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**Seroprevalence and Co-Infection of Herpes Simplex Virus Type 2
and Human Immunodeficiency Virus in Nigeria.**

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Abstract:

Background: Herpes simplex virus type 2 (HSV-2) is a sexually transmitted virus that is the most common cause of genital ulceration worldwide. The increasing evidence that HSV-2 infection could significantly enhance the rates of sexual transmission and acquisition of human immunodeficiency virus (HIV) in developing countries informed our design of this study.

Objectives: To determine the seroprevalence and co-infection of HSV-2 and HIV and to evaluate their association with demographic factors among adults (≥15yrs) in Pankshin.

Methods: One hundred and eighty blood samples were collected from adults, age ≥15 years from Town Clinic Pankshin and General hospital Billang Shippang in Pankshin Local Government Area of Plateau State. DetermineTM and Stat pak rapid test kits were used to screen the collected samples for antibodies to HIV. The seroprevalence of HSV-2 was determined using Diapro HSV-2 type specific ELISA Kit according to the manufacturer's instructional manual.

Results: The estimated prevalence of HSV-2 was 24.4% and it was higher among women (26.09%) than among men (21.53%). That of HIV was 19.49%; men had a prevalence rate of 4.69% while that of women was 5.22%.

Conclusion: HSV-2 antibodies were frequent in the study group, genital herpes was not reported by the HSV-2 positive subjects, indicating low awareness of the HSV-2 infection. The prevalence of HIV however was not that significant. The percentage of co-infection was 2.8%.

Keywords: Herpes Simplex Virus Type 2, Human Immunodeficiency Virus, Pankshin, Plateau State, Nigeria.

Introduction:

Herpes simplex virus (HSV) infection is a common cause of ulcerative mucocutaneous disease in both immunocompetent and immunocompromised individuals.⁽¹⁾ It is a growing worldwide problem with high prevalence in women in developing countries, especially those with HIV infection, where incidence of reactivation is high.⁽²⁾

HSV-2 infection is highly prevalent worldwide although most infected persons are either asymptomatic or have genital symptoms that remain unrecognised. HSV-2 seroprevalence varies between regions and populations. In the United States, one in four sexually active adults had HSV-2 infection, with a 31% increase in HSV-2 prevalence between 1978 and 1990. About 40-60% attendees in STD clinics have already acquired genital herpes and 20-35% of pregnant women are HSV-2 seropositive. Studies have shown that about 1.6million new HSV-2 infections occur yearly in the United States.⁽³⁾

Seroprevalence of HSV-2 in western European countries including France, Germany, The Netherlands, Italy and Switzerland now approach that of the U.S. In South America, HSV-2 prevalence rates are similar to or higher than the U.S. in both heterosexual and homosexual populations. Comparably, high HSV-2 rates have been observed in sub Saharan Africa where HIV prevalence is the highest. Herpes Simplex Virus type 2 acquisition rates among South African teenagers are estimated to be 10-20% per year after sexual debut, and 20% of HIV

seronegative and 80% of HIV seropositive teenagers are HSV-2 seropositive. Herpes Simplex Virus type 2 Seroprevalence is >40% among antenatal attendees in Africa and ranges from 60-95% among female sex workers in sub-Saharan Africa.⁽¹⁾

In recent years, a parallel and interesting epidemiological association has emerged between HSV-2 and HIV infection. HSV-2 seroprevalence rates are higher in HIV positive than in HIV negative individuals and are especially high among HIV positive persons in sub-Saharan Africa. Multiple mechanisms may explain these observations; genital ulceration provides a site for HIV entry on HIV negative persons and the associated inflammation increases the number of activated cells that can be targeted by HIV. Although symptomatic and asymptomatic HSV-2 reactivations may promote HIV shedding in the genital tract and increase HIV levels in blood.⁽⁴⁾

Thus there appear to be true epidemiologic synergy between these two viruses in that, HIV incidence is increased in parallel with HSV-2 prevalence among HIV negative and positive persons and HIV prevalence increases HSV-2 incidence. Furthermore, HIV infections change the natural history of HSV-2 infection and HSV-2 infections may alter the course of HIV disease.⁽⁵⁾

Therefore, the evidence that genital HSV-2 is facilitating the perseverance of the global HIV epidemic informed our design of this present study to determine how common genital herpes and HIV are among persons with HIV in Pankshin LGA

of Plateau State and identify the risk factors involved in the progression of the infection.

Materials and Methods:

Study design

Prior studies on HIV seroprevalence in plateau State and Nigeria in general had been based on antenatal care attendees; hence a significant part of the at-risk population is often not screened. Thus, the study included both low-risk and high-risk members of the population.

Volunteers for the study were asked to report at the two sites (one urban and one rural) within Pankshin Local Government area. The choice of these sites was based on facilities to draw blood and previous participation in HIV studies. A structured questionnaire was used to obtain demographic and behavioural information from the subjects.

Eligibility Criteria

Inclusion criteria in the study included:

- Subjects ≥ 15 years of age.
- Informed consent after voluntary counselling.

Study population

One hundred and eighty (180) blood specimens were obtained with informed consent from adults ≥ 15 years that accepted a voluntary counselling before testing for HIV and HSV-2. Ninety samples each from the two centres were collected for analysis. Subjects were select-

ed using random sampling method. Sample size was determined using:

$$n = t^2 \times p \times (1-p) / M^2$$

Where:

n = required sample size
t = confidence level at 95% (standard value of 1.96)
p = estimated prevalence of HIV in the project area
m = margin of error at 5% (standard value of 0.05)

Laboratory analysis

Each sample was initially screened with a rapid HIV test kit (determine™) and all samples with a non reactive results were reported as negative whereas reactive samples in the initial testing were further tested using Stat pak®. Discordant samples were confirmed using Ginnie II. Samples that were reactive in the first test but negative in the second were recorded as negative. The samples were further screened for antibodies to HSV-2 using the Diapro HSV-2 specific ELISA test kit. All screening was done according to the kit manufacturer's instructions.

Ethical consideration

Ethical clearance for the study was sought and obtained from the ethical committee of Plateau State Specialist Hospital.

Statistical analysis

Data were entered into Microsoft® excel (2007) and further exported to SPSS® version 16.0 for analysis. Pearson's chi square test was performed at 95% confidence interval and significant level was accepted at $P < 0.05$.

Results:

Of the 180 specimens tested, 44 (24.4%) were seropositive for HSV-2 IgG antibodies. The prevalence was 14 out of 65 (21.5%) and 30 out of 115 (26.1%) among males and females respectively (Table 1). Seroprevalence was slightly higher among women than in men ($P>0.05$). Prevalence by age group showed that those within the age group 45-54 had the highest prevalence (36.7%); followed by those within the age group 55-64 (33.3%); while the lowest prevalence was recorded among age group ≥ 65 (0.0%). The overall preva-

lence of HIV was 5.0%. As with HSV-2, the seroprevalence was also slightly higher among women (5.2%) than in men (4.6%). The infection occurred more among the age groups 15-24 (7.7%), 25-34 (6.3%) and 35-44 (5.3%) (Table 2). Table 3 shows the co-infection rate of HSV-2 and HIV. The total percentage of co-infection observed in the study was 2.8%, with age group 35-44 having the highest interclass co-infection rate of 5.3%. The seroprevalence of HSV-2 and HIV in relation to occupation of patients is shown in table 4. Only cooks, traders and transporters showed a uniform prevalence rate for both HSV-2 and HIV of 25.0%, 100% and 50.0% respectively.

Table 1: SEROPREVALENCE OF HSV-2 IN RELATION TO AGE AND SEX

Age (years)	Total No. Tested / (% Positive)	Males		Females	
		No. Tested	No (%) Positive	No. Tested	No (%) Positive
15-24	39 (23.1)	9	0 (0.0)	30	9(30.0)
25-34	63 (17.5)	14	2 (14.3)	49	9(18.4)
35-44	38 (31.6)	16	7 (43.8)	22	5(22.7)
45-54	30 (36.7)	18	4 (22.2)	12	7(68.3)
55-64	3 (33.3)	3	1 (33.3)	0	0(0.0)
65≤	7 (0.0)	5	0 (0.0)	2	0(0.0)
Total	180(5.0)	65	14(21.5)	115	30(26.1)

Table 2: SEXSEROPREVALENCE OF HIV IN RELATION TO AGE AND.

Age (years)	Total No. Tested / (% Positive)	Males		Females	
		No. Tested	No (%) Positive	No. Tested	No (%) Positive
15-24	39 (7.7)	9	0 (0.0)	30	3(10.0)
25-34	63 (6.3)	14	2 (14.3)	49	2(4.1)
35-44	38 (5.3)	16	1 (6.3)	22	1(4.5)
45-54	30 (0.0)	18	0(0.0)	12	0(0.0)
55-64	3 (0.0)	3	0(0.0)	0	0(0.0)
65≤	7 (0.0)	5	0 (0.0)	2	0(0.0)
Total	180(5.0)	65	14(21.5)	115	30(26.1)

Table 3: Co-infection of HIV and HSV-2 in relation to age

Age (years)	Total No Tested	HIV Positive	HSV-2 Positive	HSV-2/HIV Co-infection (%)
15-24	39	3	1	1(2.6)
25-34	63	4	2	2(3.2)
35-44	38	2	2	2(5.3)
45-54	30	0	0	0(0.0)
55-64	3	0	0	0(0.0)
65≤	7	0	0	0(0.0)
Total	180	9	44	5(2.8)

Table 4: SEROPREVALENCE OF HSV-2 IN RELATION TO OCCUPATION

Occupation	Total No Tested	HIV Total No. Positive (%)	HSV Total No. positive (%)
Applicants	8	1(12.5)	2(25.5)
Artisans	5	0(0.0)	1(20.0)
Civil servants	18	2(11.1)	5(62.5)
Clergy	1	0(0.0)	0(0.0)
Cook	4	1(25.0)	1(25.0)
Entrepreneurs	2	0(0.0)	2(100)
Farmers	39	0(0.0)	8(20.5)
Housewives	44	0(0.0)	8(18.2)
Security	1	0(0.0)	1(100)
Students	45	3(6.7)	11(24.4)
Traders	1	1(100)	1(100)
Transporters	2	1(50.0)	1(50.0)
Others	10	0(0.0)	3(30.0)

Discussion:

From this study, 24.4% of the study population was found to be HSV-2 positive. The prevalence was higher among women than among men, which mirrors the trends in prevalence.⁽⁶⁾ This represents a much lower prevalence compared to the work done by Dada and co⁽⁷⁾, 1998 and Agabi and co⁽⁸⁾, 2010 in which 59.0% among commercial sex workers and 87.0% of patients attending the STI clinic in Jos tested positive to HSV-2 respectively. The relatively low prevalence of HSV-2 in this study can be attributed to the differences in the study population between above mentioned studies and our study. While their study population

was among high risk group (commercial sex workers) and STI clinic attendees, this study was among the general population who accepted voluntary counselling and testing for HIV and HSV-2. However, the recorded prevalence of 21.5% among men and 36.1% among women is higher than estimates from Western Europe, where prevalence reached a maximum of around 18% among women and 13% among men.⁽⁹⁾

Only 5.0% of the population was found to be HIV positive and the percentage of co-infection with HSV-2 and HIV was found to be 2.8% showing that coinfection with HSV-2 and HIV was not so common in

the population under survey. However, from the degree of low positive cases recorded, it cannot be completely stated that those negative are truly negative because a negative serological test does not exclude the possibility of infection either in the past (for HSV-2) or in the window period (for HIV).

The co-infection rate of 2.8% obtained from this study is quite low compared to available information on the subject of discourse, especially among sex workers and high-risk groups.^(10,11,12,13) Higher rates of 62.7-100%,^(14,15,16,17) 88%⁽¹⁸⁾ and 91%⁽¹⁹⁾ have been reported in the US, Haiti and Central African Republic respectively. The low co-infection rate recorded in our study could be attributed to the fact that the study did not differentiate between HIV-1 and HIV-2 infections, because most of the strong evidence shown in the epidemiologic synergy between HIV and HSV-2 were done with HIV-1. And Nigeria is one of the countries where HIV-2 is common. Other countries include Senegal, Ghana, and the Ivory Coast. Outside of West Africa, HIV-2 is extremely rare.⁽¹⁷⁾

The co-infection rate was found to occur within the age groups 15-24 and 35-44 years. Higher age groups did not show co-infection with HSV-2 and HIV. In relation to occupation of subjects, the prevalence of HSV-2 and HIV did show that traders had 100% prevalence for both infections. This however, does not indicate a statistical significance considering that only one subject from the occupation consented to be part of the study.

From the result of this investigation, we found that there is no strong association between HSV-2 and HIV infection in the area understudied. The low prevalence of HSV-2 may be responsible for this trend. There is need for further studies in this part of the country to validate the link between the two infections.

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