

Seroprevalence of Transfusion Infections Among Prospective Blood Donors in a District Hospital in Abuja, Nigeria. Séroprévalence Des Infections Par Transfusion Chez Les Donneurs De Sang Potentiels Dans Un Hôpital De District D'abuja, Au Nigeria.

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ABSTRACT

Background: Blood transfusion plays a crucial role in medical practices. However, blood transfusion safety remains a public health concern in developing countries due to the high prevalence of Transfusion Transmissible Infections (TTIs) among blood donors.

Methods: This was a retrospective cross-sectional study involving data obtained from prospective blood donors' records at the blood bank of Asokoro District Hospital (ADH), Abuja, Nigeria, from 01 January 2021 to 31 December 2021. The records comprised results of screening for TTIs, namely Human Immunodeficiency Virus (HIV), Hepatitis B virus (HBV), Hepatitis C virus (HCV), and syphilis. Screening was performed using rapid test kits. Data was analyzed with the SPSS 23.0 statistical software.

Results: A total of 1,507 blood donor data were analyzed. The age range of the donors was 17 to 67 years. TTIs amongst donors in ADH, Abuja was HCV 4.2%, HBV 4.1%, Syphilis 1.0%, and HIV 0.9% respectively.

Conclusion: There is a need for counselling amongst positive patients after blood transfusion screening, and referral to the relevant clinics for management. There is also a need to create effective public health interventions towards HCV infection which had the highest prevalence among blood donors.

Keywords: transfusion, transmissible infections, seroprevalence, blood donors, blood transfusion, Nigeria

ABSTRAIT

Contexte: Les eaux usées municipales sont une source majeure de la transfusion sanguine joue un rôle crucial dans les pratiques médicales. Cependant, la sécurité des transfusions sanguines reste un problème de santé publique dans les pays en développement en raison de la forte prévalence des infections transmissibles par transfusion (ITT) parmi les donneurs de sang.

Méthodes: Il s'agissait d'une étude rétrospective sur les dossiers des donneurs de sang potentiels à la banque de sang de l'hôpital d'Asokoro à Abuja (Nigeria) entre le 1er janvier et le 31 décembre 2021. Les résultats du dépistage rapide des ITT (VIH, VHB, VHC et syphilis) ont été analysés avec SPSS 23.0.

Résultats: Au total, 1 507 données de donneurs de sang ont été analysées. La tranche d'âge des donneurs était de 17 à 67 ans. Les ITT parmi les donateurs de l'ADH, à Abuja, étaient respectivement de 4,2 % pour le VHC, de 4,1 % pour le VHB, de 1,0 % pour la syphilis et de 0,9 % pour le VIH.

Conclusion: Il est nécessaire de conseiller les patients positifs après un dépistage par transfusion sanguine et d'être orientés vers les cliniques compétentes pour la prise en charge. Il est également nécessaire de mettre en place des interventions de santé publique efficaces contre l'infection par le VHC, qui présente la prévalence la plus élevée chez les donneurs de sang.

Mots-clés: infections transmissibles par transfusion, séroprévalence, donneurs de sang, transfusion sanguine, Nigeria.

INTRODUCTION

Blood transfusion plays a major role in saving lives. Patients with obstetric hemorrhages during childbirth, road traffic accident victims with blood loss anemia, sickle cell patients with crisis, and various medical and surgical conditions often need blood transfusion for survival. Thus, blood transfusion plays a crucial role in clinical practices. However, blood transfusion carries a significant risk of transfusion-transmissible infections (TTIs), especially in developing countries. Despite improvements in blood selection processes as well as donor blood screening measures, blood transfusion safety remains a public health concern in developing countries (1).

Safe blood transfusion continues to be an issue of concern in sub-Saharan Africa due to the high prevalence of TTIs among blood donors and the general population coupled with poor infrastructure, lack of political will, inadequate investment in human capital developments, poor remuneration for staff, epileptic power supply, and inadequate screening kits and equipment (2-4). Due to inadequate screening tools, transmission of infection can occur during the window period, and this can significantly contribute to the prevalence of TTIs in the population (1,5).

The effects of unsafe blood transfusion are enormous with the associated morbidity and mortality affecting the recipients of the blood transfusion as well as their families and communities (6,7). Assessment of TTIs is crucial for evaluating the safety of blood transfusion and helps keep track of the success of recently introduced screening methods (8).

There is limited data on TTIs among blood donors in Abuja. Our study

therefore assesses the seroprevalence of transfusion transmissible infections among blood donors in Asokoro District Hospital, Abuja. This study will help provide demographic data and a better understanding of the epidemiology of infectious agents such as Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and syphilis. The data obtained from our study will help provide a scientific basis for developing control approaches in preventing the transmission of these infectious agents via blood transfusion.

METHODS

This study was carried out at the Asokoro District Hospital Blood Banking Service (ADHBBS). Asokoro District Hospital is in Abuja, the Federal Capital Territory (FCT) of Nigeria. The hospital serves as a referral center for cases from primary and secondary healthcare facilities in the FCT, and other neighbouring states. It also serves as a Teaching Hospital for medical students. The blood bank provides blood and blood products that are needed in the hospital. All prospective donors are screened for TTIs with rapid kits and only donors whose Haemoglobin concentrations are adequate and tested negative for all the four TTIs screened are subjected to the Elisa test for confirmation before the blood can be used in the blood bank.

This was a retrospective cross-sectional study, whereby data was obtained from blood donors' records at the ADHBBS from 01 January 2021 to 31 December 2021. The donors were predominantly voluntary and family replacement donors. The record comprised all prospective blood donors who came into the blood bank to be tested and screened for blood transfusion transmissible infections. Blood donor data, such as

age, sex, packed cell volume (PCV), and serological results using rapid kits were obtained from the record book of the blood bank. Cases with missing or incomplete biodata and test results were excluded from this study.

Screening methods: Rapid tests for TTIs were carried out using the lateral flow immuno-chromatographic assay method for qualitative detection of antibodies. Screening was performed at this blood bank for HIV, with Abbot Determine™ HIV-1/2 test strips; Hepatitis B, with HBsAg Test Strips by Atlas Medicals; Hepatitis C with HCV antibody test kits by Atlas Medicals; and syphilis with Syphilis Antibody Test Strips by Atlas Medicals. The kit manufacturer's instructions were strictly followed.

Donors' information was entered into Microsoft Excel Data processing and data generated were analyzed using the Social Sciences (SPSS) for Windows, version 23.0 (SPSS Inc. Chicago, Illinois, USA) for analysis. The chi-square test was used to determine the association between the donors' demographic variables and their serological results. A p-value less than 0.05 was considered statistically significant.

Ethical consideration: Ethical approval was obtained from the Medical Ethics Committee of Asokoro District Hospital, Abuja. Informed consent is not required for retrospective studies, as per our institutional guidelines, but donor details were completely anonymized to ensure confidentiality.

RESULTS

A total of 1,507 blood donor records met the inclusion criteria and were analyzed. The majority of the blood donors 95.5% (n = 1439) were males while the females were 4.5% (n = 68) as shown in Table 1. The age range of the donors was 17 to 67 years with a

mean age of 35.6 ± 6.8 years. Most of the participants 55.9% (n = 843) were within the age group of 30 – 39 years.

The prevalence of HIV, HBV, HCV, and Syphilis among the blood donors in this study is shown in Figure 1. The highest prevalence of 4.2% (n=64) was observed for HCV infection. Table 2b shows the association between their gender and serological results, and there was no significant association. There was a significant association between the donors' age group and HCV serology results ($\chi^2 = 15.103$, $p = 0.004$), as shown in Table 2a.

DISCUSSION

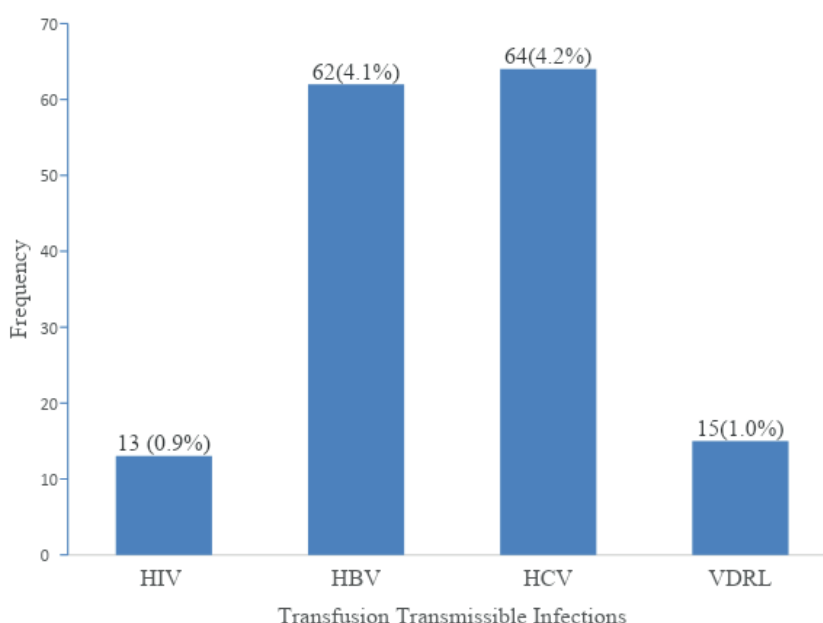
Blood safety remains a major challenge in Africa, especially in Sub-Saharan countries (13). Screening of blood has important public health benefits for the recipient and the community. HCV infection was most prevalent in this study; however, this is not usually the case among the four infections and has rarely been seen to be the most prevalent infection. It was noted to be second most prevalent in Oshogbo, and 3rd most prevalent in Eastern Nigeria, Abeokuta, Calabar, Ghana, and Northern Ethiopia (9-14). A similar prevalence of HCV of 4.2% was seen in Ghana, while a much higher prevalence of 6.0% was seen in Oshogbo and 8.1% in Eastern Nigeria, while a much lower prevalence of 3.6% was seen in Calabar, 2.8 % Anambra, Eastern Nigeria and 1.5% in Abeokuta (9-14).

This shows there might be a possible rise of HCV infection in FCT as compared to other states. Data also shows that 15 – 30% of those who have chronic hepatitis from HCV are at risk of liver cirrhosis which puts them at risk of developing hepatocellular carcinoma (15). Hence there needs to be public

Table 1: Distribution of the demographic characteristics of prospective blood donors.

Age group (years)		Frequency (N=1507)	Percent
<20		12	0.8
20 – 29		254	16.9
30 – 39		843	55.9
40 – 49		359	23.8
≥50		39	2.6
Range		17 – 67	
Mean ± SD		35.6 ± 6.8	
Median		35	
Confidence interval		35.3-35.9	
Gender	Male	1439	95.5
	Female	68	4.5

Figure 1: Seroprevalence of TTIs among the prospective blood donors



health measures to reduce the rate of spread of HCV and again because there is no effective vaccine against hepatitis C, although medications can cure 95% of cases access to effective management is poor (8).

Interesting to note that there was a positive association of HCV infection with age ($p=0.002$), as in most cases 45.3% were seen in those between 30 – 39 years of age. However, this significant relationship was not noted among other infections even though all infections were most prevalent

amongst this age group. This again confirms that the age group likely to be infected with HCV is the young proportion of the working age group. There is a need to create awareness and focus public health interventions on this age group.

The HBV infection was seen in 4.1% of cases which was one of the lowest prevalence seen in literature as 20.7% was reported in FMC Owerri, 18.6% in Oshogbo, 13.7% in Eastern Nigeria, 10% in Abeokuta, 5.0% in Ghana, 4.6 % in Madonna University in Eastern

Table 2a: Association between the donors' age group and their serological results.

Age group (years)	HIV		HBV		HCV		VDRL	
	Positive n=13 n(%)	Negative n=1494 n(%)	Positive n=62 n(%)	Negative n=1445 n(%)	Positive n=64 n(%)	Negative n=1443 n(%)	Positive n=15 n(%)	Negative n=1492 n(%)
<20	0(0.0)	12(0.8)	1(1.6)	11(0.8)	3(4.7)	9(0.6)	0(0.0)	12(0.8)
20-29	3(23.1)	251(16.8)	11(17.7)	243(16.8)	11(17.2)	243(16.8)	2(13.3)	252(16.9)
30-39	8(61.5)	835(55.9)	39(62.9)	804(55.6)	29(45.3)	814(56.4)	11(73.3)	832(55.8)
40-49	2(15.4)	357(23.9)	10(16.2)	349(24.2)	19(29.7)	340(23.6)	1(6.7)	358(24.0)
>50	0(0.0)	39(2.6)	1(1.6)	38(2.6)	2(3.1)	37(2.6)	1(6.7)	38(2.5)
Chi-square	1.210		2.976		15.103		3.897	
P-value	0.876		0.562		0.004*		0.420	

*Significant at 95%

Table 2b: Association between the donors' gender and their serological results.

Gender	HIV		HBV		HCV		VDRL	
	Positive n=13 n(%)	Negative n=1494 n(%)	Positive n=62 n(%)	Negative n=1445 n(%)	Positive n=64 n(%)	Negative n=1443 n(%)	Positive n=15 n(%)	Negative n=1492 n(%)
Male	11(84.6)	1428(95.6)	59(95.2)	1380(95.5)	61(95.3)	1378(95.5)	14(93.3)	1425(95.5)
Female	2(15.4)	66(4.4)	3(4.8)	5(4.5)	3(4.7)	65(4.5)	1(6.7)	67(4.5)
Chi-square	3.598		0.016		0.005		0.163	
P-value	0.114		0.758		0.763		0.501	

Nigeria and similar result in a similar study population in Calabar (4.1%) and Ethiopia (4.2%) (9-15). The picture seen in the FCT could be because of the improved public health interventions especially immunization services in the FCT regarding HBV. Also, the other studies stated above were much earlier, and the possibility that public health measures might have caused a much lower prevalence in this present study.

Both HBV and HCV cause liver infection and put an individual at risk of liver cirrhosis and hepatocellular carcinoma, especially HBV (15). Hence there is a need for effective counselling amongst positive patients after blood transfusion screening, and more importantly to refer them to the gastroenterologist for effective management. These measures would reduce the likelihood of these grave complications and public health measures would reduce the

likelihood of spread. Noteworthy that HBV unlike HCV has a vaccine and continuous vaccination of the young would continue to mitigate this infection.

The HIV infection seen amongst the study population was 0.9% which was the least transmissible infection. This was quite an impressive picture as compared to other regions in the country and continent as 26.7% was seen in FMC Owerri, 13.7% was seen in a similar population in Eastern Nigeria, 6.6% in Eastern Ethiopia, 6.2% in Abeokuta, 5.6% in Madonna University in Eastern Nigeria, 4.2% in Calabar, 3.9% in Ghana and 3.1% in Oshogbo (9-14,17). These were, however, higher than 0.26% seen in Northern Ethiopia (15).

This picture could have arisen because of the effective public health interventions towards HIV infection in the FCT. The hospital

also has several free HIV screening points, where effective counselling and referrals are carried out. There is also an HIV-dedicated clinic, so most patients who utilize the hospital are likely to have had a free HIV screening and are more likely to be aware of their status and those who are positive are less likely to turn up to donate blood. There is a need to have such primary healthcare measures replicated in several facilities so many people would be aware of their status and appropriate interventions can be metered out.

Syphilis infection was seen in 1.0% of the study population. Similar prevalence amongst similar study populations was seen in 1.1% in Oshogbo, 1.8% in Ethiopia, and a much higher prevalence of 5.2% in Ghana, 4.7% in FMC Owerri, 3.4% in Eastern Ethiopia, and 3.1% in Calabar (9,13-15,17-19).

The study showed that HCV infection had the highest prevalence when compared to the other infections and there was a significant association of age with HCV infection. The other infections were relatively lower when compared to similar studies in the country.

LIMITATIONS

The major limitation of the study was that it was hospital-based and therefore analyzed only the records of prospective donors who visited the blood bank. As a result, the findings may not reflect the true prevalence and incidence of TTIs within the general population. The diagnostic test kits used in this study are a limitation. The nucleic acid-based diagnostic technique is better than the serological method that was used. Another limitation is the retrospective nature of the study design, which was associated with incomplete data.

CONCLUSION

The common TTIs seen in our study were HCV and HBV. There was a positive association of HCV infection with age ($p=0.002$), as in most cases 45.3% were seen in those between 30 – 39 years of age. Screenings for these infections are an important primary prevention strategy to mitigate these infections and secondary strategies to manage positive cases.

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