THE SERO-PREVALENCE OF CHLAMYDIOSIS AMONG HIV PATIENTS AND HEALTHY FEMALE VOLUNTEERS IN PORT-HARCOURT, RIVERS STATE.

ABSTRACT

Background: Chlamydiosis caused by the bacterium *Chlamydia trachomatis* is the most prevalent bacterial Sexually Transmitted Infections (STI) known to cause damage to a woman's reproductive organs.The study was undertaken to determine the sero-prevalence of chlamydiosis among HIV patients and Healthy female volunteers in Port-Harcourt. The prevalence of chlamydiosis was investigated among 250 (150 HIV patients, and 100 Healthy volunteers) consented women of reproductive age attending Rivers State University Teaching Hospital in Port-Harcourt, Rivers State. Enzyme Linked Immunosorbent assay technique was performed to detect *Chlamydia trachomatis* IgG antibodies. The overall sero-prevalence of *C. trachomatis* in the population studied was 45 (10%). The distribution of women that tested positive for *Chlamydia trachomatis* IgG antibodies within the population investigated showed 5 (5%) for pregnant women, 10% for healthy volunteers, 11% for outpatients. The highest percentage of prevalence rate, 19 (12.7%) was recorded among HIV patients above 35 years. When prevalence was evaluated with the subgroups, there was no significant difference of *Chlamydia trachomatis* IgG antibodies across the subgroups (P>0.05).). There was no association between socio-demographic factors and sero-prevalence of chlamydiosis. The possible risk factor for chlamydiosis base on life style was lack of screening for *Chlamydia trachomatis* (P<0.05) as a result of limited awareness of the infection by majority of the participants. Chlamydiosis is largely under diagnosed in the population. Therefore every sexually active woman irrespective of age is expected to undergo screening for chlamydia infection.

Key words: Chlamydiosis, sero-prevalence, *Chlamydia trachomatis*IgG antibodies, HIV patients, Healthy volunte

INTRODUCTION

Chlamydiosis is a Sexually Transmitted Infection (STI) caused by the bacterium *Chlamydia trachomatis*. The bacterium infects the "wet" linings (mucous membranes) of the body such as the genital tracts which include the cervix, uterus, fallopian tubes, urethra (the tube that allows urine and semen to pass out of the body) and epididymis (a tube in the testicle that stores and carries sperm).[1,2,3] It can also infect the throat (pharynx), anus and rectum. In addition, it can infect the eyes through contact with infected discharge. Many people with Chlamydia infection have no symptoms. If symptoms do occur, they usually appear two to three weeks after infection (the incubation period) but it can take as long as six weeks. When the cervix is infected, symptoms

may include an unusual discharge (a fluid that flows out of the opening of the vagina), unusual vaginal odour, pain during vaginal intercourse, and bleeding between menstrual periods.[1,2] If the infection spreads to the uterus and fallopian tubes, symptoms such as lower abdominal pain, fever and nausea may occur. Infection of the urethra: Symptoms may include a yellow or white watery or milky discharge, a painful burning sensation during urination, urethral itching, and testicular pain and swelling.[1,3]

This bacterium affects people of all ages but is most common in young women. The majority of reported cases of chlamydia occur in people under the age of 30. In United Kingdom, as many as 10% of women of childbearing age are infected. In most parts of Africa including Nigeria, *Chlamydia trachomati*s is not routinely screened for, and hence relative information about the frequencies of the organism is sparse. [3,4,5]The prevalence reported varies from as high as 56.10% in Jos to a much lower prevalence of 9% in Maiduguri. [6,7]Recent study had proven that individuals at increased risk of chlamydia infection are people who have had unprotected sex with a new sexual partner or more than two sexual partners in the past year and people who have had previous sexually transmitted infections.[1,2,8]

Females living with HIV face unique challenges related to their immune systems and sexual health. The presence of HIV weakens the immune system, making these individuals more susceptible to various infections, including other STIs like Chlamydia.[1,9,10] Chlamydia is often asymptomatic, and when left untreated, it can lead to severe health complications, including pelvic inflammatory disease, ectopic pregnancies, and infertility Females living with HIV are more susceptible to Chlamydia due to their weakened immune systems, making them at a higher risk of contracting and experiencing complications from this bacterial infection.[2,7,8] Chlamydia can exacerbate the progression of HIV. It can lead to increased viral shedding of HIV, potentially making these individuals more infectious to their sexual partners.[1,2,10] This poses challenges in managing and preventing the spread of both infections. To address these challenges, awareness, regular screening, and education are vital. Healthcare providers play a pivotal role in offering appropriate testing and treatment for Chlamydia in females living with HIV. [1,2,4]Timely diagnosis and management of Chlamydia are crucial to mitigate the risks associated with co-infection, improve individual health outcomes, and reduce the transmission of both infections. This study was aimedinvestigating thesero-prevalence of chlamydiosis among HIV patients and Healthy female volunteers drawn from Rivers State Teaching Hospital, Port-Harcourt, Rivers State.

Methodology

Study design

A cross-sectional study was carried out using the sample of the selected participants.

Data was generated from self-structured questionnaires that were distributed to the participants who volunteered to partake in the study. The questionnaires entailed questions on socio-demographics and risk factors associated with Chlamydia infection.

Study Area

The study was carried out in Port-Harcourt, also known as the Garden city. Its latitude and longitude are 4.824167, 7.033611. It is the capital and largest city in Rivers State, Nigeria.Port Harcourt is the leading hub for medical services in Rivers State. Many healthcare facilities including hospitals and research facilities are located in Port Harcourt. The city has a prominent tertiary health institution University of Port Harcourt Teaching Hospital(UPTH) is situated on East West Road, and River State University Teaching Hospital (RSUTH).

Rivers State University Teaching hospital (RSUTH) located at 5-8 Harley Street, Old GRA 500101. The hospital was established in 1925 as Braithwaite Memorial Hospital, named after Eldred Curwen Braithwaite, a British doctor and a pioneer of surgery, originally, served as a medical facility for senior medical servants. It later became a general hospital and has since gained status as a 'specialist health institution. A major turnaround in the facility, occurred in 2018 upon the establishment of a Medical college at the rivers state university, which in turn led to the upgrade of the Braithwaite Memorial Specialist Hospital to a teaching hospital renamed, Rivers State Teaching Hospital (RSTH).

Study population

Total of 250 women of age between 15- 55 who met the inclusion criteria were enrolled into this cross-sectional study. The women were distributed in two sub-groups which are immunocompromised patients (those attending HIV clinic for medical services), and Healthy volunteers (asymptomatic women of the same age range were regarded as healthy subjects).

Eligibility criteria

The study included women between 15-55 years who are not currently on antibiotic medication. Healthy volunteers who are neither pregnant nor HIV positive, HIV patients who are not pregnant who gave their consents to participate in the study. While women of age below 15 and those above 55 and those who did not meet the inclusion criteria were excluded.

Sample collection and Analysis

A 2ml volume of blood was collected from each subject by venipuncture in a plain tube under aseptic condition, Sample was centrifuged to obtain serum which was used for laboratory analysis using enzyme linked immunosorbent assay (ELISA) for chlamydia IgG antibodies determination[11, 12]

Statistical analysis

Statistical Package for Social Sciences (SPSS) was used to analyze the data generated in this study. Prevalence of markers was expressed in percentages. The association between socio-demographic factors and variables was tested using Pearson chi-square. Statistical significance was accepted at $p < 0.05$ (95% confidence limits).

Results

A total of 250 blood samples collected from consented women of reproductive age (15-55 years) within four subgroups were tested for *Chlamydia trachomatis* IgG antibodies. 150 samples were collected from HIV patients, and 100 samples from healthy volunteers. Two hundred and fifty questionnaires were administered to respondents, and 240 were returned. This indicated a 97%

response rate which is considered an excellent response rate and sufficiently representative for the analysis.

Table**1**shows the prevalence of *Chlamydia trachomatis* IgG in the sera of the study population. Of 250 subjects tested, 29 (11.6%) demonstrated *Chlamydia trachomatis* IgG antibodies. HIV subgroup showed the highest sero-prevalence 19(12.7%) while Healthy volunteers showed the lowest sero-prevalence 10(10%). There was no statistical difference in the distribution of *Chlamydia trachomatis* 1gG antibodies between thetwo subgroups (P>0.05).

Table 2shows the sero-prevalence of Chlamydiosis and the associated sociodemographic factors.HIV patients above 35 years recorded the highest sero-prevalence while the lowest prevalence was found among participants below 35 years. There was no significance difference in the prevalence of *C. trachomatis* IgG antibodies (P >0.05) relative to the age groups. Participants who were self-employed showed the highest sero-prevalence (18.2) while the ones who are employed showed the lowest prevalence (3.0). There was no statistical relationship between chlamydiosis and occupation (P>0.05).HIV patients with secondary education had the highest prevalence of chlamydiosis (5.3%) while with primary and secondary education recorded the lowest prevalence (2.4%). there was no evidence of relationship recorded (P>0.05).
Table .3records the sero-prevalence of chlamydiosis based on associated risk factors. The highest sero-prevalence (4.5%) was seen among participants who lacked the knowledge of Sexually Transmitted Infections (STI). Based on the awareness of chlamydiosis, healthy volunteers who had the knowledge of chlamydiosis recorded the highest sero-prevalence (8.1%) while the lowest sero-prevalence (0.5%) was seen in the same group among those who do not have the knowledge of chamydiosis. The data obtained did not show any statistical increase (P > 0.05).

Participants who wash their hand rarely had the highest prevalence (20%) while the ones who wash their hands occasionally had the lowest prevalence (5.9%). The data obtained from this table did not show a statistical significance (P>0.05).

Those who screen regularly for other STIs recorded the highest prevalence 1 (14.3%) while participants who rarely screen for STIs recorded the lowest 5 (1.4%)

Those who do not screened for *Chlamydia trachomatis* had a higher prevalence rate of 15.8% compared to participants who had undergone *Chlamydia trachomatis* screening with the prevalence of 1.3%.The data obtained shows a statistical increase (P < 0.05).

Table 1. The overall sero-prevalence of Chlamydiosis among HIV Patients and Healthy Volunteers.

Group	CT Positive	CT Negative	Total	Percentage(%)
HP	19	131	150	12.7
HV	10	90	100	10

Abbreviations:HP = HIV Patients; **HV** = Healthy Volunteers; **CT** = *Chlamydia trachomatis*

$X^2 = 5.075$, $P > 0.05$

Table 2. The Sero-prevalence of chlamydiosis in the study population

Parameter	NE	Number Positive	
		HP	HV
		IgG(%)	IgG(%)
AGE GROUP			
15-25	94	0(0.0)	8(9.3)
26-35	64	4(8.0)	2(14.3)
36-45	67	11(16.0)	0(0.0)
46-55	25	4(16.0)	0(0.0)
Occupation			
Unemployed	28	3(17.6)	0(0.0)
Employed	48	2(3.0)	0(0.0)
Self-employed	59	10(18.2)	0(0.0)
Students	115	4(13.8)	10(11.6)
Education			
Non-Formal	3	0(0.0)	0(0.0)
Primary	18	0(0.0)	0(0.0)
Secondary	105	8(5.3)	0(0.0)
Tertiary	124	11(2.4)	10(10.0)

Abbreviations: **NE** = Number Examined; **HP** = **HIV** Patients; **HV** = Healthy Volunteers; **IgG** = Immunoglobulin G-*Chlamydia trachomatis* ELISA test

$X^2 = 4.065$, $P > 0.05$

Table 3: Sero-Prevalence of Chlamydiosis Based On Associated Risk Factors InPort-Harcourt

Risk Factors	Responses	NE(%)	NP IgG(%)			
			HP	HV	X2	P-VALUE
Awareness						
Heard of STI	YES	139	10(4)	10(4)	3.6	0.058
	NO	111	9(4.5)	0(0.0)		
Heard of Chlamydiosis	YES	55	3(3.03)	8(8.1)		
	NO	195	16(4.6)	2(0.57)	0.968	0.62
personal hygiene						
Hand washing	Regularly	190	16(4.7)	10(2.9)	5.26	0.08
	Occasionally	57	2(1.9)	0(0.0)		
	Rarely	3	1(20)	0(0.0)		
Vaginal wash with	Water only	183	14(4.2)	8(2.42)	3.869	0.276
	Soap and water	52	3(3.2)	2(2.2)		
	Water and antiseptics	14	2(8.0)	0(0.0)		
	Others	1	0(0.0)	0(0.0)		
Repeat undies	Regularly	4	0(0.0)	0(0.0)	0.914	0.633
	Occasionally	28	2(0.04)	0(0.0)		
	Rarely	217	17(4.3)	10(2.6)		
Lifestyle						
Sexually Active	Yes	218	18(4.6)	6(1.5)	0.009	0.925
	NO	32	1(1.7)	4(6.9)		
No. of sexual partner	One	198	17(4.8)	4(1.1)	2.769	0.837
	Two	14	0(0.0)	0(0.0)		
	Multiple	4	0(0.0)	0(0.0)		
	None	34	1(1.7)	6(10)		
Unprotected sex	Yes	194	16(4.6)	4(1.1)	0.227	0.893
	No	56	3(3.0)	6(6.0)		
Type of protection	Condom	53	8(8.3)	6(6.3)	6.252	0.441
	Medication	2	0(0.0)	0(0.0)		
	None	195	11(3.1)	4(1.1)		
Screened for C.T	Yes	218	10(2.5)	10(2.5)	1.117	0.007
	No	32	9(15.8)	0(0.0)		
Screen for other STI	Regularly	4	1(14.3)	0(0.0)		
	Occasionally	43	3(3.8)	0(0.0)	0.16	0.925
	Rarely	203	15(4.1)	10(2.7)		

Discussion

Chlamydia trachomatis infection is generally considered as a silent infection and hence known as an asymptomatic infection. It is usually in latent infection occurring unnoticed and remains endemic in the population for a long time.[1,6,13] A sero-prevalence of 10% was recorded in this study. This is similar to the sero-prevalence of 11% reported inUniversity of Port-Harcourt. [14]In contrast to this report, higher sero-prevalence of 32.1% and 45% were recorded at Vhembe District, [15] and at Bida in North central Nigeria[10] while a lower prevalence rate of 5.5% was reported in India. [2,3] The reason for these disparities could be difference in subject's population and settings, socio-demographic, and testing methods.

Out of the two subgroups that participated in this study, HIV patients recorded the highest sero-prevalence (12.7%) while the lowest sero-prevalence (10%) was recorded among healthy volunteers. Although, there was no statistically significance difference in the distribution of *Chlamydia trachomatis* IgG antibodies between the subgroups.

A relatively lower sero-prevalence of 12.7% recorded among HIV patients in this study was due to the adequate healthcare provided to the HIV patients attending Rivers State Teaching Hospital in Port-Harcourt as shown by their viral load result where majority of viral copies are drastically reduced. However, this prevalence was not statistically significance. This suggests a previous exposure, therefore, it is unlikely that HIV infection induces a higher prevalence of Chlamydia infection, but rather Chlamydia infection facilitates the transmission of HIV which is in agreement with the report in North central Nigeria. [16,17] However, In contrast to the sero-prevalence obtained among HIV patients in this study, a higher prevalence of 35.2% was obtained in Enugu State, Nigeria. [18]

The sero-prevalence of chlamydiosis among healthy volunteers in this study was 10%. This is similar to the sero-prevalence of 11% reported in University of Port-Harcourt. [14]In contrast to this report, a study on the prevalence of *Chlamydia trachomatis* among adolescent females in Port-Harcourt[19] recorded a prevalence of 37% and another study in North central Nigeria [18] reported 43.3% while in Niger Delta,[19,20] a lower prevalence of 7.3% was obtained. Difference in subject's population, settings, socio-demographic, or testing methods could be the reason for the disparities.

The different age stratification used in this study showed that HIV patients above 35 years had the highest sero-prevalence of *Chlamydia trachomatis* (16%) compared to other age groups in the study population. This report is similar to the findings in Niger Delta [20] and in England[21] but inconsistent with the observations recorded in Kano State[18] and in Delta State,[19] where women within the ages of 25-29, had the highest prevalence of *Chlamydia trachomatis* infection. However, there is no statistical relationship between age and acquisition or transmission of *Chlamydia trachomatis*. This suggests that every sexually active woman is liable of contracting the infection irrespective of age.

Most researchers recorded that unemployment may leave women with limited alternatives where they may resort to engaging in high risk behavior such as becoming sex workers or to engaging in transactional sex in which they provide sex in exchange for money and material resources from a partner. However, this study found that women who are self-employed are more infected (18.2%) than unemployed women (3.6%). This finding is similar to the findings in Swaziland. [22]Women who own business enterprises and other establishments might go extra miles in

search of money to ensure their businesses flourish. Also, the typesof businesses might explain the high sero-prevalence of chlamydiosis among self-employed women in this study. Women working in high-risk occupation such as bars, food facilities, guesthouses and similar facilities are at high risk of STI infections.

Participants with tertiary education had a highest sero-prevalence of chlamydiosis (10%). This could be attributed to limited awareness of *Chlamydia trachomatis*. This report is in line with the result obtained in Northern Nigeria. [17] This study did not find evidence of relation between educational status and chlamydiosis.

The risk factor associated with chlamydiosis as identified in this study is lack of screening for *Chlamydia trachomatis.* This may be due to limited awareness of *Chlamydia trachomatis* by the participants. Majority of the participants lack the knowledge of *Chlamydia trachomatis*, hence, majority do not undergo screenings for the organism.

Conclusion

The prevalence of Chlamydiosis was found to be 11.6% in the study population. There was no relationship between socio-demographic factors and chlamydiosis. Hence, the infection could be acquired and transmitted irrespective of age, occupation, education and marital status. The risk factor associated with the infection was lack of screening for *Chlamydia trachomatis* which is generally due to limited awareness of *Chlamydia trachomatis*. There is need for the inclusion of routine screening for anti-*chlamydia trachomatis* antibodies among asymptomatic patients and among HIV positive women which will aid the policy of effective management of *Chlamydia trachomatis* in the effort to reducing HIV infection, and improve reproduction.

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