



## Prevalence of Viral Infections and Syphilis among newly-admitted Students in a Nigerian Tertiary Institution

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**Abstract:** A major public health challenge that Nigeria faces as a country is the scourge of infectious diseases. Screening for infectious diseases help to detect and identify suspected cases who could be potential source of infections and possible challenge to the public. The emergence of HIV brought an additional pressure on the health sector as a result of increased occurrence of many infections. Among such infections are Hepatitis B virus (HBV), and syphilis which are recognised co-factors for increased risk of HIV transmission and acquisition. The study aimed at determining the prevalence of HBV, HIV and syphilis infections among newly admitted students of the University of Port Harcourt. A total of 500 blood samples were screened for the presence of HBsAG and HIV but 315 for syphilis antibodies using different types of Rapid Diagnostic Test kits. Study participants were made up of 229 (45.8%) males and 271 (54.2%) females in the age range of 15->29 years. Age group 15-19 had the highest frequency of 265 (53%) while the lowest frequency was in the >29 years group with 7 (1.4%). Obtained prevalence of HBsAG was 7 (1.4%), HIV 3 (0.6%), and syphilis 5 (1.6%). Highest number of viral infections was found in 20-24 age group: (HIV 3/3 (100%) and HBV 6/7 (85.7%). Syphilis infection was found only among the males while the viral infections were found more in the females. Even though study suggests a low prevalence of these infections, there is need for increased awareness of safe sex practices since sexual route is the commonest route of transmission, also need for adequate treatment for positive cases to prevent the spread to the general university population. Voluntary screening for these infections as well as inclusion of vaccination against HBV as part of the medical exercise for registration in the university is advocated.

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**Key words:** HIV, HBV, syphilis, prevalence, infection, screening, seropositive.

### 1. Introduction

One of the major challenges facing the public health sector in Nigeria is the scourge of infectious diseases. The fight against infectious agents entails screening for the diseases which is aimed at detecting and identifying suspected cases who could be potential source of spreading the infections to the general public. Prevalence studies in various cohorts of population therefore serve as tools to provide needed information on the diseases of interest. Infections of primary interest in a cohort comprising mostly of young persons as evidenced in a University community are those that are mostly transmitted sexually because half of all new sexually transmitted diseases are acquired by young people aged between 15-24 years (Satterwhite et al, 2008).

Hepatitis B infection is a potentially life-threatening liver infection caused by hepatitis B virus (HBV) and transmitted by contact with semen, infected blood and other body fluids. The infection can

lead to chronic disease in millions of people and it is among the most common causes of liver cirrhosis, cancers and other cancers including non-Hodgkin lymphoma, prostate and renal cancers (WHO, 2016). An estimated 370 million chronic cases have been reported globally with 65 million cases residing in sub-Saharan Africa (Hwang and Cheung, 2011). A 10% prevalence have been reported in Nigeria with a gradual decline over the past 13 years (Nna et al, 2014). However, in specific sub-group studies, a range of 0.5% - 46.8% prevalence with a pooled prevalence estimate of 13.6% was reported by Musa et al, (2015). The highest prevalence was found among pregnant women while geographical distribution showed a higher prevalence in Northern than Southern Nigerians. The prevalence obtained among students in higher institution in North West Nigeria was 9.2% with male students having a higher rate than their female counterparts (Isah et al, 2015).

The introduction of antiretroviral drugs changed the management of HIV with a consequent reduction in transmission. HIV is spread mainly through sexual contact and reports from National AIDS and STIs control shows heterosexual transmission accounts for the majority of HIV transmission (FMOH, 2016). HIV was first reported in Nigeria in 1986, consequently the number of people living with HIV/AIDS steadily increased and the epidemic became established (Nasdi and Harry et al, 2006). The National Agency for the control of AIDS reports a current prevalence of 1.4% among adults aged 15-49 years showing a decline from 4.1% of previous reports (NGARPR, 2015; NACA, 2019; Awofala, 2016). Despite the decline, HIV still remains a public health challenge in Nigeria and the rest of sub-Saharan Africa.

Syphilis is a systemic disease caused by *Treponema pallidum*, subspecies *pallidum* (T. pallidum). It is classified either as acquired or congenital based on the mode of transmission. Acquired syphilis is transmitted either through sexual contact including oral and anal or through blood transfusion while congenital syphilis is transmitted from mother to child (Janier et al, 2014). Syphilis has been an age-long disease with a decrease in incidence/prevalence in the 1940s due to the availability of penicillins. This decrease has however had a turn around to increasing prevalence usually in combination with HIV (Creek et al, 2015). Syphilis infection is a recognized cofactor for increased risk of HIV transmission and acquisition (WHO, 2012).

Epidemiology studies show estimates of 6 million new cases globally in population between 15-49 years (WHO, 2015). African studies report prevalence rates of 2.2% and 1.9% among pregnant women attending antenatal clinic in Nigeria and Ethiopia respectively (Taiwo et al, 2007, Yibarek and Ayele, 2019). However, a higher rate of 6.5% was reported among patients attending General hospital in Calabar Nigeria (Edem et al, 2013).

The study aimed at determining the prevalence of HIV, Hepatitis B and Syphilis infections among the newly admitted undergraduate students of the University of Port Harcourt for the 2016/2017 academic session.

## 2. Materials and methods

The study carried out between (March-April, 2017), was a prospective study with population consisting of newly admitted undergraduate students, (age range 16-29 years) of the new session (2016/2017) of the University of Port Harcourt, Choba, Rivers, State Nigeria. As part of the admission exercise into the University, the newly admitted undergraduate students are usually screened for common infections to ascertain their health status

before registration in the University Health Centre. The University Health Centre (Lulu Briggs Health Centre), provides healthcare for the students of the University usually at the level of primary health care under the Tertiary Institution Students Health Insurance Scheme (TISHIP). In collaboration with the staff of the Health Centre, the research was carried out to determine the prevalence of Hepatitis B virus, HIV and syphilis infections. Approval of the study was obtained from the Management of the Health Centre prior to starting the study.

Seven thousand (7000) students were admitted into the University for the 2016/2017 session. The calculated sample size for the study based on the admitted students was 364 and this served as the minimum number of students to be tested for the presence of the infections of interest. Participants were recruited if they met the following criteria: must be newly admitted into the undergraduate programme, willingness to participate in the study.

Blood samples of 500 students were collected and retained in labelled blood sample bottles and appropriate tests were carried for HIV, HBV and syphilis infections were carried out respectively.

Appropriate tests for the detection of hepatitis B surface antigen (HBsAg) were conducted using commercially available rapid diagnostic test kit (HBSAG Rapid Test Strip Serum/plasma IHBSG-S31, Hangzhou Biotest Biotech Co. Ltd, Hangzhou China) which involves the use of serum HBsAg test strips to determine the presence of HBV infection. The HBsAg device is a qualitative lateral flow immunoassay for the detection of HBsAg in serum or plasma. Briefly described, collected blood samples were allowed to clot and retract after which serum was carefully obtained and separated from the whole blood for HBsAg assay. Both the test device and the serum specimen were allowed to equilibrate at room temperature (15-30°C) prior to testing. 60 µl of the sample was added to the specimen well of the test device and allowed to stand for 15-30 minutes as extended period of time may give a weak indication of the result (Blumberg, 1977). Samples were confirmed positive if they meet the requirements indicated by the manufacturer.

The rapid diagnostic tests method was used in detecting antibodies for HIV antigens in blood samples. Blood samples were screened for antibodies to HIV-1 and 2 using two enzyme-linked immunosorbent assay (ELISA) rapid screening kits, (Determine HIV 1/2, Alere Medical Co., Ltd., Matshuhidai-Matsudo-shi, Chiba, 270-2214, Japan) based on WHO systems for detecting antibodies to HIV-1 and 2. Non-reactive specimens were reported as negative. All reactive specimens were confirmed positive using HIV-1/2 STAT-PAK® test kits and

reported as positive. However for the samples that were negative with STAT-PAK® test kits, a repeat test with DETERMINE® test kits was done. The DETERMINE® test kits Rapid diagnostic test kits for HIV is a visual read, qualitative immunoassay which involves immunofiltration (flow-through test) and immuno-chromatographic (lateral flow test) that detect presence of HIV antibodies. Briefly described, collected blood samples were allowed to settle in order to extract the serum. The serum was added to the test device using a test dropper. A reactive result is indicated by the appearance of a red coloured line in the test region and the control region. The control region is used to indicate both successful addition of specimen. The assay can be performed in less than five minutes. The results were read visually.

Out of the 500 recruited for the study, we were not able to collect samples of 185 persons, therefore only 315 samples were tested for the presence of syphilis infection. Rapid diagnostic kits (Syphilis Rapid Test Strip (WB/Serum/Plasma, Hangzhou

Biotest Biotech Co. Ltd, Hangzhou China) were used for the detection of samples positive for syphilis infection. The test is a rapid, qualitative test for the detection of antibodies (IgG and IgM) to *Treponema Pallidum* in whole blood, serum and plasma. Results were interpreted positive with the appearance of two lines according to manufacturer's instruction.

Data entry and analysis was carried out by descriptive statistics using Statistical Package for Social Sciences (SPSS) version 21 (IBM corporation). Results were presented in the form of frequencies, table and figures.

### 3. Results

A total of 500 students (229 males and 271 females) were involved in the study, age range 16-30 with the highest range being 16-19 years (53%) (Table 1). Out of the 500 students, 485 (97.0%) were single, 5 (1.0%) were married while 10 (2.0%) had unknown marital status (Table 1).

**Table 1. Marital status**

S/N	Demographic Characteristics	Number (Percentage)
1	Sex Male	229 (45.8%)
	Female	271 (54.2%)
2	Age 15-19 years	265 (53%)
	20-24 years	206 (41.2%)
	25-29 years	22 (4.4%)
	>29 years	7 (1.4%)
3	Marital Status Single	485 (97%)
	Married	5 (1.0%)
	Unknown	10 (2%)

Result analysis shows prevalence of the various infections as follows: syphilis (N=315:1.6%), HIV (N=500: 0.6%) and HBV (N=500: 1.4%). Table 2 shows the prevalence distribution according to sex with females having a higher prevalence in the viral infections (HIV and HBV) than the males. However there was no female positive in the syphilis result. Also among all the positive samples, there was no mixed infection since none of the samples tested positive for mixed infection.

All the positive samples for syphilis were within the age range of 15->29 years. Age specific prevalence for the various infections showed that all (100%) of the three HIV-positive samples and 85.7% (6/7) of all the HBV-positive were all in the age range of 20-24, the remaining one (1) 14.3% was within the 25-29 age range. There was no positive samples for the age range 15-19 and ages >29 years. The age specific result for the syphilis could not be determined.

**Table 2. Prevalence of the infections according to sex**

	SYPHILLIS	HIV	HBV
MALE	5/165 (3.0%)	1/229 (0.4%)	3/229 (1.3%)
FEMALE	0/150 (0)	2/271 (0.7%)	4/271 (1.5%)
TOTAL PREVALENCE	5/315 (1.6%)	3/500 (0.6%)	7/500 (1.4%)

#### 4. Discussion

The University is a Community which consists primarily of young people who are sexually active. The infections screened in the present study are primarily transmitted through sexual intercourse. The results of this study have presented the prevalence of the three infections (syphilis 1.6%, hepatitis B 1.4% and HIV 0.6%) among newly admitted students in the University of Port Harcourt.

The prevalence rate of 1.4% (7/500) for HBV obtained from the population tested is relatively low when compared with previous studies in Nigeria (Musa et al, 2015) and at variance with other studies among such population. Ekuma et al, (2014) established a prevalence of 16.7% (50 out of 300) newly admitted students of University of Jos, while Isa et al, 2015 obtained 9.2% among students in a tertiary institution in Northern Nigeria. The disparity may be attributed to low prevalence of HBV in the study area and also absence of co-infection. This could be inferred from the results of 4.6% obtained among HIV-positive persons in Port Harcourt (Frank-Peterside and Martins, 2016), a population group that have been reported to have higher rates of infection as well as higher incidence of morbidity and mortality (Collins et al, 1999).

Figures obtained from present study fall within the low prevalence rate as defined by the World Health Organization (WHO, 2010). The lower result could be because a greater percentage of the students were between the age 16-19 and also possibly that they are more informed about the disease compared to those screened in the Northern part of the country as obtained in the two studies in Northern Nigeria.

The result of 0.6% prevalence in HIV infection obtained from the study is in consonance with the declining rate of HIV prevalence in the country as evidenced by the current prevalence of 1.4% for adults aged 15-49 years (UNAIDS, 2019) compared to earlier reports of 4.1% and 3.1% reported among unemployed youths in Port Harcourt (NGARPR, 2015, Ejele et al, 2005). The UNAIDS report established that women are twice more likely to be living with HIV than their male counterparts (1.9% versus 0.9%) and that this difference was seen more in females in age bracket 20-24 years being more than three times likely to be living with HIV when compared to young men in the same age group. Even though the present study has a lower population compared to National studies, the result obtained is still in consonance with the earlier studies of women having higher prevalence rates than their male counterparts. Studies have shown that young women are infected earlier in life and also have higher prevalence rate than men of the same age range (NACA, 2015). Inequalities both culturally and

economically on the part of women render them to increased vulnerability to HIV infection (Wathula, 2016; UNAIDS, 2019) in addition to lack of knowledge and appropriate sexual reproductive health services (NBS and UNICEF, 2017).

The study has demonstrated that syphilis, an age-long sexually transmitted infection is still prevalent in Nigeria. Most of the earlier studies on syphilis were carried out among pregnant women attending antenatal clinic and demonstrated various values ranging from 0.13% to 3% all in south western Nigeria (Olubukola and Adesina, 2010, Nwabuisi and Aboyeji, 2003, Olowe et al, 2014). This study however was carried out among students in the University comprising mostly young people who are usually sexually active and STIs are very common among this population (Satterwhite et al, 2008). The 1.58% value obtained in the present study is not very far from the values obtained among the pregnant women in the above quoted studies. The association of syphilis with increased risk of HIV infection, has caused a potential for increased morbidity and mortality (Olokoba et al, 2008). This study however did not record any mixed infection.

The overall higher prevalence seen among the 20-24 years age range group of persons may be attributed to high sexually activity among this age range as the studied infections are primarily transmitted through sexual contact. The age range of 15-19 constituted the highest group in the study participants and possibly accounts for the absence of any positive sample for the infections since this group of persons may not be as sexually active as the older age groups.

#### 5. Conclusion

The prevalence of the three types of infections among newly admitted University of Port Harcourt students has been established as follows: syphilis (1.6%), HIV (0.6%) and HBV (1.4%). The study also revealed that age group of 20-24 years were found to be more likely to harbour the infections. Since transmission routes of the infections are mainly through the sexual route, the importance of safe sex practices should be emphasized among this population. The need for continuous awareness and voluntary screening for the diseases among these group of persons is very imperative. Additionally, vaccinations against HBV should be made available to the students as part of the medical registration requirement exercise.

#### Limitations

We were not able to establish age-specific prevalence for syphilis.



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