African Journal of Biotechnology Vol. 8 (6), pp. 941-948, 20 March, 2009
Available online at http://www.academicjournals.org/AJB
ISSN 1684–5315 © 2009 Academic Journals

Full Length Research Paper

Human immunodeficiency virus (HIV) specific antibodies among married pregnant women and female commercial sex workers attending voluntary counseling and HIV testing (VCT) centre in Abuja, Nigeria

Waidi Folorunso Sule[1]*, Moses Olubusuyi Adewumi[2] and Temitope Christiana Samuel[1]

[1]Department of Microbiology, Kogi State University, Anyigba, Nigeria. [2]Department of Virology, University College Hospital, University of Ibaban, Ibadan, Nigeria.

Accepted 9 December, 2008

Generally, married women and commercial sex workers (CSWs) engage in sexual activity - an important risk factor for contracting HIV. We therefore tested a hypothesis that prevalence of HIV-1/2 antibodies among married pregnant women (PW) is not different from that of female CSWs. One hundred married PW and 99 female CSWs enrolled in the study. They were consecutively selected as they visited the VCT centre for HIV antibody test. Pertinent data were obtained from each subject using questionnaire forms; venous blood sample was aseptically collected from subjects that gave verbal consent. Plasma obtained from each sample was tested using parallel testing algorithm with DETERMINE® HIV-1/2 and HIV-1/2 STAT-PAK® test was used for statistical analysis of the data. The overall prevalence of HIV-1/2 antibodies was 29.1% (n = 199). Seroprevalence of 39.4 and 19.0% were observed for the CSWs and the PW, respectively. Using various variables, comparison of HIV-1/2 serostatus of the CSWs with that of the married PW showed that the CSWs generally had significantly higher seroprevalence. CSWs who were inconsistent in the use of condom with their clients prior to sexual intercourse in the past three months before this study (*P* = 0.0001, OR = 11.2) and those aged ≤ 39 years had significantly (*P* = 0.004, OR = 2.6) higher seroprevalence. Though both groups recorded seropositivity, inconsistency in the use of condom appeared to be the factor mostly responsible for the significantly higher seropositivity of the female CSWs.

Key words: HIV-1/2 antibody prevalence, pregnant women, commercial sex workers, risk factors, Nigeria.

INTRODUCTION

There are two types of human immunodeficiency virus (HIV); these include; types 1 and 2. HIV-1 is the primary cause of human acquired immunodeficiency syndrome (AIDS) (Nielsen et al., 2005), though both types are associated with the disease. Furthermore, HIV-1 is responsible for the HIV and AIDS pandemic (UNAIDS, 2001a); while HIV-2 predominantly circulates in certain West African countries (Abimiku, 1999). In sub-Saharan Africa region, as worldwide, female population is a key factor in the epidemiology of HIV and AIDS because 50% of all adults with HIV infection are women predominantly infected via heterosexual transmission; furthermore, females are the most severely affected (UNAIDS/WHO, 2002; Mitchell and Stephens, 2004; WHO, 2004a; NASCP, 2002). In its report, UNAIDS (2006) stated that at the end of 2006, the sub-Saharan Africa which housed about 63% of the world's 39.5 million HIV and AIDS peo-

*Corresponding author. E-mail: equine318@yahoo.com. Tel: 08032071447, 08051134501.

Abbreviations: **STI**, sexually transmitted infection; **PW**, pregnant women; **CSW**, commercial sex worker; **SW**, sex worker; **NASCP**, National AIDS and STD Control Programme, Nigeria; **UNAIDS**, Joint United Nations Programme on HIV/AIDS; **ANC**, antenatal clinic; **UNDP**, United Nations Development Programme; **NACA**, National Action Committee on AIDS, Nigeria.

ple had 60% of such as women.

Moreover, 57% of the adults living with HIV and AIDS in the vast region were women of reproductive age, which represented 80% of HIV infected women worldwide (WHO, 2004a; Dabis and Ekpini, 2002).

As a result of HIV and AIDS prevalence that is consistently higher than one per cent (1%) among PW, most countries in sub-Saharan Africa, with a few exceptions, such as Madagascar, are experiencing generalized HIV and AIDS epidemic (UNAIDS, 2006; UNAIDS/WHO, 2003). Besides the higher prevalence of HIV among women, PW as a subset of female population, forms a key data source of the epidemic because the sentinel surveillance systems in the region (Nigeria inclusive) primarily rely on data from PW attending ANCs (Asamoah-Odei et al., 2003; NASCP, 2002). In addition, the prevalence among PW is a good indicator of how the epidemic is progressing among the general or the heterosexually active population (UNAIDS/WHO, 2003; EuroHIV, 2005). This is because the level of HIV infection among PW is close to the prevalence in the general population of men and women of 15 - 49 years of age (UNAIDS/WHO, 2003). Moreover, there is the possibility of significantly reducing the chance of HIV transmission to infants if infected PW is diagnosed before or during pregnancy.

Another pivotal subset of female population is the female CSWs. This subset is specifically important in the spread and acquisition, as well as, in the prevention strategies for HIV. This is because they serve as "bridge factor" between infected and uninfected individuals (UNDP, 2004; Elmore-Meegan et al., 2004). In addition, Siriwasin et al. (1998) earlier reported that commercial sex work was strongly associated with HIV seropositivity.

Though HIV-1/2 is spread from infected to uninfected chiefly by sexual intercourse, they can also be spread perinatally and through blood transfusion. HIV-2, however, is less efficiently transmitted compared to HIV-1 (Reeves and Doms, 2002). The established risk factors for contracting the HIVs are unprotected sexual intercourse, sex work (CDC, 2006), injection drug use (EuroHIV, 2007), sharing of sharp objects, transfusion of unscreened blood and blood products (Smith et al., 2005), breastfeeding (WHO, 2003), having more than one sexual-partners and having STIs (Ogunsola, 2006). In Nigeria, group of people considered as high risk for HIV and AIDS include CSWs, men that have sex with men (MSM), long-distance truck drivers, commercial motorcyclists, military personnel, police officers, migrant and mobile populations and prisoners (Onwuliri and Jolayemi, 2006; Onoja et al., 2004). Importantly, these high-risk groups transmit the HIVs to general population through their interaction with other subgroups of the population known as bridge populations, which in Nigeria include the clients of SWs and the sexual partners of people in the high-risk groups. These groups engage in risky behaviors such as unsafe sex, commercial sex, injection drug use with contaminated needles, and substance abuse, which beclouds their judgment about unprotected sex. In the context of sex work, UNAIDS (2002) reported that the factors most associated with increased vulnerability to HIV are daily number of clients, frequency of sexual intercourse, irregular condom use, STD history and levels as well as drug consumption.

One of the most effective ways, among others, to prevent HIV infection and transmission (as well as STIs) is by use of condom during sexual intercourse (Ghys et al., 2002; Alary et al., 2002; Akwara et al., 2005). Another means to guide against transmission and acquisition of the HIVs is by voluntary counseling and testing to know whether or not one (including one's partner) has the antibodies to these viruses and possibly infected (UNAIDS, 2001a; Siriwasin et al., 1998). Akwara et al. (2005) observed that this has important effects on knowledge and behavioral changes and access to HIV and AIDS-related services. The least expensive means of knowing one's HIV serostatus is by testing human blood samples for the presence of HIV-1/2 specific antibodies (WHO, 2004b). Such testing has been used for surveillance study of HIV infection globally which provides invaluable epidemiological data for health planning/ programme regarding HIV and AIDS (WHO, 2004b; Koblavi-Deme et al., 2001). In this regard, rapid HIV serodiagnosis which is less costly, with reduced turnaround time is especially suitable. Some rapid kits have therefore been recommended by FDA/USAID to screen large number of individuals providing test results in less than 20 min or within one hour (WHO, 2004b; Children's Hospital and Health System, 2006). This mode of testing is especially beneficial in resource-constrained countries, like Nigeria. Many rapid HIV test kits in strips or cartridges are easy to handle and can yield high-quality rapid test results comparable to that of traditional ELISAs (WHO, 1998). WHO gave credence to rapid HIV test by development of testing algorithms showing that sequential combinations of two or three antibody tests (ELISAs and/or rapid tests) can be reliably used to confirm HIV test results (Meda et al., 1999).

Using these means, various studies have reported the burden of HIV among PW and CSWs in different parts of the world. UNAIDS (2001a), De Cock and Weiss (2000) observed that the prevalence rates of HIV could exceed 40% among PW in sub-Saharan Africa. In this region, major variations occur in HIV prevalence among PW attending ANC between capitals, major cities and large towns. In South Africa, most ANCs in cities and large towns had prevalence of over 20%. In East Africa, the prevalence in ANCs in cities ranged from 10-17%; while the data from 33 cities and large towns in West Africa was higher than 10% among PW only in Abuja, Nigeria; in Daloa and Yamoussoukro, Côte d'Ivoire; in Yaounde, Cameroon, and in Bangui, Central African Republic (Asamoah-Odei et al., 2003). Contrary to what obtained in sub-Saharan Africa, though also on the increase, the prevalence of HIV infection in PW born in the UK increas-

ed to 0.07% in 2004, after several years of low and stable prevalence around 0.03% (De Souza-Thomas et al., 2005). In the same vein, various prevalence rates have been documented among CSWs. In Senegal, national HIV prevalence is below 1%; yet, among SWs in two cities, prevalence rose from 5 and 8% in 1992, to 14 and 23%, respectively in 2002 (UNAIDS, 2004). Also in 2001, among commercial sex workers in Ghana associated with an establishment ("seaters"), 76% were HIV positive (Akwara et al., 2005). In Nairobi, Kenya, East Africa, where HIV prevalence in general population approaches 10%, Wilson (2006) reported prevalence of approximately 60% among SWs; and 50% for SWs in Zambia, South Africa. However, among Japanese and Chilean female SWs, Miyazaki et al. (2004) and Barrientos et al. (2007) recorded zero (0%) prevalence for HIV antibodies. In Cambodia, Ohshige et al. (2000) reported HIV prevalence of 54% among female CSWs. In Nigeria, national prevalence of HIV among female SWs reportedly rose from 17.5% in 1991 to 22.5% in 1993, and to 36.5% in 1995 (NACA, 2003; Society for Family Health, 2001). The two groups of female population stated above engage in heterosexual activity, the most common and growing mode of HIV transmission in Nigeria and worldwide, with the exception of US and Western Europe (NASCP, 2002; UNAIDS, 2001[b]; Siriwasin et al., 1998).

To the best of our knowledge, there are not many studies, especially in Nigeria, that compared the HIV-1/2 antibody prevalence among married PW and female CSWs. The objectives of this study therefore were to determine the prevalence rates of HIV-1/2 antibodies of female CSWs and married PW, to compare the prevalence rates of these two categories of female gender and to identify some of the variables of each group that might be responsible for difference(s) in their prevalence rates.

MATERIALS AND METHODS

The study area

We carried out this study at the VCT, Asokoro District Hospital, Abuja, Nigeria, between April and June, 2007. Abuja is the Federal Capital Territory of Nigeria, located in the centre of the country, on the guinea savannah of the middle-belt between 60° 45'W and 7° 30'E of the Greenwich meridian.

Study design

Abuja, the Federal Capital territory of Nigeria, was used as study site because it is one of the major places in Nigeria where sex work thrives as many people (nationals and foreigners) migrate thereto because it is the hot bed of economic activities and a new frontier for those in search of opportunities. Lots of pregnant women also visit the hospital for ANC/VCT. Permission to carry out this study was granted by the Hospital after explaining the objectives of the study. Following this, women were consecutively selected as they visited the VCT centre. One hundred apparently healthy married pregnant women and 99 female CSWs, who self-identified as such, eventually gave verbal consent to participate in the study after due explanation of objectives and procedures of the research. With questionnaire forms, face-to-face interviews were done in confidence to obtain pertinent demographic and risk factor data. Blood sample was thereafter collected from each participant for HIV-1/2 anti-body test. Demographic data collected included age, educational status, occupation, marital status, histories of blood transfusion and sexually transmitted infections (STIs) and condom use with partners during sexual intercourse in the last three months. In order to maintain confidentiality, identity number was given to each woman. We first confirmed the performance of the rapid kits by testing two each with known pooled positive and negative plasma samples prior to use for the subjects' samples. All seropositive women were appropriately referred for post-test counseling/continuing support.

Serological test

About 5 ml blood sample was aseptically collected by venepuncture from each subject into EDTA-vacutainer blood sample bottle. Each blood sample tube was gently rotated to mix the collected blood with the anticoagulant. The samples were stored at refrigeration temperature and later centrifuged at 2000 rpm for 10 min to separate the plasma from blood cells. The plasma was subsequently aliquoted, labeled and stored in refrigerator until tested. Each plasma sample was brought to room temperature and tested using parallel testing algorithm with DETERMINE® HIV-1/2 (Abbott laboratories) and HIV-1/2 STAT-PAK® (Chembio Diagnostic Systems, Inc.).

Data analysis

The results of this study are presented using descriptive statistics . Mann-Whitney U test was used to compare median age of the two groups of women. Using 5% level of significance, χ^2 test was used to evaluate whether or not there was statistical difference between the two groups; and between HIV-1/2 seropositivities of any two categories. Odds ratio (OR) was calculated at 95% confidence interval (CI) for data that satisfy 2 by 2 contingency tables in order to give credence to statistical inference. The statistical package for the social sciences (SPSS) version 13.0 for Windows was used for the data analysis.

RESULTS

Altogether, 199 females aged 18-45 years enrolled in this study. They comprised 100 married PW and 99 female CSWs. The median age of the married PW was 29.0 years (range 19-42 years), and 25.0 years for the CSWs (range 18-45 years). The median age of the PW (n = 100) was significantly higher (P = 0.0001) than that of the CSWs (n = 99). The level of education of the entire subjects ranged from illiterate to master's degree. Comparison of the two groups of female with respect to religion and history of previous blood transfusion apparently showed no significant difference (P = 0.799 and P = 0.804, respectively) (Table 1). However, the two groups differed significantly with respect to history of previous STIs (P = 0.0001, OR = 6.0), level of education (P = 0.0001, OR = 40.7) and age (P = 0.0001, OR = 3.5). In the same vein, the female CSWs and the married PW that were seropositive for HIV-1/2 apparently differed statistically with respect to educational level (P = 0.006, OR = 8.5) but they did not differ with age (P = 0.084, OR = 2.8), Table 1. The two rapid kits used for HIV-1/2 sero-

Table 1. Comparison of female CSWs with married PW attending VCT centre, Asokoro District Hospital, Abuja, Nigeria, with respect to demographic data.

Variable	Total number	Size of sub-group (%)	*P*-value / OR (95% CI)
Religion			
christian	135	CSWs: 68 (50.4)	0.799 / 1.1 (0.6 – 2.0)
moslem	64	CSWs: 31 (48.4)	
BT			
yes	15	CSWs: 7 (46.7)	0.804 / 1.1 (0.4 -3.3)
no	184	CSWs: 92 (50.0)	
STIs			
yes	46	CSWs: 37 (80.4)	0.0001* / 6.0 (2.7-13.3)
no	153	CSWs: 62 (40.5)	
Educational level			
≤ secondary	140	CSWs: 96 (68.6)	0.0001* / 40.7 (12.1-137.3)
≥ Diploma	8	CSWs: 2 (25.0)	
Age range (years) for seropositive			
≤ 29	42	CSWs: 31 (73.8)	
≥ 30	16	CSWs: 8 (50.0)	0.085 / 2.8 (0.9-9.3)

Level of significance is at $P < 0.05$; Asterisk (*), significant difference (or statistical association); OR, odds ratio; CI, confidence interval; BT, blood transfusion; STI, sexually transmitted infection; CS, civil service; HW, full-time house wife.

status determination showed 100% concordance in the test results when used for both the known pooled plasma samples and the subjects' plasma samples. The overall HIV-1/2 antibody prevalence (n = 199) was 29.1, with 39.4 and 19.0% respectively for the CSWs and the PW. Statistical analysis of risk factors for antibody positivity among the female CSWs showed that manner of condom use ($P = 0.0001$, OR = 66.9) and history of previous STIs ($P = 0.0001$, OR = 7.1) were significantly associated with HIV-1/2 seropositivity (Table 2). However, among the married PW, HIV-1/2 seropositivity was apparently associated with educational status ($P = 0.002$) and occupation ($P = 0.0001$, OR = 7.9), Table 2. When the two groups were compared with respect to HIV-1/2 seropositivity, results showed that being a CSW, a CSW within age range 18-39 years and use/manner of use of condoms by clients of CSWs might be responsible for the significantly higher seroprevalence of the female CSWs (Table 3).

DISCUSSION

In this study, we investigated the prevalence of HIV-1/2 antibodies among 199 women comprising 99 and 100 female CSWs and married PW respectively who attended the VCT centre, Asokoro District Hospital, Abuja, Nigeria. We compared the two sub-groups with respect to demographic data and HIV-1/2 serostatus. Our analyses showed a clear association between the sub-groups and HIV-1/2 serostatus ($P = 0.002$) and that CSWs were significantly (OR = 2.8) more likely to be seropositive (Table 3).

Attributes documented as risk factors for contracting HIV-1/2 such as age (NASCP, 2002); use of condom (Akwara et al., 2005); histories of previous blood transfusion (Onwuliri and Jolayemi, 2006); STIs (Ogunsola, 2006) and educational level (Ezegbudo et al., 2004) were used as bases for comparison of the two sub-groups of women.

Going by the report of Federal Ministry of Health (FMoH), Nigeria (2003) that Nigerian youths (males and females) aged 20-29 years were more infected with HIV, we categorized the age of the study subjects into ≤ 29 years and ≥ 30 years for the purpose of comparison. Thirty one (79.5%) of the 39 seropositive female CSWs were ≤ 29 years, while 11 (57.9%) of the 19 seropositive PW were in this age group. Maybe because the subjects studied here were mainly females, the overall statistical analysis (n = 199) showed that HIV-1/2 serostatus among the youthful women aged ≤ 29 years did not appear significantly different ($P = 0.638$, data not shown) from that of women aged ≥ 30 years. However, comparison of the serostatus between CSWs and PW aged ≤ 29 years revealed that the CSWs had significantly ($P = 0.017$; OR = 2.6) higher seropositivity than their PW counterpart. The same observation was made when the age range was widened to ≤ 39 years (Table 3). These observations were further buttressed by about 3 folds (OR = 2.8) higher odds that any selected seropositive female would be a CSW (Table 1).

In regard to another risk factor i.e. use of condom, which as used here referred to use of condoms by the male clients of the CSWs and the presumed husbands of the married PW during sexual intercourse in the last 3 months prior to this study; the rate of condom use was

Table 2. Risk factors for HIV-1/2 antibody prevalence among CSWs and married PW attending VCT centre, Asokoro District Hospital, Abuja, Nigeria.

Factor	No. tested	No. positive (%)	*P*-value / OR (95% CI)
A. CSWs			
Age range (years)			
≤ 29	82	31 (37.8)	0.477 / 1.5 (0.5 – 4.2)
≥ 30	17	8 (47.1)	
Manner of condom use			
always	49	2 (4.1)	0.0001* / 66.9 (14.2 - 315.1)
sometimes	50	37 (74.0)	
Previous BT			
yes	7	6 (85.7)	10.7 (1.2 – 93.0)
no	92	33 (35.9)	
Previous STIs			
yes	37	25 (67.6)	0.0001* / 7.1 (2.9 – 17.7)
no	62	14 (22.6)	
Educational status			
illiterate/primary	20	10 (50.0)	
secondary	76	27 (35.5)	
≥Diploma	3	2 (66.7)	
B. Married PW			
Age range (years)			
≤ 29	58	11 (19.0)	0.992 / 1.0 (0.4 – 2.7)
≥ 30	42	8 (19.0)	
Condom use			
sometimes	3	1 (33.3)	2.2 (0.2 – 25.5)
no	97	18 (18.6)	
Previous BT			
yes	8	2 (25.0)	
no	92	17 (18.5)	0.652 / 1.5 (0.3 – 7.9)
Previous STIs			
yes	9	8 (88.9)	58.2 (6.6 – 510.7)
no	91	11 (12.1)	
Educational status			
illiterate/primary	13	7 (53.8)	
secondary	31	6 (19.4)	0.002*
≥ Diploma	56	6 (10.7)	
Occupation			
CS/student/office work	59	4 (6.8)	0.0001* / 7.9 (2.4 – 26.3)
trading/HW	41	15 (36.6)	

P value not shown for invalid statistical analyses; OR (odds ratio) shown only for 2 x 2 contingency table.

higher among the CSWs than among the PW (Table 2). Observation similar to this was made by Jackson et al. (2005) that condom use was low or irregular among steady partners. However, the rate of condom use observed here for the CSWs was lower ("always" = 49.5%) than among Chilean female SWs ("always" = 93.4%) reported by Barrientos et al. (2007). The analysis of HIV-1/2 serostatus between the CSWs and the PW with regard to condom use was done at two instances: on one hand we compared the two sub-groups who reported they "sometimes" used condom, and on the other we compared the sub-groups on the hypothesis that the PW who reported "no" to condom use should be at higher risk of testing positive to HIV-1/2 antibodies than CSWs who reported "sometimes". Statistical analyses showed that CSWs who "sometimes" used condom had about 5 times higher likelihood of seropositivity compared to their corresponding PW; and in the same vein, but surprising-

Table 3. Comparison of female CSWs with married PW attending VCT centre, Asokoro District Hospital, Abuja, Nigeria, with respect to HIV-1/2 serostatus.

Factor	No. tested	No. positive (%)	*P*-value / OR (95% CI)
Group			
CSWs	99	39 (39.4)	0.002* / 2.8 (1.5 – 5.3)
MPW	100	19 (19.0)	
Age (≤ 29years)			
CSWs	82	31 (37.8)	0.017* / 2.6 (1.2 – 5.7)
MPW	58	11 (19.0)	
Age (≤ 39 years)			
CSWs	96	37 (38.5)	0.004* / 2.6 (1.4 - 4.9)
MPW	97	19 (19.6)	
Sometimes used condom			
CSWs	50	36 (72.0)	5.1 (0.4 - 62.5)
MPW	3	1 (33.3)	
Condom use			
sometimes by CSWs	50	36 (72.0)	0.0001* / 11.2 (5.1-25.0)
no by MPW	97	18 (18.6)	
Without previous BT			
CSWs	92	33 (35.9)	0.008* / 2.5 (1.3 - 4.9)
MPW	92	17 (18.5)	
Without previous STIs			
CSWs	62	14 (22.6)	0.085 / 2.1 (0.9 - 5.1)
MPW	91	11 (12.1)	
≤ secondary School Education			
CSWs	96	37 (38.5)	0.302 / 1.5 (0.7 – 3.2)
PW	44	13 (29.5)	

P value not shown for invalid statistical analyses.

ly, unlike PW who said “no” to condom use, CSWs that reported “sometimes”, still had about 11 times greater odds of being seropositive (Table 3). Since in both analyses, CSWs reported they “sometimes” used condom, reasons for greater odds of HIV seropositivity among this sub-group might be that they had more sexual partners and engaged in more frequent sexual contact than the PW. We further observed the effectiveness of consistent use of male condoms in protecting against STIs as we observed that the CSWs who reported “always” had significantly ($P = 0.0001$; OR = 0.2, data not shown) lower rates of previous STIs than CSWs who reported “sometimes” to condom use. In the same vein, when HIV-1/2 serostatus of the CSWs who reported “always” was compared separately with that of PW who reported “no” and “sometimes”, CSWs with report of “always” had respectively 0.01 and 0.08 likelihood of being positive (data not shown), indicating protectiveness of consistent condom use.

We also compared the two sub-groups on the premise of reported history of blood transfusion. We observed that while the two sub-groups were comparable ($P = 0.804$) in this regard (Table 1); CSWs without such history had significantly higher ($P = 0.008$) HIV-1/2 seropositivity with more than 2 times greater odds of being positive compared to the corresponding PW (Table 3). This observation was also suggestive of other risk factor(s) contributing to higher seroprevalence among the CSWs.

As regards STIs, Table 2 reveals that this variable was strongly associated with HIV-1/2 antibody positivity for both sub-groups. However, the CSWs appeared to have about 6 times higher odds (OR = 6.0) of having had STIs compared to the PW. The higher level of STIs among the CSWs might be connected with significantly ($P = 0.0001$) lower level of education (by extension, lower level of enlightenment on STI prevention/control) compared to the PW (Table 1). With respect to HIV-1/2 serostatus however, the CSWs without history of STIs apparently had 2 times higher (OR = 2.1) chances of being positive to HIV-1/2 antibodies (Table 3). This observation was also indicative of factor(s) other than previous STIs as contributing variable(s).

Furthermore, reports have it that level of education is associated with HIV (and hepatitis B) infection (Ezegbudo et al., 2004). We therefore compared the two sub-groups on the basis of formal education attained at the time of

this study. Similar to report of Ezegbudo et al. (2004), we observed that, overall (n = 199) lower level of education i.e. ≤ secondary school education appeared strongly associated (P = 0.002; OR = 3.5) with HIV-1/2 seropositivity; however, CSWs who had ≤ secondary school education did not significantly (P = 0.302) differ in seropositivity compared to their corresponding PW (Table 3).A limitation observed in this study however, was that we did not inquire if any of the women used female condom. Information on this might present a different perspective of the seropositivity vis-à-vis condom use and STIs. Another was that we did not study frequency of sexual intercourse per day or number of sexual partner.

Conclusively, this study has contributed to the information on the burden of HIV infection among women and the two subgroups in Abuja, Nigeria. And in unison with previous findings, we also found that, though both sub-groups recorded high HIV-1/2 seroprevalence, the CSWs appeared to have significantly higher risk of being so. The reasons for this might be inconsistency in the use of condom by their clients prior to sexual intercourse in the past three months (or more); higher rates of previous STIs and lower educational level. However, other risk factors like frequency of sexual intercourse per day or number of sexual partners on the part of the CSWs might be responsible for our observations since, even when both sub-groups shared “sometimes” use of condom; “no” to previous STIs and blood transfusion, the CSWs still had greater chances of testing positive. Since group with high exposure to HIV have been identified right from the start of the HIV and AIDS epidemic as major targets for prevention intervention (Nagot et al., 2002), we suggested, as already advocated, that CSWs insist on consistent use of male condoms by their clients. In addition to this intervention strategy, use of female condoms by CSWs needs to be scaled-up because the cumulative probability of vaginal exposure to semen during heterosexual intercourse with female condom is less compared to that with male condoms (Daly et al., 1994).

ACKNOWLEDGEMENTS

The authors acknowledge the permission of the Management of Asokoro District Hospital, Abuja, and supports of laboratory staff of the VCT section in providing technical assistance and materials in the course of this study.

REFERENCES

Abimiku AG (1999). Updates on AIDS in Africa: A menacing public health problem. A. I. M. 1(2): 29-33.

Akwara PA, Gabriel BF, Govindasamy P, Alayón S, Hyslop A (2005). An in-depth analysis of HIV prevalence in Ghana: Further analysis of demographic and health surveys data. Calverton, Maryland, USA: ORC Macro, p 23.

Alary M, Mukenge-Tshibaka L, Bernier F, Geraldo N, Lowndes CM, Meda H, Gnintoungbè CAB, Anagonou S, Joly JR (2002). Decline in the prevalence of HIV and sexually transmitted diseases among female sex workers in Cotonou, Benin, 1993 -1999. AIDS, 16(3): 463-470.

Asamoah-Odei E, Asiimwe-Okiror G, Garcia Calleja JM, Boerma JT (2003). Recent trends in HIV prevalence among pregnant women in sub-Saharan Africa. AIDScience, Vol. 3 Num. 19.

Barrientos JE, Bozon M, Ortiz E, Arredondo A (2007). HIV prevalence, AIDS knowledge, and condom use among female sex workers in Santiago, Chile. Cad. Saúde Pública, Rio de Janeiro, 23(8): 1777-1784.

CDC (2006). The global HIV/AIDS pandemic, 2006. MMWR 55(31): 841-844.

Children’s Hospital and Health System (2006). Rapid HIV Test. Available at www.chw.org

Dabis F, Ekpini ER (2002). HIV-1/AIDS and maternal and child health in Africa. Lancet, 359: 2097-2104.

Daly CC, Helling-Giese GE, Mati JK, Hunter DJ. (1994). Contraceptive methods and the transmission of HIV: implications for family planning. Genitourin Med , 70: 110-117.

De Cock KM, Adjorlolo G, Ekpini E, Sibailly T, Kouadio J, Maran M, Brattegaard K, Vetter KM, Doorly R, Gayle HD (1993). Epidemiology and transmission of HIV-2. Why there is no HIV-2 pandemic. JAMA, 270: 2083-2086.

De Cock KM, Weiss HA (2000). The global epidemiology of HIV/AIDS. Trop. Med. Int. Health, 5: A3-9.

De Souza-Thomas L, Dougan S, Emmett L, James L, UK collaborative group for HIV and STI surveillance (2005). HIV and other sexually transmitted infections in the United Kingdom: An update 2005. Eurosurveillance, 10(51):2867. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=2867

Elmore-Meegan M, Conroy R, Agala B (2004). Sex workers in Kenya, numbers of clients and associated risks: An exploratory survey. Reproductive Health Matters, 12: 50-7.

Embassy of the Federal Republic of Nigeria (2005). Abuja, Nigeria-Political Capital City.

EuroHIV (2005). HIV/AIDS Surveillance in Europe: HIV prevalence among pregnant women. Mid-year report 2005, No. 72, p 38.

EuroHIV (2007). HIV/AIDS Surveillance in Europe: Mid-year report 2006. Saint-Maurice: French Institute for Public Health Surveillance, No. 74, p 3.

Ezegbudo CN, Agbonlahor DE, Nwobu GO, Igwe CU, Agba MI, Okpala HO, Ikaraoha CI (2004). The seroprevalence of Hepatitis B surface antigen and human immunodeficiency virus among pregnant women in Anambra State, Nigeria. Shiraz E-Medical J. Vol. 5 Num. 2.

Ghys PD, Diallo MO, Ettiègne-Traoré V, Kalé K, Tawil O, Caraël M, Traoré M, Mah-Bi G, De Cock KM, Wiktor SZ, Laga M, Greenberg AE (2002). Increase in condom use and decline in HIV and sexually transmitted diseases among female sex workers in Abidjan, Cote d’Ivoire, 1991-1998. AIDS 16(2):251-8.

Jackson LA, Sowinski B, Bennett C, Ryan D (2005). Female sex trade workers, condoms, and the public-private divide. J. Psychol. Human Sex 17: 83-105.

Koblavi-Deme S, Maurice C, Yavo D, Sibailly TS, N'guessan K, Kamelan-Tano Y, Wiktor SZ, Roels TH, Chorba T, Nkengasong JN (2001). Sensitivity and specificity of human immunodeficiency virus rapid serologic assays and testing algorithms in an antenatal clinic in Abidjan, Ivory Coast. J. Clin. Microbiol. 39(5): 1808-1812.

Meda N, Gautier-Charpentier L, Soudre RB, Dahourou H, Ouedraogo-Traore R, Ouangre A, Bambara A, Kpozehouen A, Sanou H, Vallea D, Ky F, Cartoux M, Brain F, Van de Perre P (1999). Serological diagnosis of human immunodeficiency virus in Burkina Faso: reliable, practical strategies using less expensive commercial test kits. Bull. World Health Organ. 77(9): 731-739.

Mitchell HS, Stephens E (2004). Contraception choice for HIV positive women. Sex. Transm. Infect. 80:167-173.

Miyazaki M, Babazono A, Kato M, Takagi S, Chimura H, Une H (2003). Sexually transmitted diseases in Japanese female commercial sex workers working in massage parlors with cell baths [Abstract]. JIC 9(3):248-253.

NACA (2003). National policy on HIV/AIDS, Abuja, Nigeria: National Action Committee on AIDS.

Nagot N, Ouangré A, Ouedraogo A, Cartoux M, Huygens P, Defer MC,

Zékiba T, Meda N, Van de Perre P (2002). Spectrum of commercial sex activity in Burkina Faso: Classification model and risk of exposure to HIV. JAIDS, 29: 517-521.
NASCP, FMoH (2002). HIV/AIDS: What it means for Nigeria (Background, projections, impact, interventions, and policy), 1st edn. Abuja, Nigeria, pp 9-10.
Nielsen NJ, Pedersen FS, Kjems J (2005). Molecular strategy to inhibit hiv-1 replication, Retrovirology 2:10.
Ogunsola FT (2006). The role of sexually transmitted infections in HIV transmission. In Adeyi et al. (eds) AIDS in Nigeria: A nation on the threshold. Havard Centre for Population and Development Studies, USA. p 93.
Ohshige K, Morio S, Mizushima S, kitamura K, Tajima K, Ito A, Suyama A, Usuku S, Saphonn V, Heng S, Hor LB, Tia P Soda K (2000). Cross-sectional study on risk factors of HIV among female commercial sex workers in Cambodia. Epidemiology and Infection, 124: 143-152.
Onoja AJ, Shehu M, Abu A, Odama L, Inyang US, Nasidi A (2004). Baseline HIV-1 prevalence among various risk groups in Nigeria [abstract]. Int. Conf. AIDS. 15: abstract no. MoPeC3479.
Onwuliri VA, Jolayemi OM (2006). Reaching vulnerable and high-risk groups in Nigeria. In Adeyi et al. (eds) AIDS in Nigeria: A nation on the threshold. Havard Centre for Population and Development Studies, USA. pp 310-311.
Reeves JD, Doms RW (2002). Human immunodeficiency virus type 2. J. Gen. Virol. 83(6): 1253-1265.
Siriwasin W, Shaffer N, Roongpisuthipong A, Bhiraleus P, Chinayon P, Wasi C, Singhanati S, Chotpitayasunondh T, Chearskul S, Pokapanichwong W, Mock P, Weniger BG, Mastro TD (1998). HIV prevalence, risk, and partner serodiscordance among pregnant women in Bangkok. JAMA. 280:49-54.
Smith DK, Grohskopf LA, Black RJ, Auerbach JD, Veronese F, Struble KA, Cheever L, Johnson M, Paxton LA, Onorato IA, Greenberg AE (2005). Antiretroviral post-exposure prophylaxis after sexual, injection-drug use, or other non-occupational exposure to HIV in the United States. MMWR 54 (02): 1-20.
Society for Family Health (2001). National behavioural survey 1: Brothel based sex work in Abuja, Nigeria: Society for Family Health.
UNAIDS (2001[a]). Worldwide HIV-1 infection, Dec. 2000. Available at www.unaids.org/epidemic_update/report_dec00/index_dec.html
UNAIDS (2001[b]). Global HIV/AIDS epidemic update. Geneva: Joint United Nations Programme on HIV/AIDS/ World Health Organization, p 36.
UNAIDS (2002). Sex work and HIV/AIDS. Joint United Nations Programme on HIV/AIDS (UNAIDS Technical Update), Geneva.
UNAIDS (2004). Report on the global AIDS epidemic, July 2004.
UNAIDS (2006). Report on the global AIDS epidemic. Available at www.usaid.gov
UNAIDS/WHO (2002). AIDS epidemic update. Geneva: UNAIDS/02.46E.
UNAIDS/WHO (2003). A history of the HIV/AIDS epidemic with emphasis on Africa. UNAIDS, Geneva and WHO, Geneva, UN/POP/MORT/2003/2, pp 3-6.
UNDP (2004). HIV and AIDS: A challenge to sustainable human development, p 13.
WHO (1998). The importance of simple and rapid tests in HIV diagnostics: WHO recommendations. WER 73(42):321-328.
WHO (2003). HIV transmission through breastfeeding: A review of available evidence. Available at www.who.int/reproductive-health/docs/hiv_infantfeeding/breastfeeding.pdf
WHO (2004a). AIDS epidemic update: December 2004. World Health Organization: Geneva, p 87.
WHO (2004b). HIV assays: Operational characteristics (Phase 1), Report 14, Simple/Rapid Tests. Geneva. p 2. Available at www.who.int/eht/
Wilson D (2006). HIV epidemiology: A review of recent trends and lessons. Global HIV/AIDS Program, The World Bank, First draft, pp 5-8.