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Review Article

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Hysterosalpingographic Findings in Chlamydia Trachomatis IgG-Positive Infertile Women Attending the Gynecological Clinic in Abuja. Nigeria

Iyellobu Collins Ekhaesomi and Offor Juliet Oluchukwu*

Department of Obstetrics & Gynaecology, Federal Medical Centre Abuja, FCT, Nigeria.

***Corresponding author**
Juliet Oluchukwu Offor, FWACS, FMCOG, Department of Obstetrics and Gynaecology, Federal Medical Centre, Abuja, FCT, Nigeria.

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ABSTRACT

Background: Chlamydia trachomatis infection is one of the prevalent sexually transmitted infections that frequently remains asymptomatic, allowing persistent inflammation to result in tubal and endometrial damage with subsequent infertility. In resource-limited settings, where access to definitive diagnostic modalities is restricted, identifying cost-effective screening approaches to detect women at risk of upper genital tract pathology is particularly important.

Objective: To investigate the hysterosalpingography tubal and uterine findings and determine factors associated with tubal occlusion among Chlamydia trachomatis IgG–positive infertile women at the Federal Medical Centre, Abuja, Nigeria.

Methodology: This prospective cross-sectional study enrolled 130 consenting infertile women aged 15–49 years who tested positive for C. trachomatis IgG antibodies using a rapid chromatographic immunoassay kit (Acro Biotech, USA). All participants underwent hysterosalpingography (HSG) on day 10 of their menstrual cycle to assess tubal patency and uterine abnormalities. Descriptive statistics and logistic regression analysis were used to analyse factors associated with tubal occlusion.

Results: Of the 130 women, Secondary infertility accounted for 53.1% of cases. Tubal occlusion was detected in 76.9% (95% CI: 69.0–83.3) of participants, while 26.9% had uterine synechiae. Women with uterine synechiae had a fourfold increased likelihood of tubal occlusion (OR = 4.00; 95% CI: 1.68–9.52; p = 0.002). Increasing age, early sexual debut, multiple lifetime sexual partners, lower social class, and uterine synechiae were independently associated with tubal occlusion, with a p-value of ≤ 0.5.

Conclusion: A high burden of tubal and uterine pathology was observed among Chlamydia trachomatis IgG–positive infertile women. Chlamydia serology may serve as a useful adjunctive screening tool to identify women at increased risk of upper genital tract pathology before more invasive or costly investigations.

Keywords: Infertility, Chlamydia Trachomatis, Uterine Synechiae, Tubal Occlusion, Hysterosalpingography

Introduction

Infertility remains a major reproductive health challenge globally and is associated with significant psychological, social, and economic consequences, particularly in sub-Saharan Africa [1,2]. In many African societies, including Nigeria, infertility often carries profound social stigma and may result in marital disharmony, separation, or divorce [1,2]. The causes of infertility are equally distributed between women and men, with approximately 40% of cases attributed to male factors, 40% to female factors, 15% to combined female/male factors, and 5% unexplained [3]. Female factors, especially tubal pathology, constitute a substantial proportion of infertility cases [3].

Tubal factor infertility commonly arises from ascending genital tract infections, mostly by Chlamydia trachomatis and Neisseria gonorrhoeae [4]. Chlamydia trachomatis infection is frequently asymptomatic, allowing persistent inflammation to cause irreversible tubal damage, including luminal obstruction, ciliary dysfunction, and peritubal adhesions [5].

The World Health Organisation estimated 128.5 million new Chlamydia trachomatis infections globally in 2020, with a prevalence of 2.5% among women aged 15–49 years [5]. Studies have shown varying prevalence rates of Chlamydia trachomatis infection among patients with tubal infertility, ranging from 38.3% in Zaria, Northern Nigeria [6] to 63.9% in Sagamu, Southern Nigeria [7] and 81% among blacks in Birmingham/ Pittsburgh, United Kingdom [8]. These variations may reflect

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differences in population characteristics, laboratory techniques, and access to healthcare services.

Beyond tubal damage, chronic chlamydial infection has also been implicated in endometrial inflammation and uterine synechiae, further compromising fertility [3-6]. Given the significant burden of Chlamydia trachomatis infection on reproductive health, it is essential to investigate the relationship between this infection and tubal/uterine factor infertility.

While nucleic acid amplification tests, ELISA, and micro-immunofluorescence assays offer more diagnostic accuracy, their cost and technical requirements limit widespread use in low-resource settings [9]. Rapid serological tests, although less specific, offer a more accessible alternative for identifying women with prior exposure who may be at increased risk of upper genital tract pathology.

This study aims to investigate the relationship between Chlamydia trachomatis infection and tubal/uterine factor infertility among infertile women at the Federal Medical Centre, Abuja, Nigeria. By exploring these associations using a rapid test, this study can contribute to the development of a more accessible and cost-effective diagnostic tool for infertile women.

Methodology

This study was conducted at the Gynaecology, Radiology and Molecular Laboratory Departments of the Federal Medical Centre Abuja, from 7th of October, 2020 to 27th of March, 2021. It was a prospective cross-sectional study involving 130 eligible women of reproductive age group (15 - 49 years) with primary or secondary infertility.

Study Procedure and Data Collection

The sample size was calculated using Kish Leslie's formular n= Z2 p(1-p)/d2 [10]. The participants were recruited using a consecutive sampling technique. A well-structured, purpose-designed proforma was used to obtain socio-demographic data, gynaecological history, biometrics and other relevant information. Serum samples were obtained to detect Chlamydia antibody IgG using a rapid chromatographic immunoassay anti-Chlamydia IgG rapid test kit (Acro BIOTECH, USA) [11]. Hysterosalpingography [12] using urograffin on day 10 of the menstrual cycle was performed on all participants.

Sample Collection and Anti-Chlamydia IgG Test

Five millilitres of venous blood was withdrawn from the patients into a plain bottle. The blood was allowed to clot and retract in the refrigerator at 6-10 °C, following which the serum (supernatant) was carefully aspirated with a micropipette. The test cassette was placed on a clean and level surface. The dropper was held vertically, and 1 drop of serum or plasma (approx. 40ul) was transferred to the specimen well of the test cassette, and then 1 drop of buffer (approx. 40ul) was added, using the rapid chromatographic immunoassay anti-Chlamydia IgG rapid test kit with sensitivity and specificity of 94.9% and 92.2%, respectively. The timer was started, and the results were read at 10 minutes. The presence of two pink lines on the test and control regions was interpreted as a positive result.

Hysterosalpingography

A Leech Wilkinson cannula was introduced into the cervix by a gentle screw-like motion to prevent spillage of contrast after eliminating air with some contrast. About 15-20mls of warm dilute contrast (1:1 of water) was instilled into the uterine cavity. With the help of the radiographer, spot images of the endometrial canal, Fallopian tubes and intraperitoneal spillage were obtained. A delayed image was also obtained after 20 minutes. After these, the instruments were dismounted from the patient, and the vulva was cleaned. Bilateral tubal blockage was considered a tubal factor infertility.

Data Analysis

The data was keyed into Excel (2010) and was exported to IBM SPSS Statistics version 23.0 (2015) for analysis. Categorical variables such as social class were presented as frequencies and percentages, while continuous variables were presented as mean, standard deviation and interquartile range. Logistic regression was used to determine risk factor associations, and a P-value < 0.05 was considered statistically significant.

Ethical Consideration

Approval for the study was obtained from the Health Research and Ethics Committee of the Federal Capital Territory, Abuja. Participants were assured of utmost confidentiality, and written informed consent was obtained from each participant.

Results

There were 130 infertile women seropositive for chlamydia trachomatis, with a mean age of 33.4 ±4.6 years, ranging from 21.0-42.0 years. The median parity was 1, and the mean age at coitarche was 17.4 years, with 70% (91) having their first intercourse at or before 18 years. Most women (95; 73.7%) belonged to the middle class. About 68.5% (89) had at most 5 lifetime sex partners. The majority (111; 85.4%) were nulliparous, and 53.1% (69) had secondary infertility, with the median duration of infertility of 4.0 (IQR:3.0-6.0) years and crude range (1-15 years). Most women (116; 82.2%) had a previous history of pelvic inflammatory disease. Their mean Body mass index was 26.4 Kg/M2. These are shown in Table 1

Table 1: Baseline Demographic and Clinical Descriptive Characteristics

Characteristics	N	Min-Max	Mean	SD	Median	IQR	%
Age (years)	130	21.0-42.0	33.4	4.6	-		
Parity	130	0-3	-	-	0.0	0.0-0.0	
0	111						85.4
1	14						10.8
2 and above	5						3.8
Previous Pregnancies	69	0-6	-	-	1.0	0.0-3.0	

Age at 1st intercourse (years)	130	11.0-25.0	17.4	2.5	-	-	
≤18	91						70
>18	39						30
Lifetime sex partners	130	2.0-10.0	-	-	5.0	4.0-6.0	
Duration of infertility (years)	130	1.0-15.0	-	-	4.0	3.0-6.0	
Weight (Kg)	130	51.8-95.5	68.0	9.2	-	68.0	
Height (M)	130	1.51-1.75	1.60	0.04	-	1.60	
Body Mass Index (Kg/M2)	130	19.8-37.1	26.4	3.1	-	26.4	
Social class							
Upper	23						17.7
Middle	95						73.1
Lower	12						9.2
Type of infertility							
Primary	61						46.9
Secondary	69						53.1
Previous pelvic infection							
PID	116						82.9
STI	7						5.4
None	7						5.4

SD- standard deviation, IQR- Interquartile range (Q1-Q3), where Q represents the quartiles, % - percentage

Comparison of Age, Gynaecological Profile and Tubal Status on Hsg in the Study Population.

Mean age and age at first intercourse were comparable between the patients who had tubal occlusion and those without tubal occlusion (P>0.05). Similarly, median parity, previous pregnancies, lifetime sexual partners and duration of infertility were statistically comparable between the patients who had tubal occlusion and no tubal blockage (P>0.05)

Table 2: Comparison of Age, Gynaecological Profile and Tubal Status on Hsg in the Study Population

Variable	Tubal status on HSG		Test of statistics	P value
	Blocked (n=100)	Unblocked (n=30)		
Age (years); Mean± SD	33.3 ±4.8	33.7±3.9	t=0.471	**0.638***
Age at first intercourse; Mean ± SD	17.3 ±2.5	17.7±2.5	t=0.674	**0.501***
Previous pregnancies; Median (IQR)	1.0 (0.0-3.0)	1.50 (0.0-4.0)	U=1350.0	**0.379***
Parity; Median (IQR)	0.0 (0.0-0.0)	0.0 (0.0-0.0)	U=1402.5	**0.380***
Lifetime sex partners; Median (IQR)	5.0 (3.0-6.0)	5.0 (4.0-6.0)	U=1234.5	**0.135***
Duration of infertility (years); Median (IQR)	4.0 (3.0-6.0)	4.5 (3.0-6.0)	U=1342.5	**0.379***

SD- standard deviation, IQR- Interquartile range (Q1-Q3) where Q represents the quartiles, t-Independent Samples t-test, U- Mann-Whitney U test, *Differences in mean or median not statistically significant, P>0.05

Tubal and Uterine Findings among the Study Population

Among the 130 Chlamydia trachomatis IgG–positive infertile women studied, 76.9% demonstrated tubal occlusion on hysterosalpingography, while 23.1% had patent tubes. Uterine synechiae were identified in 26.9% of participants. These findings indicate a substantial burden of upper genital tract pathology among seropositive infertile women. This is shown in Table 3 below:

Table 3: Tubal and Uterine Findings.

Tubal status on HSG	Frequency	Per cent (%)	95% confidence Interval Lower limit (%)-Upper limit (%)
Blocked	100	76.9	69.0 – 83.3
Unblocked	30	23.1	16.7 – 31.0
Total	130	100.0	
Chi square Goodness-of-fit Test =37.692; P= <0.0001*			
Uterine Synechiae	**Frequency**	**Per cent (%)**	**95% confidence Interval Lower limit (%)-Upper limit (%)**

Present	35	26.9	20.0 – 35.1
Absent	95	73.1	64.9 – 80.0
Total	130	100.0	
Chi square Goodness-of-fit Test=27.692; P= <0.0001 **			

Association Between Uterine Synechiae and Tubal Occlusion

A statistically significant association was observed between uterine synechiae and tubal occlusion (p = 0.002). Over half (57.1%) of women with uterine synechiae had bilateral tubal occlusion, and the odds of tubal occlusion were four times higher among women with synechiae compared with those without. This is presented in Table 4 below:

Table 4: Association Between Uterine Synechiae and Tubal Occlusion

Tubal status on HSG	Uterine Synechiae		Total n (%)
	Present n (%)	Absent n (%)	
Blocked	20 (57.1)	80 (84.2)	100 (76.9)
Unblocked	15 (43.9)	15 (15.7)	30 (23.1)
Total	35 (100.0)	95 (100.0)	130 (100.0)

Chi square= 10.560; Fisher Exact Probability Test (P)=0.002**; Relative risk ratio (RR)= 1.474 (95% CI: 1.092 – 1.989), Odds ratio (OR) = 4.00 (95% CI: 1.680- 9.523)

Predictors of Tubal Occlusion

Multivariate logistic regression analysis identified increasing age (P=0.026), early age at sexual debut (P=0.032), multiple lifetime sexual partners (P=0.025), lower social class (P=0.021), previous pregnancies (P=0.042), and uterine synechiae (P=0.0001) as independent predictors of tubal occlusion among Chlamydia IgG–positive women. These findings suggest that both biological and social determinants contribute to the development of severe tubal pathology. This is presented in Table 5 below.

Table 5: Logistic Regression Analysis of Predictors of Tubal Occlusion

	B	S.E.	Sig.	Exp(B) Odds ratio	95% CI for EXP(B)	
					Lower	Upper
Age (years)	0.161	0.072	0.026**	1.174	1.019	1.353
Previous pregnancies	-0.544	0.273	0.042**	0.575	0.337	0.981
Age at first sex (years)	-0.273	0.127	0.032**	0.761	0.594	0.973
Lifetime sex partner	-0.369	0.165	0.025**	0.691	0.500	0.956
Previous pelvic infection	-0.724	0.695	0.298	0.485	0.124	1.895
Type of infertility	0.717	0.819	0.382	2.048	0.411	10.201
Social class	-0.201	0.089	0.021**	0.731	0.539	0.953
Uterine synechiae	-2.581	0.646	0.0001**	0.580	0.172	1.277
Constant	2.694	2.761	0.329	14.787		

Dependent variable- Tubal factor infertility; ** Statistically significant at P<0.05; Not statistically significant P>0.05

Discussion

This study demonstrates a high prevalence of tubal occlusion and uterine synechiae among infertile women with serological evidence of prior Chlamydia trachomatis exposure in Abuja, Nigeria. The prevalence of tubal occlusion (76.9%) is comparable to findings from other Nigerian and international studies reporting rates between 66% and 78% among women undergoing infertility evaluation [13-17]. The high burden observed may reflect delayed presentation, limited access to early STI diagnosis, and the largely asymptomatic nature of chlamydial infection.

Uterine synechiae were detected in over one-quarter of participants, and their strong association with tubal occlusion suggests progressive upper genital tract damage following chronic inflammation. Similar associations have been reported in Northern Nigeria and other low-resource settings [6,18,19]. These findings support the concept that Chlamydia trachomatis–related reproductive tract injury may extend beyond the fallopian tubes to involve the endometrial cavity.

Although this study did not include a Chlamydia IgG–negative control group, the high prevalence of pathology among seropositive women highlights the clinical utility of Chlamydia serology as a risk stratification tool in infertility work-up. However, IgG positivity reflects prior exposure rather than active infection, and causality cannot be inferred. Other factors such as unsafe abortion, puerperal sepsis, endometriosis, or infection with other organisms may also contribute to the observed findings [19,20].

The demographic analysis showed that most women with upper genital tract pathologies were in the middle class (73.1%)

and had attained higher education, and this is consistent with findings by Odusolu [21]. The study also found that patients in the age-group (21-23) had a prevalence of 41.5% of upper genital tract pathologies, consistent with studies that found a higher prevalence of Chlamydia trachomatis infection and its sequelae among females less than 25 years of age [4,22].

The identified associations between tubal occlusion and early sexual debut, multiple sexual partners, and lower social class are consistent with established epidemiological risk factors for sexually transmitted infections [18,22,23]. These findings highlight the importance of targeted public health interventions with emphasis on STI prevention and early treatment.

Strengths of the Study include the use of a rapid test kit with high specificity (92.2%) that is readily available, less invasive, and easier to perform as point-of-care testing. This offers an option for patients who are afraid of performing HSG as a first line of tubal patency assessment, and relatively lower cost compared to ELISA, MIF, and HSG with no complications.

Limitations include that HSG may not conclusively diagnose tubal occlusion due to potential tubal spasm, and laparoscopy and chromopertubation would have been more accurate. The non-use of the micro-immunofluorescence (MIF) assay, which is the gold standard in detecting serum Chlamydia antibodies and the non-use of NAATS and ELISA, which have high specificity. Possible cross-reactivity of other Chlamydia species with Chlamydia trachomatis antibodies, and other factors like endometriosis or other organisms, may have contributed to the tubal occlusion.

Conclusion

A high burden of tubal occlusion and uterine synechiae was observed among Chlamydia trachomatis IgG–positive infertile women attending the Federal Medical Centre, Abuja. Prior exposure to Chlamydia trachomatis appears to be associated with significant upper genital tract pathology in this population.

Recommendations

Chlamydia trachomatis IgG testing may be considered as an adjunctive, low-cost screening tool during infertility evaluation to identify women at increased risk of tubal and uterine pathology, particularly in resource-constrained settings. Public health strategies focusing on STI prevention, early diagnosis, and prompt treatment are essential to reduce infertility-related morbidity. Further studies incorporating Chlamydia-negative controls and more definitive diagnostic modalities, such as laparoscopy, are recommended.

Disclosures

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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Authors' Contributions

All authors contributed to the conception and design of the study. Data collection, analysis, and interpretation were performed by the authors. All authors drafted and critically revised the manuscript and approved the final version for publication.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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References

1. Roomaney R, Salie M, Jenkins D, Eder C, Mutumba-Nakalembe MJ, et al. A scoping review of the psychosocial aspects of infertility in African countries. Reprod Health. 2024. 21: 123.
2. Doyle M, Carballedo A. Infertility and mental health. Adv Psychiatr Treat. 2014. 20: 297-303.
3. Adams A, Sharpe A. Infectious diseases. In: Kumar V, Abbas AK, Aster JC, editors. Robbins and Cotran Pathological Basis of Disease. 10th ed. Philadelphia: Elsevier Saunders. 2020. 943-974.
4. Tsevat DG, Wiesenfeld HC, Parks C, Peipert JF. Sexually transmitted diseases and infertility. Am J Obstet Gynecol. 2017. 216: 1-9.
5. World Health Organisation. Chlamydia. Geneva: WHO; 2024 Nov 21. Available from: https://www.who.int
6. Tukur J, Shittu SO, Abdul AM. A case-control study of active genital Chlamydia trachomatis infection among patients with tubal infertility in Northern Nigeria. Trop Doct. 2006. 36: 14-16.
7. Odelola OI, Akadri AA. Chlamydia trachomatis seropositivity among women with tubal factor infertility and fertile controls: a comparative study. Pan Afr Med J. 2023. 44: 178.
8. Gorwitz RJ, Wiesenfeld HC, Chen PL, Hammond KR, Sereday KA, et al. Population-attributable fraction of tubal factor infertility associated with chlamydia. Am J Obstet Gynecol. 2017. 217: 336.e1-336.e16.
9. Meyer T. Diagnostic procedures to detect Chlamydia trachomatis infections. Microorganisms. 2016. 4: 25.
10. Kish L. Survey Sampling. New York: John Wiley & Sons, 1965.
11. Product information. ACRO BIOTECH Inc. Chlamydia trachomatis IgG rapid test cassette serum/plasma. Product information. Catalog No. 935200. 2020.
12. Broeze KA, Opmeer BC, van Geloven N, Coppus SF, Collins JA, et al. Are patient characteristics associated with the accuracy of hysterosalpingography in diagnosing tubal pathology? An individual patient data meta-analysis. Hum Reprod Update. 2011. 17: 293-300.
13. Koledade AK, Adesiyun AG. Investigation of correlates of chlamydia antibody testing and hysterosalpingography among women with tubal infertility. Open J Obstet Gynecol. 2014. 4: 1077.

14. Ogbu G, Anzaku SA, Aimakhu C. Burden of Chlamydia trachomatis infection amongst infertile women compared with pregnant controls in North-Central Nigeria. Int J Res Med Sci. 2017. 5: 3819-3826.
15. Alfarraj DA, Somily AM, Alssum RM, Abotalib ZM, El-Sayed AA. The prevalence of Chlamydia trachomatis infection among Saudi women attending the infertility clinic in Central Saudi Arabia. Saudi Med J. 2015. 36: 61.
16. Nguma J, O'yandjo A, Sialikyolo J, Liogo G, Aundu A, et al. Hysterosalpingographic findings among patients undergoing infertility work-up in Kisangani, Democratic Republic of the Congo. Open J Obstet Gynecol. 2019. 9: 267-277.
17. Abiodun FO, Adegbola O, Okunade KS, Omisakin SI, Ugwu AO, et al. Impact of genital Chlamydia trachomatis infection in women presenting with infertility in Lagos, Nigeria. Asian J Res Infect Dis. 2025. 16: 44-55.
18. Ajani TA, Eliku CJ, Anaedobe CG, Olusesan TA, Ajani MA. Prevalence and associated risk factors of Chlamydia trachomatis among gynaecology clinic attendees in a tertiary institution in Ogun State, Nigeria. Ann Trop Pathol. 2019. 10: 136-140.
19. Oyetunji OL, Tukur J, Lawal AM, Abdurrahman A. Chlamydia trachomatis antibody titre association with tubal pathology among infertile women in a tertiary care facility in Nigeria. Trop J Obstet Gynaecol. 38: 154-160.
20. Coppus SF, Opmeer BC, Logan S, van der Veen F, Bhattacharya S, Mol BW. The predictive value of medical history taking and Chlamydia IgG ELISA antibody testing in the selection of subfertile women for diagnostic laparoscopy: a clinical prediction model approach. Hum Reprod. 2007. 22: 1353-1358.
21. Odusolu P, Edet E, Emechebe C, Agan T, Okpe A. Prevalence of Chlamydia trachomatis immunoglobulin G antibody in infertile women in Calabar. Afr J Med Health Sci. 2016. 15: 74-79.
22. Linhares IM, Witkin SS. Immunopathogenic consequences of Chlamydia trachomatis 60-kDa heat shock protein expression in the female reproductive tract. Cell Stress Chaperones. 2010. 15: 467-473.
23. Hoenderboom BM, van Benthem BH, van Bergen JE. Relation between Chlamydia trachomatis infection and pelvic inflammatory disease, ectopic pregnancy and tubal factor infertility in a Dutch cohort of women previously tested for chlamydia in a screening trial. Sex Transm Infect. 2019. 95: 300-306.