IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 6 Ser.16 (June. 2020), PP 14-17
www.iosrjournals.org

Seroprevalence of *Treponema pallidum* among HIV patients attending Kogi State specialist hospital, Lokoja, Nigeria.

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Abstract
This study was carried out to determine the seroprevalence of Treponema pallidum among HIV positive patients attending Kogi State Specialist Hospital, Lokoja, Kogi State of Nigeria.100 patients, of which 50 were HIV positive and 50 HIV negative, were randomly selected and screened to determine the presence of syphilis. Two milliliter venous blood samples were aseptically collected and an immunochromatographic test was used to determine syphilis antibodies. Among the 100 patients screened, 78 were females and 22 males of which 4 females and 1 male tested positive to HIV co-infection with syphilis, with higher prevalence observed in females (8%) than in males (2%). In terms of occupation, business people had a higher prevalence (15%) against civil servants (8%), while patients who were single had 12.5% prevalence compared to their married counterparts who had 10%. With respect to education, the non-educated had a greater prevalence of 26.67% while the prevalence of the educated which was 2.86%. All the positive cases were between the ages 21-40. Although, the association was not significant, all non-HIV patients used as control tested negative to Treponema pallidum. It is recommended that the population should be enlightened, routinely screened and treatment of HIV co-infection with syphilis made free.

Keywords: *Seroprevalence, HIV, syphilis, co-infection, Nigeria.*

Date of Submission: 10-06-2020 Date of Acceptance: 27-06-2020

I. Introduction

Syphilis is one of the most imperative sexually transmitted infections, caused by the spirochete *Treponema pallidum* which is a significant public health issue, especially in developing countries including sub-Saharan Africa.[1] Human immunodeficiency virus (HIV) and *Treponema pallidum* can co-infect the same host because their risk factors are the same, as they are both transmitted sexually.[2] WHO estimates that approximately 349 million people are actively infected with a treatable sexually transmitted disease.[3] Of these, estimates from 1999 suggest an annual rate for syphilis of approximately 12 million active infections.[3] Almost two-thirds of these cases are in sub-Saharan Africa and south/southeast Asia. HIV may affect the transmission of syphilis, alter its serological diagnosis, accelerate and change the clinical course and response to treatment.[4] These two diseases have a lot in common and have synergistic negative effect on the host which has serious clinical implications. Epidemiological survey and studies have shown that STIs, such as syphilis, are associated with an increased rise in HIV transmission. A co-infection of HIV and *Treponema pallidum* increases morbidity and mortality in immunocompromised individual and results in some medical complications like an alteration in the dosage and duration treatment for cure of syphilis.[5] The incidence of syphilis and other sexually transmitted diseases like HIV have been reported to have increased significantly during the last decade.[6]

1.2 MATERIAL AND METHOD

1.2.1 Study Area

Kogi State is located in the Central region of Nigeria. It lies between longitude 7.9075°N and latitude 6.5783°E. The state has a total area of 29,833 Km^2, with a population of about 4,473,500 of which majority of them are farmers while others are business people.

1.2.2 Study Population

A total of 100 patients, attending Kogi State Specialist Hospital (HIV unit), Lokoja were recruited for this study. Among these 100 patients, 50 were confirmed HIV patients while the other 50 were confirmed non-HIV patients. Ethical approval for the study was obtained from the Ethical Review Committee (ERC) of Kogi State Specialist Hospital in accordance with the Code of Ethics of the World Medical Association (Declaration

of Helsinki). Oral consent was sought and obtained from patients and necessary personnel (parent/guardians) prior to enrollment of patients. This study did not interfere with the normal treatment of patients.

1.2.3 Sample Collection

2 ml of blood sample was collected from each of the 100 recruited patients under aseptic conditions, using a sterile disposal syringe. The blood samples were placed in a sterile 5ml EDTA containers and were capped at room temperature. It was then centrifuged for 5 minute to obtain the serum, which was then kept in the refrigerator at a very low temperature until it was needed for use.

1.2.4 Test procedure

WHO-approved immunochromatographic test kit for syphilis named " One Step Anti-Syphilis Test" was used to screen the sera of the patients for the presence of syphilis. 1 ml of serum was separated into a clean tube, and the sealed pouch concealing the dipstick was opened. The dipstick was then dipped into the serum until only the colored area was submerged. After 15 minute, the result was read. The appearance of only a pink to deep purple colored band on the control region of the dipstick indicated a negative result. The appearance of two distinct pink to deep purple color on test and control regions indicated a positive result. When neither the test band nor the control band appeared, the result test was considered invalid.

1.2.5 Test Principle

One Step Anti-Syphilis Test utilizes the principle of immunochromatography, a unique two-site immunoassay on a membrane. As the test sample flows through the membrane assembly of the test dipstick, the recombinant *Treponema* antigen-colloidal gold conjugate forms a complex with *Treponema* specific antibodies in the sample. This complex moves further on the membrane to the test region where it is immobilized by the recombinant *Treponema pallidum* antigens coated on the membrane leading to the formation of a pink to deep purple coloured band at the test region which confirms a positive test result. Absence of this coloured band in test region indicates a negative test result. The unreacted conjugate and the unbound complex if any, along with mouse IgG gold conjugate move further on the membrane and are subsequently immobilized by the Goat anti-mouse antibodies coated on the control region of the membrane assembly, forming a pink to deep purple coloured band. The control band serves to validate the test results.

II. Results

Out of the 50 confirmed HIV patients examined, 5(10%) tested positive to syphilis screening. On the other hand, all of the 50 non-HIV patients tested negative for the presence of *Treponema pallidum.* Table 1 shows the gender distribution of *Treponema pallidum* among HIV and non-HIV patients. 10% of both male and female HIV patients tested positive to syphilis while no positive case of syphilis was observed in both male and female non-HIV patients. Also, 3(12.5%) positives cases were recorded among HIV patients within the age bracket of 21-30 years in contrast to 2(13.3%) HIV patients within the age 31-40 who tested positive to syphilis as (Table 2). No syphilis case was recorded in other age groups of HIV patients.

With respect to occupation, HIV patients who were business people appeared to have a higher prevalence (15%) of syphilis than civil servants and students whose prevalence were 8% and 0% respectively. 4(10%) of married HIV patients tested positive compared to their counterparts who were single and divorced with the prevalence of 12.5% and 0% respectively. In terms of education status, only 1(2.86%) educated HIV patient tested positive for the presence of *Trepanoma pallidum* while 4(26.67%) of their non-educated counterparts tested positive for syphilis.

Table 1: Gender Distribution of *Trepanoma pallidum* among HIV and Non-HIV Patients

Variables	**No. of participants (%)**		**No. of Positive cases of Anti-Syphilis Abs(%)**	
	HIV Patients	**Non-HIV Patients**	**HIV Patients**	**Non-HIV Patients**
Gender				
Male	10(20)	12(24)	1(10)	0(0)
Female	40(80)	38(76)	4(10)	0(0)
Total	50(100)	50(100)	5(10	0(0)

Key: Abs - Antibodies

Table 2: Age Distribution of *Trepanoma pallidum* among HIV and Non-HIV Patients

Variables	**No. of participants (%)**	**No. of Positive cases of Anti-Syphilis Abs(%)**
	HIV Patients Non-HIV Patients	**HIV Patients Non-HIV Patients**

Age				
10-20	8(16)	8(16)	0(0)	0(0)
21-30	24(48)	22(44)	3(12.5)	0(0)
31-40	15(30)	14(28)	2(13.3)	0(0)
41-50	3(6)	6(12)	0(0)	0(0)
Total	50(100)	50(100)	5(10)	0(0)

Key: Abs - Antibodies

Table 4.4: Socio-economic factors among seropositive patients

Variables	**No. examined**	**Seropositive sample (%)**	**X^2**	**p-value**	
Occupation					
Business people	20	3(15)			
Students	5	0(0)		1.222	0.543
Civil servants	25	2(8)			
Total	**50**	**5**			
Education Status					
Educated	35	1(2.9)			
Non-educated	15	4(26.7)	6.614	0.010	
Total	**50**	**5**			
Marital Status					
Married	40	4(10)			
Single	8	1(12.5)		0.278	0.870
Divorced	2	0(0)			
Total	**50**	**5**			

III. Discussion

In this study, a seroprevalence of 10% co-infection of *Treponema pallidum* and HIV was observed. This study shows lower prevalence rate to the finding of Uneke, who reported a prevalence of 14.0% in Abakaliki and 30% prevalence in Federal Medical Centre (FMC) in Ebonyi State of Nigeria.[7]

From the study, syphilis did not show a significant variation with gender, as a prevalence of 10% was recorded in both male and female patients with HIV. This, however, opposes the findings of Hwang, who reported that females had 4.2% higher prevalence of syphilis than males.[8] It also contradicts the findings of Todd in a rural African population who reported higher prevalence of syphilis in females (9.1%) to males (7.5%).[9] Furthermore, the results of this study indicate that *Treponema pallidum* is more prevalent in people living with HIV, as no positive case was recorded in patients without HIV.

Although statistically insignificant (P> 0.05), this study suggests that business people have a prevalence of syphilis (15%) than civil servants (8%) and students (0%).

Also, the marital status of the patients examined was statistically insignificant. It shows that those married had a prevalence of 10% while those who were single have a prevalence of 12.5%. This agrees with the findings of Onwuezebe who reported higher prevalence in unmarried HIV patients.[10] This could be attributed to the possibility that single individuals tend to have multiple sexual partners, thus increasing their likelihood of contracting syphilis compared to their married counterparts, who are committed and usually have just one sexual partner.

The seroprevalence of *Treponema pallidum* among HIV patients in respect to education status shows that the non-educated participants have a prevalence of 26.67% compared to the educated who have 2.86%. This result is statistically significant and may explain that the non-educated have little or no knowledge of syphilis infection and proper prevention techniques were not used in comparison to their educated counterparts who were well-informed about sexually-transmitted diseases and may wear condom or employ other prevention techniques to protect themselves from syphilis.

Acknowledgements

We appreciate the support and cooperation of the management of Gunduma health care Centre, Gumel. We also thank the participants for their willingness to be enrolled for the study.

Competing interests

Authors declare that there is no competing interest.

Funding

No specific funding was received for this project.

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Adejoh, P., Bello, Kizito E, et. al. "Seroprevalence of Treponema pallidum among HIV patients attending Kogi State specialist hospital, Lokoja, Nigeria." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(6), 2020, pp. 14-17.