



# Transfusion Transmissible Infections among Voluntary Blood Donors in Port-Harcourt Metropolis, Rivers State, Nigeria

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**Abstract**— A survey of Blood Transfusion Transmissible Infections (TTIs) among voluntary blood donors of different age groups was conducted between March 2017 and June 2018 in Port-Harcourt metropolis, Rivers State, Nigeria. A total of 200 voluntary blood donors consisting of 151(75.5%) males and 49(24.5%) females participated in the study. All the blood donors were within the ages of 18 to 65 years. Blood samples were taken from the veins of blood donors. The blood samples were screened in the laboratory for Venereal Diseases (VD), Hepatitis B surface antigen (HBsAg), Hepatitis C Virus (HCV) and Human Immuno-deficiency Virus (HIV) 1 and 2 using test Kits. Of the 200 blood donors involved, none was positive for HIV 1 and 2 infections. Only 2(1%) participants were positive for VDRL infections. A total of 8(4.0%) of the study participants were positive for HBsAg while 1(0.5%) was positive for HCV. The prevalence of TTIs was higher in females 6(3.0%) than in males 5(2.5%), but there was no significant differences in prevalence among genders ( $P > 0.05$ ). Blood is still one of the main sources of transmission of Hepatitis B Virus (HBV), HCV and VD. Availability of safe blood for transfusion is necessary for the recuperation of the recipient. This can be achieved by vigorous screening of donors and donated bloods.

**Keywords**— Transfusion, Infections, Blood, Donors, Port-Harcourt, Metropolis.

## I. INTRODUCTION

Blood transfusion worldwide is currently facing interesting challenges. A myriad of TTIs, HIV, HBV, HCV and VD, have provoked a greatly heightened emphasis on safety with inescapable implications for the complexity and cost of providing a transfusion service. The discovery that HIV, HBV and HCV could be transmitted through transfusion has heralded a new era in blood transfusion practice worldwide with emphasis on two fundamental objectives, safety and protection of human life (Diwan & Mathur, 2012; WHO, 2012).

There are estimated 33 million people living with HIV/AIDS in the world and of these 23 million are in sub-Saharan Africa. Blood transfusion accounts for 5-10% of the HIV infections in sub-Saharan Africa (Okoroiwu *et al.*, 2018). Similarly, 12.5% of patients who received blood transfusion are at risk of post-transfusion hepatitis (Fasola & Otegbayo, 2002). People in developing countries still face the risk of acquiring these infections because mandatory screening test are not carried out. Many countries still lack a national blood transfusion service despite some recent improvement in this important area. Human Immunodeficiency Virus, HBV, HCV and VD are of great concern as transfusion-

transmissible infections because of their prolonged viraemia and carrier or latent state. They also cause fatal, acute, chronic and life-threatening disorders. These viral infections have emerged a global public health problem and a significant cause of mortality and morbidity in Nigeria and many parts of the world (Ejele *et al.*, 2005).

The demand for blood is high and far outweighs its supply. Transfusion requirements and increasing demand for blood drives paid donors to donate more often than the required 12 weeks minimum interval which further complicates it. A significant number of the paid donor population has also been reported to be anaemic and further donation by such individuals without considering their baseline haemoglobin investigation could be harmful (Benedict *et al.*, 2012). Best practice as recommended by the World Health Organization ought to be put in place to be able to curb some of these issues.

There is a need to strictly regulate blood donation practices locally and the activities of those involved in blood banking. There is also a need to encourage non-remunerated voluntary blood donation practice which remains the gold standard in blood donation. However, voluntary donation is less than 25 % in Rivers State, Nigeria (Okoh *et al.*, 2014) as a whole whereas in other States the rate is high. The aim of this study was to investigate TTIs among voluntary blood donors in Port-Harcourt Rivers State, Southern Nigeria.

## II. MATERIALS AND METHODS

### 2.1 Study Area

This study was conducted in Port Harcourt. Port-Harcourt is a metropolitan city in the heart of the oil and gas industry in the Niger Delta region of Nigeria with a high influx of migrant workers from all parts of the world. The metropolis is an industrial centre with large number of multinational firms as well as other industrial concerns, particularly business related to the petroleum industry. It is the chief oil-refining city in Nigeria and has two main oil refineries that process around 210,000 barrels of crude oil daily. It is a port town that lies along the Bonny River (an eastern tributary of the River Niger), 66 km upstream from the Gulf of Guinea, with a population of 6,144,673 (Encyclopaedia Britannica). However, the city is characterized by low level of environmental sanitation, poor housing, lack of potable water and improper management of wastes especially in the indigenous core areas characterized by high density and low/middle income populations (Ayotamuno & Gobo, 2004).

### 2.2 Study Design

The study was a cross sectional survey of transfusion-transmissible infections among voluntary blood donors of different age groups in Port-Harcourt metropolis. The research was conducted between March 2017 and June 2018.

### 2.3 Study Population

A total of two hundred 200 voluntary non-remunerated blood donors who consented, were recruited in the study. The blood specimens were collected over a period of six months.

### 2.4 Ethical approval

Ethical approval for this study was obtained from the ethical committee of the Ministry of Health, Government of Rivers State, Nigeria (MH/PRS/391/VOL.2/705).

### 2.5 Consent

Informed consent of the study participants were obtained after due sensitization. Donors' Confidentiality was assured.

### 2.6 Criteria for selection of participants

**2.6.1 Inclusion criteria:** included in the study were apparent healthy donors between 15 to 65 years of age, with no history of long-term medication use, with no history of blood transfusion within the last 3 months preceding the study, haemoglobin concentration  $\geq 12.5$  g/dL prior to donation, willingness to give oral informed consent after counselling and non-menstruating or breast-feeding women.

**2.6.2 Exclusion criteria:** excluded from the study were all blood donors who did not meet the inclusion criteria.

### 2.7 Demographic Data of Participants

The socio-demographic data of the blood donors, especially the age and gender were recorded.

### 2.8 Blood Samples Collection

Prior to collection of blood samples from the donors, a pre-blood donation sample was collected from each donor and sent to the Department of Pathology, River State University Teaching Hospital, Port-Harcourt for screening. Only donors who passed the inclusion criteria were bled, to avoid wastage of blood pints. Blood samples for the diagnosis of HBV, HIV, HCV and VD infection were collected from all qualified study participants. The upper arm area of each donor was thoroughly cleaned and sterilized using cotton wool soaked in methylated spirit. Five millilitres of venous blood were obtained from the ante-cubital vein. About 2.5 ml of the blood was introduced into blood specimen bottle containing anticoagulant Ethylene Diamine Tetra-Acetic Acid (EDTA). The remaining 2.5 ml was transferred into plain tubes without anticoagulant according to WHO standard method. The blood was allowed to clot and

afterwards centrifuged. The serum samples were then aliquoted into a vial which was labelled and stored at -20°C prior to testing. All blood donations were drawn manually and none was automated in this study. None of the blood donations were separated into components.

### 2.8.1 Examination of Blood Samples for Venereal Disease Research Laboratory (VDRL), HBV and HCV

The donor blood samples were screened for VDRL, Hepatitis B antigen (HBsAg) and HCV. Testing for HBV and HCV were based on chromatographic methods using test kits according to the manufacturers' instructions. All the reactive samples were repeated in duplicate before labelling them seropositive or seronegative. The VDRL test for antibodies to *Treponema pallidum* was conducted using the DiaSpot® Rapid Detection Testing kits (ACON one-step insert rapid chromatographic immunoassay test strips). The test was performed according to the manufacturer's instructions.

### 2.8.2 Examination of Blood Samples for HIV 1 and 2

HIV test was done according to the national testing algorithm. Using the stored serum samples earlier collected from the participants, HIV screening was done with two kits as recommended by the World Health Organization (WHO, 2015). Determine® HIV-1/2 (5 Abbott Laboratories, IL, USA) was used for the test, while Uni-Gold® HIV-1/2 (Trinity Biotech, Dublin, Ireland) was used for the confirmatory test. The test was carried out by applying 50 µL of the serum to the Sample Pad (marked by the arrow symbol) of the Test Unit and allowed to lay flat in the bench for 20 minutes, after which the result was read and interpreted based on the presence or absence of two pink/red

lines (Control line and Ab line). The Control line appears in the Control Area and the Ab line appears in the Lower Test Area of the Test Unit. The intensity of the Ab and Control lines may vary, however, any visible pink/red colour in both the Control and Lower Test Areas, regardless of intensity, is considered reactive. A Reactive test result means that HIV-1 and/or HIV-2 antibodies have been detected in the sample. The test result is therefore interpreted as preliminary positive for HIV-1 and/or HIV-2 antibodies. Since the serum sample was used for the test, the Chase Buffer was not added. As part of quality assurance measures, the test initiated within 2 hours after removing the protective foil cover from each Test Unit and results were not read after 30 minutes of adding the serum sample.

### 2.9 Data Analysis

The data collected was analysed using the Statistical Package for Social Sciences (SPSS) version 2.3. All the categorical variables were summarised percentages and used to evaluate descriptive statistics. Significant levels were measured at 95% CI with the levels of significance set at 5% probability value ( $P > 0.05$ ).

## III. RESULTS

Of the 200 participants examined, none tested positive for HIV 1 & 2. A total of 8(4.0%) were positive for HBsAg. Only 1(0.5%) was positive for HCV while 2(1.0%) were positive for VDRL. The prevalence of TTIs was higher in females 6(3.0%) than in males 5(2.5%). There was no significant differences in prevalence among genders ( $P > 0.05$ ) [Table 1].

Table 1: Prevalence of TTIs among the study participants in Port Harcourt metropolis

TTIs	Number tested	Seropositive		
		Positive males (%)	Positive females (%)	Total (%)
HIV	200	0 (0)	0 (0)	0 (0)
VDRL	200	0 (0)	2 (1.0)	2 (1)
HBsAg	200	5 (2.5)	3 (1.5)	8 (4)
HCV	200	0 (0)	1 (0.5)	1 (0.5)
Total	200	5 (2.5)	6 (3.0)	11 (5.5)

Of the 11 positive cases of other transfusion transmissible infections 9(81.82%) were in the age group 15 – 25 years and 2(18.18%) were in the age group 26 – 35 years. None in the age groups between 36 and 65 years had any blood transfusion transmissible infections. Also, of the 11 positive

cases, 2(18.18%) had syphilis (VDRL), 8(72.73%) had HBV, and 1(9.09%) had HCV infection. HBV infection was the predominant blood transfusion transmissible infection, followed by syphilis and HCV infection among the blood donors (Table 2).

Table 2: Prevalence of TTIs among the different age groups of study participants in Port Harcourt metropolis

Age groups (Years)	Number tested (%)	Transfusion transmissible infections				
		HIV (%)	VDRL (%)	HBSAg (%)	HCV (%)	Total (%)
15-25	64 (32.0)	0 (0)	2 (3.13)	6 (9.38)	1 (1.56)	9 (14.06)
26-35	86 (43.0)	0 (0)	0 (0)	2 (25.0)	0 (0)	2 (2.38)
36-45	38 (19.0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
46-55	9 (4.5)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
56-65	3 (1.5)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	200	0 (0)	2 (1)	8 (4)	1 (0.5)	11

#### IV. DISCUSSION

In his study, the prevalence of HIV was found to be 0.0% which means that none of the blood donors had antibodies to human immunodeficiency virus detected by the testing method used. A similar study by Tiwari *et al.* (2008) reported 0.084% and 0.054% prevalence of HIV among voluntary non-remunerated blood donors using rapid test kits. This shows that the blood donors in the present study area were safe. But a contrary report by Dada *et al.*, (2015) reveals that some of the apparently healthy blood donors in their study, were seropositive for HIV. For VDRL, the prevalence was found to be 1% in the present study, which compares favourably with another study (Ahmad *et al.*, 2019).

A total of 4.0% were positive for HBsAg. Prevalence of HBV among blood donors differs. Another study carried out in South Eastern Nigeria shows that among healthy blood donors, 2.7% were seropositive of HBsAg (Dada *et al.*, 2015). The major route of HBV transmission is parenteral and it is most infective among blood-borne viruses in chronic carrier state and is associated with chronic liver disease, cirrhosis and Hepatocellular carcinoma.

For Hepatitis C, the observed prevalence in this study was 0.5%. This agrees with an earlier observation by Narayanasamy *et al.* (2015) which reported a similar prevalence of HCV in their study in India. Transmission of HCV is primarily through blood exposure and majority of the infected persons progress to chronic and chance of cirrhosis and hepatocellular carcinoma is more as compared to HBV. This study has once more reaffirmed that blood is one of the main sources of transmission of HBV, HCV and VD, therefore donor selection is of paramount importance (Houghton, 2009).

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