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## Detection of Chlamydia Trachomatis Among Sexually Active Adults in Aba Metropolis, Abia State

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### Abstract

**Background:** *Chlamydia trachomatis* infection affects over 131 million people annually. It is one of the most prevalent bacterial sexually transmitted infections. This study was aimed at the detection of the prevalence of *Chlamydia trachomatis* amongst sexually active adults in Aba metropolis, Abia state, to determine the relationship between the subject's number of sex partners and the infection prevalence and also to identify the age group and gender that is more prone to this infection.

**Method:** Self-collected vaginal and urethral swab samples were obtained from one hundred participants (50 females and 50 males respectively) at Seventh Day Adventist (SDA) Hospital, Aba, Abia State and screened for *Chlamydia trachomatis* antigen using the Solid Chlamydia Rapid Test Kit (USA).

**Results:** Out of the 100 subjects screened, 3 female subjects (3.0 %) were positive for *Chlamydia trachomatis* antibodies. The age

group prevalence was as follows; 16-20 years (nil), 21-25 years (3.0%), 26-30 years (nil), 31-35 years (nil). It was observed that participants with 2 and 3 sexual partners recorded a prevalence of 2.0 % and 1.0 % respectively. Thus, revealing the dependent relationship between number of sex partners and chlamydia infections. This study also demonstrated that educational status is also a factor dependent on *Chlamydia trachomatis* mode of infection as 2 positive cases (2.0 %) from subjects who are O-level certificate holders and 1 positive case (1.0 %) from subjects who are graduates were obtained.

**Conclusion:** Regular screening for *Chlamydia trachomatis* is highly encouraged since asymptomatic cases are common in the population and if undiagnosed will continue to be a threat to the patient's reproductive life with its established complication and adverse consequences.

**Keywords:** *Chlamydia Trachomatis*, Sexually Active Adults, Chlamydia Infections, Public Health

### Introduction

*Chlamydia trachomatis* is a bacterial infection that is primarily spread through sexual contact. It is a common sexually transmitted infection (STI) and is particularly prevalent among adults of reproductive age. According to the World Health Organization (WHO), an estimated 131 million new cases of chlamydia occurred globally in 2016, the majority of which were among 15- to 24-year-olds [1]. In addition to being a significant public health concern, chlamydia can lead to serious

complications if left untreated, such as pelvic inflammatory disease (PID) in women, which can cause infertility and chronic pelvic pain. Detection and timely treatment of chlamydia are essential to reducing its spread and preventing complications [2-4]. However, the infection is often asymptomatic, which means that many people who have it may not know they are infected. Therefore, early detection and diagnosis of chlamydia through regular testing is crucial to reducing its prevalence and impact among sexually active adults.

In Nigeria, annual screening for *Chlamydia trachomatis* is not practiced and the impact of chlamydial infection is not well known. This is due to poor laboratory diagnostic facilities and the lack of awareness about this infection. However, previous disease prevalence rates from studies conducted in Nigeria ranged from 6.9% to 56% [5]. Majority of those studies targeted selected populations such as pregnant women, infertility and sexually transmitted clinic attendees, and students. Other questions that the research aims to accomplish includes:

#### **High burden of disease**

*Chlamydia trachomatis* is one of the most common sexually transmitted infections (STIs) globally and can cause serious reproductive health problems, including infertility, if left untreated. Conducting a study in Aba, where the burden of disease may be high, can help to understand the scale of the problem and inform targeted interventions to reduce the transmission of *Chlamydia trachomatis*.

#### **Public health impact**

Ultimately, the goal of a study on the detection of *Chlamydia trachomatis* in Aba is to improve the sexual and reproductive health of the population by reducing the transmission and morbidity associated with this infection. The findings from this study can inform public health policies and guidelines for the prevention and control of *Chlamydia trachomatis* and other STIs, and help to improve the overall health and well-being of the population in Aba.

#### **Potential for interventions**

Identifying high-risk populations and areas with high transmission of *Chlamydia trachomatis* in Aba can inform the development and implementation of targeted interventions such as education and outreach campaigns, testing and treatment programs, and condom and distribution.

#### **Variation in the knowledge or access to healthcare**

Conducting a study in Aba can also bring to light any variations in the knowledge or access to healthcare in that area, this will help in understanding and addressing barriers to testing and treatment, and in designing and delivering interventions that are tailored to the specific needs and cultural context of the population.

#### **Statement of problem**

There is limited data on the prevalence and risk factors for *Chlamydia trachomatis* infection in the population of Aba. A study in this location can help fill this data gap and improve our understanding of the epidemiology of *Chlamydia trachomatis* in the area.

#### **Justification**

In this research work, these hypothesis; the prevalence of *Chlamydia trachomatis* infection among adults of in Aba is higher than the national average and The misdiagnosis of *Chlamydia trachomatis* is as a result of it's similarity to Neisseria gonorrhoea will be evaluated. Hence, the need for this work. The aim of this study is to detect *Chlamydia*

*trachomatis* infection among the targeted study population, which will aid service providers to plan possible interventions in the community.

## **Materials and methods**

### **Study Area And Duration Of Study**

This study was carried out at the Seventh Day Adventist (SDA) Hospital located at Ogbor-Hill, Aba, Abia state. Abia state was created in 1991 with 17 local government areas, it shares boundaries with Imo, Rivers and Cross Rivers states. The state is well known for its industrial centres and markets. The position of the state makes it a focal point for trade and transport in Nigeria. The people are very industrious and most of the industrial base of the state is private-sector driven. Aba, the Enyimba city, is the major industrial belt of Abia state and attracts young people who throng seeking employment, resulting in the large population of Aba. The SDA Hospital is a foremost missionary hospital with well-equipped laboratories. It is a referral centre for other hospitals in Aba and its environs. SDA is owned by the Seventh Day Adventist church and its also a Heart to Heart centre for HIV and STDs and also integrated with the National TB and Leprosy Control Programme (NTBLCP). The entire study lasted for 4 weeks.

### **Study Design**

The study was a hospital-based, cross-sectional study involving young, sexually active adults.

### **Study Population**

Individuals aged 16 to 35 years old, who are sexually active and either admitted to the STD clinic or had been referred from peripheral health centres for assessment were invited to participate and were enrolled at the time of presentation to the clinic. Informed consent was obtained and participation was voluntary.

### **Sample Collection**

Self-collected urethral swabs and vaginal swabs were received from each participant. These subjects were instructed on the method of inserting the swab sticks into the urethra and vagina and how to collect the swabs, emphasis was placed on vaginal swabs which contain large numbers of cellular components and not just fluids. Each swabs (urethral and vaginal) were inspected visually for the presence of quality debris. Swabs which were improperly collected were rejected and the participants were asked to provide fresh samples, adhering to the collection instruction.

### **Sample Size**

A total of 100 subjects, the sample size was determined using the Fischer's formula, represented mathematically represented as;  $n = Z^2 P(1-P)/d^2$  ( where  $n$  = sample size,  $d$  = degree of precision or absolute error to be decided by the researcher; can also be denoted as  $e$  taken to be 0.05,  $Z$  = normal deviation at the required confidence level taken to be 1.96 ,  $P$  = expected proportion in population based on previous studies). The study population was made up of 50 males and 50 females.

### **Sampling Method**

*Chlamydia trachomatis* antigen was detected using the Solid *Chlamydia* rapid test kit (USA).

### **Ethical Approval**

This study was approved by the Department of Medical Laboratory Science in Abia State University, Uturu. Ethical approval was obtained from the Ethical Committee of the Abia State University Teaching Hospital (ABSUTH).

**Statistical Analysis**

Data generated from the study were analyzed using standard descriptive analysis. Association between categorical variables were determined using the Chi-square test and significance level set at 5 %.

**Inclusion Criteria**

The following subjects were included:

1. All subjects who consented to participate in the study.
2. Subjects of age 16 or older.
3. Sexually active subjects (having had vaginal, anal or oral sex).
4. Non-pregnant subjects.
5. Subjects who haven't been tested for chlamydia within the past year.
6. Subjects who are resident of Aba or having had sexual contact with a person who lives in Aba.

**Exclusion Criteria**

The following subjects were excluded:

1. Subjects unwilling to participate.
2. Individuals who have had a recent chlamydia treatment.
3. Individuals on antibiotics treatment for the past 30 days.
4. Individuals who are not sexually active or who have not had a recent sexual partner.
5. Symptomatic individuals.

**Laboratory Procedure****Principle:**

The Chlamydia Rapid Test is a qualitative, lateral flow immunoassay for the detection of Chlamydia antigen from female vaginal swab, and the male urethral swab samples. Antibodies specific to the Chlamydia antigen is coated on the test line region of the test. During testing, the extracted antigen solution reacts with an antibody to Chlamydia that is coated onto particles. The mixture migrates laterally to react with the antibody to Chlamydia on the membrane and generates a coloured line in the test region. The presence of this coloured line in the test line region indicates a positive result, while its absence indicates a negative result. To serve as a procedural control, a coloured line will always appear in the control line region, indicating that proper volume of specimen has been added and membrane wicking has occurred.

**Test Procedure:**

1. The test cassette was removed from the sealed pouch and used immediately.
2. For the extraction of the chlamydia antigen from the female cervical and male urethral swab specimen; the extraction reagent 1 bottle was held vertically, and 5

drops of reagent 1 (approx. 300 µl) was added to the extraction tube. Extraction reagent 1 is colourless. Immediately the swab was inserted and compressed to the bottom of the tube, afterwards rotated about 15 times and left to stand for about 2 minutes.

3. Holding the extraction reagent 2 bottle vertically, 6 drops of extraction reagent 2 (approx. 250 µl) was added to the extraction tube. The solution became turbid, the bottom of the tube was compressed and the swab was rotated 15 times until the solution turns clear with a slight green or blue tint.
4. The swab was pressed against the side of the tube and withdrawn while squeezing the tube, leaving as much liquid in the tube as possible. Afterwards the dropper tip was fitted on top of the extraction tube.
5. The test cassette was placed on a clean, leveled surface. 3 drops of the extracted solution (approx. 100 µl) was added to the sample well of the test cassette, Avoiding trapping air bubbles in the sample well.
6. The result was read immediately after the appearance of a coloured line not later than 20 minutes.

**Results****Enrollment Of Participants Into The Study**

A total 100 participants were enrolled into the study. Of these, 50(50.0 %) were males and 50(50.0 %) were females. *Chlamydia trachomatis* antigens was detected in 3/100 (3.0 %) patients, giving an overall prevalence rate of 3% (Shown in Table 1).

**Age And Gender Distribution Of Subjects**

There was no *Chlamydia trachomatis* infection detected in the males of all age groups. However, females in the age group 21-25 years (n=3,100 %) were mostly infected. Chlamydia trachomatis antigen was not detected in any other age groups of the female subject (Shown in Table 2).

**Some Demographic Characteristics Of CT Patients In The Study**

The single participants were significantly infected than the married (3.0 % vs 0 %,  $p < 0.05$ ). In the educational status, majority (45 %) of the participants attained secondary level of education followed by (40 %) who had no formal education. C.trachomatis ag was observed more among the secondary school level participants (66.7 %) (Shown in Table 3).

**Association Between C.trachomatis Infection And Sex Partners**

Women who had multiple sex partners were significantly infected (3.0 %) than those who maintained only one partner (0 %) ( $p < 0.05$ ) (Shown in Table 4).

**Table 1:** Enrollment of Subjects into the Study at SDA Hospital Aba

Gender	No. Screened (%)	CT antigen positive (%)	CT antigen negative (%)
Male	50	0(0)	50(51.5)
Female	50	3(100)	47(48.5)
Total	100	3(3.0)	97(97.0)

**Key:** CT - *Chlamydia trachomatis*

**Table 2:** Age and Gender Distribution of CT Ag Among the Subjects

Age Groups (yr.)	No. Screened	Males CT Ag Pos (%)	Females CT Ag Pos (%)	Total CT Ag detected (%)	Total CT Ag negative (%)
16-20	6	0(0)	0(0)	0(0)	6(6.1)
21-25	45	0(0)	3(100)	3(100)	4.2(43.3)
26-30	40	0(0)	0(0)	0(0)	4.0(41.2)
31-35	9	0(0)	0(0)	0(0)	9(9.3)
<b>Total</b>	100	0(0)	3(3.0)	3(3.0)	97(97.0)

**Key:**

Ag - Antigen

CT - *Chlamydia trachomatis*

neg - Negative

Pos - Positive

**Table 3:** Demographic Characteristics Of Ct Patients At SDA Hospital Aba

Where n=100

Variable	No. Screened (%)	CT antigen Pos (%)
<b>Marital Status</b>		
Single	73(73.0)	3(3.0)
Married	27(27.0)	0(0)
<b>Educational Status</b>		
Primary	12(12.0)	0(0)
Secondary	45(45.0)	2(66.7)
Tertiary	3(3.0)	0(0)
Non-formal	40(40.0)	1(33.3)

**Key:**CT - *Chlamydia trachomatis*

Pos - Positive

**Table 4:** Relationship Between CTI and Number of Sex Partners

Where n=100

Multiple Sex Partners	No. Screened	CT Ag detected
Yes	96	3
No	4	0

**Key:**

Ag - Antigen

CT - *Chlamydia trachomatis*CTI - *Chlamydia trachomatis* Infection**Discussion**

Early detection and treatment of *Chlamydia trachomatis* infection on young, sexually active adults prevent disease and reduce disease prevalence. It is therefore cost-effective to screen young adults for *Chlamydia trachomatis* infection [6]. Chlamydial infection cases are mostly asymptomatic in male and female gender but can be detected by laboratory diagnosis [7]. In many developed countries, more advanced screening programs for *Chlamydia trachomatis* have been setup to reduce its transmission. The Centers for Disease Control and Prevention recommend annual screening for all sexually active individuals of 25 years or less, as genital chlamydial infection is the most frequently reported and highly prevalent in  $\leq 25$  years old individuals.

In this study, the prevalence of *C.trachomatis* infection was 3%. This result is similar to the result of Opara *et al.* [8] among Umungasi residents of Aba, Abia State, Nigeria. Observations from the United States of America recorded an annual overall case of 5 % prevalence and in Ethiopia with its 5.9 % prevalence [5]. It differs from 58.33 % reported cases among pregnant women in India [9]. The observed different prevalence rates could be due to a much larger study population and more advanced laboratory diagnosis techniques.

The prevalence rate of *Chlamydia trachomatis* infection among the female subjects was higher (3%) than that of the male subjects (0%). This sex specific prevalence might be

due to the multiple sexual partners of the participating female subjects.

The highest prevalence recorded in the subjects according to their age groups was obtained in the 21-25 years age category. No case was recorded in the other age brackets. This result maybe due to the fact that most 21-25 years old are highly sexually active and hardly practice safe sexual activities thus leading to the high prevalence observed in that age category. This factor was furtherly supported by the 50% prevalence observed in the 20-24years age group by Nwanguma *et al.*, [10] in Enugu, 46.3% prevalence observed in the 20-25 years age group reported by Ogbu *et al.*, [11] and the 33.3% prevalence observed in the 19-24 years age group reported by Wariso *et al.* [12] (2012) in Port Harcourt. The low prevalence recorded among subjects of the age group 26-30 years and 31-35 years maybe dependent on occupation, financial and family responsibility of the subjects in these age groups.

The single subjects recorded the highest prevalence of 3% positive to CT antigen in contrast to the married subjects and this could be as a result of the multiple sexual partners of the single subjects unlike the married subjects who are lawfully bound to their spouse. Subjects of secondary education and non-formal education recorded a prevalence of 2% and 1% respectively unlike those who had tertiary educational training and this could be as a result of unawareness of what CT infection is (by the former) due to

their limited educational background. As this was also the case in the study carried out by Nwachukwu *et al.*,<sup>[13]</sup> which recorded an 18% positive prevalence rate to CT antigen.

### Conclusion

A relatively low prevalence of CTI was observed in Aba metropolis. The results obtained although showing a relatively low prevalence rate may serve as background information for further studies.

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