DETECTION OF HIV 1 & 2 ANTIBODIES AMONG INTENDING BLOOD DONORS

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ABSTRACT: This study was carried out to detect the presence of HIV antibodies among intending blood donors. Determine® HIV-1/2 Test cards (manufactured by Inverness Medical, Japan), Global® HIV-1/2 Kit (manufactured by Global Diagnostics, USA) and HIV -1/2 Stat- Pak® Assay (manufactured by Chembio Diagnostic Systems, USA) were used in a stepwise order for the detection of HIV-1 and HIV-2 in the blood. Overall prevalence rate of HIV was 17.5%. Age group 18-39 years of age had the highest prevalence of HIV (18.4%) compared to age group 40 years and above (14.6%). HIV antibodies were more prevalent among females (19.4%)] than their male counterparts (17.2%). Two risk factors (age and gender) pertinent to transmission of HIV were studied. No one appeared to be significantly associated (P> 0.05) with HIV-1/2 antibodies prevalence among the samples screened. This study however further confirmed the presence of HIV antibodies among intending blood donors. This calls for the need for an extensive blood screening practice in our blood banks. General surveillance and public health education to stop the spread of the infection from blood donors is advocated.
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1. INTRODUCTION

One of the greatest health challenges of this age is that posed by HIV an acronym for Human Immunodeficiency virus (HIV), the causative agent for acquired immunodeficiency syndrome (AIDS) (Nester *et al*. 2004; Nielsen *et al*. 2005; FMoH 2006). The pandemic of HIV infection ranks among the greatest infectious disease scourges in history (WHO, 2005). The presence of the virus in patients causes the immune system to elicit the production of antibodies to HIV. The detection of these antibodies can be used as a diagnostic tool. ELISAs, western Blots, PCR-based assays and various other test systems are currently available for HIV-1/2 detection (Kovacs *et al*., 1995; CDC, 2005). Many rapid immunochromatographic tests such as Chembio HIV-1/2 Stat-Pak Assay and Abbott Determine HIV-1/2® test kits, which are simple and easy to use utilizes immobilized antigens for the detection of antibodies to HIV-1/2 in serum, plasma or whole blood. Serological markers for HBV, HCV and HIV are screened in blood banks routinely. These tests are obligatory for transfusion safety and may give an idea about the seropositivity rates of a specific region (Afsar *et al*., 2010; Alli et al., 2010).

Globally, since the beginning of the epidemic, almost 60 million people have been infected with HIV and 25 million people have died of HIV-related causes (UNAIDS/WHO, 2009). Both HIV prevalence rates and the numbers of people dying from AIDS vary greatly between African countries. Numerous reports have been published regarding seroprevalence of HIV infection in specific subgroups in Africa (Kowane, 1991). Currently, Nigeria HIV prevalence is low (4.1%) compared to the rest of Africa. However, because of its large population (it is the most populous country in sub-Saharan Africa), this equates to around 2.6 million people living with HIV (UNAIDS, 2008; Avert, 2010). Overall, rates of new HIV infections in sub-Saharan Africa appear to have peaked in the late 1990s, and HIV prevalence seems to have declined slightly, although it remains at an extremely high level (Avert, 2010).

By the end of 2009, it was estimated that there will be only one HIV testing and counseling facility for approximately every 53,000 Nigerian adults, which shows how desperately the government needs to scale up HIV testing services (WHO, UNAIDS & UNICEF, 2008). Statistics show that by the end of 2009, about 3 million

people were living with HIV in Nigeria (NACA, 2009). However, the National Agency for the Control of AIDS (NACA) has just launched its National Strategic Framework to cover 2010 to 2015 (NACA, 2009). This Framework is to reach 80 percent of sexually active adults and 80 percent of most at-risk populations with HIV counseling and testing by 2015; ensure 80 percent of eligible adults and 100 percent of eligible children are receiving ART by 2015; and to improve access to quality care and support services to at least 50 percent of people living with HIV by 2015 (Sofo et al., 2003). Nigeria, therefore, still has a long way to go in combating its devastating AIDS epidemic (Dirisu et al., 2011).

The aim of this study was to detect the presence of HIV 1 & 2 antibodies among intending blood donors and to compare the prevalence determined with those reported for blood donors and other subpopulations in developed and other developing countries.

2. MATERIALS AND METHODS

2.1. STUDY AREA

The study area is the Blood Grouping & Serology Unit, University College Hospital (UCH), located at the municipal area of Ibadan, which is made up of five local government areas. Ibadan is the capital city of Oyo State located in the forest zone of southwestern Nigeria. Ibadan city lies on the longitude 3°5' East of Greenwich meridian and latitude 7°23' North of the Equator. Besides being the largest indigenous city in Africa south of Sahara, the city is an important trade and educational centre. It also houses one of the largest and foremost teaching hospitals in Africa. However, the city is characterized by low level of environmental sanitation, poor housing, and lack of potable water and improper management of wastes especially in the indigenous core areas characterized by high density and low income populations.

2.2. SAMPLE COLLECTION

Two hundred blood samples were collected from Blood Grouping & Serology Unit, University College Hospital, Ibadan, South Western Nigeria.

2.3. HIV ANTIBODIES SCREENING

Determine® HIV-1/2 Test cards (manufactured by Inverness Medical, Japan), Global® HIV-1/2 Kit (manufactured by Global Diagnostics, USA) and HIV -1/2 Stat- Pak® Assay (manufactured by Chembio Diagnostic Systems, USA) were used in a stepwise order for the detection of HIV-1 and HIV-2 in the blood. These methods which are immunochromatographic and qualitative in nature, detect the presence of antibodies to HIV-1 and HIV-2 in human blood and can be read in-vitro having more than 99.9% sensitivity and 99.75% specificity. The interpretation of test results was performed according to the manufacturer's specifications.

2.4. DATA ANALYSIS

Data was presented using descriptive statistics for HIV antibody. The prevalence for HIV infection was calculated by using patients with positive samples as numerator and the total numbers of patients enrolled in this study as denominator. The data generated from this study were presented using descriptive statistics. The data was subjected to statistical analysis using SPSS computer software version 19.0 for Windows to determine any significant relationship between infection rate, age and gender.

3. RESULTS

A total of 200 blood samples were tested for antibody to HIV. The age range of the blood donors used in this study was 18 to 61 years. The age range of the blood donors used in this study was 18 to 61 years. The Standard deviation for the age is 8.4 with mean 32.4, median 32 (range 18 - 61), standard error of mean 0.6 (Table 1). Majority of the blood donors were males [169(84.5%)] while 15.5% (n = 31) were females. The male:female ratio was 5.5:1 (Table 2).

3.1. Detection of HIV antibodies in relation to Age Groups

Of the total of 200 samples tested for antibody to HIV, only 35 tested positive giving HIV prevalence of 17.5%. In the age group 40 years and above, a total of 48 samples were tested, of which 7 tested positive, thus, giving the prevalence of 14.6%. Age groups 18-39 years of age showed prevalence of 18.4 for HIV antibody as shown in Table 1. There was a significant association ($P<0.05$) between age groups and infection acquisition.

Table 1: Detection of HIV antibodies in relation to age groups

Age group (years)	No. Tested (%)	No. Positive for HIV (%)
18-39	152(76.0)	28(18.4)
40 and above	48(24.0)	7(14.6)
Total	**200(100.0)**	**35(17.5)**

3.2. Detection of HIV antibodies in relation to sex

Table 2 shows the prevalence of HIV in relation to sex. HIV antibody was more prevalent among females [6(19.2%)] than their male counterparts with 17.2% (n=29) prevalence for HIV (Table 2). Also, there was a significant association (P<0.05) between sex and infection acquisition.

Table 2: Detection of HIV antibodies in relation to Sex

Sex	No. Tested (%)	No. Positive for HIV (%)
Males	169 (84.5)	29(17.2)
Females	31(15.5)	6(19.4)
Total	**200(100.0)**	**35(17.5)**

4. DISCUSSION

From this study, the age range of blood donors was 18 to 61 years with a mean of 32.4 years. This is similar to that in the study by Alli et al. (2010) who reported that their blood donors in Ibadan, Nigeria were in the age range of 18 to 65 years with a mean of 31.3 years. Olokoba *et al.* (2009) also reported that their blood donors in Yola, Nigeria were in the age range of 18 to 61 years. Khan *et al.* (2002) reported that their blood donors were in the age range of 18 to 60 years. It is also similar to the findings of Muktar *et al.* (2005) in Zaria, Nigeria in which their donors had a mean age of 33.0 years even though their age ranged from 19 to 42 years. However, the donors in Jos, Nigeria were in the age range 21 to 50 years according to Egah *et al* (2004). Most of the blood donors in this study were males 84.5%. This is similar to the 84.5% reported by Alli et al. (2010). Egah *et al* (2004) reported 95.0% of the donors were males in their study. Olokoba *et al.* (2009) reported that 96.0% of their donors were males while Muktar *et al.* (2005) found that 98.0% of their donors were males. However, all the donors were males in the study by Elfaki *et al* (2008) among the Sudanese donors.

In this study, the overall prevalence rate was 17.5% (n=35). This study showed a high prevalence rate among the blood donors (17.5%) than what was previously reported. The prevalence rate reported in this present study was also higher than the national sentinel seroprevalence rate of <4.0% reported for Oyo State in 2010 (FMoH, 2011, Chukwu, 2011). However, it is lower than the 47.54% reported for HIV in a study by Dirisu et al. (2011) among intending blood donors in Benin City, Nigeria. Pennap *et al.* (2006) reported 38.65% prevalence rate of HIV and AIDS in Keffi and environs, Nassarawa State, Nigeria. Motayo *et al.* (2009) reported 13.6% among patients and 28.6% among pregnant women in Ibadan. However, this value is higher than the 12.0% reported among patients with pyrexia of unknown origin and 10.8% among STD patients (Motayo et al., 2009).

This finding differs from the 6.0% rate reported by Egah *et al.* (2004) among blood donors in Jos, Nigeria and the 4.55% reported in Cameroon (Musi *et al.*, 2004). Umolu *et al.* (2005) reported 10.0% seroprevalence rate of HIV among blood donors in Benin City, Nigeria. Buseri *et al.* (2009) reported the overall prevalence of HIV among prospective blood donors in Osogbo, Nigeria to be 3.1%. A zero seroprevalence rate was reported for HIV among blood donors in Ibadan (Alli et al., 2010). This rate also differs from the 3.5% seroprevalence reported for HIV in Enugu (Chukwurah and Nneli, 2005); the 3.8% seroprevalence of HIV reported among blood donors at MNH in Dar es Salaam (Matee et al., 2006). Chikwem *et al.* (1997) reported that one of the most common infections transmissible through blood transfusion is HIV-1 (5.8%) among blood donors in Maiduguri, Nigeria. Oronsaye and Oronsaye (2004) reported 7.0% donors positive for HIV and 0.6% donors positive for both HIV and HBsAg among donors in Benin City, Nigeria.

Adeokun (2006) noted that geographic variations in HIV prevalence may be due to previous hubs of sexually transmitted infections (STIs) or urban development in Nigeria. Equally, review of the HIV national sentinel survey showed that HIV prevalence varied significantly across geopolitical locations as well as between different risk groups in Nigeria (Olaleye et al., 2006; Utulu and Lawoyin, 2007). The wide differences in the HIV infection rate among the voluntary blood donors in the different regions within Nigeria, and even outside Nigeria may be due to the differences in geographical locations, age range of donor patients, sample sizes, the period of time the studies were carried out, and the different socio-cultural practices such as sexual behaviour, marriage practices, circumcision, scarification, tattooing etc which take place in these regions (Olokoba *et al.* 2009; Alli et al., 2010).

In this study, two risk factors (age and gender) pertinent to transmission of HIV were evaluated. No one appeared to be significantly associated with HIV-1/2 antibodies prevalence among the samples screened. Age and gender were not significantly associated (P> 0.05) with HIV-1/2 seropositivity. Documented risk factors for contracting HIV-1/2 such as age, sex and tribal marks were used as bases for comparison (Sule et al., 2010). In a study by Buseri *et al.* (2009), the highest prevalence of HIV infections occurred among commercial blood donors and those aged

18 to 47 years old, the most sexually active age group. Also in this study, higher proportion (19.4%) of females than (17.2%) of males population had antibody to HIV-1/2, however, this difference was not significant (P>0.05). This was in line with the findings of Alikor and Erhabor (2005) and Sule et al. (2010), who reported no statistically difference in gender. Though, most studies have attributed that higher proportion of male than female population had antibody to HIV (Olaleye et al., 2006; Sule et al., 2009). Previous study by Olaleye et al. (2006) showed a significantly higher HIV infection rate among males than females in different regions and even in communities within the same geographic location in the country (Olaleye et al., 2006). 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 (Mitchell and Stephens, 2004; WHO, 2004; Sule et al., 2010).

The prevalence rate of HIV for the blood donors screened in this study is high (17.5%) and of all the three risk factors studied, no risk factor appeared to be associated with seropositivity thus, there is still need for adequate counseling and education about HIV and AIDS. Comparatively, HIV rate of 17.5% reported in this subpopulation may be a true reflection of the HIV rates in the population rather than the lower than 4.1% reported for Oyo State, in the 2010 national sentinel survey (FMoH, 2011). A number of African countries have conducted large-scale HIV prevention initiatives in an effort to reduce the scale of their epidemics and these include the use of condoms (Adeyi et al., 2006) and the provision of voluntary HIV counselling and testing (VCT) (Sule et al., 2010). In many developed countries, these steps have helped to virtually eliminate MTCT. Yet sub-Saharan Africa continues to be severely affected by the problem, due to a lack of drugs, services and information, and the shortage of testing facilities (Avert, 2010; Sule et al., 2010).

5. CONCLUSION

Conclusively, this study has further confirmed the presence of HIV infection among intending apparently healthy blood donors. This calls for the need for an extensive blood screening practice in our blood banks. In line with previous findings, it showed that, though this group recorded anti-HIV-1/2 prevalence, age and gender were not significantly associated with the HIV-1/2 seropositivity. The fact that these subjects are intending donors does not exclude them from being potential sources or carriers of transfusion transmissible infections (TTI‟s), especially HIV. So this study uncovered the fact that donors themselves are not an exemption to the general HIV pandemic ravaging sub-Saharan Africa, Nigeria precisely (Dirisu et al., 2011). It further emphasized the more urgent need for implementation of standard preventive measures and interventions especially health education and sex education among the general populace, and risk control programmes and measures aimed at reducing the spread of HIV infection. The use of condoms which play a key role in preventing HIV infection around the world (Adeyi et al., 2006) is also advocated. The provision of a more conducive HIV counselling and testing (HCT) which has been an important part of any national prevention programme could – and needs to be – made more widely available in places in the country.

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