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Detection and Seroprevalence of Hiv 1 & 2 Antibodies in Abeokuta, Southwest, Nigeria

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Abstract The HIV pandemic has ravaged mankind for over 3 decades. Gradually, incidence of new infections has declined globally due to increased prevention and control measures. In Southwestern Nigeria, there has been increased surveillance activity to complement control measures in recent years. We report here findings of the latest HIV surveillance revealing the prevalence of HIV in Abeokuta, Nigeria. About 744 subjects were tested for HIV seroconversion between January and March 2010. Screening tests were carried out using Determine™ HIV 1 & 2 (Abbott) and Chembio HIV 1& 2 Stat-Pak™ rapid test kits following manufacturer's instructions. A seroprevalence rate of 11.7% (87/744) was determined with a significantly higher seropositivity in females (16.0%; 60/375) than males (7.3%; 27/369). Age group 16-45 years old was found to have the highest seroprevalence rate of 13.6% (70/514), followed by the age group 46 years and older with 11.0% incidence (12/109), and lastly, the age group 1-15 years old had the lowest HIV seroprevalence of 4.1%(5/121). HIV prevalence in outpatient was the highest, (12.5%; 33/264). This was followed by OPD having 15.0 (9/60), inpatient (Ward) subjects who had 11.0% seroprevalence (22/199) and others having 8.3% seroprevalence (14/168). The lowest HIV seroprevalence was recorded in Outreach visitations with only 2 positive cases (3.8% seroprevalence; 2/53). This current report shows a fairly high HIV seroprevalence rate in Southwestern Nigeria, with relatively high rate of HIV infections among the elderly. According to these findings prevention and control measures should thereby be stepped up, particularly at the local level with more attention toward sexually active adults and the elderly.

Keywords Seroprevalence, HIV 1&2, Prevention, Control, Abeokuta

1. Introduction

The Human Immunodeficiency virus (HIV) is the agent responsible for the development of the dreaded Acquired immune deficiency syndrome (AIDS), with its several opportunistic infectious diseases and associated malignancies[1]. In Nigeria, the first case of HIV/AIDS was described in 1985 in a sexually active 13 year-old girl[2-3]. The prevalence has since grown to about 5% of the population in Nigeria[4] with an estimated 140 million inhabitants[5].

Globally, HIV prevalence is said to be on the decline because of health promotion activities directed towards preventive measures reducing the number of new infections and providing better treatment options for people living with AIDS. However, this seems not to be the case in sub-Saharan Africa despite concerted efforts by governments and global partners[6].

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Universal counselling and testing have been introduced as a policy in Nigeria with setting up of the National Agency for Control of AIDS (NACA) and respective state and local government AIDS control agencies. With the recently launched National Strategic Framework by NACA to run from 2010 to 2015[7], the following objectives were set up: to reach 80% of sexually active adults and 80% of the most at–risk populations with HIV counselling and testing, and to ensure that 80% of eligible adults and 100% of eligible children receive anti-retroviral therapy (ART) by 2015[8]. It is envisaged that as time progresses more people will have access to treatment and testing in even the most remote regions of the country.

The most widely applied testing strategy, particularly for initial serodiagnosis as well as for surveillance, is the rapid test kit which is based upon immunochromatographic detection of HIV antibodies by immobilized gp120 recombinant proteins on a solid matrix format like a cassette or strip[4,9]. This mode of testing is highly beneficial in resource poor setting like Nigeria and has been adopted by the Federal Ministry of Health. The WHO have endorsed rapid testing and developed universal testing algorithms for resource poor nations, showing the

sequential combination of 2 or 3 antibodies-based tests (ELISA and or rapid test) to confirm HIV test results[10]. In Nigeria, several studies have been done using this format of testing[4, 11-12]. In addition, there were several reports evaluating the performance characteristics of rapid test kits[13-14].

In Abeokuta and Ogun State, there were previous reports on prevalence of HIV in adult population as well as at-risk populations; however the need for regular and more recent reports on the prevalence of HIV/AIDS was pertinent for the achievement of the National Strategic Framework enacted by NACA. It was with this in mind that we decided to center our objective toward determining the prevalence of HIV/AIDS in Abeokuta in recently infected individuals across all age groups and both genders in one of the largest ART centers in Ogun State, Nigeria.

2. Materials and Methods

2.1. Study Area and Study Population

The study was carried out at the Institute of Human Virology supported HIV Laboratory at the Federal Medical Center, Abeokuta, Ogun State, Nigeria between January and March 2010. The Federal Medical Center is one of the largest hospitals in Ogun state serving patients from neighboring states like Lagos and Oyo States, with a capacity of 300 beds and various specialties including Urology, E.N.T., Internal medicine, Pediatrics among others. There is also a Community Medicine department which uses the ART Clinic and the HIV laboratory. Abeokuta city is a low income, civil servant city with low level sanitation, poor housing and lack of potable water. There is however ongoing urban development especially around the cosmopolitan areas of the city. Three hundred and thirty nine subjects whose blood samples were tested at the HIV laboratory between January 2010 and March 2010 were retrospectively reviewed for the study, simple demographic information were retrieved from the Laboratory register. All records of subjects were treated with the highest level of confidentiality in accordance to the Belmont report[15].

2.2. Sample Collection

Blood sample was drawn from attendees as well as patients attending various clinics of the Center. About three milliliters of blood was collected aseptically from patients and dispatched to the laboratory for immediate testing.

2.3. Screening For HIV 1 And 2 Antibodies

Testing of sera samples was done following Federal Ministry of Health (FMoH) testing Algorithim, using Determine HIV1/2 ™ Abbott, and Chembio HIV1/2 Statpak™. The screening for HIV antibodies was carried out using parallel double rapid HIV antibody tests; Chembio HIV-1/2 Stat-Pak® (by Chembio Diagnostics Systems, Inc. Medford, New York 11763 USA) and Abbott Determine HIV-1/2® test kit (by Abbott Japan Co., Ltd. Minto-Ku, Tokyo, Japan) according to the manufacturers' instructions. A seropositive test means observable seroreactivities in HIV with both test kits. Discordant results and seroreactivity to a single kit were recorded as seronegative.

The test kit is a qualitative, lateral flow immunoassay for the detection of HIV antibodies in serum or plasma. The membrane is pre-coated with anti-HIV antibodies on the test line region of the strip. During testing, the serum or plasma specimen reacts with the particle coated with the anti-HIV antibody. The mixture migrates upward on the membrane chromatographically by capillary action to react with anti-HIV antibodies on the membrane and generate a colored line. The presence of this colored line in the test region indicates a positive result, while its absence indicates a negative result. To serve as a procedural control, a colored line will always appear in the control line region indicating that proper volume of specimen has been added and membrane wicking has occurred. The interpretation of test results was performed according to the manufacturer's specifications. Discordant results were recommended for retesting after a period of three months. Subjects with double rapid HIV antibody tests that were non-reactive were reported as HIV-uninfected[16-17].

2.4. Data Analysis

The data generated from this study were presented using descriptive statistics. The data was subjected to Fisher's Exact Test for comparison of proportions to determine any significant relationship between infection rate, age and gender. Confidence level was set at $p = 0.05$

3. Results

During our study period, a total of 744 blood samples were tested for anti-HIV antibody with an age range of 0.5yrs-70yrs, median age 32 years. A seropositivity rate of 11.7% (n=87) was determined with a statistically significant difference in seropositivity in relation to gender, age and hospital attendance.

3.1. HIV Seroprevalence in Relation to Gender

Table 1. Prevalence of HIV positivity in relation to Gender

Sex	No tested (%)	No Positive for HIV (%)
Males	369 (49.6)	27 (7.3)
Females	375 (50.4)	60 (16.0)
Total	**774 (100)**	**87 (11.7)**

Table 1 shows the gender distribution of HIV seropositivity; 60 out of total of 375 females were tested positive for HIV representing seroprevalence of 7.8% (60/774) of the total population and 16.0% (60/375) of the female sub-population. In contrast, HIV seroprevalence recorded in males was 3.6% (27/774) of the total population and 7.3% (27/369) of the male sub-population tested. There

was a statistically significant difference ($p < 0.05$) in HIV seropositivity between the genders.

3.2. Seroprevalence of HIV In Relation to Age Group

Table 2 shows the prevalence of HIV infection according to age group of attendees of Federal Medical Center Abeokuta, ART center. In our present study, age group 16-45 had the highest rate of HIV seroprevalence of 13.6 % (70/514), followed by the age group 46 and above (11%; 12/109), and lastly, age group <1-15 had the lowest HIV seroprevalence of 4.1% (5/121). There was a statistically significant difference in HIV positivity between age groups ($p < 0.05$).

Table 2. Seroprevalence of HIV in relation to Age range

Age range(years)	No tested (%)	No positive for HIV (%)
<1-15	121 (16.3)	5 (4.1)
16-45	514 (69)	70 (13.6)
46 and above	109 (14.7)	12 (11.0)
Total	**744 (100)**	**87 (11.7)**

3.3. Prevalence of HIV Infection In Relation to Clinic Attendance and Ward

The seroprevalence of HIV was evaluated in subjects based on the type of clinics they attended either outpatient or Ward admitted inpatient cases. For outpatient cases, clinics were categorized into Hospital counselling and testing (HCT), Outreach visitations and Outpatient Clinic (OPD). For inpatient cases, subjects were simply grouped as Ward. The highest prevalence rate was recorded among outpatients, with HCT having 15.2% prevalence of the total population tested (40/264); followed by OPD having 15.0 (9/60), inpatient (Ward) subjects who had 11.0% seroprevalence (22/199) and others having 8.3% seroprevalence (14/168). The lowest HIV seroprevalence was recorded in Outreach visitations with only 2 positive cases (3.8% seroprevalence; 2/53) as shown in Table 3.

Table 3. Seroprevalence of HIV according to type of hospital visitation

Type of Visitation	No tested (%)	No positive (%)
HCT	264 (35.5)	40(15.2)
OPD	60 (8.0)	09(15.0)
Ward	199 (26.7)	22(11.0)
Outreach	53 (7.2)	02(3.8)
Others	168 (22.6)	14(8.3)
Total	**744 (100)**	**87 (11.7)**

4. Discussion

Our current report reviews the prevalence of HIV antibodies in 744 subjects mostly residing in Abeokuta and its environs, located in Ogun State, South west Nigeria. An overall prevalence rate of 11.7% (87/744) was observed in our study. This is higher than in a study done recently at Ibadan with a rate of 9%[11-12]. This prevalence rate is also higher than the national prevalence rate of 4.0% reported for Oyo State in 2010[18]. The prevalence rate of 11.7% is slightly above the previously predicted figure for Ogun State. Even though this prevalence rate was recorded in Abeokuta, it provides an insight into the likely seroprevalence rate for the whole Ogun State. In other States of Nigeria with similar population distributions such as in this study, prevalence rates are comparably lower. For instance, a seroprevalence rate of 3.5% was previously reported for Enugu, Nigeria[19] and 10.0% among blood donors in Benin City, Nigeria[20]. The relatively high prevalence rate in our current study might be attributed to both the increase in case detection and the expansion of coverage areas for HIV counselling and testing over the years. This would reflect the number of new infections detected added to the number of previously detected HIV infections.

The demographic profile of tested participants reviewed in our current study revealed that more women were infected than men. This is in agreement with the previous reports of the higher HIV seroprevalence in females, than males[11-12, 21]. It has been previously documented that females are at a higher risk of HIV infection than men and that they are a major driving force in the epidemiology of HIV globally accounting for over 50.0% of infections[11-12, 22]. Age range distribution revealed that the highest HIV prevalence rate was recorded in the adult age group (15-45 years) while the lowest rate was recorded in the paediatric age group. This trend agrees with the most reports which identify the sexually active adults as the most at-risk age bracket for HIV infection[11-12, 21, 23]. Health promotion experts have highlighted that vices such as alcoholism, unprotected casual sex and occupational hazards particularly in migrant workers are principal HIV transmission factors accounting for high infection rates among adult of reproductive age.

Our present study however highlights the fact that the middle aged and elderly populations are at an almost equivalent risk of exposure as the young adolescent age group, with a prevalence of 11% in the above 45 years age group. This indicates that preventive health measures needs to be channelled toward this age bracket and more attention be paid to health promotion activities in our elderly population who generally believe they are out of the most vulnerable period of their lives in regards to sexually transmissible infections. Factors such as previous STI and HIV infection have been previously identified a major factor in HIV transmission, in a study done at Ibadan; a rate of 10.8% was reported in STI patients and 28.6% in pregnant women[21].

Hospital attendance and HIV prevalence with respect to the type of Clinic attended was also investigated. Seroprevalence according to the various Clinics attended and inpatient admission revealed that Hospital Counselling and testing (HCT) recorded the highest rate with 40 cases (15.2% seroprevalence) in this sub-population and 5.4% seroprevalence for the entire population. Subjects who attended Outpatient clinics also were recorded to have a high seroprevalence rate of 15.0% in the sub-population tested and 1.2% seropositivity for the entire population.

Several reports have indicated that voluntarily tested prospective blood donors have displayed a high HIV prevalence of up to 10.0% as reported among blood donors in Benin City[20], and up to 17.5% as reported for intending blood donors in Ibadan[23]. In subjects voluntarily tested at Outreach visitations outside our center, a low HIV seroprevalence of 3.8% for the sub-population and 0.3% of the total population was recorded in our study. This low HIV seroprevalence in Outreach patients reported here differs significantly from the seroprevalence in HCT subjects but it is in agreement with earlier reports of low prevalence rates in voluntarily tested blood donors in Ibadan[24] and in Enugu[19]. There are several reports showing variations in HIV prevalence among different populations[11-12, 23, 25], where geographic variations in HIV prevalence may be attributed to hubs of STI and rapid urbanization[26, 27].

5. Conclusions

We reported here a very recent HIV prevalence in a representative general population in Abeokuta metropolis, there was a statistically significant difference in gender ($p < 0.05$) and within age groups. There was a significantly high prevalence rate among HCT subjects as compared to In-patients under admission. Evidenced and reported risk factors such as age, gender were investigated. Our prevalence rate of 11.7% is higher than previous reports from south western Nigeria; 3.1% in Oshogbo[20], 9.0% in Ibadan[11]. This is likely to be due to increased testing capacity and case detection in our locality and not necessary as a result of increase in HIV transmission rates; however this is still debatable and subject to further investigation. It is however suggested that other investigators look into the transmission dynamics and their role in new HIV infections in Abeokuta. The government at the local level should also support HIV prevention programmes in at risk populations and the elderly.

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