

**SEROPREVALENCE OF HEPATITIS B VIRUS HBSAG, HUMAN IMMUNODEFICIENCY VIRUS AND TREPONEMA PALIDIUM AMONG BLOOD DONORS IN A TRANSFUSION CENTER IN THE NIGER DELTA REGION OF NIGERIA****Abah A.<sup>1</sup>, Ayodele M.B.O.<sup>2</sup>, Aaron U. U.\*<sup>2</sup> and Chinda D.<sup>3</sup>**<sup>1</sup>Department of Animal and Environmental Biology, University of Port Harcourt.<sup>2</sup>Department of Medical Microbiology and Parasitology, University of Port Harcourt.<sup>3</sup>Department of Microbiology Technology, University of Port Harcourt.**\*Corresponding Author: Dr. Aaron U. U.**

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**ABSTRACT**

Hepatitis B virus (HBV), Syphilis and Human Immunodeficiency Virus are important pathogens associated with blood. Blood transfusion is an important therapy during life threatening conditions. However, this practice is not without risks. This study was intended to assess the prevalence of Syphilis, Hepatitis B virus (HBsAg) and HIV infections among voluntary blood donors attending a specialist hospital in the Niger Delta of Nigeria. Blood samples were obtained from 300 intending blood donors between the ages of 18-50 years and screened. The result showed that syphilis, Hepatitis B virus and HIV recorded a sero-prevalence of 1%, 2%, and 8.7% respectively, with the highest prevalence observed among age group 38-47 years, - Syphilis(1%), Hepatitis B virus (0.7%) and HIV (5.7%). Nevertheless, male subjects showed a sero-prevalence of 1.3%, 0.3% and 4% for syphilis, Hepatitis B virus infections respectively. While the female subjects had 0.7%, 0.7% and 4.7% respectively. Therefore, this study showed a high sero-prevalence of blood transmissible infections among blood donors. As such, there should be adequate public enlightenment on the modes of transmission and prevention of these diseases in the society.

**KEYWORDS:** *Blood, Transmissible Infections, HIV, Syphilis, Hepatitis B Virus, Prevalence.***INTRODUCTION**

Prompt, accurate and precise diagnosis of infections is an important strategy for the control and prevention of blood transmissible infections. This is because blood as a tissue can be the medium through which a number of viruses, bacteria, parasites and fungi are transmitted from one person to another (Alter, 2006). This is more worrisome bearing in mind that, blood transfusion is today a globally accepted medical practice recommended as a therapy in a number of clinical interventions aimed at saving lives (Aora *et al.*, 2010). For this singular fact, the World Health Organization recommended screening of all blood donors for infection should be a mandatory practice before donation and prior to transfusion (WHO, 2010).

In sub-Saharan Africa, there is a high level of occurrence of blood demanding health conditions in many parts of sub-Saharan Africa. In Nigeria the increase in road accidents, pregnancy-related hemorrhage, armed robbery attacks, and violent events like militancy, cultism and separatist agitations, increases the possibility of the transmission of HBV, HIV and other blood-borne pathogens, through contaminated blood as reported by United Nations System in Nigeria (UNSN 2001). Nigeria

is classified among the group of countries highly endemic for HBV and HIV infection in sub-Saharan Africa. About 75% of the Nigerian population is reportedly likely to have been exposed to HBV (Sirisena *et al.* 2002) at one time or the other in their life (Sirisena *et al.* 2002). There is likewise a high incidence of HIV infection in the Niger delta region of Nigeria (Aaron *et al.*, 2017).

Hepatitis B virus is a major risk in blood transmission and can lead to chronic liver disease (Schreiber *et al.*, 1996). Evaluation of an individual for hepatitis B virus often involves screening for serum HBsAg, antibody to HBsAg and IgM anti-HBc (antibody to hepatitis B core antigen (Frank-Peterside and Ayodele, 2016). Although, most blood donor centers perform the screening for HBsAg, detection of IgM anti-HBc in serum, will be very helpful in the diagnosis of hepatitis B virus infection during the window period and can also be useful in the detection of rare Hepatitis B virus mutants with altered HBsAg epitopes (Frank-peterside and Ayodele, 2016: Ayodele *et al.*, 2016: Arora *et al.*, 2010). Therefore, its usage in blood donor screening is highly recommended.

Nevertheless, since the beginning of this century, Human Immunodeficiency Virus (HIV) infection had been one of the most significant global epidemics (Aaron *et al.*, 2010). This infection is more intriguing because of the existence of a high genetic diversity in the causative HIV species. This enables the virus to evolve under in-vivo selective pressures and cause rapid development of immunological escape mutants and drug resistant mutants (Mayer and Busch, 1994). The knowledge of HIV subtypes is importantly critical in blood transfusion safety as it determines the capacity of screening tests available to determine antibodies to the array of serotypes present among the donor population (Frank-Peterside and Ayodele, 2016).

Similarly, *Treponema pallidum* as a pathogen causing syphilis is a minor hazard in modern blood transfusion because of its consistently low prevalence in recent times (Matee *et al.*, 2006). The rapid plasma regain (RPR) test is commonly used for the screening of the blood and blood products for Syphilis (Lathamani *et al.*, 2013). Currently, syphilis testing requires that an initial screening test be done with a non-treponemal assay and confirmed with a treponemal assay. But in practice and as observed from other studies (Lathamani *et al.*, 2013; Matee *et al.*, 2006; Uneke *et al.*, 2005; Muktar *et al.*, 2005; Butashirili, 2001), a single treponemal or non-treponemal assay test is used.

Furthermore, varying data exists for hepatitis B virus, HIV and Syphilis infections among blood donors all over the world. However, these sero-prevalence fall between 0.6-26% for Hepatitis B virus, 0.084-11.7% for HIV infection and 0.95-4.7% for Syphilis infection (Dessie *et al.*, 2007; Matee *et al.*, 2006; Uneke *et al.*, 2005; Muktar *et al.*, 2005; Butashirili, 2001). Whereas, in Nigeria, the prevalence had been between 1.3-1.49% for Hepatitis B virus infection, 1.1-5.8% for HIV infection and 0.1-3.6% for syphilis infection (Uneke *et al.*, 2005; Egah *et al.*, 2004; Muktar *et al.*, 2005).

## MATERIALS AND METHODS

### Study Area

This study involves 300 subjects that were intending to donate blood at the Diète Koki memorial hospital, Opolo, Yenagwa. This is a Niger Delta community situated at the heart of the capital of Bayelsa state, south-south of Nigeria. The hospital is located 4°55'29''N and 6°15'51''E. The people of this area are known for their fishing and farming prowess.

### Inclusion Criteria

Persons who are between the ages 18-50 years, weighing  $\geq 50$ kg and with packed cell volume  $\geq 30\%$  were allowed to be part of this study.

### Exclusion Criteria

Persons below 18 years or weighing less than 50Kg or having a packed cell volume below 30% or a female

menstruating or breast feeding were excluded from this study.

### Consent

All subjects were properly educated on the procedures to be undertaken and either oral or written consent was obtained before blood collection.

### Ethical Approval

Ethical approval was obtained from the ethical committee of the University of Port Harcourt and the Diète Koki memorial Hospital, Yenagwa, before the commencement of this study.

### Sample Collection

The blood samples of all consented subjects that met the inclusion criteria were obtained aseptically into plain sterile containers and centrifuged at 1500rpm for 5 minutes. The sera were then used for the screening. The Determinee HIV 1/2 (Alere Medical Co. Ltd, Chiba, Japan). Was used for HIV screening while Abon Biopharm Co. Ltd HBsAg kit was used for hepatitis B virus screening and Syphilis kit (Abon Biopharm Co. Ltd) were used for *Treponema pallidum* screening. Two drops of sera were placed on the test pad of each test kit (Determinee HIV 1&2, Abon Biopharm Co. Ltd HBsAg kit and Syphilis kit-Abon Biopharm Co. Ltd) and samples were allowed to flow through to the result pad area by capillary action. The result was read after 5 minutes. A positive test was indicated by the appearance of control and test bands. Nevertheless, the result is considered negative, when only one line was observed at the control band whereas the result is considered as invalid if the test band line appeared without the corresponding lines on the test and control band areas.

### Statistical Analysis

All data generated from this study were entered into the Microsoft Excel spreadsheet and analyzed using tables, charts and figures.

## RESULTS

A total of 300 consented blood donors who met our study criteria were screened. About 57.7% of the study population was males and 42.3% were females with majority of them being between the age group 28-36 years. The result showed that 1% of the study population was sero-positive for Syphilis, 2% for Hepatitis B virus (HBsAg) and 8.7% for HIV infection. Also, male subjects showed 1.3% prevalence for Syphilis, 0.3% prevalence for Hepatitis and 4% prevalence for HIV infections. Similarly, among the female subjects, 0.7% test positive to syphilis infection while 0.7% and 4.7% were positive for Hepatitis B virus (HBsAg) infection respectively. Age group distribution of the infection showed that the highest sero-prevalence for Syphilis was 1%, Hepatitis B virus (HBsAg) was 0.7% and HIV was 5.7%. Nevertheless, co-infection of these blood transmissible infections was also observed above the studied population. The prevalence of HIV and

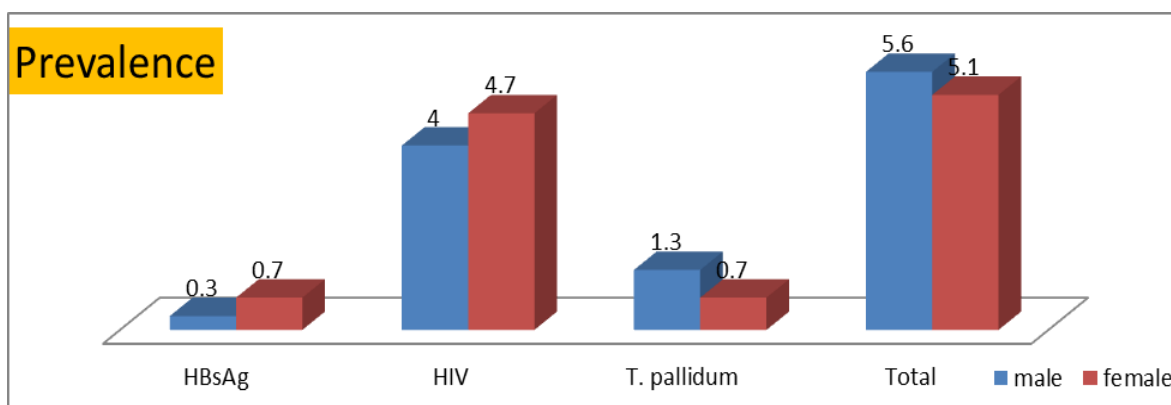
*Treponema pallidum* co-infection of (HIV and Syphilis) in this study was 0.3% while 0% while 0% co-infection prevalence was observed for HBsAg and Syphilis co-infections.

**DISCUSSION**

This study recorded an overall study prevalence of 2% for Hepatitis B infection among the donor population studied. This was not higher than the 7% high endemicity criteria outlined by Hodges *et al.*, (1998) and lower than some results gotten from studies in other parts of Nigeria like the one reported by Uneke *et al.*, (2005), which examined 175 donors visiting the University of Jos teaching Hospital, Jos and obtained an HBV prevalence of 25.9%. Also, it was lower than the range Ekpo *et al.*, (1995), estimated as the prevalence of HBV among blood donors in Nigeria as being between 7.6%-26%. This study showed a very low HBV incidence

compared with that of Ekpo *et al.*, (1995), Julius *et al.*, (2005) and Frank-Peterside and Ayodele, 2016, and Ayodele *et al.*, (2016).

Similarly, the study revealed a very low male HBV prevalence of 0.3%. This was however not comparable with the 10.79% reported by Julius *et al.*, (2012). Whereas, the female HBV prevalence from this study (0.7%) was higher than that of males (0.3%). This did not agree with the findings of Uneke *et al.*, (2005) and Julius *et al.*, (2012) which reported more male HBV prevalence among blood donors. This could be closely associated with the cultural freedom existing among male and females in this clime, as male and female folks engage in multiple sexual partnerships with married and unmarried folks. This position was proposed by Aaron *et al.*, (2017) as a major mode of transmission of sexually transmitted infections in Orashi, Niger Delta, Nigeria.



**Fig. 1: Sex Distribution of Hepatitis B, *T. pallidum* and HIV Prevalence among Blood Donors.**

Also, findings from this study showed that, there were more voluntary male (57.7%) donors than females (42.3%) with a female to male donor ratio of 1:1.4. This was in conformity with the reports of Mast *et al.*, (2006), Julius *et al.*, (2012) and Uneke *et al.*, (2005). This trend of gender distribution of voluntary blood donation may not be unconnected with the cultural/traditional disposition of the African society where males are clothed with the sole responsibility of taking critical family decisions and care for their family members. Also, males in this part of the globe are more

adventurous and proactive in risk taking to save lives than their female counterparts who look-up to the males for virtually all critical life risky decisions. Additionally, this trend could be as a result of the disparity in educational awareness among the two gender, as parents prefer to train male children than females who will marry and bear their husband's names. Also, females in this part of Nigeria are prone to early sexual exposures leading to early pregnancies and subsequently, early child nursing and school drop out for family responsibilities.

**Table 1: Age Distribution of HbsAg, HIV and *T. pallidum* Among Voluntary Blood Donors.**

Age (years)	Sample Size (%)	Number of Positive Test (Percentage Prevalence %)			
		Hepatitis B Virus HbsAg (%)	Treponema pallidum (Syphilis) (%)	Human Immunodeficiency Virus (HIV) (%)	Group Total (%)
18-27	61(20.3)	0(0)	2(0.7)	5(1.7)	7(11.5)
28-37	183(61)	2(0.7)	3(1)	17(5.7)	22(12)
38-47	49(16.4)	1(0.3)	1(0.3)	4(1.3)	6(12.2)
48-57	7(2.3)	0(0)	0(0)	0(0)	0(0)
Total	300(100)	3(1)	6(2)	26(8.7)	35(11.7)

Nevertheless, the prevalence of infected persons unqualified to be recruited as blood donors among the studied population was highest (12.2%) among subject

within age group 38-47years. This was slightly comparable with the findings of Uneke *et al.*, (2005), Frank-Peterside and Ayodele (2016), and Bello *et al.*,

(2011). Also, in this present studied, the highest HBV prevalence (0.7%) among people of age group 28-37 years when compared to the age group prevalence of other studies showed the closest being the report of Uneke *et al.*, (2005). This study indicated that there was

observable linkage in the percentage prevalence between age group 31-40 years (highest prevalent age group) and 21-30 years following as against this present study with 38-47years (highest prevalent age group) and 28-37years following.

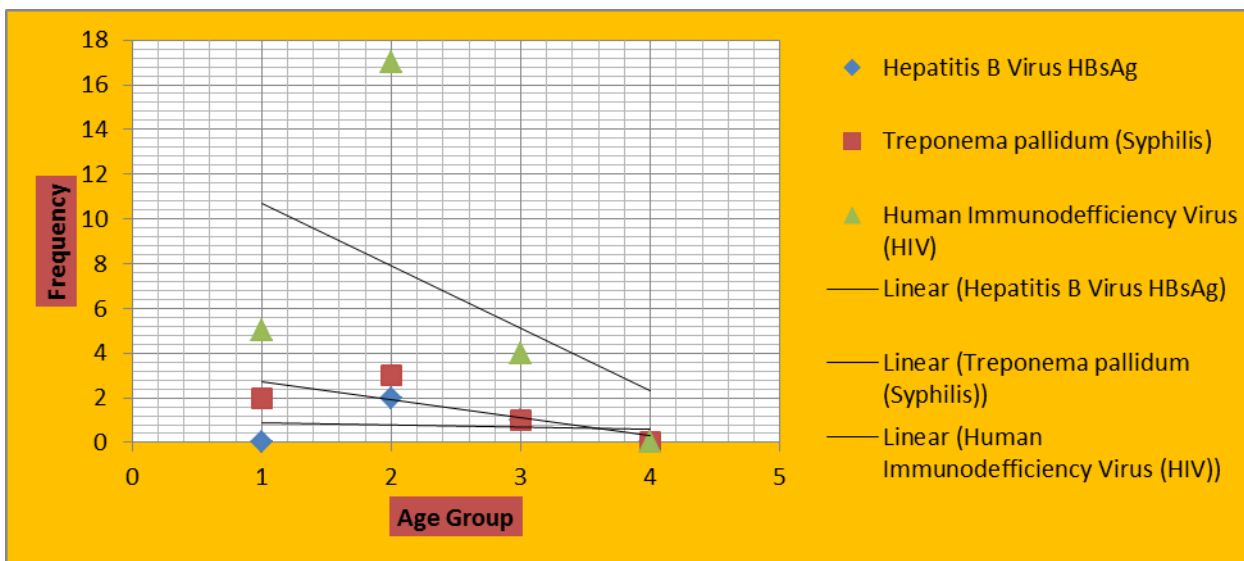


Fig. 2: Age Group Relationships among the Different Blood Transmissible Infections.

This could also be related to the submissions of Aaron *et al.*, (2017) which linked HIV infection incidence to promiscuity mostly among married folks within these age brackets. Furthermore, the published report of Frank-Peterside and Ayodele (2016) as well as that of Bello *et al.*, (2011), slightly agreed with the observations of this study with their highest age group observed among subjects within the age bracket of 30-40 years and followed by age group 21-30 years.

Moreover, HIV among blood donors was more prevalent among female subjects (4.7%) than males (4.0%). This however, agreed with the gender prevalence of HIV observed from the publish report of Frank-Peterside and Ayodele (2016) (4.7%). Nevertheless, this study age distribution of HIV among blood donors still followed the same trend as that of hepatitis B (HBsAg) infection with the highest prevalence falling within the age bracket 28-47 years. But of the contrary the age distribution of HIV among this study group showed the highest prevalence among age group 28-37 years followed by age group 38-47 years as against that of hepatitis B (HBsAg) as outline in Table 1 above. This HIV age distribution findings, still conforms to the linkage of Aaron *et al.*, (2017).

Note worthy, is the fact that, there has been low incidence of *Treponema pallidum* in recent times. This has prompted most blood donor screening centers to neglect its presence in their routine donor screening test catalogue simply because *Treponema pallidum* as a pathogen causing syphilis, is a minor hazard in modern blood transfusion because of its consistently low prevalence in today world (Matee *et al.*, 2006). However,

this study showed that this trend could be undermining the effect of the disease transmission an effect to the general public health of populace. In the same vein, the age distribution of *T. pallidum* followed the same trend as observed for Hepatitis infection and HIV infection in this study with the highest prevalence of *T. pallidum* observed among age group 28-37 years and followed by age group 18-27 years and 38-47 years. These findings indicate the high risk group to be youths within the age bracket of 18-47 years, which harbors the most productive labor force of any population and the transition labor force (the future of any nation). Thus, calls for critical appraisal and review of current policy and public / health practices on syphilis as an infection.

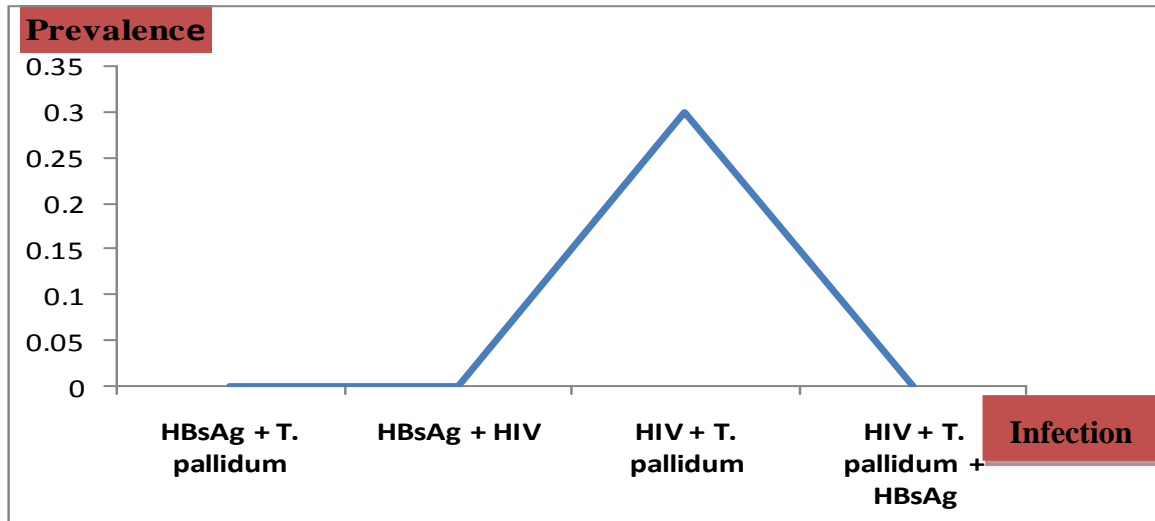


Fig. 3: Prevalence of Co-infection of HIV, Hepatitis B virus and *T. pallidum* among Voluntary Blood Donors.

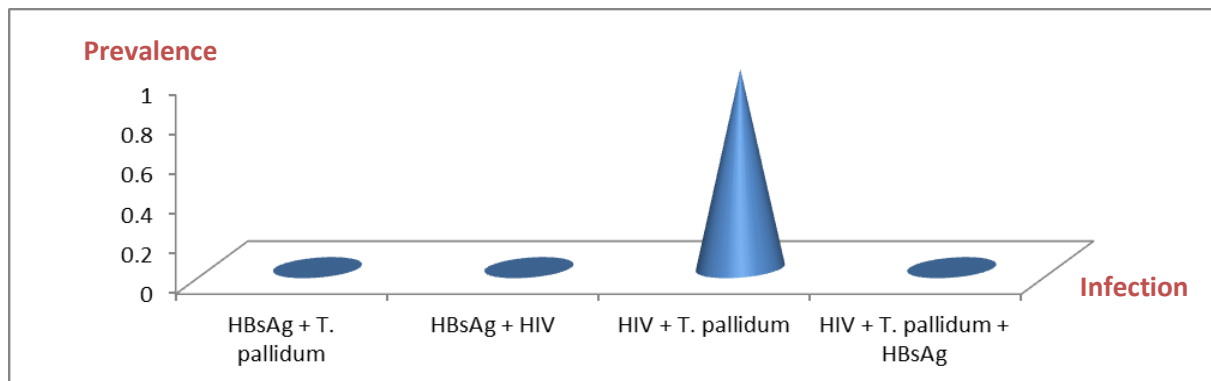


Fig. 4: Frequency Distribution of Co-infection of HIV, Hepatitis B Virus and *T. pallidum* among Voluntary Blood Donors.

Also, co-infection between hepatitis B (HBsAg) and *Treponema pallidum* among the studied population was none existent but HIV and syphilis co-infection was 0.3%. This showed that syphilis infection although neglected, was still an important sexually transmitted infection among HIV positive subjects. Therefore, it requires renewed vigor for the detection, control and prevention of the pathogen, *Treponema pallidum*, in order to curtail the public health impact on the general population. Also, this result finding, buttressed the fact that the World health organization recommendation on blood donor should be strictly adhered to in all instances and cases to include syphilis, hepatitis B and C and HIV. It is by this practice according to Arora *et al.*, (2010), that transfusion transmissible infections can be prevented.

#### CONCLUSION

This present study had demonstrated the existence of a demonstrated the existence of HBsAg, *Treponema pallidum* and HIV among voluntary donors in Diете Koki memorial hospital, in the Niger Delta region, a geopolitical region of the Nigeria. Also, it showed the presence of HIV, *Treponema pallidum*. Similarly, there was observed a higher prevalence of female infection

with HIV as well as HBsAg but was contrary for *Treponema pallidum*. Nevertheless, this study showed that, the highest risk of infection among the studied population was between the age group 38-47 years and thus it is imperative for all stake holders in the health sector to insist on adherence on the WHO guidelines for blood donor screening. Proper and the right information about transmission, prevention and control of blood transmissible infections. Efforts of government and non-governmental organizations should be directed towards encouraging research and surveillance on these infectious diseases.

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#### Conflict of Interest

The researchers have declared no conflict of interest in this study.

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