

Detection of HIV-1 and -2 Antibodies Among Freshmen of the University of Port Harcourt, Port Harcourt, Southern Nigeria

C. Mbakwem-Aniebo, C.C. Ezekoye and I.O. Okonko

Department of Microbiology, University of Port Harcourt, East-West Road,
P.M.B. 5323, Choba, Port Harcourt, Rivers State, Nigeria

Abstract: This study was carried out to determine the prevalence of HIV-1 and -2 among freshmen of University of Port Harcourt, in Port Harcourt, Southern Nigeria. Seven hundred and six new students (347 males and 359 females) were recruited for this study from January to March 2010. Samples of blood were collected, transported, stored and processed using standard laboratory procedures. All the patients were screened for the presence of antibodies to HIV-1 and -2 using 2 enzyme-linked immunosorbent assay (ELISA) rapid screening kits, based on WHO systems-2 for detecting antibodies to HIV-1 and 2. The diagnosis of HIV infection was further confirmed by Western blot. The results showed that there were 347 (62.5%) males and 359 (37.5%) females, their age ranging from 16 to 25 years. The male:female ratio was 1:1. Of the 706 fresh students who were enrolled into the study, 6(0.9%) were positive for HIV-1 and -2 antibodies. It showed that students 16 years of age and above had higher infection rate for HIV (15.5%, n=16). Statistically, there is no significant difference in the distribution of infections with respect to age ($P>0.05$). Antibodies to HIV-1 and-2 was detected in the same proportion among males and females (4.0%, n=3) and no significant difference in the distribution of HIV infections by gender ($P>0.05$) was observed. The results of this study have highlighted the fact that HIV infection is common among freshmen of Uniport, Port Harcourt, an urban area of Rivers State. The presence of HIV-1 and-2 antibodies in freshmen, of Uniport calls for a concerted effort to implement a clear-cut plan to establish the necessary infrastructure and resources to control the HIV infection among students.

Key words: Blood • ELISA • Freshmen • HIV • Uniport • Nigeria

INTRODUCTION

Acquired immunodeficiency syndrome (AIDS) is one of the most important public health problems worldwide at the start of the 21st century [1]. It is caused by Human immunodeficiency virus (HIV), an enveloped human retrovirus found in the Lentivirus family and was discovered in the early 1980s [2]. The distribution of the virus is global but the incidence rate in the past few years appears to have gone down. Two strains of this virus have been identified; HIV-1 and HIV-2. They elicit the production of different specific antibodies after infection of an intact host [3]. HIV prevalence is the percentage of the population living with HIV infection. UNAIDS estimates that approximately one-half of 1% (0.5%) of the world's population is currently living with HIV infection [4-5].

Different studies to determine the prevalence of HIV among different populations have been carried out. Bordine and Richard [6] reported that out of 1050 military personnel screened for HIV in the United States, only 95 were positive. In another study, in the USA, students in 19 universities were screened for HIV. Of the 16,863 students, only 30 were positive for HIV [7]. In a study by Nwachukwu and Orji [8] (4.79%) out of 167 fresh graduates had HIV infection and all of them do not have any prior information about their HIV statuses. In Nigeria, the HIV prevalence rate among adults ages 15-49 is 3.9 percent. Nigeria has the third-largest number of people living with HIV [9]. In a new HIV Sero-Prevalence Sentinel Survey conducted among the antenatal clinic attendees in Nigeria has shown that the epidemic curve of the pandemic is on the decline in the country with overall 2010 National prevalence put at 4.1 per cent [10-11].

Corresponding Author: Iheanyi O. Okonko, Department of Microbiology, University of Port Harcourt,
East-West Road, P.M.B. 5323, Choba, Port Harcourt, Rivers State, Nigeria.
Tel: +234 803 538 0891.

Chukwu [12] who released the 2010 report in Abuja attributed the decline to the effectiveness of HIV prevention/ intervention strategies adopted in the country. Giving insight into the sentinel survey, Chukwu [12] reported that the results had further confirmed that the HIV and AIDS epidemic in Nigeria remains a public health problem of enormous magnitude that must be given priority attention. According to him, the epidemic has affected all parts of the country with varying degrees of severity [11].

In Rivers State, about 400,000 individuals are living with the dreaded HIV/ AIDS in 2010. The number of persons living with the virus in the state represented 7.4% which was based on a technical report of the 2008 National HIV Sero-prevalence Sentinel Survey carried out among pregnant women attending ante-natal clinics in Nigeria [13]. This study was undertaken to determine the prevalence of HIV among freshmen of Uniport in Port Harcourt, Southern Nigeria.

MATERIALS AND METHODS

Study Area: This study was carried out among freshmen of University of Port Harcourt, Port Harcourt, Southsouthern, Nigeria. Uniport is one of the Federal Universities in Nigeria and it is located at Port-Harcourt, Rivers state, Southern Nigeria. It was established by the Federal Government in 1975. Port Harcourt (Igbo: *Diobu, Iguocha* or *Ugwuocha*; Pidgin: "Po-ta-kot") is the capital of Rivers State, Nigeria [14]. It lies along the Bonny River and is located in the Niger Delta. Coordinates: 4°53'23"N 6°54'18"E and it is located in a city 360 km² (139 sq mi). According to the 2006 Nigerian census Port Harcourt has a population of 1,382,592 [15]. The main city of Port Harcourt is the Port Harcourt city in the Port Harcourt Local Government Area, consisting of the former European quarters now called old Government reservation area (GRA) and New layout areas. The Port Harcourt Urban Area (Port Harcourt metropolis) is made up of the city itself and parts of Obio/Akpor Local Government Area [16]. Port Harcourt City, which the capital of Rivers State, is highly congested as it is the only major city of the state. The Greater Port Harcourt urban area, spans eight local government areas that include Port-Harcourt local government, Okrika, Obio/Akpor, Ikwerre, Oyigbo, Ogu/Bolo, Tai and Eleme local governments respectively. Port Harcourt features a tropical monsoon climate with lengthy and heavy rainy seasons and very short dry seasons. Only the months of December and January truly

qualifies as dry season months in the city. The harmattan, which climatically influences many cities in West Africa, is less pronounced in Port Harcourt. Port Harcourt's heaviest precipitation occurs during September with an average of 370 mm of rain. December on average is the driest month of the year, with an average rainfall of 20 mm. Temperatures throughout the year in the city are relatively constant, showing little variation throughout the course of the year. Average temperatures are typically between 25°C-28°C in the city.

Study Population: This was a cross-sectional sero-analysis to determine the prevalence of HIV infection among freshmen of University of Port-Harcourt. The study was carried out in collaboration with International Foundation for Education and Self-Help (IFESH). The freshmen carrying out their compulsory medical tests were allowed to willingly report at the Laboratory for free retroviral screening. Old students who are interested were tested but excluded from the study, so as to achieve the specific objectives of the study. A total of seven hundred and six (706) freshmen (347 males and 359 females) of different ages and socioeconomic status attending the Department of Health Services, Lulu Briggs Medical Centre, University of Port Harcourt, Port Harcourt, Southern Nigeria were enrolled in this study. The study was conducted from January to March 2010 by recruiting consecutive consenting new students presenting at medical centre until a total of 706 participants was attained. Other relevant information of all participants was obtained using a performa specially designed for this purpose. All study was performed according to the International Guidelines for Human Experimentation in Clinical Research. The age of the freshmen ranged from 16 to 25 years. The female-male ratio was 1:1. The diagnosis of HIV infection was established by standard ELISA test further confirmed by Western blot. Table 1 summarizes the demographic characteristics of freshmen of Uniport, Choba, Port Harcourt, Southern Nigeria used in this study.

Methods: The method of blood sample collection employed was venipuncture technique. The samples of blood were collected into EDTA bottle. The specimens were transported in a commercially available collection and transport system for HIV to the Medical Microbiology and Virology unit, Department of Microbiology, University of Port Harcourt, Port Harcourt, Southsouthern Nigeria for analysis and processed using

Table 1: Demographical characteristics/parameters of Freshmen of Uniport, Choba, Port Harcourt, Southern Nigeria

Parameters	No. Tested (%)
Age Group (years)	
16-25	706(100.0)
Sex	
Males	347(49.2)
Females	359(50.8)
Total	706(100.0)

standard laboratory procedures. All the patients were screened for antibodies to HIV-1 and -2 using 2 enzyme-linked immunosorbent assay (ELISA) rapid screening kits, based on WHO systems-2 for detecting antibodies to HIV-1 and 2. For the detection of the presence of HIV-1 and/or HIV-2 antibodies in the blood samples collected, a World Health Organization (WHO) approved kits called ‘DETERMINE® HIV-1/2 (Abbott laboratories) and HIV-1/2 STAT-PAK® (Chembio Diagnostic Systems, Inc.)’, ELISA based kits, were used. The kits were designed primarily to test for the presence of HIV-1 and/or HIV-2 antibodies in the blood. This ELISA based kit is both sensitive and specific (99-100%).

The diagnosis of HIV infection was further confirmed by Western blot. All tests were carried out according to the manufacturer’s specifications. All data generated was presented in Tables and subjected to statistical analysis (the χ^2 -test, with the level of significance set at $p < 0.05$) using statistical package for social sciences (SPSS) to determine any significant relationship between infection rate, age and gender. The prevalence of HIV was determined from the proportion of positive individuals to the total number of individual under consideration and it is expressed in percentage.

RESULTS

Of the 706 freshmen who were enrolled into the study, 6(0.9%) were positive for HIV-1 and -2 antibodies. There were 347 (49.2%) males and 359 (50.8%) females, their age ranging from 16 to 25 years. The baseline characteristics of the infected freshmen are shown in Table 2 along with values for the age and sex. The age-specific infection rate showed that freshmen 20-25 years of age had higher infection rate of 16 (15.5%) for HIV than those in 16-19 years, who had a total of 14 (14.4%) infection rates for HIV (Table 2). Statistical analysis by chi-square however showed no significant difference in the distribution of infections with respect to age ($P > 0.05$). The gender-specific infection rate showed that males had

Table 2: Risk factors for HIV infections among Freshmen of Uniport, Choba, Port Harcourt, Southern Nigeria from January to March 2010

Parameters	No. Tested (%)	No. Positive for HIV (%)
Age Group (years)		
16-25	706(100.0)	6(0.9)
Sex		
Males	347(49.2)	3(0.9)
Females	359(50.8)	3(0.8)
Total	706(100.0)	6(0.9)

higher infection rate of 3(0.9%) for HIV than their female counterparts (0.8%, n=3). However, there was no significant difference in the distribution of HIV infection and sex of subjects ($P > 0.05$).

DISCUSSION

A total of 706 samples of blood were collected from freshmen students of Uniport between January and March 2010; of which 6 representing 0.9% were positive for antibodies to HIV-1 and -2. As the World enters the third decade of the HIV/AIDS epidemic, the evidence of its impact is undeniable, robbing countries of both human and natural resources. In line with the findings of previous studies, 0.9% infection rate reported in this study is comparatively low. HIV prevalence among female and male premarital couples in the United States of America was found to be 0.0 to 0.4% and 0.0 to 1.1% respectively [17]. The 0.9% reported in this study is higher than the 0.2% prevalence of HIV reported by Gayle *et al.* [7] among University students in USA. A relatively low prevalence of HIV among the premarital couples (2.0%) was also reported by Jeremiah *et al.* [18]. When compared with the HIV prevalence of 6.1% among premarital couples in the South-east of Nigeria, the result of this study appears very low [19]. Contrastingly, an HIV prevalence of 0.9% was recorded among freshmen in this study and this 0.9% prevalence was only among singles and age group 20-25years [18, 20].

The prevalence rate recorded in this study is not in conformity with the research conducted by Pennap *et al.* [21] and Akinjogunla and Adegoke [22]. Although there is a spatial variation in the HIV and AIDS prevalence in Nigeria as some parts of the country are more affected than others, there is no state or community that is not affected. Also in another study, Nwachukwu and Orji [8] reported that out of 167 fresh graduates, 8(4.79%) had HIV infection and all of them do not have any prior information about their HIV status. In Saudi Arabia, in a cross sectional study, it was observed that 6,046 HIV

infections were diagnosed of which 1,285(21.3%) were Saudi citizens and HIV infections were common among age groups 20-24 years [23].

In the present study, the 0.9% prevalence was only among age group 20-25years. This is comparable to the findings of previous studies in some parts of Nigeria and outside Nigeria. In Nigeria, as it is in many sub-Saharan African countries, prevalence of HIV and AIDS is predominant in the age group 15-24 years [24]. This age group is also characterized by social vices such as, teenage pregnancy, unsafe abortions, drug use and sexually transmitted infections [25-27].

Our finding also compared favourably with the findings of Laah and Ayiwulu [28] who reported higher seroprevalence rate of HIV in age group 20-34 years. Data from the United States of America (USA) showed that among youths age 20 to 24 years, 64% of reported HIV infections occurred among young men and 36 per cent among young women. While among youths age 13 to 19 years, 57% of reported HIV infections occurred among women and 43% among young men [29]. From 2001 through 2005, African Americans accounted for the largest percentage of new cases of human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) in all age categories, especially among people aged 13 to 24 years [30]. Macpherson *et al.* [31] reported in Canada that 36(0.01%) out of 256, 970 children greater than 15 years of age were HIV positive. This group of children are sexually active and may not see need for the use of protective devices such as good quality condoms [8].

The study found no significant association with the sex of subjects. This deviated from the findings of some studies in Nigeria. Laah and Ayiwulu [28] reported higher seroprevalence rate of HIV in females than their male counterparts in Nasarawa State, Nigeria. A few studies have however, documented higher prevalence of HIV/AIDS among males than among females [32, 33]. This is contrary to what was reported in our study.

Other contributing factor to sustained spread of HIV/AIDS was that pre-marital and extra-marital sexual contacts which were common in Port Harcourt. The prevalence of the HIV and AIDS is fuelled by low levels of male and female condom use, high rates of casual and transactional unprotected sex among young people, poverty, low literacy levels, cultural and religious factors, as well as stigma and discrimination [33-35].

The results of this study are within the range of those found in other surveys [7, 36-40]. Between 1985 and 1988, seroprevalence among all first-time voluntary

donors to Red Cross blood programs (a population in which people at increased risk of HIV infection were asked to exclude themselves from donation) was 0.04 percent. Seroprevalence among residential Job Corps entrants (a group comprising primarily inner-city, economically disadvantaged youths) since 1987 was 0.41 percent [7, 38]. On the basis of available data, it is estimated that approximately 1 million people in the United States are infected with HIV, equivalent to a rate of seroprevalence of 0.4 percent [7, 39]. The study by Middelkoop *et al.* [41] showed a high force of infection among adolescents, positively associated with increasing age. In their study, HIV prevalence was 5.0% among 820 secondary school participants aged 13 to 22 years. This is higher than the value reported in our study.

Testing for HIV can serve as a bridge for providing earlier treatment and encouraging behavior change among people already infected with HIV or at risk for HIV infection [30, 42-43]. From this study and other previous studies, it could be deduced that HIV infection is present in University campuses although the rate appears to be far lower than that of populations known to be at high risk. Also the infected individuals do not have any prior information about their HIV status. In conclusion, the study has revealed that the prevalence of HIV in fresh students in Port Harcourt is similar to that in other developing areas in the country. Further studies could be undertaken to investigate other epidemiological parameters. On the side of the authority, the Government could reduce the infection rate further down by embarking on health education campaigns and training on TB and HIV prevention.

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