The Sero-prevalence and risk factors of Chlamydiosis among women of reproductive age in Port Harcourt

Abstract

Aim: This study is aimed to determine the association between chlamydiosis and some selected risk factors among women of reproductive age

Studydesign: The study was a cross-sectional study conducted at Rivers State University teaching hospital.

Place and duration of the study: The study was conducted at Rivers State University teaching hospital, Rivers State, Nigeria between March, 2022 and August, 2022.

Methodology: This cross-sectional study included 450 women who ranged in age from 15 to 55 years and met the inclusion criteria after obtaining ethical approval from Rivers state teaching hospital ethics committee. The women were divided into four subgroups: outpatients, immunocompromised patients (HIV clinic patients), expectant women, and healthy volunteers. Well-structured questionnaires were used to obtain data on risk factors of chlamydiosis and data were analysed using Chlamydia trachomatis IgG Enzyme Immunoassay test kit.

Results: Out of the 450 samples examined, 45 (10%) tested positive to chlamydia antibodies with the highest prevalence among the immunodeficiency virus subjects (12.7%). Healthy volunteers had a complete knowledge of chlamydiosis when compared with human immunodeficiency virus subjects, outpatients and pregnant women, 8.1%, 3%, 1% and 0% respectively. Statistically, there was no association (p=.06) between awareness parameters and sero-prevalence of chlamydiosis. Similarly, there was no association (p=.08) between person hygiene parameters and sero-prevalence of chlamydiosis. The study equally revealed that there was an association between self-screening for sexually transmitted infection as a life style and chlamydiosis (p=.05).

Conclusion: This study has revealed that there is a significant connection between self-screening for STI and chlamydia infection. Also, awareness as a risk factor associated with chlamydiosis should be intensified to reduce the negative impact it has on the society especially among the reproductive age.

Keywords: *Chlamydia trichomatis, gram-negative, infection, bacteria*

Introduction

Comment [n1]: Yes add the country ….Nigeria

Comment [n2]: italice

Comment [n3]: These key words do not tally…..i suggest …risk factors, Reproductive age, HIV

Comment [n4]: 1) This introduction is too long. You focused mainly on the biology of Chlamydia which is not relevant for a peer reviewed journal.
2) After a brief introduction of Chlamydia, this should be followed by literature as it relates to age, HIV, pregnant women and healthy individuals. These are the risk factors you are studying.

Chlamydiae are obligate, aerobic, intracellular parasites of eukaryotic cells. They are small Gram-negative coccoid or rod shaped, non-motile bacteria [1]. Chlamydiae exhibit characteristics intermediate between bacteria and viruses. They are widespread in the natural world, being parasites of people, animals and birds with tropism for squamous epithelial cells and macrophages of the respiratory and gastrointestinal tract. However, they differ from most true bacteria in that they have no peptydoglycan in their cell wall, and differ from viruses by possessing both DNA and RNA, cell wall, (that resembles that of GNB), ribosome, replicate by binary fission, and are susceptible to antibiotics. The structure consists of a major outer membrane protein cross-linked with disulphate bonds. It also contains cystein rich protein (CRP) that may be functional equivalent to peptydoglycan. This unique structure allows for intracellular division and extracellular survival [2]. They are split into various species, three of which—*C. pneumoniae*, *C. psittaci*, and *C. trachomatis*—cause illnesses in humans. The host range, clinical expression, antibiotic susceptibility (due to folate biosynthesis), staining features (due to glycogen inclusion), inclusion morphology, form of the elementary body, and minimal DNA sequence homology are the distinguishing factors between the three species [3].

The two major species that are most commonly contracted by people are *Chlamydia trachomatis* and *Chlamydia pneumoniae*, while other species are always zoonotic and spread from animals to humans [4]. *Chlamydia trachomatis*, being a Gram-negative bacteria can only multiply inside of a host cell according to [1]. The bacterium is a member of the Chlamydiaceae family, which also includes the genera *Chlamydia* and *Chlamydiophilia*. Round *C trachomatis* cells range in diameter from 0.3 to 1 depending on the stage of replication. Triaminar outer membrane with lipopolysaccharide and proteins resembling those of Gram negative bacteria make up the envelope that surrounds the cells. The absence of the thin peptidoglycan layer between the two membranes in Chlamydiae is a significant distinction.

The bacteria, *C. trachomatis* go through two different phases of their life cycle. initial or reticulate bodies and elementary bodies. A stiff cell wall surrounds the spherical elementary body, which is the extracellular infective form and is 200–400 nanometers across. This permits it to persist outside of a host cell. If it comes into contact with a susceptible host cell, this form has the ability to start a fresh infection. Reticulate bodies are only present inside host cells and range in size from 600 to 1500 nanometers. Both forms are immobile [5]. The genome is substantially smaller than that of many other bacteria at approximately 1.04 megabases, encoding approximately 900 genes. Several important metabolic functions are not encoded in the *C. trachomatis* genome, and instead, are likely scavenged from the host cell [1].

Comment [n5]: Check spelling

Comment [n6]: Check spelling

Comment [n7]: Parameter of measurement....mm,cm or micro meters

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Comment [n9]: Please rewrite this sentence

C trachomatis is a strict human pathogen. It is found in the conjunctiva and urogenital tract of an infected host. It also inhabits the respiratory and gastrointestinal tracts of humans [6]. Occular discharges from infected cases are the common source of eye infection for trachoma. Occasionally, respiratory discharge and human feces can be a source of infection. Trachoma is transmitted through eye-eye contact through droplets, contaminated hands, and contaminated clothing. These methods facilitate the transmission of ocular discharges from the eyes of infected children to those of normal children. Trachoma is also transmitted by inoculation of respiratory droplets or by ingestion of food and water contaminated with the feces of an infected human. Genital discharges are the source of infection for adult inclusion conjunctivitis. Adult inclusion conjunctivitis is usually transmitted by orogenital contact and also by autoinoculation. Inclusion conjunctivitis in newborns is acquired by the infants born vaginally from mothers who are infected with *C. trachomatis* [7]. Three times as many women are diagnosed with genitourinary *C. trachomatis* infections than men. Women aged 15–19 have the highest prevalence, followed by women aged 20–24, although the rate of increase of diagnosis is greater for men than for women. Risk factors for genitourinary infections include unprotected sex with multiple partners, lack of condom use, and low socioeconomic status living in urban areas [8]. Chlamydia trichomatis infection is one of the neglected sexually transmitted disease of mostly woman in sub- Sahara Africa and across the globe in general. Nevertheless, the development of signs and symptoms such as vagina discharge and genital pain is very rare among the infected subjects. Hence, the infected subjects may live with it for so long without being aware that they are carriers, there by constituting a public health risk to the general public [9].Henrich reported that marriage frequently conveys the cultural assumption of monogamy and lowers the risk of sexually transmitted diseases in many cultures [10]. Also, according to the research carried out by [11], and [12], compared to their single counterparts, married adults report having fewer sexual partners and are less likely to participate in dangerous sexual activities. The research carried out by [13] on the relationship between knowledge and personal hygiene and the occurrence of occurrence of sexually transmitted diseases, the proportion of teenagers with STDs who practiced poor personal hygiene was found to be greater (case group) than those who practiced personal hygiene. *Chlamydia trachomatis* risk factors also include: Having sexual contact before the age of 25. Several sexual partners not routinely using condom had history of sexually transmitting the disease [14]. This study is aimed at discussing the sero-prevalence of *Chlamydia trichomatis* and the associated risk factors.

Comment [n10]: Spelling

Comment [n11]: Do you mean …urogenital?

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Comment [n13]: Put the towns or countries where work was done so that the sentence flows…… Rewrite as such……According to research carried out in the US and Puerto Rico [11, 12].

Materials And Methods

Studyarea

The research was conducted in Rivers State University Teaching Hospital (RSUTH), located at 5-8 Harley Street, Old GRA 500101, in Port-Harcourt, Nigeria. RUSTH is a tertiary hospital and serves as a reference for many other healthcare facilities in the state.

Studydesignandpopulation

This cross-sectional study included 450 women who ranged in age from 15 to 55 and met the inclusion criteria. The women were divided into four subgroups: outpatients (hospital patients who were not residents), immunocompromised patients (HIV clinic patients), expectant women, and healthy volunteers. By means of well-structured questionnaires data were collected from the participants and their risk factor parameters were obtained. The association between the risk factors and sero-prevalence of chlamydiosis was determined.

Comment [n14]: Can we know the formula you used to get this sample size?

EthicalapprovalandInformedconsent

The Rivers State Ministry of Health, the Rivers State Hospital Management Board ethics committees, and PAMO University of Medical Science all provided approval for the study. Written consent to participate in the study was obtained from participants.

Eligibilitycriteria

Inclusioncriteria**:** Women between the ages of 15 and 55 who are not taking antibiotics were included in the study. Also, all consenting participants who were registered with the hospital were included.
Exclusioncriteria**:** the study excluded women of age below 15 and those above 55 and those who did not meet the inclusion criteria.

Samplecollectionandpreparation

Each individual had 2 ml of blood drawn from them via venipuncture into an uncomplicated tube under aseptic conditions. Sample was centrifuged to obtain serum which was used for laboratory analysis using enzyme linked immunosorbent assay (ELISA) for chlamydia IgG antibodies determination, catalogue number BC-1071 purchased from Bio check with MAP LAB plus microwell reader [15,16].

Comment [n15]: What do these references on Toxoplasmosis got to do with the reagent or Chlamydia?Give the link or reference where I can see this particular reagent BC 1071

Qualityassurance

To ensure accuracy, positive and negative controls were added.

StatisticalAnalysis

The data produced for this study was examined using the Statistical Program for Social Sciences (SPSS). Prevalence was represented as a percentage. Using pearson chi-square, the relationship between risk factor characteristics and variables was examined. The threshold for statistical significance was set at p=.05 (95% confidence intervals).

Result

Table 1 shows the Sero-prevalence of chlamydiosis in the study population in relation to the subgroups. The highest prevalence (I2.7%) was recorded among HIV patients while the lowest prevalence was seen among pregnant women.

Table 2 shows the association between awareness and sero-prevalence of chamydiosis. Two parameters ("heard of STI" and "heard of chlamydiosis") under awareness were studied. There was no significant association (p=.62) between the parameters and chlamdydiosis.

Table 3 shows the association between personal hygiene and sero-prevalence of chamydiosis. Five parameters ("hand washing", "vaginal washing", and "clean after urination", "wear tight undies and repeated undies) under personal hygiene were studied. There was no significant association (p=.08) between the parameters and chlamdydiosis.

Table 4 shows the association between lifestyle and sero-prevalence of chamydiosis. Six parameters ("sexually active", "no of sexual partners", "unprotected sex", "type of protection", "self-STI screening" and "STI screening of partner") under lifestyle were studied. There was no significant association (p=.93) between the parameters and chlamdydiosis except "self-STI screening. There was a significant association (p=.05) between "self-STI screening and sero-prevalence of chlamydiosis among the women.

Comment [n16]: Write these results in prose…….presently they look too mathematical

Comment [n17]: Check spelling

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Table 1: The Sero-prevalence of chlamydiosis in the study population in relation to subgroups

Comment [n23]: It would have been good for us to see this distribution according to age.

SUBGROUPS	NE (%)	NP (%)
H P	150 (33.3)	19 (12.7)
PT W	100 (22.2)	5 (5.0)
O P	100 (22.2)	11 (11.0)
H V	100 (22.2)	10 (10.0)
OVERALL	450	45 (10)

NE = Number Examined: **HP** = **HIV** Patients; **PTW** = Pregnant Women ; **OP** = Out Patients;
HV = Healthy Volunteers **NP: Number positive**

Table 2: Association between Sero-prevalence of Chlamydiosis and Awareness

Awareness	Responses	NE (%)	NP (%)					
			HP	PTW	OP	HV	X2	P-VALUE
Heard of STI	YES	250	10(4)	2(0.8)	9(3.6)	10(4)	3.600	0.058
	NO	200	9(4.5)	3(1.5)	2(1)	0(0.0)		
Heard of Chlamydiosis	YES	99	3(3.03)	0(0.0)	1(1.0)	8(8.1)		
	NO	351	16(4.6)	5(1.42)	10(2.85)	2(0.57)	0.968	0.62

NE = Number Examined; NP = Number Positive HP = HIV Patients; PTW = Pregnant Women; OP = Out Patients; HV = Healthy Volunteers

Comment [n24]: If 250 out of the 450 examined say they have heard of STI, then the sums here for HP, PTW,OP and HV should be 250.This discrepancy cuts accros the whole table

Table 3: Association between Sero-prevalence of chlamydiosis and personal hygiene

personal hygiene	Response	NE	NP (%)					
			HP	PT (%)	OP	HV	X2	P-VALUE
Hand washing	Regularly	341	16(4.7)	4(1.2)	8(2.3)	10(2.9)	5.26	0.08

Comment [n25]: The sum here is not 341.The number of participants here is 447……your sample size is 450

	Occasionally	101	2(1.9)	1(1.0)	3(3.0)	0(0.0)		
	Rarely	5	1(20)	0(0.0)	0(0.0)	0(0.0)		
Vaginal wash with	Water only	330	14(4.2)	4(1.2)	7(2.1)	8(2.42)	3.869	0.276
	Soap and water	93	3(3.2)	1(1.06)	2(2.2)	2(2.2)		
	Water and antiseptics	25	2(8.0)	0(0.0)	1(4.0)	0(0.0)		
	Others	2	0(0.0)	0(0.0)	1(50)	0(0.0)		
Clean after urination	Regularly	283	13(4.6)	3(1.1)	5(1.8)	10(3.5)	4.341	0.136
	Occasionally	148	6(4.1)	2(1.4)	6(4.1)	0(0.0)		
	Rarely	19	0(0.0)	0(0.0)	0(0.0)	0(0.0)		
Wear air-tight undies	Regulaly	24	2(8.3)	0(0.0)	2(8.3)	0(0.0)	1.691	0.429
	Occasionally	146	7(4.8)	2(1.4)	3(2.1)	4(2.7)		
	Rarely	280	10(3.6)	3(1.1)	6(2.1)	6(2.1)		
Repeat undies	Regularly	8	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0.914	0.633
	Occasionally	51	2(0.04)	1(2.0)	2(3.9)	0(0.0)		
	Rarely	391	17(4.3)	4(1.0)	9(2.3)	10(2.6)		

NE = Number Examined**; NP** = Number Positive **HP** = HIV Patients; **PTW** = Pregnant Women; OP = Out Patients; HV = Healthy Volunteer

Comment [n26]: Thee do not sum up to 330

Table 4: Association between Chlamydiosis and Lifestyle

Lifestyle	Responses	NE (%)	NP (%)					
			HP	PTW	OP	HV	X2	P-VALUE
Sexually Active	Yes	392	18(4.6)	5(1.3)	10(2.6)	6(1.5)	0.009	0.925

	NO	58	1(1.7)	0(0.0)	1(1.7)	4(6.9)		
No. of sexual partner	One	357	17(4.8)	5(1.4)	10(2.8)	4(1.1)	2.769	0.837
	Two	26	0(0.0)	0(0.0)	0(0.0)	0(0.0)		
	Multiple	7	0(0.0)	0(0.0)	1(14.3)	0(0.0)		
	None	60	1(1.7)	0(0.0)	0(0.0)	6(10)		
Unprotected sex	Yes	350	16(4.6)	5(1.4)	10(2.6)	4(1.1)	0.227	0.893
	No	100	3(3.0)	0(0.0)	1(1.0)	6(6.0)		
Type of protection	Condom	96	8(8.3)	0(0.0)	2(2.1)	6(6.3)	6.252	0.441
	Medication	3	0(0.0)	0(0.0)	0(0.0)	0(0.0)		
	None	351	11(3.1)	5(1.4)	9(2.6)	4(1.1)		
Self STI screening	Yes	57	9(15.8)	0(0.0)	4(7.0)	0(0.0)	1.117	0.007
	No	393	10(2.5)	5(1.3)	7(1.8)	10(2.5)		
STI screening for partner	Regularly	7	1(14.3)	0(0.0)	0(0.0)	0(0.0)		
	Occasionally	78	3(3.8)	0(0.0)	5(6.4)	0(0.0)	0.16	0.925
	Rarely	365	15(4.1)	5(1.4)	6(1.6)	10(2.7)		
Screened Ever for C.T	Yes	393	10(2.5)	5(1.3)	7(1.8)	10(2.5)	1.117	0.007
	No	57	9(15.8)	0(0.0)	4(7.0)	0(0.0)		

NE = Number Examined; NP = Number Positive HP = HIV Patients; PTW = Pregnant Women; OP = Out Patients; HV = Healthy Volunteers

Comment [n27]: These do not add up to 357

Discussion

Sero-prevalence of chlamydiosis based on awareness of sexually transmitted infection and/or Chlamydiosis as a risk factor was considered and based on this study, it was discovered that lack of awareness of both sexually transmitted infections and chlamydiosis was more among the HIV subjects followed by pregnant women, outpatients and lastly by healthy volunteers though there was no significant difference ($p>0.05$). This could be attributed to increased education on the topic of STI and/or Chlamydiosis in the society. This report is in consonance with the report of [7].

Comparison on the basis of sero-prevalence of chlamydiosis with respect to personal hygiene (hand washing, vaginal was, clean after urination, wear air-tight undies, and repeat undies) as a risk factor revealed also that there was no significant difference. This however, is contrary to the research of [13], which reported that level of hygiene practice can lead to increased risk of chalmydia infection in the population that was studied.

The prevalence of chlamydiosis based on lifestyle (sexually active, number of sexual partners, unprotected sex, type of protection, self STI screening, STI screening for partner) as a risk factor showed no association except for self STI screening subgroup. There was a significant relationship between self-screening for STI and chlamydia with the participants without self STI screening having the higher sero-prevalence compared to those without self-screening practice. This implies that women who go for regular screening for STI are at lower risk of contracting chlamydial infection than women who do not. This is in agreement with the report of [14] where the risk factors that may lead to chlamydiosis are reported. The highest risk factor for contraction of chlamydiosis by very young women as reported by many researchers is the risk of having multiple sexual partners as the cervix and vagina undergo dramatic histological changes due to exposure to oestrogen. Hence, the cervix in adolescent girls still displays area of exposed columnar epithelium, a condition known as cervical ectopy [9]. However, data from this study showed no association between chlamydiosis and number of sexual partners.

Conclusion

This study has demonstrated that there is a significant connection between self-screening for sexually transmitted infections (STI) and chlamydia infection and should be adopted by women of reproductive age. Also, awareness as a risk factor associated with chlamydiosis should be intensified to reduce the menace the infection has on the society especially among women of reproductive age.

Ethics Approval/Consent

Ethical clearance was sought and obtained from the Ethics committee of the Rivers State Ministry of Health with the reference number RSUTH/REC/2022147. Written informed consent was obtained from all the participants and they participated voluntarily. All the participants were informed of the objectives of the study and the protocol for sample collection.

Comment [n28]: This discussion is too narrow. A lot of work has been done in Nigeria and other African countries which you can use to expand or give more meaning to these results.

Comment [n29]: Tell us what happened here

Comment [n30]: Rewrite as……research carried out at the community Health center Talise[13]

Comment [n31]: Spelling

Comment [n32]: The risk factors reported….state if they agree with yours or not

Comment [n33]: This discussion means being young and having multiple sexual partners exposes women to chlamydiosis……..this is not in your work for you did not show us the prevalence of chlamydia as per age group.

References

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