Seroprevalence of Syphilis in Persons Attending Public and Private Healthcare Facilitiesin Urban Communities of Port Harcourt, Nigeria: A RetrospectiveStudy.

Abstract

Introduction: Syphilis is a sexually transmitted infection caused by the bacteria *Treponema pallidum.* It is also transmissible from mother to child, or through transfusion of infected blood or blood products. This study was aimed at finding the seroprevalence of syphilis in some high-density urban communities within the Port Harcourt metropolis in the Niger Delta region of Nigeria

Materials and Methods: The is a cross-sectional retrospective study involving a review of laboratory records of persons from some urban communities in Port Harcourt, attending public and private healthcare facilities, who underwent laboratory investigations for syphilis.

Results: The blood samples of 316 persons, including 153 males and 163 females, living in five different, contiguous urban communities within Port Harcourt metropolis were analyzed between January 2022 and December 2023. The ages ranged from 6 years to 78 years, the mean age was 35.19, the median was 33.50 and the modal age was 27 years. The overall seroprevalence of syphilis in the study area was 2.2%; the prevalence for males was 2.6% while that for females was 1.8%. There was zero prevalence among the age groups ranging from 1-19 and 70-79 years old; the 20-29 age group had a prevalence of 1.2%, 30-39 (2.0%), 40-49 (1.5%) 50-59 (2.7%), 60-69(11.1%).

Conclusion: This was apparently the first study to determine the prevalence of syphilis in the urban communities and will be of immense help to public health policy makers in formulating measures for prevention, management and control of syphilis.

Keywords: Syphilis. *Treponema pallidum*, Public Health, Serology, sexually transmitted infections

Introduction

Syphilis is an historical disease which has remained a global public health issue since 1494 when it was documented in French soldiers who invaded Italy with mercenaries from across Europe.[1] It is a sexually transmitted infection (STI) caused by *Treponema pallidum,* which may be transmitted vertically from mother to child and horizontally through transfusion of infected blood or blood products. An estimated 7.1 million new syphilis infections were recorded in 2020 with 30% being in Africa.[2,3] It is the second most common infectious cause of stillbirth.[4]

Treponema pallidum was identified in 1905 by Schaudinn and Hoffmann.[5,6] It is a spirochete measuring 0.10 to 0.18 micrometers in diameter and 6 to 20 micrometers in length.[6] It is a chronic systemic disease with largely short symptomatic periods separated by latency periods of usually longer but variable duration.[7] There are four stages of syphilis, primary, secondary, latent, and tertiary/late. The primary or chancre phase is characterized by a firm, round, painless ulcer at the entry site of the pathogen, which may appear within 10 and 90 years.[8]

Secondary Syphilis manifests in about 25% of untreated cases, within 2-8 weeks after the disappearance of the primary chancre with multiple systemic symptoms involving any part of the body. These may include fevers, myalgias, headaches, anorexia, sore throat, weight loss, joint pain, malaise, and particularly, the cutaneous symptoms. Tertiary or late-stage syphilis may manifest several months of years, after the initial infection as cardiovascular syphilis,

neurosyphilis, or gummatous syphilis (infiltration of any organ and its subsequent destruction), in 25 - 40% of untreated cases.[8]

Syphilis is curable, having been treated with penicillin since 1943, which is still a drug of choice, as well as other alternatives.[7] It however remains an intractable public health challenge, with high prevalences in resource poor countries, commonly among female sex workers and a rising incidence in some developed countries driven by population of men having sex with men.[9] The advent of the human immunodeficiency syndrome, (HIV) has led to a resurgence of syphilis. Immunosuppression by the virus makes it easier for the spirochete to overcome the host defenses; on the other hand, genital ulcers which is a common symptom of syphilis provides a route for the virus gain access into the host tissue.[10]

In recent years there has been a rise in the incidence of syphilis.[11] The disease is getting more prevalent, with associated rise in morbidity and neonatal mortality; thus, the need arises for increased surveillance, testing and treatment strategies.[6] The disease manifest several symptoms that are associated with many other illnesses, hence the nickname “mimicker”. It thus becomes imperative that syphilis screening should be carried out extensively in order to detect it at all times to curb the spread and ensure proper management. There appear to the paucity of data on the prevalence of syphilis in Port Harcourt, and none in Diobu and environs. This study was thus conceived to fill this gap by aiming to ascertain the prevalence of syphilis in some urban communities in Port Harcourt, Nigeria.

Materials and Methods

Study Area

The study area, Diobu is a high-density collection of urban communities situated in the heart of Port Harcourt metropolis in the Niger Delta of Nigeria. The notable urban communities are Mile I, Mile II and Mile III urban communities. The coordinates of Diobu are: 4°47'24"N, 6°59'36"E (Latitude:4.772152; Longitude:6.994514). It is bordered on the north by New GRA, on the northeast by D-line, on the northwest Rivers State University, on the east by Old GRA, on the southeast by Kidney Island, and on the southwest by Eagle Island. The adjoining communities that were part of the study area share many of the demographic attributes with regards to population and human activities.

There is a large presence of young people in Diobu, made up of people born there and many of those who are migrating into the city from villages. There is bustling night life, red light districts, a number of night clubs, hotels, brothels, guest houses and such places catering for the young and old. The overcrowded tenement buildings, the squalor of water fronts and an economy that is characterized by runaway inflation and high degree of uncertainty and unpredictability are factors that may drive unprotected sex, leading to STI’s like syphilis.

Design of the study

This is a retrospective cross-sectional study conducted from January 2022 to December 2023 among 316 adult male and female residents of Diobu and closely adjoining urban communities of Port Harcourt metropolis; attending public and private healthcare facilities within the area. The inclusion criteria include persons who live within Mile I, Mile II and Mile III, Eagle Island/ Agip and D-line, who within the study period, conducted serological laboratory investigations for

syphilis at Diagnostix and Scientifique Laboratories, Port Harcourt. Persons, whose laboratory records captures the relevant data on age, gender, residence and syphilis result. those living far from the study area, did not have complete data, or did not perform the tests were excluded.

Data collection

Convenience sampling method was employed as patients' data were obtained by reviewing their medical laboratory records. The outcomes of the laboratory tests of Syphilistests and relevant socio-demographic data about the ages, genders and areas of residence were extracted, coded and anonymously analyzed.

Laboratory Analysis

The sera of the patients were analyzed using SD Bioline syphilis 3.0 (Standard diagnostics, INC. Korea) which is a solid phase immunochromatographic assay used to qualitatively detect the antibodies of all isotypes [Immunoglobulin G (IgG), Immunoglobulin M (IgM), Immunoglobulin A (IgA)] against TP. It is pre-coated with recombinant *T. pallidum*, antigens which binds to any *T. pallidum*, antibodies, that may be present in the patient sample to produce a visible line. Whole blood, serum or plasma may be used for the analysis.

Statistical analysis

Data were analyzed with IBM SPSS Statistics version 25. Descriptive statistics were employed in presenting the data were in counts and percentages. Pearson chi-square test and Fishers exact test were employed to ascertain associations between the categorical variables.

Ethical Considerations

The study design was reviewed and approved by ethical review committee of the Faculty of Medical Laboratory Science, Federal University Otuoke, Nigeria. Relevant approvals were sought and obtained from the management of Diagnostix and Scientific Laboratories.

Results

The blood samples of 316 persons, including 153 males and 163 females, living in five different, contiguous urban communities within Port Harcourt metropolis were analyzed between January 2022 and December 2023. The ages ranged from 6 years to 78 years, the mean age was 35.19, the median was 33.50 and the modal age was 27 years.

Seroprevalence of Syphilis in some Urban Communities of Port Harcourt

The overall seroprevalence of syphilis in the study area was 2.2%; the prevalence for males was 2.6% while that for females was 1.8%. There was zero prevalence among the age groups ranging from 1-19 and 70-79 years old; the 20-29 age group had a prevalence of 1.2%, 30-39 (2.0%), 40-49 (1.5%) 50-59 (2.7%), 60-69 (11.1%) (Table 1)

Table 1: Seroprevalence of Syphilis in some Urban Communities of Port Harcourt

Characteristics	No. Tested	No. Positive
Age		
0 – 9	3 (0.95)	0 (0.0)
10 – 19	24 (7.6)	0 (0.0)
20 – 29	83 (26.3)	1 (1.2)
30 – 39	100 (31.7)	2 (2.0)
40 – 49	69 (21.8)	1 (1.5)
50 – 59	26 (8.2)	2 (7.7)
60 – 69	9 (2.9)	1 (11.1)
70 – 79	2 (0.63)	0 (0.0)
Total	316 (100)	7 (2.2)
Genders		
Males	153 (48.4)	4 (2.6)
Females	163 (51.6)	3 (1.8)
Total	316 (100)	7 (2.2)
Residence		
Mile I	66 (20.9)	2 (3.0)
Mile II	82 (26.0)	4 (4.9)
Mile III	61 (19.3)	0 (0.0)
D-Line	57 (18.0)	1 (1.8)
Eagle Island	50 (15.8)	0 (0.0)
Total	316 (100)	7 (2.2)

Seroprevalence of Syphilis in Mile I Diobu Port Harcourt

The seroprevalence of syphilis in in Mile I Diobu, Port Harcourt was found to be 3.0%, the males have a zero prevalence while the females recorded 3.0%. The 30-39 age group had a prevalence of 9.1%, while the other age groups had zero prevalence. (Table 2)

Table 2: Seroprevalence of Syphilis in Mile I Diobu Port Harcourt

Characteristics	No. Tested	No. Positive
Age Groups		
0 – 9	1 (1.5)	0 (0.0)
10 – 19	2 (3.0)	0 (0.0)
20 – 29	17 (25.8)	0 (0.0)
30 – 39	22 (33.3)	2 (9.1)
40 – 49	16 (24.2)	0 (0.0)
50 – 59	7 (10.6)	0 (0.0)
60 – 69	0 (0.0)	0 (0.0)
70 – 79	1 (1.5)	0 (0.0)
Total	66 (100)	2 (3.0)
Genders		
Males	30 (45.5)	0 (0.0)
Females	36 (54.6)	2 (5.6)
Total	66 (100)	2 (3.0)

Seroprevalence of Syphilis in Mile II Diobu Port Harcourt

The seroprevalence of syphilis in in Mile II Diobu, Port Harcourt was found to be 4.9%, the males have a prevalence of 7.0% while the females recorded 2.6%. The 20-29 age group had a prevalence of 7.1%, 50-59 (16.7%), 60-69 (25%), while the other age groups had zero prevalence. (Table 3)

Table 3: Seroprevalence of Syphilis in Mile II Diobu Port Harcourt

Characteristics	No. Tested	No. Positive
Age Groups		
0 – 9	1 (1.2)	0 (0.0)
10 – 19	13 (15.9)	0 (0.0)
20 – 29	14 (17.1)	1 ()
30 – 39	24 (29.3)	0 (0.0)
40 – 49	20 (24.4)	1 (5.0)

50 – 59	6 (7.3)	1 (16.7)
60 – 69	4 (4.9)	1 (25.0)
70 – 79	0 (0.0)	0 (0.00
Total	82 (100)	4 (4.9)
Genders		
Males	43 (52.4)	3 (7.0)
Females	39 (47.6)	1 (2.6)
Total	82 (100)	4 (4.9)

Seroprevalence of Syphilis in Mile III Diobu Port Harcourt

The seroprevalence of syphilis in Mile III Diobu, Port Harcourt was found to be zero, as all the samples from the area tested negative to syphilis (Table 4)

Table 4: Seroprevalence of Syphilis in Mile III Diobu Port Harcourt

Characteristics	No. Tested	No. Positive
Age		
0 – 9	0 (0.0)	0 (0.0)
10 – 19	1 (1.8)	0 (0.0)
20 – 29	20 (35.1)	0 (0.0)
30 – 39	17 (29.8)	0 (0.0)
40 – 49	11 (19.3)	0 (0.0)
50 – 59	5 (8.8)	1 (20.0)
60 – 69	3 (5.3)	0 (0.0)
70 – 79	0 (0.0)	0 (0.0)
Total	57 (100)	1 (1.8)
Genders		
Males	24 (42.2)	1 (4.2)
Females	33 (57.9)	0 (0.0)
Total	57 (100)	1 (1.8)

Seroprevalence of Syphilis in D-Line Port Harcourt

The seroprevalence of syphilis in D-Line, Port Harcourt was found to be 1.8%, the males have a prevalence of 4.2% while the females recorded zero prevalence. The 50-59 age group had a prevalence of 20%, while the other age groups had zero prevalence. (Table 5)

Table 5: Seroprevalence of Syphilis in D-Line Port Harcourt

Characteristics	No. Tested	No. Positive
Age		
0 – 9	0 (0.0)	0 (0.0)
10 – 19	1 (1.8)	0 (0.0)
20 – 29	20 (35.1)	0 (0.0)
30 – 39	17 (29.8)	0 (0.0)
40 – 49	11 (19.3)	0 (0.0)
50 – 59	5 (8.8)	1 (20.0)
60 – 69	3 (5.3)	0 (0.0)
70 – 79	0 (0.0)	0 (0.0)
Total	57 (100)	1 (1.8)
Genders		
Males	24 (42.2)	1 (4.2)
Females	33 (57.9)	0 (0.0)
Total	57 (100)	1 (1.8)

Seroprevalence of Syphilis in Eagle Island Port Harcourt

The seroprevalence of syphilis in Eagle Island, Port Harcourt was found to be zero, as all the samples from the area tested negative to syphilis (Table 6)

Table 6: Seroprevalence of Syphilis in Eagle Island Port Harcourt

Characteristics	No. Tested	No. Positive
Age		
0 – 9	0 (0.0)	0 (0.0)
10 – 19	2 (4.0)	0 (0.0)
20 – 29	16 (32.0)	0 (0.0)
30 – 39	17 (34.0)	0 (0.0)
40 – 49	8 (16.0)	0 (0.0)
50 – 59	6 (12.0)	0 (0.0)
60 – 69	1 (2.0)	0 (0.0)
70 – 79	0 (0.0)	0 (0.0)
Total	50 (100)	0 (0.0)
Genders		
Males	25 (50.0)	0 (0.0)
Females	25 (50.0)	0 (0.0)
Total	50 (100)	0 (0.0)

Statistical Analysis

Pearson's Chi-square test of independence and Fisher's exact testwere performed to evaluate the relationship between the residence, age and gender (independent variables) and results of syphilis tests. (dependent variable). The association between these variables were found not be significant, given that the p values were not less than 0.05, we therefore failed to reject the null hypothesis which states that the variables are independent. In other words, there was no sufficient evidence to conclude that a significant association exists between the residential areas, ages and genders of the participants and the test results obtained for syphilis screeningtests..

Discussion

This study has been able to establish the seroprevalence of syphilis in some urban communities within Port Harcourt metropolis. The seroprevalence of 2.2% recorded in this study is in tandem with some recent studies in Rivers state, Nigeria such as 2.2%[12] and 2.28%[13] reported among patents attending two different public healthcare facility in the state. It was however lower than the 6.8% reported for persons living with HIV in Sierra Leone.[3] and 6.2% reported in a study of female sex workers in Ethiopia.[14]

It is apparent that syphilis is not as common as many other sexually transmitted infections, however its devastating sequelae .makes imperative, the need not to ignore it.[15] The prevalence of syphilis among pregnant women in sub-Saharan Africa is reported as 2.9% [16] but a much higher prevalence of The finding in this study and across the continent is higher than the outcome of some other studies, elsewhere in Africa a prevalence of 1.4% was reported among Tanzanian pregnant women[17], while in India, a prevalence of 1.03%, was reported among pregnant women.[18]

In this study, syphilis infection was only detected in the three of the urban communities of Mile I, Mile II and D-Line. The first two communities were the home of 85% of the seropositive persons; and may be attributable to the rambunctious mix of businesses, residential settlements and disparate human activities, including overcrowded settlements populated by persons with low level of education existing in these areas compared to the other communities with lesser population density settlements and less business activities.

The strength of this study lies in the fact that it focused on urban communities with high population densities, policy measures aimed at the prevention and control of the disease can be tailored to adapt to the needs and peculiarities of the communities. While the outcomes can be extrapolated to address the same issues in other such communities, the template can also be expanded to conduct studies of syphilis and other related diseases in the study area and in other urban communities within the metropolis.

One limitation of the study was its nature as retrospective, the sociodemographic characteristics were limited to age, gender and place of residence as found in the laboratory records. Many other factors that may constitute high risk behaviour could not be evaluated. Also as a cross-sectional study the effects of variations in time and specific conditions could not be evaluated.[19',20]

Conclusion

This determination of the seroprevalence of syphilis in densely populated areas of Port Harcourt, Nigeria, in this study has contributed immensely to the epidemiological data necessary for proactive and prompt decisions towards prevention and management of the infection. More studies like this are required to fucus on this and other diseases of public health importance in other to improve the health and wellbeing of the people. It is hoped that further studies will be designed to take care of the limitations of this study.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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