS, 2006). But inadequate facilities needed for extensive screening tests in the setting of high burden of the TTIs in the country have continued to hinder appreciable progress towards provision of safe blood (Kuliya-Gwarzo 2009). On a general note, high endemicity of these TTIs has been reported in African countries including Nigeria (Tagny *et al,* 2010) though there are variations from one region to another. Our study found an overall TTI prevalence of 14% which is higher than the 10.63% reported by Salawu *et al.,* 2010 in Southwest Nigeria and the 3.8% reported in Eritrea (Fessehaye *et al.,* 2011). Earlier works had reported

higher prevalence rates of 15.5% and 15.9% in Jos North central Nigeria and Oshogbo Southwest Nigeria respectively (Buseri *et al.,* 2008; Onoja *et al.,* 2015). Differences in the prevalence rates of TTIs may reflect the varying composition of the donor types as voluntary blood donors have been found to have the least TTIs rates when compared with the family replacement and commercial donors (Tagny *et al.,* 2010). Similarly, changes in population risks, introduction of new screening technique or confirmatory method resulting in improved detection of individuals as well as increase in number of false positive results are additional determinants of varying TTIs prevalence rates in a given population (Salawu *et al.,* 2010).We noted the highest prevalence rates for the TTIs to be with the first time donors, those within the young age range of 20-29 years and those with primary education as their highest level of education. Some workers had earlier reported more voluntary blood donation and less risk of TTIs with individuals who have higher level of education (Tagny *et al,* 2010).

Our study recorded a HIV prevalence rate of 3% which is much higher than the National and Northwest prevalence rates of 1.4% and 0.6% respectively among adults aged 15-49 years reported in a recent population based survey in Nigeria (UNAIDS, 2019). Similar to our finding were those by Buseri *et al.,* 2008 and Onoja *et al.,* 2015 who both found prevalence rates of 3.1% for HIV infection in the Southwest and Northcentral parts of Nigeria. Lower prevalence rates have however been recorded by earlier workers in Nigeria and other parts of sub-Saharan Africa (Ejele *et al.,* 2005; Hassan A *et al.,* 2010; Salawu *et al.,* 2010; Tagny *et al.,* 2010; Fessehaye *et al.,* 2011; Afolabi *et al.,* 2013; Okocha *et al.,* 2015; Fasola *et al.,* 2017). Much higher prevalence rates than ours have also been reported in Southwest parts of Nigeria and other sub-Saharan African countries (Ampofo *et al.,* 2002; Matee *et al.,* 2006; Motayo BO *et al.,* 2015).

In Nigeria, HBV infection is considered to be hyper endemic with prevalence of HBsAg among the adult population including family replacement donors within the range of 1.2%-26% and 2.4% in voluntary blood donors (Kuliya-Gwarzo 2009). Our finding of 9% prevalence rate for HBsAg positivity is at variance with the 6.5% reported by Hassan A *et al.,* in Zaria and the 18.6% reported by Buseri *et al.,* in Osogbo. HCV infection is considered to be endemic in Nigeria with varying prevalence rates from different geo-political regions ranging from 0.5%-12.3% (Kuliya-Gwarzo 2009). The 2% prevalence rate for HCV infection observed in our study is similar to the 2.2% earlier reported by Hassan A *et al.,* in Zaria but contrasts the higher rate of 6.0% reported by Buseri *et al.,* in Osogbo.

Syphilis infection is high in Africa and this has necessitated for its screening in many blood banks including those in Nigeria (Tagny *et al.,* 2010). Though we found a zero prevalence rate of syphilis infection in our study, this is similar to the finding by Motayo BO *et al.,* in Abeokuta, Southwest Nigeria. Damulak *et al.,* and Olokoba *et al.,* had earlier reported prevalence rates of syphilis among blood donors to be 0.9% and 1.7% in Jos Northcentral and Yola, Northeast Nigeria respectively. Higher prevalence rates had been reported in other sub-Saharan African countries with as high as 3.5% and 4.7% rates reported in Ghana and Tanzania respectively (Ampofo *et al.,* 2002; Matee *et al.,* 2006).

The findings in this study of co-infections of HIV with HBV and HBV with HCV is in keeping with several other reports within and outside Nigeria (Salawu *et al.,* 2010; Noubiap *et al.,* 2012) and largely reflects the routes of transmission shared by the causative agents of these TTIs which include; direct contact with blood, transfusion of infected blood and blood products, sexual activity as well as intravenous drug injections.

CONCLUSION:

In our study area, the seroprevalence rates of TTIs were found to be high and as this could militate against provision of adequate safe blood, we advocate for improvement in donor education and screening for TTIs, recruitment and retainment of voluntary regular non-remunerated blood donors (VNRBD) as means of ensuring adequacy of safe blood for use in medical practice.

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Conflict of interest: Nil

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