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Distribution Rate of Chlamydial Infection According to Demographic Factors among Pregnant Women Attending Clinics in Zaria Metropolis, Kaduna State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Chlamydia trachomatis also known as the “Silent Epidemic” is a major threat to the reproductive health of women. This study was aimed at determining the seroprevalence of *Chlamydia trachomatis* based on demographic factors among women attending clinics in Zaria metropolis, Kaduna State. Each participant completed a researcher-devised questionnaire and quasi design was used in the selection of hospitals. Subsequently about 5mls of peripheral blood for serological analysis was obtained after informed consent. Presence of antibodies to *Chlamydia trachomatis* was determined using Enzyme Linked Immunosorbent Assay (ELISA) to detect IgG and screening for HIV was also done using Determine[®] HIV 1/2 as well as Uni-Gold[™] HIV Test Kits. Out of the two hundred and seventy (270) samples collected, 32(11.9%) were positive for *Chlamydia trachomatis* IgG, 7(2.6%). Chlamydial infection was found to be significantly associated with level of education. There was no significant association between chlamydial infection and occupation, subjects' husbands' occupation.

Keywords: Chlamydial infection; demographic factors; pregnant women.

1. INTRODUCTION

Genital infections with *Chlamydia trachomatis* are the most common sexually transmitted bacterial infections in European countries [1,2], in the United States [3,4] and worldwide, with more than 90 million cases annually [5]. The Centres for Disease Control and Prevention [6] estimates that there are approximately 2.8 million new cases of *Chlamydia* in the United States each year and that about one million individuals in the United States are infected with *Chlamydia* [6]. It has also been reported as an established cause of pelvic inflammatory disease (PID), ectopic pregnancy and infertility among women [7]. Although the major impact of the disease is on the female genital tract [1,2], men may suffer from urethritis, prostatitis, infertility and Reiter's syndrome [2]. *Chlamydia trachomatis* is also the causative agent of trachoma, a chronic infection of the conjunctiva characterized by extensive scarring and blindness.

Sexually transmitted infections (STIs) contribute to a variety of obstetric and gynaecologic complications in women, including increased risk of tubal infertility and have been associated with chronic pelvic pain. They are also significantly associated with adverse pregnancy outcomes such as spontaneous abortion, preterm delivery, ectopic pregnancy, premature rupture of membranes, intrauterine infection of the foetus, and low birth weight in infants (Mardh, 2002).

This study was aimed at determining the seroprevalence of *Chlamydia trachomatis*

based on demographic factors among women attending clinics in Zaria metropolis, Kaduna State.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted among pregnant and non-pregnant women attending clinics in Zaria metropolis, Kaduna State, Nigeria.

2.2 Study Design

The study was a descriptive cross-sectional survey which combines the use of administered structured questionnaires and the analysis of serum samples collected from consented patients. Quasi design was adopted for the purpose of this study.

2.3 Inclusion Criteria

Women receiving antenatal care and non-pregnant women at the various health Clinic during the period of study who gave consent to participate in the study aged <15-50 years with or without HIV were eligible for inclusion).

2.4 Exclusion Criteria

Women receiving antenatal care and non-pregnant women at the various health Clinic during the period of study who do not give their consent to participate in the study aged <15- 50 years with or without HIV were not eligible for inclusion.

2.5 Sample Size

The sample size was determined using the following equation as described by Naing et al. (2006).

$$n = \frac{z^2 p (1 - p)}{d^2}$$

Where n = sample size

z = z score for a level of 95% confidence interval = 1.96

p = prevalence rate at 10.5% Zaria, Nigeria [8]. d = allowable error = 5% = 0.05.

Therefore:

$$n = \frac{(1.96)^2 \times 0.105 \times (1 - 0.105)}{(0.05)^2}$$

$$= 144.406$$

$$= 144 \text{ samples}$$

$$\text{Attrition rate} = 10\% \text{ of } 144 \text{ sample size}$$

$$= 158.4$$

A total of 270 samples were collected (equal number of samples were collected to make good comparison between the subjects).

2.6 Questionnaire Administration

A structured questionnaire was administered after informed consent was obtained from the study population in order to access the risk factors associated with the prevalence of *Chlamydia trachomatis* among pregnant and non- pregnant women. Parameters considered included occupation, husband's occupation and educational level

2.7 Sample Collection

Blood samples were collected from women of reproductive age <15-50 years who gave their consent. Approximately two hundred and seventy (270) blood samples were collected from one hundred and thirty five (135) pregnant and one hundred and thirty five (135) non-pregnant women attending clinics from each of the centres under study in Zaria.

All materials required for the collection of venous blood was assembled and labelled appropriately with the subject's identification number (ID) and date. Five millilitre of blood was collected through venepuncture using sterile 5ml needles and syringes (CHANGZHOU HUICHUN MEDICAL EQUIPMENT CO., LTD, CHINA - Expiry date: 02-2016). The blood sample in the syringe was released into the labelled container and allowed to clot for 30 minutes. This was followed by centrifugation of the collected blood sample to separate the serum at 3000 r.p.m. for 5 minutes. The serum was thereafter carefully separated with a transfer pipette in order to avoid extracting red cells and aseptically transferred into a sterile labelled serum storage screw-capped container. The serum was stored in the Microbiology laboratory in a freezer at a temperature of -20°C until analysed.

2.8 CT Screening Using Enzyme Linked Immunosorbent Assay (ELISA)

2.8.1 Assay procedure

All reagents for the assay were brought to room temperature (20°C-25°C) from a temperature of 2°C-8°C and thoroughly mixed by swirling gently before use. Samples were numbered according to the microtitre wells. The desired number of coated strips was placed into the holder. Five microlitre (5µl) of the test samples, negative control, positive control and calibrator control were added to 200 µl of the sample diluents to make 1 in 40 dilutions. One hundred microlitres (100 µl) of diluted sera, calibrator and controls was dispensed into appropriate wells. For the reagent blank, 100µl sample diluents were dispensed into 1A well position. The holder was tapped so as to remove air bubbles, mixed well and incubated for 30 minutes at room temperature. The liquid from all the wells were removed and wells washed three times with washing buffer.

One hundred microlitres (100 µl) of the enzyme conjugate was also dispensed into each well and the plate incubated for 30 minutes at room temperature. Excess enzyme conjugate was removed by washing each well with washing buffer three times. Approximately, 100µl of TMB chromogenic Substrate was dispensed into each well and incubated at room temperature for 30 minutes. One hundred microlitres (100 µl) of 2 N HCl was finally

Table 1. Distribution rate of chlamydial infection according to demographic factors among women attending clinics in Zaria Metropolis, Kaduna State, Nigeria

Risk factor	Pregnant		Non-pregnant		Total	
	No. of samples	No. +ve (%)	No. of samples	No. +ve (%)	No. of samples	No. +ve (%)
Occupation of Subjects						
Civil servants	31	3(9.7)	22	4(18.2)	53	7(13.2)
Self-employed	47	2(4.3)	54	10(18.5)	101	12(11.9)
Others	57	9(15.8)	59	4(6.8)	116	6(11.2)
Statistics		$\chi^2 = 5.565$, $p = 0.201$		$\chi^2 = 6.665$, $p = 0.222$		$\chi^2 = 0.314$, $p = 0.978$
Husband's Occupation						
Civil servants	68	12(17.6)	60	9(15.0)	128	21(16.4)
Self-employed	32	1(3.1)	40	7(17.5)	72	8(11.1)
Others	35	1(2.9)	35	2(5.7)	70	3(4.3)
Statistics		$\chi^2 = 5.060$, $p = 0.261$		$\chi^2 = 4.123$, $p = 0.326$		$\chi^2 = 3.957$, $p = 0.289$
Level of education						
Primary	19	0(0.0)	17	1(5.9)	36	1(2.8)
Secondary	55	7(12.7)	60	7(11.7)	115	14(12.2)
Tertiary	53	6(11.3)	43	6(14.0)	96	12(12.5)
Others	8	1(12.5)	15	4(26.7)	23	5(21.7)
Statistics		$\chi^2 = 3.512$, $p = 0.500$		$\chi^2 = 8.567$, $p = 0.167$		$\chi^2 = 7.079$, $p = 0.051^*$

KEY: No. +ve = Number of positive samples; * = Statistically significant association exists at $p \leq 0.05$

added to stop the reaction. There was a colour change from blue to yellow and within 15 minutes the plates were read at an absorbance of 450nm using a microwell reader (WKEA MED SUPPLIES, CHANGCHUN, CHINA – Expiry date: 08-2013).

2.8.2 Data analysis

Results and data from questionnaires were presented on tables and figures. All statistical analysis was done using a computer software program, SPSS Version 19. Associations and relationship between the various risk factors were obtained using chi-square, fisher's exact, analysis of variance (ANOVA) and the student t-test. Two tailed P values ≤ 0.05 was considered to be statistically significant.

3. RESULTS

Table 1 illustrates the distribution of chlamydial infection based on occupation and educational level. Though there was no statistically significant association between study subjects' occupation and chlamydial infection, there are variations in the various types of occupation with civil servants having 3(9.7%), self-employed 2(4.3%) and others 9(15.8%) had the highest chlamydial prevalence among the pregnant women. Among non-pregnant women, the highest occurrence rate was found among the self-employed 10(18.5%) closely followed civil servants 4(18.2%) and then others with 4(6.8%). Among the women entirely, civil servants had the highest rate of chlamydial infection 7(13.2%).

A similar comparison of the study subjects' husbands' occupation revealed that there was no significant association between occupation and chlamydial infection. While civil servants had the highest prevalence of 12(17.6%) among the pregnant women, self-employed 7(17.5%) had the highest prevalence followed by civil servants self-employed 9(15.0%) among the non-pregnant women. The civil servants had the highest occurrence case 21(16.4%) of chlamydial infection among both pregnant and non-pregnant women (Table 1).

Perusal of the relationship between level of education and chlamydial infection showed that there was significant association between level of education and the infection among the women. Pregnant women with secondary

education 7(12.7%) had the highest rate of infection followed by others with 1(12.5), those with tertiary education had 6(11.3%) whereas those with primary education 0(0.0%) had no chlamydial infection. Also among the non-pregnant women others, those with tertiary, secondary and primary education had prevalences of 4(26.7%), 6(14.0%), 7(11.7%) and 1(5.9%) respectively. There also was no significant association between level of education and chlamydial infection. Overall, others who had no education had a prevalence rate of 5(21.7%), those with tertiary education had 12(12.5%) followed by secondary education 14(12.2%) while individuals with primary education had prevalence of 1(2.8%) (Table 1).

4. DISCUSSION

There was no significant association of chlamydial infection with the subjects' occupation. Chlamydial infection was detected in women who were civil servants and self-employed. A similar comparison of the study subjects' husbands' occupation revealed that civil servants had the highest infection rate among the pregnant women while the self-employed had the highest prevalence among the non-pregnant group. The high prevalence among civil servants was surprising as one expects that they should be well informed, enlightened, have a healthy lifestyle so as to protect themselves from sexual health risks and in turn educate others. Hence this also calls for a closer attention since they daily interact with people from different works of life. The reason for the high prevalence among women who are self-employed could also be due to care-free lifestyle, ignorance and promiscuity among them.

The relationship between level of education and chlamydial infection showed that there was no significant association. It has however been shown from this study that the level of education as a socioeconomic factor has an effect on the study population. The reason for the high prevalence of CT infection among women with tertiary and secondary school education may probably be due to high sexual activities among such groups [9,10]. Moreso, since most of the seropositive women had some level of education, it can therefore, be expected that they would benefit from educational awareness interventions of the disease and in the application of measures to prevent it.

5. CONCLUSION

From this study, the overall prevalence rate of CT was found to be 11.9%. Pregnant and non-pregnant women had prevalence rates of 10.4% and 13.3% respectively.

Chlamydia infection remains largely undiagnosed and a silent disease in apparently healthy populations in developing countries and can be eliminated if behavioural modifications are implemented.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Approval was obtained from the ethical committee of the various Health Care Clinic before the commencement of the research in August 2012.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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