Seroprevalence of human immunodeficiency virus based on demographic and risk factors among pregnant women attending clinics in Zaria Metropolis, Nigeria.

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Abstract

Chlamydia trachomatis **also known as the "Silent Epidemic" is a major threat to the reproductive health of women and a possible silent cofactor in the heterosexual spread of HIV in Africa. This study was aimed at determining the seroprevalence of Human Immunodeficiency Virus among pregnant women attending clinics in Zaria metropolis, Kaduna State. Each participant completed a researcher-devised questionnaire and quasi design was used in the selection of hospitals. Subsequently about 5 mls of peripheral blood for serological analysis was obtained after informed consent. Screening for HIV was done using Determine® HIV 1/2 as well as Uni-Gold™ HIV Test Kits. Out of the two hundred and seventy (270) samples collected HIV occurred in 1(0.4%) of the total population. Similarly with HIV infection, significant association was found to exist with marital status and years spent in marriage among the women. Age, occupation, level of education, family type was not found to be significantly associated with HIV infection.**

Keywords: HIV, Risk factors, Pregnant women, Seroprevalnece, Marital status, Type of marriage, Occupation, Education.

Introduction

Sexually Transmitted Infections (STIs) contribute to a variety of obstetric and gynaecologic complications in women, including increased risk of tubal infertility and have been associated with chronic pelvic pain [1]. They are also significantly associated with adverse pregnancy outcomes such as spontaneous abortion, preterm delivery, ectopic pregnancy, premature rupture of membranes, intrauterine infection of the foetus, and low birth weight in infants [2].

Human Immunodeficiency Virus (HIV) is a lentivirus, a member of the Retroviridae family that causes Acquired Immune Deficiency Syndrome (AIDS) [3]. An estimation of 33.2 million people globally is HIV-positive and 22.5 million of these people live in sub-saharan africa, with 61% (13.75 million) of these being women [4]. HIV prevalence in Nigeria has dropped from 4.6% in 2008 to 4.1% in 2011 with the number of infected people estimated at 3.1 million [5].

Lentiviruses are transmitted as single-stranded, positive-sense, enveloped RNA viruses. Upon entry into the target cell, the viral RNA genome is converted (reverse transcribed) into double-stranded DNA by a virally encoded reverse transcriptase that is transported along with the viral genome in the virus particle. The resulting viral DNA is then imported into the cell nucleus and integrated into the cellular DNA by a virally encoded integrase and host co-factors [6]. Once integrated, the virus may become latent, allowing the virus and its host cell to avoid detection by the immune system. Alternatively, the virus may be transcribed, producing new RNA genomes and viral proteins that are packaged and released from the cell as new virus particles that begin the replication cycle anew.

HIV acquisition, transmission and infectivity can be facilitated by other STIs as cofactors through multiple immunological and biological pathways [7,8].

The aim of this research is to investigate the seroprevalence of Human Immunodeficiency Virus among women attending clinics in Zaria metropolis, Kaduna State, Nigeria.

Materials and Methods

Study area

The study was conducted among pregnant and non-pregnant women attending clinics in Zaria metropolis, Kaduna State, Nigeria.

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Study design

The study was a descriptive cross-sectional survey which combines the use of administered structured questionnaires and the analysis of serum samples collected from consented patients. Quasi design was adopted for the purpose of this study.

Ethical approval

Approval was obtained from the ethical committee of the various health care Clinics before the commencement of the research.

Inclusion criteria

Women receiving antenatal care and non-pregnant women at the various health clinics during the period of study who gave consent to participate in the study aged <15-50 years with or without HIV were eligible for inclusion.

Exclusion criteria

Women receiving antenatal care and non-pregnant women at the various health Clinics during the period of study who do not give their consent to participate in the study aged <15- 50 years with or without HIV were not eligible for inclusion.

Sample size

The sample size was determined using the following equation as described by Naing et al., (2006).

$$n = \frac{z^2 p(1-\mathrm{p})}{d^2}$$

Where n = sample size

z = z score for a level of 95% confidence interval = 1.96

p = prevalence rate at 10.5% Zaria, Nigeria [9]. d = allowable error = 5% = 0.05

Therefore:

$$n = \frac{(1.96)^2 \times 0.105 \times (1-0.105)}{(0.05)^2}$$

= 144.406

= 144 samples

Attrition rate = 10% of 144 sample size

= 158.4

= 158 samples

A total of 270 samples were collected (equal number of samples were collected to make good comparism between the subjects).

Sample collection

Blood samples were collected from women of reproductive age <15-50 years who gave their consent. Approximately two hundred and seventy (270) blood samples were collected from one hundred and thirty five (135) pregnant and one hundred and thirty five (135) non- pregnant women attending clinics from each of the clinics under study in Zaria.

All materials required for the collection of venous blood was assembled and labelled appropriately with the subject's Identification Number (ID) and date. Five millilitre of blood was collected through venepuncture using sterile 5 ml needles and syringes (CHANGZHOU HUICHUN MEDICAL EQUIPMENT CO., LTD, CHINA). The blood sample in the syringe was released into the labelled container and allowed to clot for 30 minutes. This was followed by centrifugation of the collected blood sample to separate the serum at 3000 r.p.m. for 5 minutes. The serum was thereafter carefully separated with a transfer pipette in order to avoid extracting red cells and aseptically transferred into a sterile labelled serum storage screw-capped container. The serum was stored in the Microbiology laboratory in a freezer at a temperature of -20 °C until analysed.

Human immunodeficiency virus screening

Two different types of test kits were used for Human Immunodeficiency Virus (HIV) screening namely Determine® HIV 1/2 test kits and Uni-gold™ HIV test kits. All serum samples and test kits were brought to room temperature of about 20-25°C from a temperature of between 20 C-30°C and labelled appropriately.

Determine® HIV 1/2 test kits

All test kits were brought to room temperature after which the sealed and protective foil were all removed from the test strips and placed on a flat working table. About 50 µl of serum sample was added to the sample pad and allowed to stand for 15 minutes. The serum migrates through the conjugate pad and mix with the selenium colloid-antigen conjugate through the solid phase. Antibody to HIV 1/2 in the serum binds to the antigen-selenium colloid (control bar) and to the antigen at the patient's bar, forming a red band at the patient bar site giving a positive test. Absence of antibody to HIV1/2 show no red band at the patient's bar giving a negative result (ALERE MEDICAL Co., Ltd. CHIBA, JAPAN).

Uni-Gold™ HIV test kits

Samples reactive to Determine HIV 1/2 test were confirmed using Uni-gold HIV test kit. One of the sterile disposable pipettes was used to pipette 2 drops (60 µl) of serum sample and then dispensed into the sample port, followed by addition of 2 drops of the wash buffer which was after wards allowed reacting for 10 minutes. Antibodies of any immunoglobulin class specific to the recombinant HIV 1/2 proteins reacted with the gold linked antigens. The antibody protein-colloidal gold linked complex moves chromatographically along the membrane to the test and control region of the test device. After 10 minutes the result was immediately read. A positive reaction was visualized by a pink/red band in the test region of the kits. In the absence of human immunoglobulin antibodies to HIV in the analyzed specimen, a negative reaction occurs. Consequently, no visually detectable band develops in the test region of the device (TRINITY BIOTECH PLC, IRELAND).

Data analysis

Results and data from questionnaires were presented on tables. All statistical analysis was done using a computer software program, SPSS Version 19. Associations and relationship between the various risk factors were obtained using chi-

square, fisher's exact, analysis of variance (ANOVA) and the student t-test. Two tailed P values ≤ 0.05 was considered to be statistically significant.

Results

Table 1 revealed that there was statistically significant association between HIV infection among pregnant women and occupation. Pregnant women who are self-employed 1(2.1%) had the highest HIV infection followed by others 1(1.8%). In non-pregnant women, HIV infection was highest among civil servants, 2(9.1%) followed by those that did not state their occupation type 2(3.4%). The least rate of HIV infection 1(1.9%) was recorded among non-pregnant self-employed. There was no significant association between HIV infection among non-pregnant women and occupation. Overall, there was no significant association between occupation and HIV infection. Civil servants 2(3.8%) had the highest HIV infection followed by others 3(2.6%) while the self-employed had the least prevalence 2(2.0%).

Similar test of association between HIV infection and level of education showed that there was no statistically significant association between the infection and level of education (**Table 1**). Though in pregnant women, HIV infection was highest among those with primary education, 1(5.3%) followed by secondary education with 1(1.8%), tertiary and others without formal education had no HIV infection among while in non-pregnant women the highest prevalence was recorded also among those with primary education 2(11.8%), secondary 2(3.3%) and tertiary level of education had 1(2.3%). There was no HIV infection among others without formal education (**Table 1**). Generally among the women, HIV infection was highest among those with primary education 3(8.3%) and no significant association exists between HIV among the women.

The association of marital status was compared with HIV infection in pregnant and non-pregnant women. In pregnant women, there was no significant association between HIV in pregnancy and marital status. On the other hand, HIV infection among non-pregnant women was significantly associated with marital status while married women had 3(2.3%) prevalence, widows had 2(100.0%) and those who were separated had no HIV infection 0(0.0%). Comparison of the infection with respect to marital status irrespective of pregnancy status showed that there was significant association between HIV and marital status with married women having HIV prevalence of 5(1.9%) and widows 2(100.0%) (**Table 2**).

The test of association of family type with HIV infection showed that there was no significant association between family type and HIV infection in pregnancy. Also, HIV infection in non- pregnant women was not significantly associated with family type (**Table 2**).

HIV infection in non-pregnant women was compared with respect to years in marriage. There was significant association with those who have stayed in marriage for 36 years and above had high prevalence of HIV 1(50.0%) and those who had stayed for 21-25 years in marriage had 1(14.3%) prevalence among the women. Similar comparison among the pregnant women showed no significant association with those who have spent 11-15 years 1(12.5%) having a high rate of HIV infection (**Table 2**). On the whole, significant association exists between HIV infection and years spent in marriage with those who have stayed for 36 years and above having a high rate of infection 1(50%) among the women (**Table 3**).

Table 1. *Distribution of prevalence of hiv infection according to demographic factors among women attending clinics in Zaria Metropolis, Kaduna State, Nigeria.*

		No. +ve (%)	No. of samples	No. +ve (%)	No. of samples	No. +ve (%)
Occupation						
Civil servant	31	0(0.0)	22	2(9.1)	53	2(3.8)
Self-employed	47	1(2.1)	54	1(1.9)	101	2(2.0)
Others Statistics	57	1(1.8) $\chi^2 = 32.542$, $p = 0.031$*	59	2(3.4) $\chi^2 = 5.809$, $p = 0.398$	116	3(2.6) $\chi^2 = 8.641$,
						$p = 0.342$
Level of education						
Primary	19	1(5.3)	17	2(11.8)	36	3(8.3)
Secondary	55	1(1.8)	60	2(3.3)	115	3(2.6)
Tertiary	53	0(0.0)	43	1(2.3)	96	1(1.0)
Others Statistics	8	0(0.0) χ^2=2.822, $p = 0.588$	15	0(0.0) $\chi^2 = 3.926$, $p = 0.416$	23	0(0.0) $\chi^2 = 6.225$,
						$p = 0.083$

KEY: * = Statistically significant association exists at p ≤ 0.05; % = Percentage; No. +ve = number of positive samples

Table 2. *Distribution of prevalence of hiv infection according to risk factors among women attending clinics in Zaria Metropolis, Kaduna State, Nigeria.*

Risk factor	No.of Samples	Pregnant	No.of Samples	Non-Pregnant	No.of Samples	Total
		No. +ve (%)		No. +ve (%)		No. +ve (%)
Marital status						
Married	134	2(1.5)	132	3(2.3)	266	5(1.9)
Separated	1	0(0.0)	1	0(0.0)	2	0(0.0)
Widowed	0	0(0.0)	2	2(100.0)	2	2(100.0)
Statistics	-	$\chi2 = 0.015$, $p = 0.902$	-	$\chi2 = 52.796$, $p < 0.001$**	-	$\chi2 = 75.731$, $p < 0.001$**

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Table 3. *The test of association of family type with HIV infection.*

Family type						
Monogamy	110	1(0.9)	112	4(3.6)	222	5(2.3)
Polygamy	25	1(4.0)	23	1(4.3)	48	2(4.2)
Statistics		Fisher's exact = 0.248		Fisher's exact = 0.857		Fisher's exact = 0.449
Years in Marriage						
0 – 5	81	1(1.2)	61	1(1.6)	142	2(1.4)
6 – 10	28	0(0.0)	21	0(0.0)	49	0(0.0)
11 – 15	8	1(12.5)	23	1(4.3)	31	2(6.5)
16 – 20	11	0(0.0)	10	1(10.0)	21	1(4.8)
21 – 25	4	0(0.0)	7	1(14.3)	11	1(9.1)
26 – 30	3	0(0.0)	7	0(0.0)	10	0(0.0)
31 – 35	0	0(0.0)	4	0(0.0)	4	0(0.0)
36 and above Statistics	0	0(0.0) $\chi2 = 6.201$, $p = 0.357$	2	1(50.0) $\chi2 = 18.410$, $p = 0.026$*	2	1(50.0) $\chi2 = 25.002$, $p = 0.002$**

KEY: * =Statistically significant association exists at $p \leq 0.05$; ** =Statistically significant association exists at $p \leq 0.01$; % =positive; No. +ve =number of positive samples.

Discussion

Our results showed that there was statistically significant association between occupation and HIV infection among the pregnant women, though, the result showed no significant association among non-pregnant women. While occupation has been shown in previous studies to have a direct correlation to the prevalence of HIV infection, for example long distance drivers and commercial sex workers [10], the finding in this study of a higher incidence among civil servants calls for closer attention and since they are generally educated people having greater access to information than those who have and are more likely to make informed decisions and act on information given, they would greatly benefit from intervention programs. In addition, they have better jobs and greater access to money and other resources which can help them lead healthier lives. The rather high seroprevalence rate recorded in this study for these groups raises once again the questions of ethics, rights and professional duty as they relate to universal antenatal screening for HIV.

Similarly, there was no significant association between level of education and HIV infection among pregnant women and non-pregnant women. HIV infection was found to decrease with increase in education in this study and majority of the seropositive women have some level of education. This can therefore, be anticipated that they would benefit from educational interventions at raising awareness of the disease as well as in the application of measures to prevent it.

The association of marital status was compared with HIV infection in pregnant and non-pregnant women. In pregnant women, there was no significant association between HIV in pregnancy and marital status. On the other hand, non-pregnant women with HIV infection was significantly associated with marital status while married women had 2.3% prevalence, widows had 100.0% and those who were living separate had no HIV infection 0.0%. Comparison of the infection with respect to marital status irrespective of pregnancy status showed that there was significant association between HIV and marital status with married women having HIV prevalence of 1.9% and widows, 100.0%. This shows that infection of women of childbearing age with this silent infection portends serious danger for both heterosexual and vertical transmissions, thus a major health burden to the community at large. The widows were more likely to be infected than the married and those married but living separate, but the sample size in this class of people was not large enough to reach statistical significance. However, this may be a reflection of the actual situation since the widows in the study were more prone to having multiple sex partners.

The test of association of family type with HIV infection showed that there was no significant association between family type and HIV infection in pregnancy and also in women without pregnancy. This probably could be an indication of more extramarital sexual relationships among these husbands and wives in polygamous family than among their counterparts married into monogamous family relationship.

The association between HIV and years spent in marriage was assessed and found to be significant among non-pregnant women and also among the women entirely. In all, women who spent 36 years and above in marriage had the highest prevalence of HIV infection. This could probably mean that the longer the years spent in marriage, the more susceptible one becomes.

Conclusion

In all, women who spent 36 years and above in marriage had the highest prevalence of HIV infection. This could probably mean that the longer the years spent in marriage, the more susceptible one becomes. The fact that heterosexual and vertical transmissions constitute the major modes of HIV infection in Nigeria calls for a concerted effort at establishing the magnitude of the problem in order to plan appropriate intervention.

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