

# Prevalence Of Chlamydia Trachomatis Infection Among Women Attending Gynaecological Clinic For Infertility In Zaria, Nigeria

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## Abstract

**Background:** In Africa, infertility is a major reproductive health problem and it is estimated that an average of 10.1% of couples experience infertility. Infertility accounts for more than 50% of gynaecological clinic consultations in Nigeria and over 80% of laparoscopic investigations are due to infertility. Tubal infertility contributes about 60% to the main causes of infertility in Nigeria and Chlamydia trachomatis PID is an important preventable cause of tubal infertility.

**Objective:** To determine the sero-prevalence of Chlamydia trachomatis infection IgG and IgM amongst female infertile patients presenting at ABUTH, Zaria.

**Design:** It was a cross-sectional descriptive study.

**Method:** The sera of 400 consecutive consenting infertile patients presenting to the gynaecological clinic of the Ahmadu Bello University Teaching Hospital, Zaria were tested for Chlamydia antibodies using ELISA IgG and IgM kits produced by Diagnostic Automation, Inc. 23961 Craftsman Road, Suite D/E/F, Calabasas, CA 91302, USA.

**Results:** The sero-prevalence of IgG and IgM chlamydia trachomatis antibodies amongst women presenting with infertility in this study was, 31% and 29.5% respectively.

There were no significant statistical association between the socio-demographic characteristics of the patients considered and sero-positivity for chlamydia trachomatis, except for the significant statistical association found between educational status and sero-positivity for chlamydia trachomatis IgG. The highest frequency was essentially among patients who had less than tertiary education; primary education 28 (58.3%), secondary 42(34.4%), quranic education 12(33.3%) and no education 2 (16.7%), while tertiary education had 40 (22%). (P = 0.012).

**Conclusion:** The sero-prevalence of chlamydia trachomatis infection, IgG and IgM was high in the studied population.

## INTRODUCTION

The Nigeria Demographic Health Survey (NDHS) reported on women for the period of 1994 to 2000 a prevalence rate of primary infertility of 22.7% for 15 to 49 year old<sup>1</sup>. Epidemiologic studies on infertility are of a shorter duration compared to demographic studies which spans a period of five years<sup>2</sup>. Of the few epidemiological studies done in Nigeria, a survey of a representative sample of 1,075 of ever married women using a WHO validated protocol showed infertility prevalence rate of 20% in Ile-Ife,

South West Nigeria. A similar survey of a smaller sample among predominantly rural residents in Ilorin, North Central Nigeria revealed an infertility prevalence rate of almost 35%<sup>3</sup>. However in gynaecological clinic consultations in Nigeria, infertility accounts for more than 50% of cases<sup>4</sup> and over 80% of laparoscopic investigations were performed on account of infertility<sup>5</sup>.

In recent years, bacterial sexually transmitted disease (STD) has been overshadowed by the growing epidemic of viral STDs, in particular HIV. Chlamydia trachomatis

infection is the most prevalent bacterial sexually transmitted infections (STI) recognized throughout the world and Chlamydial PID is an important preventable cause of infertility and adverse pregnancy outcome. Also of public health significance, Chlamydia trachomatis is the second leading cause of blindness<sup>6,7,8</sup>.

The World Health Organization estimates that 89 million new cases of genital Chlamydia trachomatis infection occur each year<sup>9</sup>. Demographic data on Chlamydia trachomatis are scarce owing to the relatively quiescent state of the disease amongst individuals until it causes harm to them.

Studies on patients with tubal infertility revealed a prevalence of 40%, 73%, and 75% in Finland<sup>10</sup>, United States<sup>11</sup>, and Great Britain<sup>12</sup> respectively. In England and Wales, studies indicate prevalence of 2% to 12% and higher prevalence were seen amongst attendees at STD and termination of pregnancy clinics<sup>9</sup>.

Several studies suggested that Chlamydia trachomatis antibody testing is accurate in predicting tubal disease<sup>12,13,14</sup>. Several other authorities have also suggested that a careful history taking can identify a specific cause of infertility and thereby help to direct subsequent diagnostic evaluation on the most likely responsible factors. Moreover, guidelines in several countries advocate medical history taking as a tool to select women for tubal testing<sup>15,16,17</sup>.

At the Ahmadu Bello University Teaching Hospital the protocol for the management of infertility does not include routine Chlamydia Antibody Testing or prophylactic antibiotics for Chlamydia trachomatis before Hysterosalpingography evaluation.

It was in line with the global effort to reduce the menace of Chlamydia trachomatis infections amongst women that this study was embarked upon with the intent of obtaining a reliable epidemiological data which would show the prevalence of the disease amongst our population of infertility patients with a view to devising an effective Chlamydia prophylaxis and or treatment amongst patients who present with infertility regardless of whether tubal factor was diagnosed as a cause or not.

This study sought to determine the sero-prevalence of Chlamydia trachomatis genital infection amongst female infertility patients who presented to the gynaecological clinic

of Ahmadu Bello University Teaching Hospital, Shika-Zaria.

## **MATERIALS AND METHOD**

The study design is a descriptive cross-sectional laboratory based study of 400 consecutive consenting infertility patients.

Consecutive old and new patients presenting with infertility at the gynaecological clinic of ABUTH Zaria, Nigeria were selected and enrolled into the study after processing an informed written consent. Patients who had received either systemic or vaginal antibiotic therapy in the preceding six weeks were excluded from the study.

All eligible patients were serially numbered until the desired sample size was attained. Upon consenting to participate in the study, patients were given numbered proforma which they took to the side laboratory within the clinic where venopuncture was done. They were then interviewed using the standardized proforma. Patients whose aetiology of infertility was unknown as at the time of recruitment were followed up at the clinic to determine the likely cause(s) of infertility based on the outcome of their clinical evaluation. Referral letters and case notes were checked for additional information. This also helped to remove recall bias.

About 4mls of venous blood was collected from the patients into plain sample bottles at the side laboratory. The serum was extracted and samples taken to the main medical microbiology laboratory within 1 hour of collection where the samples were pooled in the refrigerator at a temperature of 2 - 8 °C for not more than seven days. The sera were tested for Chlamydia antibodies using ELISA IgG and IgM kits produced by Diagnostic Automation, Inc. 23961 Craftsman Road, Suite D/E/F, Calabasas, CA 91302, USA. This has sensitivity of 96.1% and specificity of 98.5%. The IgG kit contained Microwell strips, Sample diluents, Calibrator, Negative control, Positive control, Washing concentrate, Enzyme conjugate, Tetramethylbenzidine (TMB) chromogenic solution substrate and Stop solution. The IgM kit had similar contents. The manufacturer's instructions were followed.

The test run was considered valid provided the following criteria are met:

1. The O.D value of the reagent blank against air from a microwell reader should be less than 0.250.
2. If the O.D value of the calibrator is lower than 0.250, the test is not valid and must be repeated.
3. The IgG index for negative and positive control

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should be in the range stated on the labels.

Interpretation of results:

Negative: IgG index of 0.90 or less are sero-negative for IgG antibody.

Equivocal: IgG index of 0.91 - 0.99 are equivocal. Samples should be retested.

Positive: IgG index of 1.00 or greater.

Result, validation and interpretation are similar using the IgM reagent kit.

Data analysis was carried out using Statistical Package for Social Science software version 20 and appropriate tests of association were conducted. A p-value of less than 0.05 was considered statistically significant. Ninety-five percent confidence interval was used.

### RESULTS

Consenting female patients with infertility presenting at the gynaecological clinic of the Ahmadu Bello University Teaching Hospital, Zaria were recruited for the study until the study sample size of 400 as calculated was achieved. The recruiting period was between June 2011 and April 2012. The patients were highly motivated to participate in the study due to their condition of infertility and also because the serology test was free.

The mean age of the patients was  $31.1 \pm 5.7$  years. Almost all the subjects, 392 (98%) were married, 6 (1.5%) were divorced while 2 (0.5%) were widowed. Up to 234 (58.5%) of the patients were unemployed but only 6 (1.5%) of their spouses were not gainfully employed. Most of the women 346 (86.5%) had some form of western education, 176 (44%) had tertiary education. Three quarters of the patients 294 (75%) were married in a monogamous family type. Majority 368 (92%) were in their first order of marriage. (Table 1).

**Table 1**

Socio-demographic characteristics of patients

AGE RANGE	FREQUENCY	PERCENTAGE (%)
15-19	4	1.0
20-24	36	9.0
25-29	112	28.0
30-34	130	32.5
35-39	94	23.5
40-44	20	5.0
45-49	4	1.0
<b>TOTAL</b>	<b>400</b>	<b>100.0</b>
<b>MARITAL STATUS</b>		
SINGLE	0	0.0
MARRIED	392	98.0
DIVORCED	6	1.5
SEPARATED	0	0.0
WIDOWED	2	0.5
<b>TOTAL</b>	<b>400</b>	<b>100.0</b>
<b>EDUCATIONAL STATUS</b>		
NONE	14	3.5
QURANIC	40	10.0
PRIMARY	46	11.5
SECONDARY	124	31.0
TERTIARY	176	44.0
<b>TOTAL</b>	<b>400</b>	<b>100.0</b>
<b>FAMILY TYPE</b>		
MONOGAMY	294	75.0
POLYGAMY	98	25.0
<b>TOTAL</b>	<b>392</b>	<b>100.0</b>
<b>ORDER OF MARRIAGE</b>		
FIRST	368	92.0
SECOND	24	6.0
THIRD	8	2.0
<b>TOTAL</b>	<b>400</b>	<b>100.0</b>
<b>PATIENT'S OCCUPATION</b>		
SKILLED	82	20.5
SEMI-SKILLED	72	18.0
UNSKILLED	12	3.0
UNEMPLOYED	234	58.5
<b>TOTAL</b>	<b>400</b>	<b>100.0</b>
<b>HUSBAND'S OCCUPATION</b>		
SKILLED	188	47.0
SEMI-SKILLED	164	41.0
UNSKILLED	42	10.5
UNEMPLOYED	6	1.5
<b>TOTAL</b>	<b>400</b>	<b>100.0</b>

The mean duration of infertility was  $6.7 \pm 5.4$  years. The mean duration attendance of patients at the infertility clinic was  $3.2 \pm 4.5$  years. Also, 274 (68.5%) have previously consulted other government hospitals, private hospitals, prayer houses and or traditional healing houses on account of infertility.

Secondary infertility constituted the feature of majority of the patients, 246 (61.5%). Of the 154 (38.5%) that had previous deliveries, majority 92 (59.7%) had one previous delivery. There were patients with four previous, 10 (6.5%) and five previous, 4 (2.6%) deliveries respectively who presented for infertility evaluation and management. Of the 118 (29.5%) that had previous miscarriages, majority 88 (74.6%) had one previous miscarriage. Of the 52 (13%) that had previous induced abortions, majority 24 (46.2%) had one while 4 (3.8%) had five previous induced abortions.

The age range for sexual debut was 8 to 37 years with a mean of  $19.7 \pm 4.6$  years. However the age range for first marriage was 8 to 38 years with a mean of  $23.1 \pm 6.3$  years.

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Out of the 400 patients, 124 (31%) were sero-positive for IgG and 118 (29.5%) were sero-positive for IgM Chlamydia trachomatis antibody respectively. The positivity was either alone or in combination. (Table 2).

**Table 2**

Chlamydia trachomatis serology of patients studied

CHLAMYDIA SEROLOGY	FREQUENCY	PERCENTAGE (%)
IgG POSITIVE	74	18.5
IgM POSITIVE	68	17.0
IgG + IgM POSITIVE	50	12.5
NEGATIVE	208	52.0
<b>TOTAL</b>	<b>400</b>	<b>100</b>

Of the 400 patients, 74 (18.5%) were IgG positive, 68 (17%) were IgM positive while 50 (12.5%) were both IgG and IgM positive.

There were no significant statistical association between the socio-demographic characteristics of the patients considered and sero-positivity for chlamydia trachomatis, except for the significant statistical association found between educational status and sero-positivity for chlamydia trachomatis IgG. The highest frequency was essentially among patients who had less than tertiary education; primary education 28 (58.3%), secondary 42(34.4%), quranic education 12(33.3%) and no education 2 (16.7%), while tertiary education had 40 (22%). (P = 0.012). (Tables 3 and 4).

**Table 3**

Socio-demographic data of patients with Chlamydia trachomatis IgG sero-positivity

Age range	IgG POSITIVE	IgG NEGATIVE	Test statistics
15-19	4(100.0)	0(0.00)	$\chi^2= 8.058$ df=6 p=0.234
20-24	12(33.3)	24(66.7)	
25-29	24(21.4)	88(78.6)	
30-34	44(33.8)	86(66.2)	
35-39	32(34.0)	62(66.0)	
40-44	6(30.0)	14(70.0)	
45-49	2(50.0)	2(50.0)	
<b>TOTAL</b>	<b>124(31.0)</b>	<b>276(69.0)</b>	
MARITAL STATUS	FREQUENCY (%)	FREQUENCY (%)	Test statistics
SINGLE	0(0.0)	0(0.0)	$\chi^2= 2.946$ df=2 p=0.223
MARRIED	124(31.6)	268(68.4)	
DIVORCED	0(0.0)	6(100.0)	
SEPARATED	0(0.0)	0(0.0)	
WIDOWED	0(0.0)	2(100.0)	
<b>TOTAL</b>	<b>124(31.0)</b>	<b>276(69.0)</b>	
EDUCATIONAL	FREQUENCY (%)	FREQUENCY (%)	Test statistics
NONE	2(16.7)	10(83.3)	$\chi^2= 12.802$ df=4 p=0.012
QURANIC	12(33.3)	24(66.7)	
PRIMARY	28(58.3)	20(41.7)	
SECONDARY	42(34.4)	80(65.6)	
TERTIARY	40(22.0)	142(78.0)	
<b>TOTAL</b>	<b>124(31.0)</b>	<b>276(69.0)</b>	
FAMILY TYPE	FREQUENCY (%)	FREQUENCY (%)	Test statistics
NONE	0(0.0)	4(100.0)	$\chi^2=2.367$ df=2 p=0.306
MONOGAMY	88(29.5)	210(70.5)	
POLYGAMY	36(36.7)	62(63.3)	
<b>TOTAL</b>	<b>124(31.0)</b>	<b>276(69.0)</b>	
ORDER OF MARR.	FREQUENCY (%)	FREQUENCY (%)	Test statistics
FIRST	112(30.6)	254(69.4)	$\chi^2=1.432$ df=3 p=0.698
SECOND	10(41.7)	14(58.3)	
THIRD	2(25.0)	6(75.0)	
FOURTH	0(0.0)	2(100.0)	
<b>TOTAL</b>	<b>124(31.0)</b>	<b>276(69.0)</b>	

There was significant statistical association between educational status and sero-positivity for Chlamydia trachomatis IgG. The highest frequency was found mostly among patients with less than tertiary education while the least frequency was among patients with no education.

**Table 4**

Socio-demographic data of patients with Chlamydia trachomatis IgM sero-positivity

AGE RANGE	IgM Positive FREQUENCY (%)	IgM Negative FREQUENCY (%)	Test statistics
15-19	2(50.0)	2(50.0)	$\chi^2= 1.672$ df=6 p=0.947
20-24	12(33.3)	24(66.7)	
25-29	30(26.8)	82(73.2)	
30-34	42(32.3)	88(66.7)	
35-39	24(25.5)	70(74.5)	
40-44	6(30.0)	14(70.0)	
45-49	2(50.0)	2(50.0)	
<b>TOTAL</b>	<b>118(29.5)</b>	<b>282(70.5)</b>	
<b>MARITAL STATUS</b>			
SINGLE	0(0.0)	0(0.0)	$\chi^2= 2.830$ df=2 p=0.243
MARRIED	118(30.1)	137(69.9)	
DIVORCED	0(0.0)	3(100.0)	
SEPARATED	0(0.0)	0(0.0)	
WIDOWED	0(0.0)	1(100.0)	
<b>TOTAL</b>	<b>118(29.5)</b>	<b>282(70.5)</b>	
<b>EDUCATIONAL STATUS</b>			
NONE	2(16.7)	10(83.3)	$\chi^2= 4.873$ df=4 p=0.301
QURANIC	4(11.1)	32(88.9)	
PRIMARY	16(33.3)	32(66.7)	
SECONDARY	44(36.1)	78(63.9)	
TERTIARY	52(28.6)	130(71.4)	
<b>TOTAL</b>	<b>118(29.5)</b>	<b>282(70.5)</b>	
<b>FAMILY TYPE</b>			
NONE	0(0.0)	4(100.0)	$\chi^2=1.427$ df=2 p=0.490
MONOGAMY	88(29.5)	210(70.5)	
POLYGAMY	30(30.6)	68(69.4)	
<b>TOTAL</b>	<b>118(29.5)</b>	<b>282(70.5)</b>	
<b>ORDER OF MARRIAGE</b>			
FIRST	114(31.1)	252(68.9)	$\chi^2=4.793$ df= 3 p=0.188
SECOND	4(16.7)	20(83.3)	
THIRD	0(0.0)	8(100.0)	
FOUR	0(0.0)	2(100.0)	
<b>TOTAL</b>	<b>118(29.5)</b>	<b>282(70.5)</b>	

There was no statistical significant association found between all the socio-demographic characteristics and Chlamydia trachomatis IgM sero-positivity.

**DISCUSSION**

There was significant statistical association between educational status and sero-positivity for IgG (P = 0.012). The least frequency was found amongst those with no education 2 (16.7%) followed by those with tertiary education 40 (22%). The least frequency found amongst those with no education should be interpreted with caution as were only 2 patients in that category compared to others. This frequency is low and may be inconclusive. However the highest frequency of IgG sero-positivity was found amongst patients with less than tertiary education. This is in agreement with the Benin study where it was found that education less than tertiary was one of the independent predictors of tubal infertility<sup>2</sup>.

The sero-prevalence of IgG and IgM chlamydia trachomatis antibodies amongst women presenting with infertility in this study was, 31% and 29.5% respectively. These values are much higher compared to sero-prevalence of IgG 8.6% and IgM 0.9% found amongst women with infertility in Iran<sup>18</sup>. The reason for this may be due to strict socio-cultural practices in Iran. Being an Islamic country Sharia law is practiced and in order to ensure moral values, there is

restriction of females from the public. The purdah system practiced is also characterized by strict seclusion of married women from the public. These practices are likely to ensure minimal contact between men and women leading to relatively low premarital and extramarital sexual activities and its sequelae.

The premium on fertility amongst the patients studied can be seen in some of the socio-demographic variables. Eight of the infertile patients were at the extremes of the reproductive age group with 4 (1%) within age 15 to 19 years while another 4 (1%) within 45 to 49 years. Six (1.5%) were divorced while 2 (0.5%) were widowed.

From this study, most of the patient studied 346 (86.5%) were educated and this may have impacted positively on their health seeking behaviour which is evident by the fact that 274 (68.5%) had previously consulted other orthodox and or non-orthodox healthcare centres on account of infertility.

**CONCLUSION**

The sero-prevalence of recent (IgM); chronic (IgG) as well as recent on chronic (IgM and IgG) chlamydia trachomatis infection amongst infertile women presenting at the gynaecology clinic of Ahmadu Bello University Teaching Hospital, Zaria was found to be 17%, 18.5% and 12.5% respectively.

There was statistically significant association between educational status and patients who were sero-positive for chlamydia trachomatis IgG, with primary educational status having the most and tertiary having the least association.

**RECOMMENDATIONS**

From the findings in this study it is recommended that patients being evaluated for infertility would benefit from screening for chlamydia trachomatis and those found to have recent infection should be treated with anti-chlamydia antibiotics. This is even more important in patients that are to undergo hysterosalpingography.

Patients been managed for infertility should be promptly evaluated within the shortest time possible and should also be properly counselled on the cause, appropriate treatment and prognosis. This would forestall patients wasting resources moving from one centre to another in search of satisfactory treatment, thereby causing further delay. There is also the risk of exposure to infection while

repeatedly undergoing evaluation especially for tubal infertility. Possible options should therefore be made available to the patients so that they can make informed choices.

Improved accessibility to assisted reproductive technology which is known to cure over 50% of infertility even in developed countries would not only decrease the duration of infertility but also alleviate socio-psychological problem associated with infertility<sup>19,20</sup>.

Also there is a need for future studies to include the male spouses of the infertile women to be studied since chlamydia trachomatis is a sexually transmitted disease and infertility involves the spouses as well.

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