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Pattern of sexually transmitted infections in human immunodeficiency virus positive women attending antenatal clinics in north-central Nigeria

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ABSTRACT

Background: Sexually transmitted infections (STIs) are prevalent during pregnancy and may have adverse sequelae in both mother and fetus. Interactions between these infections and human immunodeficiency virus (HIV) synergize and may cause adverse pregnancy outcomes and reverse the gains of prevention of mother to child transmission of HIV. **Objectives:** The objective of this study is to determine the prevalence of candidiasis, trichomoniasis, gonococcal infection, syphilis, and bacterial vaginosis in HIV pregnant women and compare with HIV negative controls. **Materials and Methods:** A case-control study was conducted during the period from April to December 2010 at the Department of Obstetrics/Gynecology of University of Ilorin Teaching Hospital and three Primary Health Centers in Ilorin. A total of 160 HIV positive pregnant women attending antenatal clinics were recruited, along with the same number of HIV negative matched controls. A structured proforma was used to collect information from patients, vaginal examination was performed and samples were taken from the endocervix and the posterior vaginal fornix with swab sticks. **Results:** STIs were recovered from 142 women, giving overall prevalence of 44.4%. HIV infected women had a higher prevalence (60%) compared to uninfected (28.8%). The most prevalent STI was vaginal candidiasis (29.1%), followed by bacterial vaginosis (9.7%), and trichomoniasis (5.6%). The prevalence of candidiasis, bacterial vaginosis, and trichomoniasis was higher among HIV positive pregnant women compared to HIV negative controls ($P < 0.05$). No woman had syphilis or gonorrhea. **Conclusion:** The prevalence of candidiasis, bacterial vaginosis and trichomoniasis was higher in HIV infected pregnant women compared to uninfected. Routine screening of HIV infected pregnant women for these organisms is advocated.

Keywords: Antenatal clinics, human immunodeficiency virus + pregnant women, sexually transmitted infections

INTRODUCTION

Sexually transmitted infections (STIs) prevention and management are important outside pregnancy and even more so during pregnancy. Why reference? A number of STIs including syphilis, gonorrhea,

Chlamydia, trichomoniasis, genital herpes and human immunodeficiency virus (HIV) can cause complications during pregnancy and contribute to poor pregnancy outcomes.^[1]

The interaction between HIV infection and other STIs is well-established^[1,2] and coexisting STIs increase susceptibility of acquiring and transmitting HIV by 2-5 folds.^[3] Studies have shown that aggressive STI prevention, testing and treatment reduce transmission of HIV;^[4,5] though, some other studies have shown no impact on HIV incidence.^[6,7] From epidemiologic viewpoint, there is also a synergy between HIV and other STIs^[2] as they share a common sexual

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transmissibility and driven by common sexual behaviors.

In many African settings, HIV is now the most prevalent STI in pregnant women with 15-30% of women attending prenatal care clinics being infected with HIV,^[8] though the prevalence in West and Central Africa is much lower.^[9] The most significant sequel of maternal HIV infection in pregnancy is mother to child transmission of HIV. Many studies have described the presence of co-infections with other STIs as one of the maternal factors that increase the risk of prenatal transmission of HIV.^[10]

Sexually transmitted infections are notable for various adverse pregnancy outcomes and untreated maternal infection could lead to stillbirth, intrauterine growth restriction, premature rupture of membrane, preterm birth, low birth weight, and congenital mal-formation in a proportion of surviving infants.^[11] Other complications are puerperal sepsis, infant pneumonia, ophthalmia neonatorum especially with *Chlamydia* infection, while herpes simplex virus in pregnancy is associated with vertical transmission to the neonates.^[11]

The aim of this study was to determine the prevalence of candidiasis, trichomoniasis, bacterial vaginosis, gonococcal infection and syphilis in HIV positive pregnant women in our environment, when compared with matched HIV negative controls in pregnancy.

MATERIALS AND METHODS

This was a prospective case-control study in Ilorin, Kwara State, Nigeria. HIV positive pregnant women, who attended the antenatal clinic (ANC) of University of Ilorin Teaching Hospital and the three largest primary health care centers in Ilorin metropolis, were recruited.

Ethical clearance was obtained from the University of Ilorin Teaching Hospital. (Reference number UITH/CAT/189/12/712; 14th December 2009). Consent was obtained from all the patients after which pretest and posttest counseling were given. The HIV screening test was done using the Statpak, (ChemBio Diagnostic Systems, INC.) while determine test kits were used for confirmation. Patients who tested positive to HIV screening were enrolled into the prevention of mother to child transmission program and managed accordingly. All subjects with detectable and curable STIs were informed and treated.

A control group of HIV negative pregnant women (matched for age, educational level, and marital status with the HIV positive women) were also recruited.

Bio-data was collected using a semi-structured questionnaire, administered by doctors trained for this research. Other information collected included the number of total pregnancies including abortions and gestation age at booking.

A sterile speculum examination of the vagina was carried out and swabs taken from the endocervical canal and posterior fornix. Vaginal discharge remaining on the withdrawn speculum was used for pH determination and “whiff test.” Swab samples were conveyed to the laboratory in Stuart’s transport medium, for microscopy, culture and sensitivity, according to standard methods.

Wet preparations of the high vaginal swabs were examined for trichomonads, which were seen as motile trophozoites, and for fungal elements. Gram’s stain of the vaginal smear was also examined for yeast cells and Gram-negative intra-cellular diplococci. Bacterial vaginosis was diagnosed based on Amsel’s criteria.^[12] Clue cells on microscopy were observed while thin homogeneous vaginal discharge, alkaline pH, and Whiff test on the remaining vaginal discharge on the speculum was noted during vaginal examination in the clinic.

Swabs were inoculated on blood agar, modified Thayer Martins medium, and Sabouraud’s dextrose agar plates. Blood and Sabouraud’s agar plates were incubated under aerobic condition at 35-37°C for 24-48 h. The modified Thayer Martins agar plates were incubated in moist candle extinction tin at 37°C for 24-48 h. *Candida albicans* was identified by isolation of large Gram-positive spherical cells on Sabouraud’s dextrose agar with positive germ tube test.

Blood was taken from all subjects for rapid plasma reagin test.

Data management and analysis

The information obtained were analyzed using SPSS version 19 (IBM, New York). Data were presented using descriptive statistics of percentages, means, and standard deviation. Tests of significance were based on 95% confidence interval ($P < 0.05$) using the Chi-square test.

RESULTS

A total of 320 consenting pregnant women attending ANC in Ilorin and fulfilling the inclusion criteria were studied. The patients were matched with the controls for age, educational level, and marital status.

The age range of the women studied was between 19 and 42 years with a mean age of 30.13 ± 4.79 . Majority of the women in both groups were married: 93.1% (HIV positive) and 95.2% (HIV negative). Two (1.3%) of the HIV infected women were single while 6 (3.8%) were in a consensual union. Of the HIV uninfected pregnant women, 11 (6.9%) were single. The difference in marital status between the two groups of women was statistically significant ($P = 0.002$). A third of all the women studied were of low literacy level while the remaining had at least a secondary level of education. Gravidity ranged from 1 to 13 among the HIV positive pregnant women while it was 1-6 among the HIV negative matched controls. The mean gravidity was 3.5 ± 1.8 and 2.9 ± 1.8 for HIV positive and negatives, respectively. More than half (58%) of HIV positive pregnant and only 33% of the HIV negatives were seen within the first and second trimesters while the others were seen at booking in the third trimester. There was significant difference between the two groups with regards to marital status, gravidity, and mean age at booking [Table 1].

Table 2 compares the clinical findings between the two groups. About 92% of HIV positive women had obvious vaginal discharge while 86% of the controls had obvious discharge. The difference did not reach statistical significance ($P = 0.06$). No woman in the two groups had any genital tract ulceration. Genital wart was present in 3.4% of HIV positive women, while 1% of the controls also had genital warts. The difference between the two groups was not statistically significant ($P = 0.1$). Whiff test was positive in 15.0% of HIV positive women and 4% of HIV negative controls.

The mean pH of vaginal discharge in HIV positive women was 4.9 ± 0.8 with a range of 4-7, while the mean pH in the controls was 4.4 ± 0.6 with a range of 4-6. The difference in positivity of Whiff test ($P = 0.0005$) and mean vaginal pH ($P = 0.00$) was statistically significant between the two groups.

Table 3 compares the prevalence of the selected STI between the two groups of women. The prevalence of candidiasis, trichomoniasis, bacterial vaginosis, gonococcal infection and syphilis in HIV positive

Table 1: Sociodemographic characteristics of HIV positive and negative women

Variable	HIV negative (n=160)	HIV positive (n=160)	P value
Mean gravidity	2.9±1.8 (1-6)	3.5±1.8 (1-13)	0.01
Mean GA	28.8±7.9 (7-40)	24.4±8.2 (7-40)	0.00
Marital status %			0.002
Consensual union	0 (0)	1.4 (6)	
Married	93.1 (149)	95.2 (152)	
Single	6.9 (11)	3.4 (2)	
Religion %			0.06
Christianity	31.9 (51)	41.9 (67)	
Islam	68.1 (109)	58.1 (93)	

HIV: Human immunodeficiency virus, GA: Gestational age

Table 2: Comparison of clinical findings between HIV positive and HIV negative pregnant women

Variable (%)	HIV negative	HIV positive	P value
Vaginal discharge			0.06
Yes	138 (86)	148 (92.4)	
No	22 (14)	12 (7.6)	
Genital ulcer			-
Yes	0 (0)	0 (0)	
No	160 (100)	160 (100)	
Genital warts			0.1
Yes	2 (1)	6 (3.4)	
No	158 (99)	154 (96.6)	
Whiff test			0.0005
Present	6 (4)	24 (15.0)	
Absent	154 (96)	136 (85.0)	
Mean pH	4.4±0.6 (4-6)	4.9±0.8 (4-7)	0.00

HIV: Human immunodeficiency virus

Table 3: Prevalence of candidiasis, trichomoniasis, bacterial vaginosis, gonococcal infection and syphilis in HIV positive and HIV negative controls

Variable	HIV negative (%)	HIV positive (%)	P value
Candidiasis			0.01
Yes	37 (23)	35 (56)	
No	123 (77)	65 (104)	
Trichomonas			0.004
Yes	3 (1.9)	15 (9.4)	
No	157 (98.1)	145 (90.6)	
Bacterial vaginosis			0.0003
Yes	6 (3.8)	25 (15.6)	
No	154 (96)	135 (84.4)	
Neisseria gonorrhoeae			-
Yes	0 (0)	0 (0)	
No	160 (100)	160 (100)	
Syphilis			-
Yes	0 (0)	0 (0)	
No	160 (100)	160 (100)	

A graph will bring out this detail better and is recommended. The authors need a table on the demographic characteristics they mention. HIV: Human immunodeficiency virus

pregnant women were 35%, 9.7%, 15.9%, 0%, and 0%, respectively. The prevalence in the control group were 23%, 1.9%, 4%, 0%, and 0%, respectively.

DISCUSSION

Interaction exists between HIV infection and other STIs, and this increases susceptibility of acquiring and transmitting HIV prenatally.^[1,2] Majority of the women in this study were married (HIV infected pregnant women 94.5% vs. HIV uninfected pregnant women 93%) while the remaining were either single or were in a consensual union. There was statistically significant difference between the two groups of women with regards to marital status ($P = 0.002$). The HIV infected women were more likely to be in a consensual union while the uninfected were not in such a union, but rather single. Studies^[13,14] have shown high prevalence of STI/HIV in women in unstable relationships.

Gravidity ranged from 1 to 13 for the cases while it was 1-6 for the controls. The difference between the two groups was statistically significant. This is likely due to the higher number of both spontaneous and induced abortions in HIV infected women than their uninfected counterparts. It has been demonstrated that HIV infection may increase the risk of pregnancy wastage through placental damage and subsequent fetal death and expulsion.^[15] The HIV infected women were seen at an earlier gestational age than their HIV uninfected controls. The HIV infected women were seen at a mean gestational age of 24.4 ± 8.2 weeks while the uninfected counterparts were seen at 28.8 ± 7.9 weeks gestation. This may be due to other complaints such as vaginal discharge, fever, cough, malaise, etc., that made them seek care early in pregnancy than the uninfected women. This however is a good attitude because it provides an opportunity for early diagnosis and treatment of STIs if detected.

Human immunodeficiency virus infected pregnant women had a higher prevalence of STI than their uninfected counterparts. The overall prevalence of STI in pregnant women attending ANCs in Ilorin was 44.4% (142/320). About 60% (96/160) of the HIV infected women had STI while 28.8% (46/160) of HIV uninfected women had STI. 17 (10.6%) of the HIV infected had multiple infections (candidiasis + trichomoniasis or candidiasis + bacterial vaginosis) while 1 (0.6%) of the uninfected controls had multiple infections (candidiasis + bacterial vaginosis). The most prevalent STI was candidiasis, with overall prevalence of 29.1%. The prevalence of candidiasis in HIV infected women was 35% while it was 23% in the uninfected women. There was significant difference in the prevalence of candidiasis ($P < 0.05$)

between the two groups of women. This was contrary to a study from Cameroon^[16] where a comparable prevalence for candidiasis was noted in both HIV infected and uninfected pregnant women. Some studies have demonstrated no difference in the prevalence of Candidiasis in both HIV infected and the uninfected populations,^[17,18] but when subgroups of women such as pregnant women are studied, the prevalence of vaginal candidiasis may be higher in the HIV infected than the uninfected^[19] as was demonstrated in this study.

Bacterial vaginosis was the next most prevalent STI in the study. Overall prevalence of 9.69% was recorded. The prevalence in HIV infected pregnant women was 15.6% while that of the uninfected controls 3.8%. Although bacterial vaginosis is not strictly regarded as an STI by some authorities,^[2,3,20] it is a reproductive tract infection with significant implication for adverse pregnancy outcomes such as preterm delivery, chorioamnionitis, and postpartum infections. *Gardnerella vaginalis* and several other organisms are implicated as causing bacterial vaginosis. The prevalence of 3.8% found in HIV uninfected pregnant women was similar to that found in a similar study in this center^[21] while the higher prevalence (15.6%) found in HIV infected women was lower than that reported in a similar study in Cameroon.^[16] There was statistically significant difference in the presence of bacterial vaginosis between HIV infected and the uninfected pregnant women. This finding has significant health implication because of the earlier mentioned morbidity as well as possible mother to child transmission of HIV known to be higher in the presence of bacterial vaginosis.^[22] The morbidity in terms of increased incidence of preterm delivery is also significant because studies have shown mother to child transmission of HIV to be higher in preterm neonates than term neonates.^[23]

Trichomonas vaginalis is the most common STI in Africa.^[24] Prevalence of 9.4% was found in HIV infected women while that of uninfected women was 1.9%. These are lower than what was obtained in the Cameroonian study,^[16] but much higher than that found in a previous study in this center.^[21] The higher incidence is probably due to the fact that the previous study in this center did not consider the HIV status in the women studied.

Several studies in the recent past have recorded significant fall in the incidences and prevalence of syphilis^[25,26] and gonococcal infection.^[27-30] Zero prevalence noted in this study for syphilis is similar to that found in the Democratic Republic of Congo^[29] while

very low prevalence has been noted in several other studies. The syndromic approach to the management of STIs proposed for low resource settings and the increasing awareness of safer sex practice disseminated through sex education and through the media may have accounted for this zero prevalence in both groups of women in this study.

History of vaginal discharge in index pregnancy was found to be significantly higher in HIV infected women, but actual vaginal examination revealed no difference between the two groups of women with respect to obvious vaginal discharge ($P > 0.05$). The WHO algorithm for management of vaginal discharge syndrome has worse performance in pregnant women and such syndromic approach will lead to over treatment of women.^[1,31] However, the higher prevalence of vaginal discharge in HIV infected women may have implication for the mother to child transmission of HIV as both ulcerative and nonulcerative genital tract lesions increase risk of HIV acquisition/transmission.^[23]

No genital tract ulcer was recorded in this study. This may be due to the fact that the common organisms that cause genital tract ulcerations such as syphilis and *Haemophilus ducreyi* are now very uncommon as recent studies have shown declining trends.^[28-30] Recent findings including this study are showing decline in the conventional STIs, while the nonconventional ones are now taking prominence. This may probably be due to greater health consciousness among the populace emanating from constant health education and public enlightenment through the media. It could also be due to a shift in the ecologic niche induced by geographical variation of pathologic agents of STIs. This study also recorded zero prevalence for syphilis. Viral causes for genital ulcerations are said to be on the increase, notably herpetic lesion.^[32] Herpes simplex viral infection was not included in this study because of cost implication and clinical examination did not reveal any ulceration in both groups of women studied. Genital warts were however found in the study and it was in a higher number in the HIV infected women than the uninfected women. The difference between them did not reach statistical significance.

Normal vaginal pH is acidic even in pregnancy with pH of about 4.5. The study revealed a mean pH of 4.9 ± 0.8 with a range of 4-7 in HIV infected pregnant women and pH of 4.4 ± 0.6 with a range of 4-6 in HIV uninfected women. The difference in the vaginal pH between the two groups of women was statistically significant. The higher prevalence of STI in HIV infected women may

account for some of this but not all. The significance of increase in the vaginal pH in HIV infected women without the presence of pathogenic organisms in the vaginal remains to be determined,

CONCLUSION

The prevalence of candidiasis, trichomoniasis and bacterial vaginosis are high in pregnant women generally, but still higher in HIV infected women than their uninfected counterparts. Syphilis and gonococcal infection were not found in both HIV infected and the uninfected women in this study population.

RECOMMENDATION

It is recommended that routine screening of HIV infected pregnant women for candidiasis; trichomoniasis and bacterial vaginosis should be considered important. Further research should be carried out to determine the cause and consequences of high vaginal pH in the apparent absence of other pathogenic organisms in HIV infected women.

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