

Original Research Article

**SYPHILIS AND HUMAN IMMUNODEFICIENCY VIRUS CO-INFECTION AMONG
PREGNANT WOMEN IN NIGERIA: PREVALENCE AND TREND**

ABSTRACT- Pregnant women are at increased risk of sexually transmitted infections (STIs) due to physiological changes that accompany pregnancy, such as congestion of the cervix, edema of the vaginal mucosa, and alterations in the vaginal flora. Syphilis and HIV are both transmitted sexually and so it is not surprise that a substantial number of people are infected with both agents. The rate of HIV and syphilis co-infection varies depending on the prevalence of both infections in the community or the patient group being studied, along with individual risk factors. 1913 apparently healthy pregnant women were recruited for the study after obtained their consent. Detection of HIV p24 antigen and antibodies to HIV1/2 was screened for using BIO-RAD in-vitro diagnostic enzyme immunoassay; syphilis was screen for using DIA-PRO in-vitro diagnostic Bio-probes enzyme immunoassay for the determination of antibodies to *Treponema palladium*. Age group 26-30 had highest prevalence of HIV and VDRL in the study years, a decreasing trend was observed in the prevalence of HIV and syphilis infection within the study years. Sero-prevalence of HIV and VDRL were 63(3.29%) and 03(0.16%) respectively. The prevalence of HIV and VDRL co-infection was 01(0.05%) observed in age group 26-30. This present study clearly documents a relatively declined in sero-prevalence of HIV and VDRL

within the consecutive three years of study, this reflects the level of HIV and VDRL in the general population.

Key words: Syphilis, Human Immunodeficiency Virus, Mode of Transmission

INTRODUCTION

Pregnant women are at increased risk of STIs due to physiological changes that accompany pregnancy, such as congestion of the cervix, edema of the vaginal mucosa, and alterations in the

vaginal flora ⁽²⁷⁾. Additionally, pregnant women may be less likely to have partners that use condoms, and may have fewer options to leave unsafe relationships ⁽²³⁾. Syphilis and HIV are both transmitted sexually and so it is no surprise that a substantial number of people are infected with both agents. Syphilis is a systemic infectious disease caused by sexual or congenital transmission of the spirochete bacterium *Treponema pallidum* (*T. pallidum*). Syphilis causes a variety of signs and symptoms corresponding to stages of infection (primary, secondary, latent and tertiary). The primary stage classically presents with a single chancre (a firm, painless, non-itchy skin ulceration), secondary syphilis with a diffuse rash which frequently involves the palms of the hands and soles of the feet, latent syphilis with little to no symptoms, and tertiary syphilis includes gummatous, cardiovascular, and neurological complications that can lead to significant disability and premature death. Congenital syphilis results in fetal or perinatal death, as well as disease complications in surviving newborns ^(10, 15, 19). Syphilis is believed to have infected 12 million people in the year 1999, with greater than 90% of cases in the developing world. It affects between 700,000 and 1.6 million pregnancies a year, resulting in spontaneous abortions, stillbirths, and congenital syphilis ^[32]. During year 2010 it caused about 113,000 deaths down from 202,000 in year 1990 ^[22]. In sub-Saharan Africa, syphilis contributes to approximately 20% of perinatal deaths ^[32]. Rates are proportionally higher among intravenous drug users, those who are infected with HIV and men who have sex with men ^(10, 15, 19). In the United States, rates of syphilis as of 2007 were six times greater in men than women, while they were nearly equal in year 1997 ^[7]. African Americans accounted for almost half of all cases in year 2010 ^[8]. Syphilis infections declined rapidly with the widespread use of antibiotics, syphilis is associated with HIV infection which increases the risk of HIV transmission by two to five times and acquisition by causing genital ulcers. Genital ulcer disease is linked to increased risk of HIV infection and is

most commonly due to herpes simplex virus (HSV) in both HIV positive and negative patients⁽²⁾. The rate of HIV and syphilis co-infection varies depending on the prevalence of both infections in the community or the patient group being studied, along with individual risk factors. Co-infection is common (30–60% in a number of urban centres)^[20]. Sexually transmitted infections (STIs) are a major global cause of infertility, long-term disability and death with severe medical and psychological consequences for millions of men, women and infants⁽³³⁾. The genital ulcerations and inflammation caused by syphilis are implicated as cofactor making infected individuals three to five times more likely to acquire HIV if exposed to the virus through sexual contact. Unless prompt diagnosis and treatment of syphilis are carried out, serious complications including male and female infertility may result, and in pregnancy, adverse outcomes such as still-birth, congenital abnormalities, prenatal death and serious neonatal infection⁽²⁶⁾. Syphilis, a reportable disease caused by *Treponema pallidum*, is tracked by the Centers for Disease Control and Prevention (CDC). *Treponema pallidum* is a fragile spiral bacterium 6-15 micrometers long by 0.25 micrometers in diameter. Its small size makes it invisible on light microscopy; therefore, it must be identified by its distinctive undulating movements on dark field microscopy. It can survive only briefly outside of the body; thus, transmission almost always requires direct contact with the infectious lesion^(9, 14). It can be either acquired or congenital. That is, it can be transmitted either by intimate contact with infectious lesions (most common) or via blood transfusion (if blood has been collected during early syphilis), and it can also be transmitted transplacentally from an infected mother to her fetus^(9, 14). Syphilis is most common during the years of peak sexual activity. Most new cases occur in men and women aged 15-40 years. In year 2007, the rate of primary and secondary syphilis was highest in people aged 25-29 years⁽⁶⁾. Men are affected more frequently with primary or

85 secondary syphilis than women. This difference has varied over time. Male-to-female ratio of
86 primary and secondary syphilis increased from 1.6:1 in year 1965 to nearly 3:1 in year 1985.
87 After, the ratio decreased, reaching a nadir in year 1994-1995 ⁽⁴⁾. Since year 2002, the incidence
88 of primary and secondary syphilis has risen 54% among men. Among women, the rates of
89 primary and secondary syphilis remain lower ⁽⁴⁾. After a decade of declines, the overall
90 prevalence of syphilis among females increased 11.1% between year 2005 and 2006. Males with
91 primary and secondary syphilis out-number females 6 to 1 ⁽⁵⁾. The recent increase in the male-to
92 female ratio is largely attributable to the increased rate of disease among men having sex with
93 men ⁽⁶⁾. The hallmark of Human immunodeficiency virus (HIV) infection is immunosuppression
94 which predisposes to opportunistic infections. HIV infection is a sexual transmitted infection
95 over the world, the most prevalent transmission route of which, chiefly in developing countries,
96 is heterosexual, HIV is particularly significant in their ability of transferred from mother to their
97 newborn. It has been estimated that about 3.6% of Nigeria's total population are living with HIV
98 and AIDS ⁽³²⁾. Approximately 220,000 people died from AIDS in Nigeria in year 2009 ⁽³¹⁾. With
99 AIDS claiming so many lives, Nigeria's life expectancy has declined significantly. In year 1999
100 the average life expectancy was 54 years for women and 53 years for men ⁽³⁵⁾. In year 2009 these
101 figures had fallen to 48 for women and 46 for men. Mother to child transmission (MCT) is a
102 major route of transmission of HIV after Heterosexual routes and Blood transfusions. Each year
103 around 57000 babies in Nigeria are born with HIV ⁽³²⁾. Recent estimates reports that 360000
104 children are living with HIV in Nigeria; with their mothers being source of infection ⁽³⁰⁾. Mother
105 to child transmission of HIV occurs during pregnancy, labor, delivery or breastfeeding,
106 according to world health organization, 25 percent of HIV-infected pregnant women will
107 transmit HIV infection to their infants. About five percent of the transmissions will take place in

108 uterus during gestation, 15 percent around the delivery period, and 10 percent in the postnatal
 109 period primarily due to breast-feeding ⁽³⁴⁾. Mother to child transmission can be tamed by the
 110 administration of antiretroviral agents to the mother during pregnancy and labor and to the new
 111 born during the first weeks of life ⁽¹²⁾. Recently the World health Organization has recommended
 112 mothers who are known to be HIV positive and their children HIV uninfected or status unknown
 113 should breastfeed their infants for six months of life exclusively ⁽³⁶⁾. At present, it is estimated
 114 that 37 million adults are living with HIV over the world, two-thirds of which are in sub Saharan
 115 Africa ⁽¹¹⁾, hence the need to determine the prevalence and to assess the risk of co-infections with
 116 syphilis and human immunodeficiency virus (HIV) among pregnant women attending our
 117 antenatal clinics.

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120 MATERIALS AND METHODS

121 STUDY AREA

122 The study site was Ido town, the headquarters of ido-osi local government in Ekiti State, Nigeria.
 123 The secretariat sited in between Ido town and Usi town. It is very close to other local government
 124 districts, (Moba, Ijero, Ilejemeje and Ado). The local government comprises rural towns: Aaye,
 125 Ido, Usi, Ayetoro, Ilogbo, Osi, Ifaki, Orin, Ora, Igbole and some other smaller villages, inhabited
 126 mainly by the Ekitis, but with some non-Ekitis fund living peacefully among the people. People
 127 in Ido - Osi cherish farming, education, trading and practicing majorly Christianity religion.

128 According to 1991 Census, the Local government has a total population of 107,000 people with
129 eleven electoral wards in the Local government.

130 SAMPLES COLLECTION AND LABORATORY METHODS

131 1913 apparently healthy pregnant women who attended the antenatal clinic at the Federal
132 Medical Centre Ido-Ekiti, Ekiti State, Nigeria between January 2011 and December 2013 were
133 recruited for the study after obtained their consent. An ethical clearance for this study was
134 obtained from ethical and research committee. 4ml of venous blood was collected by
135 venepuncture into a plain bottle and allowed to clot. Detection of HIV p24 antigen and
136 antibodies to HIV-1 and HIV-2 was screened for using BIO-RAD in-vitro diagnostic enzyme
137 immunoassay (ELISA-method). The procedure was described by the manufacturer of the kit;
138 syphilis was screen for using DIA-PRO in-vitro diagnostic Bio-probes enzyme immunoassay
139 (ELISA-method) for the determination of antibodies to *Treponema palladium*. The procedure
140 was as described by the manufacturer of the kit.

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142 RESULTS

143 A total of 1913 apparently healthy pregnant women were recruited for the study from Federal
144 Medical Centre, Ido-Ekiti. HIV and syphilis infections (VDRL) were screened for during the
145 period of three consecutive years between 2011 and 2013; age group 26-30 had highest
146 prevalence of HIV and VDRL in the study years, a decreasing trend was observed in the

prevalence of HIV and syphilis infection within the study years as showed in tables 1-2. Sero-prevalence of HIV and VDRL were 63 (3.29%) and 03 (0.16%) respectively as showed in tables 3-4. The prevalence of HIV and VDRL co-infection was 01 (0.05%) observed in age group 26-30 as showed in table 5.

Table 1: Age distribution and prevalence of HIV among study population between 2011 and 2013

Age group	Number of HIV Screened in year 2011		Number of HIV Screened in year 2012		Number of HIV Screened in year 2013	
	Positivity	Negativity	Positivity	Negativity	Positivity	Negativity
15-20	-	33 (3.93%)	-	17 (2.78%)	-	02 (0.43%)
21-25	04 (0.48%)	298 (35.5%)	05 (0.82%)	137 (22.39%)	06 (1.30%)	133 (28.79)

185	26-30	27	300	10	182	01	130
186		(3.22%)	(35.76%)	(1.63%)	(29.74%)	(0.22%)	(28.14%)
187							
188	31-35	03	70	01	180	04	161
189		(0.36%)	(8.34%)	(0.16%)	(29.41%)	(0.87%)	(34.85%)
190							
191	36-40	01	102	01	70	-	23
192		(0.12%)	(12.16%)	(0.16%)	(1.47%)		(4.98%)
193							
194	41-above	-	01	-	09	-	02
195			(0.12%)		(1.47%)		(0.43%)
196							
197	Total	35	804	17	595	11	451
198		(4.17%)	(95.83%)	(2.78%)	(97.22%)	(2.38%)	(97.62%)
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Table 2: Age distribution and prevalence of VDRL among study population between 2011 and 2013

206							
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208							
209	Age group	Number of VDRL		Number of VDRL		Number of VDRL	
210		Screened in year 2011		Screened in year 2012		Screened in year 2013	
211							
212		Positivity	Negativity	Positivity	Negativity	Positivity	Negativity
213	15-20	-	33	-	17	-	02
214			(3.93%)		(2.78%)		(0.43%)
215							
216	21-25	01	301	-	142	-	139
217		(0.12%)	(35.88%)		(23.20%)		(30.09%)

218							
219	26-30	01	326	01	191	-	131
220		(0.12%)	(38.86%)	(0.16%)	(31.21%)		(28.35%)
221							
222	31-35	-	73	-	181	-	165
223			(8.70%)		(29.58%)		(35.71%)
224							
225	36-40	-	103	-	71	-	23
226			(12.28%)		(11.60%)		(4.98%)
227							
228	41- above	-	01	-	09	-	02
229			(0.12%)		(1.47%)		(0.43%)
230							
231	Total	02	837	01	611	-	462
232		(0.24%)	(99.76%)	(0.16%)	(99.84%)		(100%)
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241 **Table 3: Age distribution and prevalence of HIV among study population**

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244	Age group	Positivity	Negativity
245			

246	15-20	-	52(2.72%)
247			
248	21-25	15(0.78%)	568(29.69%)
249			
250	26-30	38(1.99%)	612(31.99%)
251			
252	31-35	08(0.42%)	411(21.48%)
253			
254	36-40	02(0.10%)	195(10.19%)

255			
256	41- above	-	12(0.63%)
257			

258	Total	63(3.29%)	1850(96.71%)
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268 **Table 4: Age distribution and prevalence of VDRL among study population**

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271	Age group	VDRL Positivity	VDRL Negativity
272			

273	15-20	-	52(2.72%)
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275	21-25	01(0.05%)	582(30.42%)
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277	26-30	02(0.10%)	648(33.87%)
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279	31-35	-	419(21.90%)
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281	36-40	-	197(10.30%)
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282			
283	41- above	-	12 (0.63%)
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285	Total	03(0.16%)	1910(99.84%)

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295 **Table 5: Age distribution sero prevalence and co-infection of HIV and VDRL among study**
 296 **population**

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298				
299	Age group	HIV positivity	VDRL positivity	Co-infection of HIV and VDRL
300				
301	15-20	-	-	-
302				
303	21-25	15(0.78%)	01(0.05%)	-
304				
305	26-30	38(1.99%)	02(0.10%)	01(0.05%)
306				
307	31-35	08(0.42%)	-	-
308				

309	36-40	02(0.10%)	-	-
310				
311	41- above	-	-	-
312				
313	Total	63(3.29%)	03(0.15%)	1(0.05%)
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323 **DISCUSSION**

324 Sexually transmitted infections are widely spread in developing countries and constitute a major
 325 public health problem. Syphilis has also acquired a new potential for morbidity and mortality
 326 through association with increased risk of HIV infection. The trend of HIV1/2 and VDRL
 327 infection in this present study was declined from 35 (4.17%) for HIV1/2 and 02 (0.24%) for
 328 VDRL in year 2011 to 11 (2.38%) for HIV1/2 and null for VDRL in year 2013, the declined
 329 trend observed in this study was due to great awareness of infection by the public. The sero-
 330 prevalence of HIV1/2 and VDRL in the study population was 63 (3.29%) and 03 (0.16%)

331 respectively which suggests that HIV affect a large percentage of clinic patients. 1 (0.05%) co-
 332 infection for HIV-syphilis was reported in age group 26-30 years. Less than 4.1% prevalence
 333 rates for HIV was reported for Oyo State in the last national sentinel survey which is similar to
 334 the prevalence rate for HIV infection in this present study. Nigeria's epidemic is characterized as
 335 one of the most rapidly increasing rates of HIV and AIDS. The prevalence rate of 3.29%
 336 recorded for HIV in this study is in line with that of the Federal Ministry of Health (2005)
 337 Sentinel Study on HIV in Nigeria. Contrary to this present study, Okonko *et al.*, 2012 reported
 338 that out of 400 subjects under study, Syphilis and HIV Status were 35 (8.8%) for HIV positive
 339 and 3(0.8%) were reactive for syphilis. Hussain *et al.*, 2006 reported that out of 863 subjects, 1
 340 (0.1%) co-infection for HIV-syphilis, 21 (2.4%) was serologically reactive for HIV-1/2 and 47
 341 (5.4%) was reactive for syphilis which is contrary to what observed in this present study. The
 342 VDRL reactivity in this present study was very low compared to 2.6% noted by Singh *et al.*,
 343 2005 and 1.6% by Srikrishna *et al.*, 1999 but relatively similar to Arora *et al.*, 2010 and
 344 Bhattacharya *et al.*, 2007 reported a 0.9% and 0.72% of VDRL reactivity respectively. The
 345 results of serological screening tests for HIV and syphilis infections performed by Hossein *et al.*,
 346 2009 in Tehran blood transfusion service between year 2003 and 2005 showed that the sero-
 347 prevalence was 2509 (0.2%) for HIV Ab1/2, and 402 (0.04%) for VDRL in 1004889 subjects;
 348 contrary to this present study, he reported the trend of HIV infection frequency had no increasing
 349 or decreasing pattern and was relatively stable and the trend of syphilis infection frequency was
 350 increasing in year 2003 to 2005. However, similar to this present study, Salawu *et al.*, 2010
 351 reported a gradual decline in the prevalence rate of anti-HIV which declined from 1.44% in 2006
 352 to 0.94% in 2007 and to reach its lowest level of 0.66% in 2008 but rose to 0.96% in the first half
 353 of 2009. VDRL showed a downward trend from 2.93% in 2008 to 1.92% in the first half of

2009, but contrary to this present study, 7.4% co-infection with HIV and syphilis was reported. In sub-Saharan Africa between 2 and 17% of women test positive for syphilis in antenatal clinics and rates of HIV co-infection are very high, contrary to this present study. In North America and Western Europe the incidence of syphilis is much lower at less than 5/100 000 of the population or less ⁽²¹⁾. There was steady decline in the incidence of syphilis in both Europe and the USA during the second half of the last century ^(16, 21), this is similar to this present study leading to the suggestions that endemic syphilis might even be eradicated in the study area. Age group 26-30 had highest prevalence of 38(1.99%) and 02(0.10%) in HIV and VDRL infection respectively in the study years, this is similar to Esan *et al* 2014, who reported that age group 26-30 and 31-35 had highest prevalence of HBV and HCV among pregnant women, it was then concluded that these were the majority age groups that attending antenatal clinic of the hospital. Contrary to this study, Okonko *et al.*, 2012 reported that 2(0.6%) subjects in the 16—39 years age group and 1(1.7%) in the 40 years and above age group were VDRL positive. The difference in syphilis positive status was reported significant between ages of subjects. 28(8.2%) subjects in the 16—39 years age group and 7 (11.7%) in the 40 years and above age group were HIV positive, but the difference in HIV positive status was not significant between ages of subjects.

CONCLUSION

This present study clearly documents a relatively declined in sero-prevalence of HIV and VDRL within the consecutive three years of study, this reflects the level of HIV and VDRL in the general population.

RECOMMEDATION

All pregnant women should be screened for HIV and syphilis at their first antenatal visit within the first trimester and again in the third trimester. Pregnant women presenting with syphilis should be offered HIV testing and all HIV-positive pregnant women should be regularly screened for syphilis.

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