CORRELATION OF CHLAMYDIA TRACHOMATIS INFECTION WITH TUBAL BLOCKAGE AMONG INFERTILE WOMEN ATTENDING AMINU KANO TEACHING HOSPITAL, KANO, NIGERIA.

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ABSTRACT

Background: Genital *Chlamydia trachomatis* is a common bacterial cause of sexually transmitted infection worldwide which is associated with significant morbidity and has a great impact on human reproduction and fertility. Infertility is a major health problem in Nigeria with a prevalence of between 20, -40% compared with global prevalence of 15%.

Objective: To correlate genital *Chlamydia trachomatis* infection with tubal blockage among infertile women and to compare with women attending family planning clinic in AKTH.

Materials and Methods: This is a cross sectional prospective study that was carried out among 142 women with tubal infertility attending the gynaecological clinic and 142 fertile women from family planning clinic of AKTH. Endocervical swab and blood samples were collected and tested using Eugene Chlamydial Rapid test Device and ELISA IgG Chlamydia antibody kits following manufacturer's instruction.

Results: The prevalence of *Chlamydia trachomatis* IgG antibodies in infertile women was 63(44.4%) while among the family planning women is 40(28.2%) and that of the *Chlamydia trachomatis* antigen is 21(14.8%) in the infertile women and 7(4.9%) in the control group. These differences were found to be statistically significant when compared (X2=8.059, P<0.05, X2=7.766, P<0.05). The prevalence of the *Chlamydia trachomatis* IgG antibodies was highest (33.0%) among age group 25-29years; while that of the antigen was highest (39.2%) among age group 30-34 years of the study population.

Conclusion: The study showed that the prevalence of *Chlamydia trachomatis* infection was higher among women with infertility. There is need for routine screening of Chlamydia trachomatis in sexual transmitted infection clinics to prevent infertility.

Key words: *Chlamydia trachomatis*, infertility, AKTH, Kano.

INTRODUCTION

Chlamydia trachomatis (serotypes D-K) are obligatory intracellular Gram negative bacteria that primarily infect the female cervix, urethra and fallopian tubes. The majority of infection is asymptomatic and goes undetected. It is associated with an increased risk of pelvic inflammatory disease resulting in ectopic pregnancy, tubal factor infertility and chronic pelvic pains,[1-3] with adverse pregnancy outcomes such as prematurity, premature rupture of membranes (PROM), chorioamnionitis, low birth weight, postpartum endometritis, spontaneous abortions, perinatal and neonatal morbidity and mortality.[4]

The world health organization (WHO) estimated that 106 million adults worldwide were newly infected with *Chlamydia trachomatis*, of which 9.1 million were seen in Africa.[5] The prevalence of *Chlamydia trachomatis* in women in the African is 2.6% with a reported incidence of 22.3/1000 population.[5] *Chlamydia trachomatis* infection is

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asymptomatic in 70-75% of infected women, can be transmitted during vaginal, oral, or anal sexual intercourse and can be passed by the mother to her newborn during delivery, with subsequent risk of neonatal eye infection or pneumonia.[6]

Infertility is a major health problem in Nigeria with a prevalence of between 20-40% compared with global prevalence of 15% where infection-related tubal damage is the commonest cause.7 Infertility is associated with adverse social and psychological consequences especially for women in developing countries, it accounted for 38.8% of all out-patients gynecological consultations in North Eastern Nigeria and tuboperitoneal factor has been shown to be the commonest cause of infertility.[8]

Chlamydia trachomatis infection is the most commonly reported notifiable disease in the United States. It is the most prevalent of all sexually transmitted diseases, and since 1994, has comprised the largest proportions of all sexually transmitted infections, based on estimates from national surveys conducted from 1999-2008, Chlamydia infection prevalence is 6.8% among sexually active females aged 14-19 years.[9]

Reports about the prevalence of *Chlamydia trachomatis* in various risk groups have recorded significant figures in Nigeria, in Enugu about 26.4%[10], Zaria, 28.26%[11], Lagos, 32.1%[12] and Port Harcourt as high as 74% with tubal occlusion seen in 78.4% of cases positive for Chlamydia infection, pelvic inflammatory disease and mucopurulent discharge were also the most common presenting symptoms among the Chlamydia positive infertile women.[13]

Screening programs for Chlamydia have been established in some developed countries like Sweden which is known to have the best screening program in the world.[14] In the USA, the centers for disease control and prevention have supported a screening program since 1988 of sexually active women aged 25 years or less[15]. The phased implementation of a national Chlamydia screening program in the UK offers screening for all sexually active women aged 24 years or less.[16] Unfortunately, the screening for this organism is difficult in many developing countries where there is an apparent ignorance about the significance of Chlamydia infection in infertility compared with other infections such as gonorrhea among women.[17]

Screening becomes the essential component of Chlamydia infection control because the infection is asymptomatic and history will usually not be helpful in assessing the risk of a previous *Chlamydia trachomatis* infection. Cell culture has been considered the ideal method for diagnosis of Chlamydia infection, although few laboratories could offer this, due to its cost and lack of experience in cell culture technique.[18] Infection with *Chlamydia trachomatis* results in the formation of antibodies detectable in the serum. Chlamydia antibody and antigen testing are non-invasive, simple and quick to perform and as such can be used as screening test for infection which may subsequently lead to tubal damage in infertile women.[15]

In view of insidious nature of the infection and paucity of report on this bacterial infection in this part of the country, this study aimed to correlate genital *Chlamydia trachomatis* infection with tubal blockage among infertile women and to compare with women attending family planning clinic in AKTH.

METHODOLOGY

This was a cross-sectional prospective study conducted in the gynecologic and family planning clinic of the Aminu Kano Teaching Hospital (AKTH), Kano, Nigeria.

The subjects were recruited from the population of infertile patients with proven tubal factor infertility confirmed by HSG attending gynecological clinic of the hospital. Aged-matched women attending the family planning clinic of the hospital within the study period were recruited as the control, because these are women that are not desirous of fertility.

The following formula for the minimum sample size of comparison between the two group

Was used.[19]

Therefore 142 patients that satisfied the inclusion criteria were recruited and 142 patients as control over a period of 12 weeks.

Ethical clearance was obtained from the research and ethical committee of AKTH.

Data collected were socio-demographic variables, sexual history reproductive history, history of treatment of any previous infection and results of relevant investigations were obtained. For antibody

detection, venous blood was taken for serological assay using ELISA Chlamydia trachomatis IgG kit (Perfemed catalog no: 10228 (96 tests)). Autobio DiagnoSTIcs Co. LTD. No 87 Jingbei Yi Road. Zhengzhou, China 450016. This has a sensitivity of 91.1% and specificity of 98.1%, to determine the IgG antibodies to Chlamydia trachomatis in human serum or plasma.

For antigen detection: Endocervical swab was collected using a sterile Cusco's speculum.. The swab was tested using EUGENE Chlamydia antigen kit manufactured by Shanghai Eugene Biotech Co Ltd.

The results will be documented as positive or negative. Those with positive results and their consorts were treated.

Data obtained was recorded on a proforma and analyzed using the Statistical Package for social science (SPSS version 16 Inc. Chicago. USA 2006). Percentages, means, standard deviation were calculated. Chi-square and Fisher exact test was used to ascertain the level of significance and P value less than 0.05 was considered statistically significant.

RESULTS

A total of 284 women were recruited over a period of 12 weeks in the gynecology and family planning clinic (December 2015-March 2016). The cases were 142 infertile women while the controls were 142 women attending the family planning clinic.

Table 1 shows the socio-demographic characteristics of the study population. The mean age of the study population was 29.32±5.547years. The mean age of the cases and control were 28.89±5.473 and 29.75±5.607 respectively. There was no statistical difference in the mean age between the study and the comparison group (P>0.05). The age ranged from 18-43years. Most of the cases 56(39.4%) were aged 25-29years while 41(28.9%) of the controls were aged 30-34years. About 282(99.3%) of the study population were married while 2(0.7%) were divorced out of which 140(98.6%) of the cases were married and 2(1.4%) were divorced and 142(100%) of the control were married. There was no statistically significant difference between the cases and control (P>0.05). Ninety one (64.1%) and 51(35.9%) were married in a monogamous and polygamous setting respectively. About 133(46.8%) of study population

had secondary school education. Majority 212(74.6%) were Muslims and the Hausa/Fulani constituted the highest 191(67.3%) ethnic group.

Table 2 shows the sexual and reproductive characteristics amongst the cases and control group. The mean age range at sexual debut was 15-20years with a mean of 18.26±3.711years in the infertile women. This was statistically significant when compared with the control group where the age range was 15-20years and the mean age of 17.59±2.346years (P<0.05). Among the infertile women, 140(98.6%) had one sexual partner, 2(1.4%) had two sexual partners, none had three or more sexual partners compared with 113(79.6%) of the family planning clients who had one sexual partner, 26(18.3%) had two sexual partners and 3(2.1%) had three or more sexual partners. The level of association was found to be statistically significant when compared (P<0.05). Sixty six (46.5%) of the cases had postabortal complications and 19(13.4%) had puerperal complications while 2(1.4%) of the controls had postabortal complications and none had puerperal complications. The difference was found to be statistically significant when cases and controls were compared (P<0.05).

Table 3 shows gynaecological symptoms and treatment. Among the infertile women, vaginal discharge was found in 136(95.8%), dyspareunia in 134(94.4%), lower abdominal pain in 136(95.8%) and genital ulcer in 6(4.2%) of cases. On the other hand vaginal discharge was reported in 66(46.5%), dyspareunia in 47(33.1%), lower abdominal pain in 39(27.5%) and genital ulcer in 2(1.4%) of family planning group. These differences were found to be statistically significant except for genital ulcer in which there was no statistical difference. About 77(54.2%) of the infertile women were treated in the hospital, 30(21.2%) in the pharmacy and 31(21.8%) had self treatment, while 33(23.3%) of the control group had hospital based treatment, 7(4.9%) were treated in the pharmacy and 10(7.0%) had self treatment. These differences were found to be statistically significant when compared (P<0.05).

Table 4 shows the prevalence of Chlamydia trachomatis IgG antibodies and antigen in the cases and control. The prevalence of *Chlamydia trachomatis* IgG antibodies in infertile women is 63(44.4%) while in the control is 40(28.2%) while that of the *Chlamydia trachomatis* antigen is

TABLE 1: SHOWS SOCIODEMOGRAPHIC CHARACTERISTICS

AGE	FREQUENY (Cases)	%	FREQUENCY (Controls)	%	X^2/Fisher	P-value
15-19	2	1.4	6	4.2		
20-24	26	18.3	24	16.9		
25-29	56	39.4	36	25.4		
30-34	30	21.1	41	28.9		
35-40	24	16.9	33	23.2		
40-45	4	2.8	2	1.4	8.637	0.124
TOTAL	**142**	**100**	**142**	**100**		
MARITAL STATUS						
MARRIED	140	98.6	142	100		
DIVORCED	2	1.4	0	0		
					2.014	0.156
TOTAL	**142**	**100**	**142**	**100**		
EDUCATIONAL STATUS						
NONE	16	11.3	9	6.3		
PRIMARY	18	12.7	19	13.4		
SECONDARY	67	47.2	66	46.5		
TERTIARY	41	28.9	48	33.8	2.545	0.467
TOTAL	**142**	**100**	**142**	**100**		
PARITY						
0	103	72.5	0	0		
1-4	39	27.5	100	70.4		
>4	0	0	42	29.6	1.784	**0.000**
TOTAL	**142**	**100**	**142**	**100**		
RELIGION						
ISLAM	105	73.9	107	75.4		
CHRISTIANITY	37	26.1	35	24.6		
TOTAL	**142**	**100**	**142**	**100**		
PATIENT'S OCCUPATION						
SKILLED	51	35.9	54	38.0		
UNSKILLED	0	0	0			
SEMI-SKILLED	0	0	0			
UNEMPLOYED	91	64.1	88	62.0	0.136	0.712
TOTAL	**142**	**100**	**142**	**100**		
HUSBAND'S OCCUPATION						
SKILLED	126	88.7	139	97.9		
UNSKILLED	2	1.4	0	0		
SEMI-SKILLED	0	0	0	0		
UNEMPLOYED	14	9.9	3	2.1	9.755	**0.008**
TOTAL	**142**	**100**	**142**	**100**		
ETHNICITY						
HAUSA/FULANI	92	64.8	99	69.7		
YORUBA	11	7.7	13	9.2		
IGBO	11	7.7	5	3.5		
OTHERS	28	19.7	25	17.6		
TOTAL	**142**	**100**	**142**	**100**		
MARITAL SETTING						
MONOGAMY	91	64.1	89	62.7		
POLYGAMY	51	35.9	53	37.3	0.377	0.828
TOTAL	**142**	**100**	**142**	**100**		
ORDER OF MARRIAGE						
NIL	0	0	2	1.4		
FIRST	116	81.7	104	73.2		
SECOND	23	16.2	24	16.9		
THIRD	3	2.1	12	8.5	6.307	0.098
TOTAL	**142**	**100**	**142**	**100**		

TABLE 2: SHOWS SEXUAL AND REPRODUCTIVE CHARACTERISTICS

AGE AT SEXUAL DEBUT	FREQUENCY (Cases)	%	FREQUENCY (Controls)	%	X^2/ Fisher	p-value
<15	38	26.8	28	19.7		
15-20	73	51.4	100	70.4		
21-25	22	15.5	13	9.2		
29-30	7	4.9	1	0.7		
31-34	2	1.4	0	0	14.543	**0.006**
TOTAL	**142**	**100**	**142**	**100**		
NUMBER OF SEXUAL PARTNERS						
ONE	140	98.6	113	79.6		
TWO	2	1.4	26	18.3		
=THREE	0	0	3	2.1	26.453	**0.000**
TOTAL	**142**	**100**	**142**	**100**		
POSTABORTAL COMPLICATIONS						
YES	66	46.5	2	1.4		
NO	76	53.5	140	98.6	79.198	**0.000**
TOTAL	**142**	**100**	**142**	**100**		
PUEPERAL COMPLICATIONS						
YES	19	13.4	0	0		
NO	123	86.6	142	100	20.362	**0.000**
TOTAL	**142**	**100**	**142**	**100**		

21(14.8%) in the infertile women and 7 (4.9%) in the control group. These differences were found to be statistically significant when compared (P<0.05) respectively. The prevalence of the *Chlamydia trachomatis* IgG antibodies was highest (33.0%) among age group 25-29years while that of the antigen was highest (39.2%) among age group 30-34 years of the study population.

Amongst the family planning women, majority 44(31.0%) are using IUCD, 38(26.8%) had implanon inserted, 25(17.6%) were taking noristerat injections, 14(9.9%) were on oral contraceptive pills,14(9.9%) were on depo-provera injection and 7(4.9%) were using condoms whilst 137(96.5%) of the infertile women never used any form of contraceptive, 2(1.4%) were using condom occasionally, 2(1.4%) used IUCD, and one patient(0.7%) was on oral contraceptive pills for regulation of menstrual cycle.

DISCUSSION

The prevalence of genital Chlamydia trachomatis IgG antibodies among 284 patients attending gynecological clinic and family planning clinic of AKTH was found to be 44.4% and 28.2% respectively. While that of the Chlamydia trachomatis antigen is 14.8% in infertile women and 4.9% in family planning attendees. Our study was able to show a relative high prevalence of genital Chlamydia trachomatis IgG antibodies and that of the Chlamydia trachomatis antigen from our study participants. This is in agreement with high prevalence of 29.4%, 38.3%, 56.1% and 74% in studies carried out in Enugu, Zaria, Jos and Port Harcourt respectively.[10,13,20,21]

The higher prevalence could be due to the fact that as the infection remained endemic, its spread could be on the increase due to asymptomatic nature of the disease and non availability of facility to detect the organism in many health units. It could also be as a result of increase in the sexual risk behavioral attitudes of individual in our society. A lower prevalence of 9%, 10%, and 10.7% were seen in Maiduguri, Ibadan and Kano.[22-24] This could be due to the diagnostic method used where the kit detects only current infection. The prevalence of Chlamydia trachomatis infection was found to be highest among patients with infertility 63(44.4%)

TABLE 3: SHOWS SYMPTOMS AND TREATMENT

VARIABLES	FREQUENCY (Cases)	%	FREQUENCY (Controls)	%	X²/ Fisher	p-value
SYMPTOMS						
VAGINAL DISCHARGE						
YES	136	95.8	66	46.5		
NO	6	4.2	76	53.5	84.014	**0.000**
TOTAL	**142**	**100**	**142**	**100**		
DYSPAREUNIA						
YES	134	94.4	47	33.1		
NO	8	5.6	95	66.9	1.153	**0.000**
TOTAL	**142**	**100**	**142**	**100**		
LOWER ABDOMINAL PAIN						
YES	136	95.8	39	27.5		
NO	6	4.2	103	72.5	1.401	**0.000**
TOTAL	**142**	**100**	**142**	**100**		
GENITAL ULCER						
YES	6	4.2	2	1.4		
NO	136	95.8	140	98.6	2.058	0.151
TOTAL	**142**	**100**	**142**	**100**		
HEALTHCARE SOURCE						
NONE	4	2.8	92	64.8		
SELF TREATMENT	31	21.8	10	7.0		
PHARMACY	30	21.2	7	4.9		
HOSPITAL	77	54.2	33	23.3	1.233	**0.000**
TOTAL	142	100	142	100		
DURATIONOF TREATMENT						
NONE	4	2.9	93	65.5		
<7 DAYS	2	1.4	1	0.7		
7-14 DAYS	136	95.7	48	33.8		
					1.369	**0.000**
TOTAL	**142**	**100**	**142**	**100**		

TABLE 4: SHOWS PREVALENCE OF CHLAMYDIA TRACHOMATIS ANTIBODIES AND ANTIGEN

RESULTS	FREQUENCY (Cases)	%	FREQUENCY (Controls)	%	X²	p-value
ANTIBODIES						
POSITIVE	63	44.4	40	28.2		
NEGATIVE	79	55.6	102	71.8	8.059	**0.005**
TOTAL	**142**	**100**	**142**	**100**		
ANTIGEN						
POSITIVE	21	14.8	7	4.9		
NEGATIVE	121	85.2	135	95.1	7.766	**0.005**
TOTAL	**142**	**100**	**142**	**100**		

for IgG antibodies and 21(14.8%) for the antigen. This was also the finding in Zaria[20], Calabar[25], Abeokuta[26] and India[27] where the prevalence was higher among infertile patients when compared to control group of family planning. This finding however is contrary to reports from Enugu[10] where the prevalence was higher among asymptomatic women. The finding in this study is in keeping with Chlamydia trachomatis being one of the commonest organisms causing tubal factor infertility.

Previous epidemiological studies on Chlamydial infection have identified a variety of risk factors, including number of sexual partners, age under 25 years, HIV seropositivity and lack of condom use.[21,28] In this study, risk determinant analysis showed that the age of the patient, age of onset of sexual activity, number of sexual partners, postabortal and puerperal complications were the risk factors for Chlamydia trachomatis infection; however, significant association was found in all except for age of the patient when cases and control group were compared. Analysis of age related prevalence of Chlamydia trachomatis in this study showed that patients in the age group 25-29years had a prevalence of 33.0% of Chlamydia trachomatis IgG antibodies. This finding is in keeping with a study conducted in Jos.[21,29] However studies in the United States found a higher prevalence among females less than 25 years of age.[15] These age groups all fall within sexually active and adolescent age group which could explain the higher prevalence among them. Age of onset of sexual activity determined in this study had the age group 15-20 years with the highest prevalence of 60.9%. This implies that the earlier an individual engaged in sexual activity, the higher the chances of being infected with *Chlamydia trachomatis*.

Multiple sexual partners has been found to be statistically associated with *Chlamydia trachomatis* infection in previous study.[30] This was also observed in this study and the level of association was significant when cases and the control group were compared. Clinical features in this study which include vaginal discharge, abdominal pain and dyspareunia were all found to be associated with *Chlamydia Trachomatis* and this is in keeping with other studies.[4,7,31] These are features of pelvic inflammatory disease and sequelae to tubal blockage. In this study, use of condom was seen in

only 3.2% of the study population. This is in agreement with several other studies which also found that inconsistent use of condom has been associated with *Chlamydia trachomatis* infection.[29,32]

CONCLUSIONS

This study showed that the prevalence of *Chlamydia trachomatis* infection was found to be higher amongst infertile women as compared to women on family planning and there was significant association between age at sexual debut, number of sexual partners, postabortal and puerperal complications and development of *Chlamydia trachomatis* infection.

From these findings, it is recommended there should be routine screening for *Chlamydia trachomatis* in gynecology and sexual transmitted infection clinics to prevent infertility and those found to have recent infection should be treated accordingly. Sexual partners of infected individuals should also be treated and young women should be enlightened on safe sex practices to reduce cases of sexual transmitted Chlamydial infections.

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