ISSN: 2536-7153 SJMLS

Sokoto Journal of Medical Laboratory Science 2024; 9(3): 283 - 288

SJMLS - 9(3) - 029

The Carrier Rate of Treponema pallidum (Syphilis) Antibody Among Women in Some Selected Locations in Ondo State, Nigeria.

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Abstract

Syphilis is a multi-stage, vertically (mother to child transmission) or sexually transmitted disease caused by *Treponema pallidum*. It is an obligate human pathogen renowned for its invasiveness and immune evasiveness. It is of global concern because it causes worldwide health problem like congenital syphilis, neurological conditions such as meningitis, hemiplegia, stroke, aphasia, seizures, and Tabes dorsalis. It does also Gummatous syphilis which features severe skin or visceral lesions called Gummas and as such should be the concern of all public health agencies. This study was done in order to determine the carrier rate of *Treponema pallidum* among apparently healthy women in Ondo State, Southwest Nigeria. Four hundred volunteered women from the three senatorial districts of the State were screened for the antibody to *T. pallidum* to determine their sero-positivity percentage. The rapid test kit was used, and results were confirmed with *Treponema pallidum* Haemagglutination Assay (TPHA) kit. Of these 400 women, 3(0.75%) was confirmed positive. The percentage sero-positivity varies across the three senatorial districts, 1.3% was reported in the urban central district, 0.83% in the north and none (0%) was seen in the southern district. The mean age of the women is 31 years, meaning that they are still within the sexually active age bracket. More efforts in public enlightenment will help in the control of STIs in Ondo State.

Keywords: Sero-positivity, Apparently Healthy, *Treponema pallidum,* Syphilis, Rapid Test Kits (RTD), Treponema pallidum Haemagglutination Assay (TPHA).

Introduction

Syphilis is a multi-stage, vertical (mother to child transmission) or sexually transmitted disease caused by a spirochete bacterium called *Treponema pallidum*. Thus it is primarily transmitted sexually or vertically during pregnancy[1]. *Treponema pallidum,* an obligate human pathogen, is renowned for its invasiveness and immune evasiveness. The clinical manifestations of its diseases result from the local inflammatory response elicited by its replication within the body tissues. In the absence of treatments, infected individuals typically follow a disease course divided into primary, secondary, latent and tertiary stages over a period of about 10 years or even more[1]. Primary syphilis usually appears10 to 90 days after exposure to the infection and comprises a painless, indurated ulcer (chancre) at the site of inoculation with the spirochete with incidence of multiple chancres development notably among HIV patients. These lesions do resolve without treatment within 3-6 weeks. Regional lymphadenopathy is common in primary syphilis and consists of rubbery lymph nodes[1, 2]. The disappearance of the chancre (s) is usually followed 6-8 weeks later by secondary manifestations (secondary syphilis); whose clinical features can include fever, headache and varied cutaneous (skin) manifestations such as a macula-papular rash on the flank, shoulders, arm, chest or back and that often involve the palms of the hands and soles of the feet. These skin lesions are highly contagious because they contain a high load of the spirochetes[1]. As signs and symptoms subside, patients enter a latent phase, which can last many years. This phase is

characterized by positive serologic tests but negative clinical manifestations. This phase is followed by tertiary syphilis in about 15%-40% of untreated individuals, which is considered as late symptomatic syphilis with severe clinical manifestations such as destructive cardiac (an aortic aneurysm, aortic valvulopathy) or neurological conditions called Neurosyphilis such as meningitis, hemiplegia, stroke, aphasia, seizures, and Tabes dorsalis. It does also include gummatous syphilis which features severe skin or visceral lesions called gummas (Peeling *et al*., 2017; Tudor *et al*., 2923). When acquired via vertical mode of transmission from mother to child, congenital syphilis is given birth to. Congenital syphilis results from transplacental transmission or contact with infectious lesions during birth and can be acquired at any stage, causing stillbirth or neonatal congenital infection (Tudor *et al*., 2023).

Materials and Methods

Ethical Consideration:

The protocols of this study were examined and approved by the Health Research Ethical Committee of Adekunle Ajasin University, Akungba-Akoko with reference number: 261023ERC1 and the procedures were therefore performed in accordance with the ethical standards laid down in the 2013 Declaration of Helsinki**.**

Sample collection:

Five (5) mls of blood was collected into new non-anticoagulated containers from volunteered women who came for free Medical screening, after they have been mobilized through their Religious and Community Leaders, without physical and clinical symptoms of sexually transmitted infections. Their Bio data like Age, Religion, and Occupation were obtained and documented. The blood samples were immediately taken into the Laboratory, centrifuged for 5minutes at 3000 revolution per minute (rpm). With separate Pasteur pipettes, each sample's serum was removed into new plain bottle, labelled and frozen at -20^{0}c until required for assay.

Method of Assay:

The Rapid Plasma Reagin (RPR) test using DiaSpot USA kits were used. This procedure is a qualitative membrane strip-based immunoassay for the detection of Treponema pallidum (Tp) antibodies (IgG and IgM) in whole blood, serum or plasma. In this test, recombinant Syphilis antigen is immobilized in the test line region of the strip. After a sample is added to the specimen pad it reacts with Syphilis antigen coated particles that have been applied to the specimen pad. This mixture migrates chromatographically along the length of the test strip and interacts with the immobilized Syphilis antigen. The double antigen test format can detect both IgG and IgM in specimens. If the specimen contains Tp antibodies, a red line will appear in the test line region, indicating a positive result, while the non-appearance of the red line is indicative of absence of the antibodies in such sample. To serve as a procedural control, a pink colour will always appear in the control line region indicating that proper volume of sample has been added and membrane wicking has occurred. Reactive samples were confirmed by using Treponema pallidum haemagglutination assays (TPHA (Fortress Diagnostics Ltd UK, Lot: TH1506-2) following the manufacture's instruction, as previously described (Olajubu and Fadipe, 2014; Wabe *et al.,* 2021).

Statistical Analysis of Data: Analysis of the data collected via questionnaires and Laboratory analyses were done using Statistical Package for Social Science (SPSS) version 25.0. The results are as presented in the tables below.

Results and Discussion

A total of 400 volunteered women were found eligible to be part of this study. Distribution indicated that 120(30%) were from the Northern Senatorial district, 124(31%) were from the South and 156(39%) were from the most populated Central district of the State. This was a fair distribution of the women population for the study because two major Cities (Ondo and Akure) are in the Central; forming the bulk of the urban dwellers, while the rest are majorly rural populace. Among these women, only one (0.83%) was a confirmed positive carrier of the antibody to *T. pallidum* form the Northern part, while none was found in the South and 2 (1.3%) were positive in the Central Senatorial district of the State. These bring the total state prevalence of antibody to *T. pallidum* among apparently healthy women to be about 0.75%, as can be seen in the Table 1 below:

Table 1: The distribution of *Treponema pallidum* antibody in the different Locations in Ondo State.

District (Locations)	Number of Subjects	Number Positive	Percentage (%)
ONDO NORTH (IKARE & ARIGI DI AKOKO).	120	1	0.83
ONDO CENTRAL (AKURE & ONDO CITIES).	156	2	1.3
ONDO SOUTH (OKITIPUPA)	124	Nil	0.0
TOTAL	400	3	0.75

NB: The total seroprevalence of Syphilis is 0.75% among women in Ondo State.

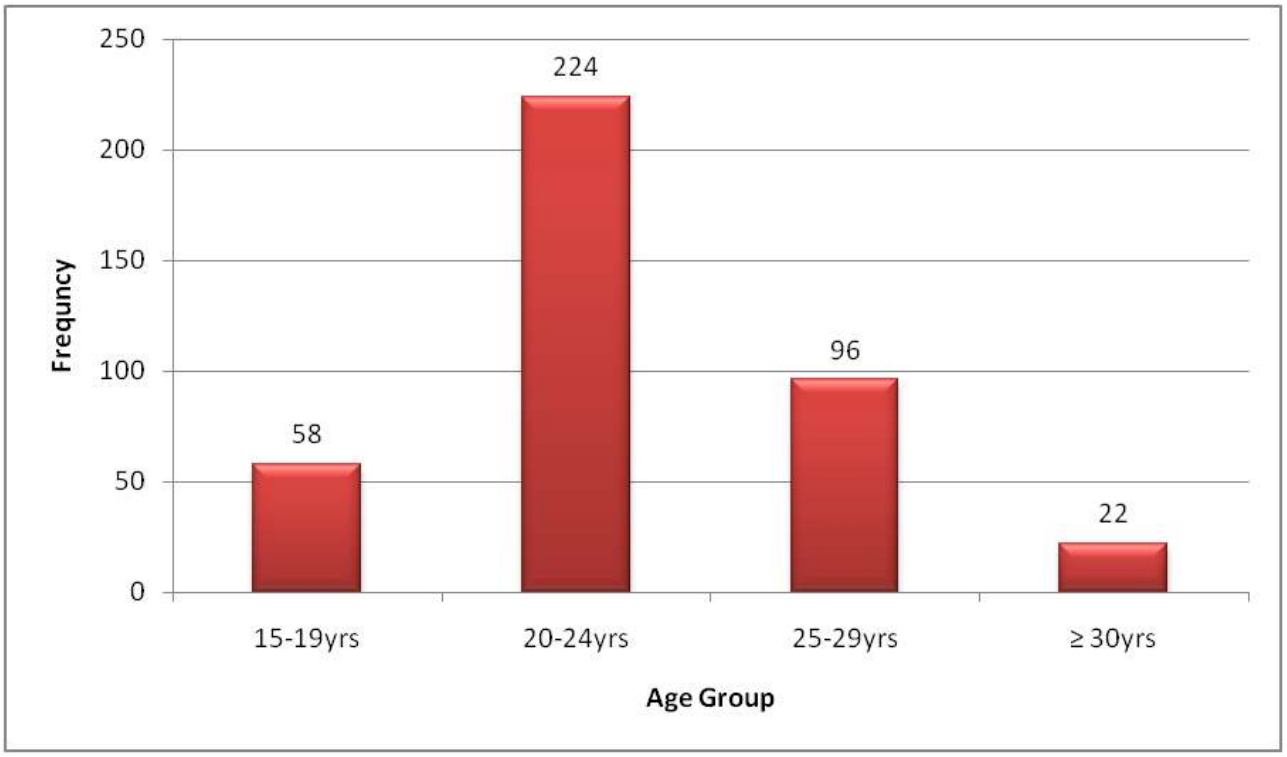

Figure 1: **Showing Bar chart of age group of the respondents (Women)**

Table 2: Socio-demographic Data of Volunteered Women of Ondo State.

Variable	Frequency	Percentage
Age group		
≤20yrs	30	7.5
21-30yrs	191	47.5
31-40yrs	134	33.5
41-50yrs	29	7.3
Above 50yrs	16	4.0
Mean ± SD	31.49±8.53	
Ethnicity		
Yoruba	370	92.5
Hausa	24	6.0
Igbo	6	1.5
Marital Status		
Single	35	8.8
Married	321	80.2
Divorced	14	3.5
Widowed	20	5.0
Separated	10	2.5
Religion		
Christianity	385	96.3
Islam	15	3.7
Educational Status		
None	14	3.5
Primary	47	11.8
Secondary	170	42.5
Tertiary	169	42.2
Occupation		
Trading	174	43.5
Civil servant	101	25.2
Artisan	67	16.8
Unemployed	58	14.5
Location		
South	124	31.0
North	120	30.0
Central	156	39.0

Key: Summary of the Demography of the 400 Women that volunteered for the Study.

Data generated from the analysis of the questionnaires used for this study, showed that the bulk of the participants are from the sexually active age range of 20-25 years, with the mean age of all the women at 31.49 (Figure 1). Also, a good number of them fall within the population of women whose level of education did not reach tertiary level and are majorly traders, artisan and unemployed housewives. Only 25% of them are Civil Servants, who are possibly educated. Significantly none of the women from the South was found positive to this sexually transmitted aetiology of Syphilis, while the North and the central had some positive cases. These women were majorly married, with few singles and some either divorced or widowed.

This total prevalence of 0.75% among apparently healthy women in Ondo State is slightly higher than 0.6% reported among pregnant women in Onitsha, a Commercial city in the Eastern part of Nigeria (Mbamara and Obiechina, 2011). Wabe and Colleagues (2021). Also, Adesina and Oladokun (2010) reported a prevalence of 0.13% among apparently pregnant women in Ibadan, a Southwestern City in Nigeria. Some other early reports of a higher prevalence have been done by some people across Nigeria and an average prevalence in Nigeria is said to be 0.125% to 4.1% (Forbi *et al.,* 2009) which is much lower than the figures from some other African countries. Among pregnant women in South Africa, 6.5% prevalence was reported, while it was 4.6% in East Africa and 4.0% in West Africa (Davey *et al.,* 2016). Apparently healthy Blood donors who were screened had prevalence of about 1.5% in Burkina Faso (Bisseye *et al.,* 2013), 3.7% in Ghana (Sarkodie et al., 2016) and 0% in Sokoto, North-Western Nigeria (Buhari *et al.,* 2014). Female sex workers and their male clients in Togo had prevalence rate of 2.2% and 2.3% respectively (Halatoko *et al.,* 2017). This difference in estimates might be attributed to the time gap between study periods, geographical setting of study population, difference in sample size of the study and the difference in the risk factors that exposes these study groups to Syphilis and other STIs.

Conclusion:

Our study indicated a 0.75% prevalence of among the women screened. Concerted efforts in terms of health education, regular screening and treatment should still continue among women as outlined by the WHO for the purpose of the control of Syphilis and other related STIs in Ondo State and environs.

Competing Interests

Authors have declared that no competing interests exist.

Acknowledgements

The authors wish to acknowledge Nigeria Tertiary Education Trust Fund (TETFUND) for providing the grant for this study and also the management of Adekunle Ajasin University, Akungba-Akoko for the enabling environment for academic scholarship.

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Citation: Fadipe, D.O., Omotuyi, I.O. and Olajubu, F.A. The Carrier Rate of Treponema pallidum (Syphilis) Antibody Among Women in Some Selected Locations in Ondo State, Nigeria. ***Sokoto Journal of Medical Laboratory Science*; 9(3): 283 – 288**.
https://dx.doi.org/10.4314/sokjmls.v9i3.29