



SERO-PREVALENCE OF HIV AMONG STUDENTS PRESENTING WITH SIGNS OF STI AT THE UNIVERSITY HEALTH SERVICES, AHMADU BELLO UNIVERSITY MAIN CAMPUS, ZARIA, NIGERIA

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Abstract

Individuals who are infected with sexually transmitted infections (STIs) are at least two to five times more likely than uninfected individuals to acquire human immunodeficiency virus (HIV) infection if they are exposed to the virus through sexual contact. The study was undertaken to determine the sero-prevalence of HIV among students presenting with signs of STIs at the University Health Services, Ahmadu Bello University, Zaria in order to increase the knowledge of the relationship between HIV and other STIs in the study area where there is no published data. A total of 200 blood samples were collected and screened for HIV using the rapid immunochromatographic test between July and August 2012. Out of the 200 samples screened, 3 samples were reactive to HIV giving a sero-prevalence of 1.5%. The highest prevalence of 3.0% was recorded among students in age group 20 – 24 years old. The virus was detected only among female students with a prevalence rate of 2.2% (3/137) and among only those who presented with signs of Hepatitis B infection (3.1%: 3/98). The virus was not detected among those who presented with signs of syphilis, hepatitis C virus, and urinary tract infections. Voluntary counselling and screening of STI patients for HIV, heightened awareness on the risk factors and prevention and treatment of other STI will help to reduce the spread of HIV infection.

Keywords: Sero-prevalence, HIV, STIs, University students, Zaria, Nigeria

Introduction

Human Immunodeficiency Virus (HIV) is a positive stranded enveloped RNA virus within the family *Retroviridae*, and a member of the *Lentivirus* genus (Brooks *et al.*, 2010). Human immunodeficiency virus is the etiologic agent of acquired immune deficiency virus (AIDS) (Willey *et al.*, 2011). The virus infects the human immune system and destroys the human defence mechanism and makes the individuals susceptible to all kinds of diseases and ailments. There are two distinct types of human HIV virus: HIV type 1 and HIV type 2. Human immunodeficiency virus type 2 predominates in West Africa while type 1 predominates in United States, Asia and Europe (Brooks *et al.*, 2010; Willey *et al.*, 2011). Human immunodeficiency virus in human originated from cross-species infection by simian virus in rural Africa, probably due to direct human contact with infected blood (Brooks *et al.*, 2010). Current evidence is that the primate counterparts of HIV-1 and HIV-2 were transmitted to human on multiple occasions (Brooks *et al.*, 2010). Human immunodeficiency virus enters the body; attach to and infect certain CD4⁺ cells which are the principal target of HIV. From the integrated position, it replicates itself fairly efficiently yielding viable virions that are well distributed in plasma and tissue fluids. High titres of HIV are found in blood and semen (Willey *et al.*, 2011). Human immunodeficiency virus is transmitted mainly during blood contact, sexual intercourse, through parenteral exposure to contaminated blood or blood products and from mother to child during the prenatal period.

Stages of untreated HIV infection include the primary infection, dissemination of virus to lymphoid organs, clinical latency, elevated HIV expression, clinical disease and death. The cardinal feature of HIV infection is the depletion of T-helper-inducer lymphocytes (Willey *et al.*, 2011).

The first symptoms of acute HIV infection are not specific and appear after an incubation period of 6 days to 6 weeks usually including fatigue, headache, nausea and night sweat. The more serious symptoms in adults are preceded by a prodrome (diarrhoea and dwindling) that can include malaise, weight loss, fatigue, shortness of breath, chronic diarrhoea, white patches in the tongue and lymphadenopathy. Opportunistic infection, cancers and neurological diseases such as AIDS, dementia, subacute encephalitis, vacuolar myelopathy, aseptic meningitis and peripheral neuropathy are associated with late stage of HIV infection (Brooks *et al.*, 2010). Evidence of infection by HIV can be detected by virus isolation, serological determination of antiviral and measurement of viral nucleic acid or antigens.

Acquired immune deficiency syndrome was recognised in the United States in 1981 as a new disease entity in homosexual men (Gottlieb, 2006; Willey *et al.*, 2011). Since then AIDS has become a worldwide epidemic that continues to expand. Sub-Saharan Africa was reported as the region that has been hit the hardest by the HIV/AIDS pandemic. The joint United Nations programme on HIV report on the global AIDS epidemic for 2006 started at the end of 2006, there were about 38.6 million persons living with the virus and 2.8 million HIV/AIDS death (Brooks *et al.*, 2010). The first case in Nigeria was reported in 1986 in a 13-year old girl. Since then, the epidemic has persisted with national HIV seroprevalence rate of 1.8% in 1991, 5.8% in 2001, 4.4% in 2005 and 4.6% in 2008 (FMOH, 2010a). Currently in Nigeria, the number of people living with HIV/AIDS is 61 million (UNAIDS/WHO, 2010). The prevalence rate of adult population was estimated 4.4% with the burden of the disease borne on young people in the 15 – 49 years age group. Factors such as poor and inadequate education, early age at first sexual debut and multiple sexual partners among others account for the very high seroprevalence rate seen in sub-Saharan Africa (UNAIDS/WHO, 2010).

Human immunodeficiency virus infection is of worldwide epidemic. Sexual transmission is an important route of transmission of the infection. There is a link between STI and HIV infection (WHO, 2010). Individuals who are infected with STIs are at least two to five times more likely than uninfected individuals to acquire HIV infection if they are exposed to the virus through sexual contact. In addition, if an HIV-infected individual is also infected with another STI, that person is more likely to transmit HIV through sexual contact than other HIV-infected person (Wasserheit, 1992). There is substantial biological evidence demonstrating that the presence of other STIs increases the likelihood of both transmitting and acquiring HIV (Wasserheit, 1992). Studies have shown the sero-prevalence of HIV among patients attending STD clinics in India to be between 1.4-14% (Banerjee and Mandal, 2002). In Nigeria the prevalence of HIV among STIs patients is estimated at 11.5% (UNAIDS/WHO, 2010).

There is no published data on the sero-prevalence of HIV among students presenting with signs of STIs in Zaria. The study was therefore aimed at determining the sero-prevalence and the possible risk factors associated with HIV among these students with the hope of establishing the prevalence rate which will help to increase the knowledge of the relationship of HIV and other STI.

Materials and Methods

Study Area and Population: The study was conducted at the University Health Service (UHS), ABU, Main Campus, Zaria. The UHS is located within ABU Main Campus, Samaru, Sabon-Gari Local Government Area of Kaduna State, Nigeria. The UHS was set up to provide health services to the staff and students of ABU and people living around the University (Samaru community). Services such as antenatal service, laboratory service, HIV counselling and testing, ophthalmic service and outpatient service, amongst others are rendered at the UHS. The study population comprised of 200 students of all age and sex who were presenting with signs of sexually transmitted infection at the UHS, ABU, Main Campus, Zaria. Limitation of the study are that the sample size was small and more female patients were recruited. Also, some students did not respond to some of the risk factors associated with HIV as contained in the questionnaire hence the

result obtained may not reflect the true risk factors for acquisition of HIV infection in the study area.

Ethical Consideration, Consent and Criteria: Prior to commencement of the study, letter of introduction was collected from the Department of Microbiology, Faculty of Science, ABU Zaria and was submitted to the Director of the UHS for ethical approval. Consent was also obtained from each student enrolled in the study. The inclusion criteria included students presenting with STI, who gave consent; while the exclusion criteria included students who did not present with STI and those who did give consent regardless of having STI or not.

Data Collection and Sample Size Determination: A structured questionnaire was designed to obtain demographic data and clinical information concerning the patients. A questionnaire was issued to each of the students who gave consent after counselling, completed, and returned before collection of sample. The least sample size to be used in the study was determined using the equation below as described by Naing *et al.* (2006):

$$n = \frac{z^2 p(1-p)}{d^2}$$

Where, 'n' is the desired sample size; 'z' is the standard normal distribution at 95% confidence interval = 1.96; 'p' is known prevalence of the infection (6.4%; Ekwezor *et al.*, 1995); 'd' is allowable error which is taken as 5% = 0.05. The sample size obtained after the calculation was 92; however, to validate the accuracy of the study, 200 samples were collected and used for the study.

Samples Collection: With the help of the laboratory technician, 3ml of venous blood was collected from each of the 200 students enrolled in the study who presented with signs of STIs between July and August 2012. The students comprised of 137 female and 63 male students who were between 16 – 31 years old. The samples were collected using a disposable sterile vacutainer needle and a 5 ml vacutainer EDTA (ethylenediamine tetra-acetic acid which is an anticoagulant). The plasma were carefully aspirated into cryovials and then stored at -4°C until ready for use as outlined by Cheesbrough (2010).

Analysis of Blood samples for HIV: All the blood samples collected were tested for HIV using Determine and Uni-Gold rapid test kits according to WHO standard outlined by FMOH (2010b).

- a. **Determine:** The protective foil cover of the test kit was removed and the kit labelled with the specimen identifier. Fifty (50) microlitre of the plasma was then added to the sample pad. The result was read after 15 minutes.
- b. **Uni-Gold:** The samples that were reactive with Determine were retested using the Uni-Gold test kit. The Uni-Gold test device was removed from its protective wrapper and labelled with the patient's identifier. Five (5) microlitre of the plasma was placed in the sample pot on the kit and 5 microlitre of Uni-Gold buffer was added.

The result was read after 15 minutes. Appearance of a single red line on the control region indicated a negative result. A positive result is indicated by appearance of a red line each on the control and the test regions (patient window site). An invalid result is indicated by the absence of red line on the control region.

Statistical Analysis: Results and data from the questionnaires were analysed, reduced to percentages and presented as tables and figures. Statistical analysis was done using the SPSS version 17. Associations between variables were determined by Pearson's Chi Square analysis and the relationship between HIV and the risk factors studied were obtained. Two tailed P values ≤ 0.05 was considered statistically significant.

Results

The sero-prevalence of HIV among students who presented with signs of STIs at the UHS, ABU Zaria was found to be 1.5% (3/200). The distribution of HIV in relation to STI is shown in Table 1. The most common STI presented by the patients was Hepatitis B (49.0%: 98/200) while the least was syphilis (4.5%: 9/200). The virus was detected only among students who presented with signs of Hepatitis B virus (HBV) infection with a prevalence of 3.1% (3/98). The virus was not detected among students who presented with signs of syphilis, Hepatitis C virus (HCV) and urinary tract infections (UTI) ($\chi^2 = 3.24$, $df = 3$, $p = 0.510$). The distribution of HIV according to socio-demographic characteristic of the patients is shown in Table 2. The highest sero-prevalence rate of 3.0% (2/66) was obtained among patients in age group 20 – 24 years old, followed by those in age group 25 – 27 years (2.2%: 1/45). There was no significant association between HIV status and age ($\chi^2 = 0.122$, $df = 3$, $p = 0.730$). Majority of the patients were females (94%: 188/200) and the virus was detected only in female patients with a prevalence of 2.2% (3/137). There was no significant association between HIV status by sex ($p = 0.818$). Analysis of the result according to marital status also showed that, out of the 200 patients screened for HIV, 188 (94%) were single, out of which 3 (3.2%) were positive and 12 (6%) were married with none positive.

Table 1: Sero-prevalence of HIV infection in relation to the various STIs presented by students at UHS, ABU, Zaria

Type of STI	Total	No. Infected	Percentage (%)
HBV	98	3	3.1
Syphilis	9	0	0.0
HCV	76	0	0.0
UTI	17	0	0.0
Total	200	3	1.5

($\chi^2 = 3.24$, $df = 3$, $p = 0.510$)

Table 2: Sero-prevalence of HIV infection according to socio-demographic characteristics of students who presented with signs of STI at the UHS, ABU Zaria

Parameter	Total (%)	HIV Positive	Percentage Positive	P-value
Age Group (years)				
16-19	81 (40.5)	0	0.0	
20-23	66 (33.0)	2	3.0	
24-27	45 (22.5)	1	2.2	0.730
28-31	8 (4.0)	0	0.0	
Gender				
Male	63 (31.5)	00	0.0	
Female	137 (68.5)	03	2.2	0.818
Marital Status				
Single	188 (94.0)	03	1.6	
Married	12 (6.0)	00	0.0	0.818

Table 3 shows the potential risk factors associated with HIV among students who presented with STIs at the UHC. Twenty-eight (28) students did not respond to some of the question asked on the risk factors associated with HIV in the questionnaire and two (2) were infected with HIV. All the patients enrolled in the study admitted to knowledge of HIV. A sizeable number of the patients (32%: 64/200) agreed to indulge in unprotected sex and one was positive. None of the patients who said yes to cuts by reused razor blade (10%: 20/200), clipper (17%: 35/200), manicure set (13%: 27/200) and needle stick injury (9%:18/200) were infected. Also none of the patient who had scar (6%: 12/200) or who had been transfused (3.5%: 7/200) was positive. The positive cases were found among patients who either answered no to the risk factors or did not respond.

Table 3: Some possible risk factors associated with HIV among students who presented with signs of STI at the UHS, ABU Zaria

Risk Factor	Total (%)	HIV Positive	Percentage Positive
Unprotected Sex			
Yes	64 (32.0)	1	1.6
No	128 (64.0)	0	0.0
No response	8 (4.0)	2	25.0
Kissing			
Yes	107 (53.5)	2	1.9
No	82 (41.0)	0	0.0
No Response	11 (5.5)	1	9.1
Reused Razor Cut			
Yes	20 (10.0)	0	0.0
No	180 (90.0)	3	1.7
Clipper Cut			
Yes	35 (17.5)	0	0.0
No	165 (82.5)	3	1.8
Manicure and Pedicure Cut			
Yes	27 (13.5)	0	0.0
No	168 (84.0)	3	1.8
No Response	5(2.5)	0	0.0
Scarification			
Yes	12 (6.0)	0	0.0
No	188 (94.0)	3	1.6
Needle Prick Injury			
Yes	18 (9.0)	0	0.0
No	180 (90.0)	2	1.1
No Response	2 (1.0)	1	50.0
Blood Transfusion			
Yes	7 (3.5)	0	0.0
No	191 (95.5)	2	1.1
No Response	2 (1.0)	1	50.0

Discussion

The present study showed that most of the patients who presented with signs of sexually transmitted infections (STIs) at the University Health Services (UHS) were seronegative, and only 1.5% of the patients were found to be seropositive. The infection rate is in agreement with a similar study carried out in Calcutta, India, where a prevalence rate of 1.5% was obtained (Banerjee and Mandal, 2002) and in Brazil with a prevalence rate of 1.5% (Smith *et al.*, 2006). The prevalence is lower than 1.9% recorded in Sudan (UNAIDS/WHO, 2010), 6.4% recorded in Ibadan (Ekweozor *et al.*, 1995) and 15.7% in USA (Blocker *et al.*, 2000). However, the infection rate is higher than 1.3% recorded in New Guinea and 1.1% in East Asia (UNAIDS/WHO, 2010).

The variation in the results obtained from various regions by various workers within and outside the country and in this study might be due to differences in geographical location of the study population, differences in methodology adopted, sensitivity and reliability of viral assay, and the difference in sample sizes. Human immunodeficiency virus was detected only among students who presented with signs of Hepatitis B virus infection. This might be due to current high prevalence rate of Hepatitis B virus surface antigen in Nigeria. Hepatitis B is hyper endemic in Nigeria (Ott *et al.*, 2012) and has been detected with a prevalence of 12.5% among asymptomatic students in Zaria (Aminu *et al.*, 2013). This study however showed a low HIV seroprevalence in patients presenting with signs of STI. Indeed, the seroprevalence of HIV among students presenting with signs of STI in the present study is less than the (Nigeria) national prevalence figure of about 4.4%.

The prevalence of HIV in this study was not limited to a particular age; it was distributed among different age group. No case of HIV was recorded among age group 16 – 19 years. This is similar to a research carried out in Nigeria in 2007 (UNAIDS/WHO, 2010). The prevalence of HIV in age group 20 – 24 and 25 – 27 years may be due to their active involvement in sex and unprotected sex. No case of HIV was recorded among age group 28 – 31 years; this may be due to their high level of awareness of the infection and the various protective strategies they have employed against contracting the infection. Human

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immunodeficiency virus cuts across both sexes but in this study, only the female students were infected, this might be due to the higher number of females in the population screened. Other studies have found higher sero-prevalence among females (0.3% and 0.2%) than males (0.17% and 0.1%) in Middle East and North Africa (Smith *et al.*, 2006) and in India (Banerjee and Mandal, 2002). The infection rate was higher among unmarried students (single), reason for this is that the populations screened were all students and majority of them were not married.

Conclusion

The prevalence rate of HIV among students who presented with signs of sexually transmitted infection at the University Health Services, Ahmadu Bello University, Zaria, is 1.5%. Implying that, the seroprevalence of HIV among these students is low. The virus was detected with the highest prevalence in the age group 20 – 24 years, and only in single females who presented with signs of Hepatitis B virus surface antigen.

Recommendations

In view of the prevalence of HIV obtained among STI patients in this study, routine screening for HIV among STI patients and proper counselling of STI patients on risk of acquiring and transmission of HIV is recommended. Public enlightenment campaigns of other STI should be linked with that of HIV/AIDS fight groups. Further study with a larger sample size is also recommended.

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