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Seroprevalence of Blood Transfusion Related Microbial Pathogens among Blood Donors Attending Hasiya Bayero Paediatric Hospital Kano, Nigeria

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Abstract
Transfusion transmissible infections are very serious complications of blood transfusion due to long term morbidity and mortality associated with blood transfusion related microbial pathogens such as Hepatitis B Virus (HBV), Human Immunodeficiency Virus (HIV) and Triponema pallidum (syphilis). The study aimed to determine the seroprevalence of some blood transfusion related microbial pathogens among blood donors attending Hasiya Bayero Paediatric Hospital (HBPH), Kano. A total of two hundred and forty nine (249) blood samples of male donors aged between 18 and 54 years were screened for Hepatitis B surface antigen (HBsAg), Human Immunodeficiency Virus (HIV) and Triponema palidum (syphilis) using rapid chromatographic immunoassay for the qualitative detection of HBV, HIV and syphilis infection. The results show that 21(8.4%) donors had serological evidence of infection with one of the screened microbial pathogen but none had multiple infections and the seroprevalence of HBsAg, HIV and syphilis was found to be 4.8%, 1.2% and 2.4% respectively. Whereas the age group 18-27 years had the highest seroprevalence rates of 2.4% 0.8% and 1.6% for HBsAg, HIV and syphilis respectively. Conclusively the seroprevalence of HBsAg, HIV and syphilis are 4.8%, 1.2% and 2.4% respectively. Therefore, the overall seroprevalence of blood Transfusion Related Microbial Pathogens is 8.4% at Hasiya Bayero Paediatric Hospital, Kano
Keywords: *Seroprevalence; Transfusion; HBV, HIV, syphilis and blood donor.*

Introduction

Transfusion transmissible infections are very serious complications of blood transfusion due to long term morbidity and mortality associated with some blood transfusion related microbial pathogens such as *Hepatitis B Virus* (HBV), *Human Immunodeficiency Virus* (HIV) and *Triponema pallidum* (sypphilis). This continued to pose a great challenge to transfusion medicine most especially in Africa due to a high transfusion demand (Hassan *et al.*, 2008).

Hepatitis B is an infection of the liver caused by HBV; a double - stranded DNA virus of the Hepadnaviridae family and a major cause of

morbidity and mortality worldwide (Aspinall *et al.*, 2011). It is the most common cause of serious liver infection in the world and estimated that more than two billion people have been infected with HBV world wide and 350 million people have chronic infection (Bashir and Aliya, 2014). Of those chronically infected, it is estimated that 65 million will die from liver disease due to the infection (Aspinall *et al.*, 2011).

HIV is the causative agent of Acquired Immuno Deficiency Syndrome (AIDS) and AIDS Related Complex (ARC). It was first reported in 1981 and isolated by the end of 1983. Since then, AIDS became a worldwide epidemic, expanding in scope and magnitude. HIV infections have affected different population and geographic regions; millions are now infected worldwide; once infected, individuals remain infected for life (Jawetz *et al.*, 2007). The Sub–saharan Africa has been most severely affected by the HIV/AIDS pandemic with almost 9% of its adult population living with HIV. The HIV/AIDS epidemic in Nigeria has extended beyond the commonly classified high risk groups and is now common in the general population with the adult prevalence rate of 5.8% in 2001(Bashir and Aliya 2014).

Syphilis is a systemic disease caused by *Treponema pallidum* (CDC, 2015) and remains a global public health threat that can lead to severe complications. It is an ancient infectious disease, yet modern efforts to control the disease remain ineffective in many countries, especially among high risk populations like men who have sex with men. The World Health Organization estimated that in 2008, there were 36 million prevalent cases of syphilis and 11 million incident cases in adults between the ages of 15 and 49 (Seña *et al*., 2015).

HBV, HIV and syphilis infections are public health problems that share similar routes of transmission such as sexual contact, exposure to contaminated blood or blood products, dangerous tradition of sharing needles, intravenous drug use, and transfer from mother to child (Emmanuel *et al*., 2012). Reports from different parts of the world vary with prevalences of HBsAg, HIV and syphilis among blood donors of 0.66%-25%, 0.084%-11.7%, and 0.95%-4.7%, respectively while, in Nigeria, prevalence's of 1.3%-14%, 1.1%-5.8%, and 0.1%-3.6% have been reported for HBsAg, HIV, and syphilis, respectively (Emmanuel *et al*., 2012).

Testing for HBV, HIV, and syphilis offers the opportunity to provide treatment and prevention advice to those who are positive and recommend vaccination to those who are HBsAg negative but at continuing risk (Aspinall *et al.*, 2011).

Materials and Methods

Samples Collection

The blood samples used for this study were collected from the Medical Laboratory Department, Hasiya Bayero Paediatric Hospital Kano. A total of two hundred and forty nine blood donors aged between 18 and 54 years were enrolled. Aseptically, 5ml of blood sample was collected from each by venipuncture into a clean dry EDTA container and stored at 4^0C. Donor's Age, Sex and occupation were recorded.

Sample size

The sample size was calculated using HIV prevalence of 3.4%, in Nigeria as reported by NACA, (2015). A standard epidemiological formula was used as follows:

$$n = \frac{z^2\, pq}{d^2}$$

n= Sample size, z= standard normal distribution at 95 confidence interval, p= prevalence rate 4.6 (0.046), q= 1-p, 1= is the maximum value of probability, d= allowable error taken as 5% (0.05)

$$\frac{1.9^2 \times 0.034\ (1- 0.034)}{0.05^2}$$

$$\frac{3.610 \times 0.034\ (0.966)}{0.0025}$$

= 47

Hence minimum sample size is 47. However, to obtain a reliable prevalence rate, 249 samples were used for the study.

Screening for microbial pathogens

All the samples were screened for Hepatitis B surface antigen (HBsAg), *Human Immuno-deficiency Virus* (HIV) and *Triponema palidum* (syphilis) using rapid chromatographic immunoassay for the qualitative detection of HBV, HIV and syphilis infection. Plasma was removed from the whole blood by spinning at 3000 rpm for 5 minutes and the strips were allowed to equilibrate to room temperature prior to testing.

HBsAg Screening Procedure

Rapid test strips (Lab ACON Biotech Co., Ltd, Canada) for HBsAg were removed from the sealed pouches with the arrows of the strips pointing toward the plasma; each strip was immersed vertically in the plasma for 15 seconds avoiding the plasma level passing the maximum line on the strip as described by the Manufacturers. Strips were then placed on a non absorbent surface and the results were interpreted at 15 minutes. Positive samples were noted with two distinct coloured red lines appearing on both the test and control region while Negative samples were noted with only one coloured line appearing in the control region and no apparent red line on the test region.

HIV Screening Procedure

Determine HIV 1/2 (Alere Medical Co. Ltd., Japan) rapid test strips for HIV were removed from sealed pouches and placed on bench. Two drops of plasma were added onto the sample pad of the test strip. The reactive samples were retested with Stat-pack kits for confirmation (Caldon Biotech, Inc., Carlsbad, CA, USA). These assays detect both HIV-1/2 infections. Results were interpreted and recorded according to the manufacturer's instructions.

Syphilis Screening Procedure

The rapid test strips (Lab ACON Biotech Co., Ltd, Canada) for Syphilis were removed from the sealed pouches, with the arrows of the strips pointing toward the plasma; each strip was immersed vertically in the plasma for 15 seconds avoiding the plasma level passing the maximum line on the strips as described by the manufacturers. Strips were then placed on a non absorbent surface and the results were interpreted and recorded at 15 minutes.

Results

Table 1: Seroprevalence of Blood Transfusion Related Microbial Pathogens

Microbial pathogens	No. of Samples Screened	No. of Positive	Prevalence (%)
HBV	249	12	4.8
HIV	,,	3	1.2
Syphilis	,,	6	2.4
Total	249	21	8.4

Table 2: Seroprevalence of the Microbial Pathogens with regards to Age of Donors

Age (year)	No. of samples Screened	Number of positive cases		
		HBsAg (%)	HIV (%)	Syphilis (%)
18-27	63	6(2.4)	2(0.8)	4(1.6)
28-37	111	3(1.2)	1(0.4)	2(0.8)
38-47	60	3(1.2)	0(0.0)	0(0.0)
48-54	15	0(0.0)	0(0.0)	0(0.0)
Total	249	12(4.8)	3(1.2)	6(2.4)

Discussion

This study has shown that 8.4% donors had serological evidence of infection with one of the screened microbial pathogens. This is lower compared to that of Emmanuel *et al*., (2012) who reported 19.3% in Kano. This may be due to increase in awareness on STDs prevention over time.

The study also shows seroprevalence of 4.8%, 1.2% and 2.4% for HBsAg, HIV and syphilis respectively. These findings are comparable to previous reports in Nigeria with prevalence's of 1.3%-14%, 1.1%-5.8%, and 0.1%-3.6% for HBsAg, HIV, and syphilis, respectively (Bashir and Aliya, 2014; Emmanuel *et al*. 2012; Koki *et al*., 2014; Hassan *et al*., 2008; Mohammed *et al*., 2015). Moreover, the seroprevalence of HBsAg is lower than that of Bashir and Aliya, (2014) and Mohammed *et al*., (2015) where they reported

14% and 11% respectively similarly that of HIV is slightly lower to that of Emmanuel *et al*., 2012 and NACA, 2015. However, the seroprevalence of syphilis in the study was found to be higher than that observed by Yakasai *et al.,* 2012 (0.55%) and Damulak *et al.,* 2013 (0.9%) in Kano and Jos respectively but significantly lower than that reported by Emmanuel *et al*. 2012 (7.5%) in Kano.

With regards to age group, 18-27 years had the highest seroprevalence rates of 2.4%, 0.8% and 1.6% for HBsAg, HIV and syphilis respectively. This differs from that of Emmanuel *et al*. (2012) who reported the age group of 28-37 years with highest rates of syphilis (8.7%), HBsAg (15.5%), and HIV (2.9%) infections. However, the study is comparable to the literature by Justin (1996) which stated that Infectivity rates of sexually transmitted diseases correspond to the most sexually active age groups, being highest in the 20-to 24-year age group, slightly lower in the 15- to 19- year age group, and lower still in the 25- to 29- year age group.

Conclusion

Conclusively, the seroprevalence of HBsAg, HIV and syphilis are 4.8%, 1.2% and 2.4% respectively. Therefore, the overall seroprevalence of blood Transfusion Related Microbial Pathogens is 8.4% at Hasiya Bayero Paediatric Hospital, Kano.

Recommendations

Blood should be properly screened for microbial pathogens and other blood related parameters before transfusion. Infected donor should be refraining from donating blood or any blood products.

More study should be carried out especially in rural area to determine the level of blood Transfusion Related Microbial Pathogens.

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