Original Article

Chlamydia trachomatis Seropositivity and Associated Risk Factors Among Women Attending A Northern Nigerian Tertiary Hospital

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Abstract

Background: Genital *Chlamydia trachomatis* (Ct) is the commonest bacterial sexually transmitted infection globally. Acquisition of Ct infection is affected by biological and behavioural factors. **Aim:** Determine the prevalence of Ct infection and identify risk factors associated with Ct infection in sexually active fertile women in Northern Nigeria. **Materials and Methods:** One hundred and fifty sexually active women presenting to the Obstetrics and Gynaecology department of Ahmadu Bello University Teaching Hospital, Zaria were studied. Socio-demographic characteristics and history of risk factors for acquisition of genital Ct were obtained from the participants using a questionnaire. Their sera were tested for the presence of Ct immunoglobulin G using Enzyme-Linked Immunosorbent Assay. **Results:** The mean ages ± standard deviation of seropositive and seronegative women were 29.1 ± 7.3 years and 28.9 (SD 6.7) years respectively ($P = 0.438$). The prevalence of Ct infection was 6.7% (10/150). Occupation was associated with Ct seropositivity ($P = 0.02$). Number of sexual partners, age at coitarche; duration of sexual exposure and previous history suggestive of sexually transmitted infection were not associated with Ct seropositivity ($P > 0.05$). **Conclusion:** A low prevalence of Ct was found among fertile women. Lack of regular source of personal income was associated with Ct infection but the sexual behavioural factors studied were not.

Keywords: *Chlamydia trachomatis, Nigeria, prevalence, risk factors, women*

Introduction

Largely asymptomatic in up to about 80% of females, genital Chlamydia trachomatis (Ct) is the commonest bacterial sexually transmitted infection (STI) worldwide.[1] Chlamydia trachomatis is an important public health problem across the globe because untreated infections can threaten human reproduction by causing adverse reproductive outcomes.[2]

A wide range of prevalence of Ct has been reported in the literature. This variation is largely due to the heterogeneity of the population studied and the diagnostic techniques used in these studies. In Nigeria, a prevalence of 3.5% – 26% has been reported among women attending out-patient clinics.[3,4] Koledade *et al*.[5] found a prevalence of 31% among infertile women. Agholor *et al*.[6] reported a prevalence of 48% among women with ectopic pregnancy. Garba *et al*.[7] found a prevalence of 2% among pregnant women and Aliyu *et al*.[8] reported a prevalence of 3.6% among women with spontaneous miscarriage. The pooled prevalence of Ct infection in Sub-Saharan Africa among reproductive-age women is 7.8%.[2] Globally, 124.3 million cases of Ct were reported by World Health Organization (WHO) in 2016.[9]

Reported risk factors for acquisition of Ct include age less than 25 years, change of sexual partner, having more than one sexual partner, and early age at first sexual intercourse.[1,4] These sexual behaviours vary between climes and are affected by the socio-cultural norms of the community.

In many developed countries, screening programmes for Ct exist to reduce transmission and reproductive tract morbidity but these are almost non-existent in many developing countries due to high costs, technical complexity relating to infrastructure, equipment, and expertise.[10] Such screening involves opportunistic and organized annual screening of high-risk women and effective case management.[1] These have reduced complications associated with Ct infection. However, in developing countries, such control measures

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are not readily available and case management is still by syndromic approach. This has contributed to the high burden of Ct infection and its complications in sub-Saharan Africa. In resource-limited countries, reports of Ct represent only the 'tip of the ice berg' because most women have an asymptomatic disease. Thus, Ct infection persists unnoticed and remains untreated for a longer period, thereby enhancing transmission of the infection to a sexual partners.[2]

Because screening and treatment of Ct infection in women will prevent reproductive morbidities, we aimed to determine the prevalence of Ct to estimate the disease burden and to identify the risk factors for this largely asymptomatic infection.

Materials and Methods

The study was a cross-sectional study conducted among 150 sexually active fertile women with a history of pregnancy within the last 12 months evidenced by current pregnancy or having a pregnancy within the last 12 months presenting to the Obstetrics and Gynaecology department of Ahmadu Bello University Teaching Hospital, Zaria between January to April 2018. The formula for calculating sample size for a cross-sectional study ($Z_{1-\alpha/2}^2$ p(1-p)/d^2) was used to obtain the minimum sample size. The prevalence of Ct of 8.7% obtained by Enwuru *et al*.[11] using a similar diagnostic technique of Enzyme-Linked Immunosorbent Assay (ELISA); where $Z_{1-\alpha/2}^2$ is the standard normal deviate at 95% confidence interval (1.96) and an absolute error (d) of 5% was used. Only non-consenting women were excluded. The data collection tool was a semi-structured, pretested, and interviewer-administered questionnaire. It had three sections namely: socio-demographic characteristics and reproductive profile; risk factors for Ct and laboratory IgG result. Under aseptic technique, 5mls of venous blood was obtained from each participant and the serum was tested for the presence of Ct immunoglobulin G using ELISA according to the manufacturer's protocol.[12] Data obtained were analysed using SPSS version 21. For univariate level analysis, descriptive summary statistics were computed such as mean and standard deviations for quantitative variables like age, while for categorical variables like tribe and marital status, frequencies and percentages were used. At bivariate analysis, chi-square test was used to determine the association between sociodemographic variables and the presence of chlamydia infection. Binary logistic regression was used to determine the predictors of Ct infection at multivariate level analysis. The level of significance was set at <0.05. Ethical approval was obtained from the Health Research Ethical Committee of Ahmadu Bello University Teaching Hospital, Zaria (ABUTHZ/HREC/B03/2017).

Results

The mean age of the women studied was 28.9 (SD 6.9 years). The women were predominantly of Hausa ethnic group and Muslims. Majority (148, 98.7%) were married. About 41.3% had tertiary education and 50% had personal source of income. These characteristics are shown in [Table 1].

Table 1: Sociodemographic characteristics of study participants

Characteristics	Frequency n = 150 (%)
Age (years)	
15-19	11(7.3)
20-24	33(22.0)
25-29	41(27.3)
30-34	24(16.0)
35-39	26(17.3)
40-44	15(10.0)
Tribe	
Hausa	109(72.7)
Igbo	3(2.0)
Yoruba	5(3.3)
Others	33(22.0)
Religion	
Islam	I31(87.3)
Christianity	19(12.7)
Educational level	
Primary	28(18.7)
Secondary	49(32.7)
Tertiary	62(41.3)
Quranic only	9(6.0)
None	2(1.3)

The prevalence of Ct IgG was found to be 6.7% (10/150). The mean ages of seropositive and seronegative women were 29.1 (SD 7.3) years and 28.9 (SD 6.7) years respectively ($p = 0.438$). The highest prevalence was seen in women aged 35–39 years. All seropositive women were married. *Chlamydia trachomatis* infection was associated with lack of regular source of income ($p = 0.02$). However, other sociodemographic variables were similar between the groups that tested positive and negative to Ct infection as seen in [Table 2].

The sexual behavioural risk factors studied were not found to be associated with Ct seropositivity ($P > 0.05$) as shown in [Table 3].

Discussion

The prevalence of Ct IgG seropositivity in our study was found to be 6.7% which is lower than that reported in a previous study in the same hospital.[4] While we studied a select group of fertile women, Ige *et al*.[4] reported a prevalence of 26% in the same setting when endocervical specimens of women in the reproductive age group were sampled and subjected to a polymerase chain reaction. Tukur *et al*.[13] found a prevalence of 38.3% among a select group of women with tubal infertility. Nwankwo *et al*.[10] from Kano studied multiple specimens using lateral flow immunoassay and found Ct prevalence to be 9.6% amongst patients attending infertility and sexually transmitted

Table 2: Sociodemographic characteristics and seropositivity for Ct IgG

Characteristic	IgG Positive n=10	IgG Negative n=140	Test statistic	*P*- value
Age (years)				
15-19	1 (9.1)	10 (90.9)	1.204	0.438
20-24	2 (6.6)	31 (93.4)		
25-29	2 (4.9)	39 (95.1)		
30-34	1 (4.2)	23 (95.8)		
35-39	4 (15.4)	22 (84.6)		
40-44	0 (0.0)	15 (100)		
Tribe				
Hausa	5 (4.6)	104 (95.4)	4.174	0.161
Others	5 (12.2)	36 (87.8)		
Religion				
Islam	6 (4.5)	125 (95.5)	7.236	0.07
Christianity	4 (21.1)	15 (78.9)		
Regular source of income				
No	2 (2.4)	80 (97.6)	5.196	0.02
Yes	8 (11.8)	60 (88.2)		
Woman's education				
Primary	2 (7.1)	26 (92.9)	1.396	0.977
Secondary	3 (6.1)	46 (93.9)		
Tertiary	4 (7.7)	58 (92.3)		
Quranic only	1 (11.1)	8 (88.9)		
None	0 (0.0)	2 (100)		

Table 3: Risk factors for Ct seropositivity

Risk factor	Seropositive n = 10	Seronegative n = 140	pvalue	Odds ratio	Confidence interval	
					Lower	Upper
No. of lifetime sexual partners						
>1	2 (20.0)	23 (16.7)	0.77	1.27	0.25	6.38
1	8 (80.0)	117 (83.6)		1.00		
No. of sexual contacts of partner						
>1	3 (30.0)	39 (26.4)	0.80	1.11	0.27	4.51
1	7 (70.0)	101 (73.6)		1.00		
Age at first intercourse (years)						
15-24	7 (70.0)	120 (79.5)	0.20	0.39	0.09	1.63
≥25	3 (30.0)	20 (20.5)		1.00		
Duration of sexual exposure (years)						
≤5	3 (30.0)	34 (24.3)	0.69	1.34	0.33	5.45
>5	7 (70.0)	106 (75.7)		1.00		
Previous history of STI						
Yes	4 (40.0)	69 (49.3)	0.57	0.69	0.19	2.54
No	6 (60.0)	71 (50.7)		1.00		

STI- Sexually transmitted infections

disease clinics. Thus, the variable sampling methods, Ct detection techniques; and study population could have accounted for this difference observed.

The highest prevalence in this study was seen in the cohort of women aged 35–39 years. This finding is not in concordance with findings by Nwankwo *et al*.[10] from Kano, Ikeme *et al*.[14] from Enugu, and Arinze *et al*.[15] from Port Harcourt that reported the highest prevalence of Ct infection to be among women aged ≤ 30 years. This may be due to the different study populations used by the researchers that constituted largely of undergraduate students and a select age bracket of not more than 34 years. Our study participants were all sexually active women of the reproductive age group that presented to the Obstetrics and Gynaecology clinic.

Lack of regular source of income was found to be associated with Ct infection and this agrees with findings by Okoror *et al*.[16] from Akure where lack of regular source of income had a significant association with Ct infection. This finding could be explained by impaired access to health care facilities for detection and treatment of Ct infection.

Having more than one-lifetime sexual partner and having a partner with multiple sexual contacts were not associated with Ct seropositivity and is consistent with finding by Ige *et al*.[4] that reported polygamous union and non-first order of marriage not to be associated with Ct infection. Commencing sexual activity at ≤ 24 years did not increase the odds of being seropositive in our study. This contrasts with the finding of Ige *et al*.[4] that reported a doubled risk of infection in women who commenced sexual activity before 18 years. The sexual act is an extremely private issue in most conservative settings like Nigeria. Thus, sexual history may be fraught with some inconsistencies that could affect this finding obtained. Similarly, having a history suggestive of an STI was not associated with Ct seropositivity in our study. Appropriate laboratory diagnosis is seldom achieved for STI in most resource-constrained settings, and often syndromic management is resorted to. What is perceived based on symptomatology as STI by mostly uninformed individuals, may not really be the case. Thus, laboratory diagnosis of STI should be encouraged and offered where available.

This study explored the burden of genital Ct by assessing the serological evidence of Ct infection among women at risk of Ct infection. However, the use of ELISA technique, type of specimen used in the study; and inability to differentiate acute Ct infection are limitations of this study.

Conclusion

A low prevalence of Ct infection was found among fertile women. Lack of regular source of personal income was associated with Ct infection. Number of life-time sexual partners, age at first intercourse, duration of sexual activity and previous history suggestive of sexually transmitted infection were not associated with Ct infection.

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Conflicts of interest

There are no conflicts of interest.

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