

HUMAN IMMUNO DEFICIENCY VIRUS INFECTION: SEROCONVERSION DURING PREGNANCY

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ABSTRACT

Background: Nigeria HIV/AIDS disease burden is now the second largest worldwide. Acute HIV infection (sero-conversion) in pregnancy is of paramount importance because of its associated higher risk of vertical transmission.

Objective: This is to detect booked patients, who at registration were in the window period of immunodeficiency virus infection, but tested reactive to a repeat HIV screening in labour.

Materials and Methods: All booked patients for the months of April and May 2010 were offered counseling and testing, with opt-out option, at booking. The patients found to be non-reactive at booking, were followed up over a period of one year and had the screening repeated in labour with rapid test kits, if three months or more had elapsed after the initial screening.

Results: A total of 206 patients registered for ANC during the period of study and nine patients tested reactive to HIV at the booking for ANC, giving a prevalence rate of 4.4%. Of the remaining 197 patients, 108 parturients (52.4% of the booked population) presented in labour but 86 (79.6%) of them met the inclusion criteria and were thus studied. The remaining 89/206 (43.2%) of the booked patients were lost to follow up.

The duration of ANC in the studied population ranged from 12 to 33 weeks with a mean of 18.7 weeks. Out of 86 HIV negative patients that presented in labour, 2 (2.3%) patients tested reactive (sero-converted) when re-screened for HIV infection in labour. Majority of the patients 84 (97.7%) engaged in unprotected sexual intercourse in index pregnancy, despite the fact that only 18 (21%) of the participants knew their partners' status. Abnormal vaginal discharge which may signify STI was found to be statistically significant in acquisition of HIV (OR = 0.68, 95 C.I = 0.47 – 0.99).

Conclusions: The prevalence rate of HIV infection among pregnant women, in this study was 4.4% with a sero-conversion rate of 2.3% in previous sero-negative pregnant patients. A repeat counselling and confidential Testing for HIV infection late in pregnancy or in labour may therefore be justified and is recommended.

KEYWORDS: HIV Infection, HIV Sero-Conversion, Pregnancy

INTRODUCTION

Human immunodeficiency virus infection is currently the fourth leading cause of mortality in the world.¹⁻³ Although the Sub-Saharan Africa accounts for only 10% of the world's population, it contributes two-third of Human Immunodeficiency Virus infection/Acquired Immunodeficiency Disease burden.^{1,4} In Africa, HIV/AIDS is more prevalent

in women (60%).^{1,3,5,6} This translates into higher prevalence of vertical transmission of HIV infection in Africa. Annual HIV birth (vertical transmission) was 56,681 with a total AIDS orphaned being 2.23 million.^{4,5}

It takes some time after a person is first infected with HIV for the body to produce enough antibodies detectable by a test⁷ HIV is active in an infected person's system and transmissible during this window period, even though the widely used rapid antibody test kits test are unable to detect the presence of the HIV infection at this period.^{7,8} Studies have shown evidence of sero-conversion within a period of three months among pregnant women, as well as among male and female blood donors,⁹⁻¹¹ the range is 1-6 months.⁶⁻⁸

The rate of vertical transmission of infection is 5 - 10% in-utero, 10 - 20% during labour and 5 - 20% during breastfeeding in the post delivery period.^{3,7} Human immunodeficiency virus infection acquired during pregnancy usually bears a worse prognosis with a higher risk of vertical transmission,^{6,12} and should thus not be missed. The advent of prevention of mother-to-child transmission of human immunodeficiency virus infection has grossly reduced the vertical transmission of HIV. Likewise, with introduction of antiretroviral drugs, human immunodeficiency virus infection, hitherto referred to as deadly and fatal disease, is now referred to as a chronic viral infection.⁶ The aim of this study is therefore to determine the overall prevalence of HIV infection in and the sero-conversion rate among pregnant patients registered for antenatal care at LAUTECH Teaching Hospital, Osogbo, Nigeria.

MATERIALS AND METHODS

This descriptive, cross sectional prevalence study was carried out at both the antenatal clinic and the labour ward of the Obstetrics and Gynaecology Department of LAUTECH Teaching Hospital Osogbo, Osun State.

Sample Size Determination

Sample size for the study was determined to be 61 patients, using Fisher's formula¹³, with HIV prevalence set at 4.1%⁶ and precision of 95% confidence interval. Deliberate 20% over-sampling was added to the sample size calculated for possible drop-out/loss-to-follow-up, thus setting total sample size at 74 pregnant women for the study. Ethical clearance was obtained from the ethical committee of LAUTECH Teaching Hospital as well as informed consent from patients studied with right to opt-out mid-way if need be without suffering any discrimination. Data obtained were confidentially kept.

Sampling Procedure/Technique

All patients registered for Ante-natal care during the months of April and May 2010 had counselling and confidential testing (with opt-out method) done to determine the sero-prevalence of HIV among pregnant women. Those that were non-reactive were followed up till delivery. Those who met inclusion criteria were studied. Patients whose booking – delivery interval was less than three months were excluded from the study in order to allow time for sero-conversion as in other previous studies.^{9,11,15} Other exclusion criteria included non-consented parturient and parturients in emergency or critical conditions that could not have counselling and testing done. Data were collected using a structured proforma. The Participants were interviewed. Likewise, supplementary information were obtained from respective case notes. Information on the proforma included age, parity, religion, level of education, patient's occupation, partner's occupation, their retroviral statuses and presence or absence of some risk factors for contacting HIV infection in pregnancy.

Data Collection

When a recruited patient that is admitted for abdominal or vaginal delivery met the above criteria, re-counselling

and testing for Human Immunodeficiency virus was offered at no cost to consenting patient using Determine® strip and Stat pak®; with the use of Unigold® as a tie-breaker, in the event of inconclusive test results. Universal safety precaution and package insert instructions were ensured when handling specimens and work areas were kept clean and organized.

Test procedure entailed labelling each package with patient's identification number. The least calloused fingertip of middle, ring or index finger were chosen and warmed as needed with warm water or moist towel to increase blood flow. Same fingertip was cleansed with alcohol and allowed to dry. Fifty micro-litre of blood sample was aseptically collected by finger prick into Well "A" of the Unigold/Stat pack cassette/determine strip. First drop of blood was wiped off. Two drops of buffer was applied to the sample pad. A period of 10-20 minutes was allowed before the test result was read. The test was reactive i.e. positive if there were two distinct red lines in both the "control" and "test" regions. The test was non-reactive i.e. negative, if one red line appears in the "control" region and no line in the "test" region. Post-test counselling was done as soon as feasible in the post-partum period and necessary treatment given, before discharge from the hospital.

Data Analysis

Data processing was with SPSS. Frequency tables were generated. Association between the primary outcomes and selected independent factors were determined using Student T-test for continuous variable and Chi square/Fisher's exact test for discrete variables. Cross tabulation was further used to determine the role of potential factors in HIV sero-conversion in pregnancy. Level of significance was set at a $P \leq 0.05$. Primary outcome measure was a reactive HIV screening result in labour while secondary outcome measures were assessment of socioeconomic and known risk factors on sero-conversion in pregnancy which are level of education, occupation, multiple sexual relationships in pregnancy and unprotected sexual intercourse.

RESULTS

Over a period of two months, 206 patients registered for ANC with 100% of them accepting counselling and testing. Only 9 (4.4% HIV prevalence) patients tested reactive and were exempted from the study. Of the remaining 197 patients, 108 parturients (52.4% of the booked population) presented in labour but 86 (79.6%) of them met the inclusion criteria and were thus studied. A total of 89/206 (43.2%) of the booked patients, delivered outside the facility and thus, lost to follow up. Out of 86 HIV negative patients followed up to labour 2 (2.3%) patients tested reactive (sero-converted) when re-screened for HIV infection in labour. Their ages ranged between 18 - 42 years. Thirty-seven (43.0%) of the studied population were primigravidae and 4 (4.7%) were grand-multiparas while more than half 45 (52.3%) were multiparas.

The details of the demographic status of the participants are as shown in Table 1. Of the 86 patients studied, 78 (90.7%) booked late (gestational age more than 13 weeks), 8 (9.3%) during the third trimester while the majority 70 (81.4%) got registered for ANC during second trimester. Only 8 (9.3%) got booked for ANC during the first trimester. The duration of ANC in the studied population ranged from 12-33(\pm 18.7) weeks. The number of ANC attended ranged from 3 to 12 times with an average of 7.3 visits.

Table 2 shows risk practices which promote HIV acquisition during pregnancy. Majority of the patients 84/86 (97.7%), engaged in unprotected sexual intercourse in index pregnancy. However, only 2 (2.3%) patients admitted to having had multiple sexual partners in the index pregnancy. Six out of the 86 patients (7.0%) had sexually transmitted infection while the 80 patients did not. However, 14/86 (16.3%) respondents attested to having abnormal vaginal discharge with only 5/86 (5.8%) having history of genital ulcer in index pregnancy. Of the respondents, 4 (4.7%) had blood transfusion during index pregnancy due to anaemia in pregnancy from malaria and malnutrition.

Table 3 shows the HIV status of the respondents at booking and in labour with their partners'. Only 18/86 (20.9%) of the respondents knew their partners' HIV status with one of the partners being positive (1.2%). The remaining 68 (79.1%) did not know their partners' HIV status.

Table 4 shows a cross tabulation of various risk factors for HIV in pregnancy. This study revealed that abnormal vaginal discharge in pregnant woman was associated with greater risk of HIV sero-conversion. Abnormal vaginal discharge was seen in all the patients that sero-converted in pregnancy. This was found to be statistically significant in acquisition of HIV (OR = 0.68, 95 C.I = 0.47 – 0.99). Cross tabulations of HIV status in labour with other identified risk factors for HIV infection were not statistically significant as shown in Table 4. However, all pregnant women that sero-converted did not know their husband's HIV status and engaged in unprotected sexual intercourse.

Three (3.5%) of the patients delivered prematurely and 5 (5.8%) were post-dated. The rest of the studied population (90.7%) delivered between 37-40 weeks of gestation. Only 2 (2.3%) of the patients tested reactive/sero-converted when re-screened in labour. Of these, one was 29 and the other 24 years of age.

They both had secondary education. One was an unskilled worker while the other a house-wife. Their partners were skilled and unskilled workers respectively. They were para 5 and para 0 respectively and booked for ANC at 22 and 17 weeks of gestation. The numbers of Ante-natal Clinic visits were 6 and 4 respectively. Estimated Gestational Ages at delivery were 38 and 39 weeks respectively.

TABLES OF RESULTS

Table 1: Socio-Demographic Characteristics of Respondents (n = 86)

| Variables | Frequency | Percentage |
|-----------------------------|-----------|------------|
| Age (Years) | | |
| Less than 20 | 2 | 2.3 |
| 20 – 24 | 4 | 4.7 |
| 25 – 29 | 43 | 50.0 |
| 30 – 34 | 30 | 34.9 |
| 35 and above | 7 | 8.1 |
| Educational Status | | |
| None | 1 | 1.2 |
| Primary | 4 | 4.7 |
| Secondary | 14 | 16.3 |
| Post-Secondary | 67 | 77.8 |
| Religion | | |
| Islamic | 26 | 30.2 |
| Pentecostal Christian | 46 | 53.5 |
| Orthodox Christian | 14 | 16.3 |
| Patients' Occupation | | |
| Housewife | 7 | 8.1 |
| Unskilled Labour | 19 | 22.1 |
| Skilled Labour | 43 | 50.0 |
| Professional | 17 | 19.8 |
| Partners' Occupation | | |
| Unemployed | 4 | 4.7 |
| Unskilled Labour | 12 | 14.0 |
| Skilled Labour | 42 | 48.8 |
| Professional | 42 | 48.8 |
| Parity | | |
| 0 | 37 | 43.0 |
| 1-4 | 45 | 52.3 |
| 5 or more | 4 | 4.7 |

Table 2: Risk Factors for HIV Infection (n =86)

| Risk Factors | Frequency (Percentage) | |
|----------------------------|------------------------|-----------|
| | Yes (%) | No (%) |
| Unprotected sex | 84 (97.7) | 2 (2.3) |
| Multiple sex partners | 2 (2.3) | 84 (97.7) |
| STD | 6 (7.0) | 80 (93.0) |
| Genital ulcer | 5 (5.8) | 81 (94.2) |
| Abnormal vaginal discharge | 14 (16.3) | 72 (83.7) |
| Blood transfusion | 4 (4.7) | 82 (95.3) |

Table 3: Human Immuno-Deficiency Virus Status (n = 86)

| HIV Status | Frequency (Percentage) | | |
|-----------------------|------------------------|--------------|-----------|
| | Reactive | Non-Reactive | Not Known |
| HIV status at booking | 0 | 86 (100) | 0 |
| HIV status in labour | 2 (2.3) | 84 (97.7) | 0 |
| Partners' HIV status | 1 (1.2) | 17 (19.7) | 68 (79.1) |

Table 4: Risk Factors for HIV Infection versus HIV Status in Labour(n = 86)

| Risk Factors | HIV Status in Labour | | | P Value |
|---|----------------------|------------------|-------|---------|
| | Reactive (%) | Non-Reactive (%) | Total | |
| Abnormal Vaginal Discharge | | | | |
| Yes | 2 (100.0) | 12 (14.4) | 14 | 0.025* |
| No | 0 | 72 (85.6) | 72 | 0.025* |
| Unprotected Sexual Contact | | | | |
| Yes | 2 (100.0) | 82 (97.6) | 84 | 0.954 |
| No | 0 | 2 (2.4) | 2 | |
| Multiple Sex Partners | | | | |
| Yes | 0 | 2 (2.4) | 2 | 0.954 |
| No | 2 (100.0) | 82 (97.6) | 84 | |
| STI | | | | |
| Yes | 1 (50.0) | 5 (6.0) | 6 | |
| No | 1 (50.0) | 79 (94.0) | 80 | 0.135 |
| Genital Ulcer | | | | |
| Yes | 1 (50.0) | 4 (4.8) | 5 | 0.114 |
| No | 1 (50.0) | 80 (95.2) | 81 | |
| Blood Transfusion in Index Pregnancy | | | | |
| Yes | 0 | 4(4.8) | 4 | 0.909 |
| No | 2 (100.0) | 80 (95.2) | 82 | |

* Fisher's exact test

DISCUSSIONS

According to 2008 WHO HIV sentinels survey, Osun state had second lowest HIV prevalence (1.2%), little higher than Ekiti state (1.0%) in Nigeria.¹ Despite this fact, 2 (2.3%) of the 86 patients tested reactive when re-screened for HIV infection in labour. Worthy of mention that 2011 report revealed that Osun has deteriorated to the 10th position among the states with a prevalence of 2.7%.² Data from Zimbabwe, South Africa and Tanzania revealed that approximately 4.8%,¹⁴ 5.2%¹⁶ and 3.0%¹⁷ of pregnant women respectively, who were initially HIV sero-negative sero-converted prior to delivery. Other studies in Brazil and the United States reported HIV incidences of 0.2/100 pregnant women per annum and 5.3/1000 person years, respectively.^{12,18}

HIV acquisition rises during pregnancy with an incidence rates of 2.3/100 person years,¹⁵ compared to 1.1/100 person years in non-pregnant and non-lactating woman and 1.3/100 person years during lactation.¹⁵ This was explained as possibly due to hormonal changes affecting the genital tract mucosa or immune responses.¹⁵

A repeat HIV testing late in pregnancy or during labour therefore, will further prevent both vertical and horizontal transmission of HIV infection^{17,19} as well as increase ARV provision for women who sero-convert during pregnancy.^{20,21} Such repeat screening has been found to be cost effective.^{20,22} In settings where HIV-1 incidence is 1.2 per 1000 persons year or higher, the cost of the repeat tests are offset by averted medical costs and it is thus recommended in such setting.²⁰

Maternal viral load is the most consistent predictor of mother-to-child transmission of HIV infection.¹⁵ Women with acute phase HIV infection during pregnancy are extremely at high risk of perinatal transmission.^{12,15,23} A case report was made of HIV sero-conversion in a 32 year old Caucasian late in pregnancy. Despite the use of HAART, Cesarean section and formula feeding to reduce mother-to-child transmission of the infection, the baby was found to be infected by 12th week of age.⁹ Yet another case report of HIV sero-conversion during late pregnancy was made, in a woman after her partner was admitted with AIDS defining illness.⁹ In addition to high viral load,²⁴ other identifiable risk factors for HIV sero-conversion in pregnancy are HIV sero-discordance, being employed (45.3% versus 29%, $p = 0.01$), married (especially polygamy 19.6% versus 6.7%) and patients from a high prevalence region.^{9,25}

In this study, 30.2% were Muslims while 69.8% were Christians. No Traditionalist was found throughout the period of study. This is not to say they are extinct. It has rather buttressed the fact that the impact of religion on medical/social behaviour cannot be over emphasized. A Traditionalist might possibly seek spiritual healing or visit trado-medical personnel than show up for orthodox medical care. Level of education and economic status notwithstanding, studies have shown that some patients can possibly get engaged in high risk behaviour for religious reason.²⁶ For instance, non-use of contraceptives by Catholics (barrier methods inclusive); yet women are not permitted to deny their husband sexually for any reason. Simpson in a study conducted in Zambia found out that when compared with other churches, Catholic Churches were more judgmental and stigmatized her HIV positive members.²⁶ This negatively affected the ART uptake of such patients.²⁶

Worthy of mention is the fact that as high as 97.7% of the respondents engaged in unprotected sexual intercourse with 79.1% of their partners' HIV status not known. In addition, 6 (7%) had sexually transmitted infections, 5.8% had genital ulcers and another 4.7% had homologous blood transfusion in the index pregnancy. These are possible risk factors for HIV infection. Only 2.3% of the studied population attested to having multiple sexual partners. This is just the tip of an ice-berg because it is not socially or culturally acceptable for a woman to have more than one sexual partner.

A second look at population that sero-converted revealed that both patients were in their second decade of life and were both below the mean age (29.3 ± 4 years) for the studied population. Both of them were secondary school leavers and of low socioeconomic status. These are possible risk factors. They both booked late for ANC and as such, they missed many counselling sessions. This put them at greater risks. They both delivered at term. This is in keeping with the fact that uncomplicated HIV infection has no adverse effect on the course of pregnancy.^{9,15}

None of the two patients that sero-converted knew their partner's HIV status and yet engaged in unprotected sexual intercourse. They both had abnormal vaginal discharges but were not identified as having STI. Unprotected sexual intercourse and STI were found to be independent risk factors for HIV sero-conversion.²⁷ Those who did not sero-convert in a study conducted at Zimbabwe were more likely to have used condom with their partner(s) (OR = 0.68, 95 C.I = 0.47 – 0.99).²⁷

In a similar study carried out at Southern Brazil, the incidence of HIV-1 sero-conversion in pregnancy was 8:1000.²⁸ Likewise, in this same study, there was 8.2% vertical transmission in group of patients with unknown HIV sero-conversion time and 33% in those with proven HIV infection sero-conversion during pregnancy.²⁸ Time interval for re-

screening was similarly three months. However, the vertical transmission in that study was tested with RNA and DNA PCR, which has a higher sensitivity and specificity than rapid antibody testing.²⁸

Mbizvo et al in their own study found HIV sero-conversion incidence to be 4.8%.²⁷ This however entailed screening in pregnancy, labour, six weeks post-delivery and then a serial three-monthly re-screening till 24 months post-delivery or termination due to subsequent pregnancy.²⁷ Women aged 17 years and below had the highest sero-conversion incidence (6.25%).²⁷ This was followed by those aged 18 and 19 years (5.42%).²⁷ In comparison, only two (2.3%) of my respondents were aged below twenty years. These factors might account for the lower sero-conversion incidence in this study.

In a study conducted in six United States cities from 2001 to 2005, 11% of the HIV-infected pregnant women were shown to have primary infection based on a two-test approach at subsequent intervals, with a minimum of 12 weeks in-between.¹⁹ Arulogun in a recent study found out that 82.8% of the respondents believed HIV spread can be reduced with mandatory premarital HIV testing (MPHT).²⁹ Upcoming positive attitude towards MPHT offers a window of opportunity of undergoing HIV testing before marriage.²⁹ This will negate unknown partner's HIV status and fear of sero-conversion in pregnancy to an extent. However, mandatory testing is unethical, promotes stigmatization and violates patients' confidentiality. Another known risk factor for HIV infection is transfusion of blood and blood products. The parallel between blood safety and HIV cannot be overlooked. Current estimate of HIV transmission approaches 1:2,000,000 units transfused.³⁰ None of the patients who sero-converted in this study had blood transfusion. However, a study conducted on blood donors at the blood bank of LAUTECH Teaching Hospital found out a 3.37% false negative result with the use of rapid screening methods when compared with screening with ELIZA.⁷

Suffice to add that no matter the figure for HIV sero-conversion in pregnancy, it underestimates the magnitude of infection among women but closely approximate that of the general population.³¹ The age adjusted HIV 1 prevalence among pregnant women was in a study found to be 32.5% (5.4% versus 8.0%, $p = <0.001$) lower than that of all women but only 8.5% (5.4% versus 5.9, $p = 0.639\%$) lower compared with that of the general population.³¹ If this is applied in this study, it means that the HIV incidence among Osogbo women may be above 2.3% found among the booked pregnant population at Osogbo.³¹

CONCLUSIONS

This study has shown that the prevalence of HIV infection among pregnant patients registered for ANC at LAUTECH Teaching Hospital, Osogbo in Nigeria is 4.4%. It has also found out that the prevalence of HIV sero-conversion in booked pregnant women at time of labour in LTH is 2.3%. The study also suggested that there may be justification for a repeat HIV screening late in pregnancy or in labour for patients that were previously non-reactive for HIV while registering for ANC. In view of findings from this study, we recommend a repeat HIV screening in labour to further aid PMTCT of HIV, as well as a prompt evaluation and treatment of abnormal vaginal discharge in pregnancy, in view of its significant association with sero-conversion in this study.

LIMITATION OF THE STUDY

Community based study is usually more informative than a hospital based sentinel survey. Besides, most of the patients booked late for ANC with many more lost to follow up (43.2% of the booked population); thus 6 months screening interval could not be applied. In addition, Physical and psychological stress associated with parturition made patient interview difficult.

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