

## Seroprevalence of *Chlamydia Trachomatis* Infection among Infertile Males Attending Aminu Kano Teaching Hospital, Kano, Nigeria

\*Kumurya AS<sup>1</sup>, Rabi M<sup>2</sup>, Hussaini I<sup>1</sup>

### ABSTRACT

*Chlamydia trachomatis* remains one of the most abundant infective bacteria that causes sexually transmitted diseases globally. To determine the prevalence of *C. trachomatis* associated infertility in male patients attending Aminu Kano Teaching Hospital, Kano. Urine specimens were received from 146 clients visiting the Infertility clinics in Aminu Kano Teaching Hospital (AKTH). Prior to specimen collection informed consent was obtained and an inquiry form administered by the investigator. Specimens were tested using a Chlamydia kit (Swalife China)-a rapid immunoassay test designed to identify genital chlamydial antigen in urogenital specimens. 146 sequential urine specimens of patients (aged 22-55 years) were obtained. Eight of these specimens were positive for *C. trachomatis* antigen yielding a prevalence of 5.4%. While 6 clients had some knowledge of Chlamydia (4.1%), 140 clients had no knowledge of Chlamydia (95.8%). Those with primary infertility were 124(84.9%) and those with secondary infertility were 22 (15.0%). Also prevalence in relation to age grouping was as follows: 22-26 years (42.9%), 27-31years (9.4%), 32-36 years (10.5%), 37-41years (6.4%), 42-46 years (6.3%) and > 47 years (4.0%). In this study, the prevalence of *C. trachomatis* in infertile males was found to be 5.4% with a low knowledge about infertility among participants. There is a need to increase awareness and screening of the larger populace for carriage of *C. trachomatis*.

**Key words:** *Chlamydia trachomatis*, genital, immunoassay, infertility, male

### INTRODUCTION

*C. trachomatis* is a species of bacteria belonging to the family chlamydiaceae and genus chlamydia.<sup>1</sup> Chlamydiae are spherical or ovoid obligate intracellular bacteria that are ubiquitous. Intracellular parasitism of chlamydia differentiates it from other bacteria. Unlike viruses, chlamydiae possess both DNA and RNA, multiply by binary fission rather than self-assembly, contain their own ribosome, have a peptidoglycan- free cell wall and are susceptible to various antimicrobial agents.<sup>2</sup> *C. trachomatis* is a small gram-negative bacterium.<sup>3</sup> *C. trachomatis* is the most prevalent sexually transmitted bacterial infection worldwide, with an estimated 4-5 million new cases each year making it the most implicated organism in infertility.<sup>4</sup> In men, *C. trachomatis* infection can lead to urethritis, epididymitis, epididymo-orchitis, prostatitis, and an enlargement of the seminal vesicles.<sup>5</sup>

A major problem of Chlamydia trachomatis infection is its asymptomatic nature.

Chlamydia trachomatis infection may often pass unnoticed and be under-diagnosed, facilitating its spread, which is mainly associated with sexual risk behavior. It causes infertility in both men and women. It has been observed that persistent Chlamydia trachomatis infection can result in the scarring of ejaculatory ducts or loss of stereocilia.<sup>6</sup> In many developed countries, screening programs for Chlamydia have been set up to reduce transmission and reproductive tract morbidity.<sup>7</sup> In most parts of Nigeria, *C. trachomatis* is not routinely screened for, hence information about the prevalence of the organism is sparse.<sup>8</sup> The United States Centers for Disease Control and Prevention recommends annual screening of *C. trachomatis* for all sexually active women aged 25 or less.<sup>9</sup>

About 30% of infertility is attributed to the female, 30% to the male and 30% to both male and female while 10% has no known cause.<sup>10</sup> In 1991, the World Health Organization projected that, globally about 8-12% of couples have some form of infertility in their propagative lives, thus affecting 50-80 million couples, with 20-35 million of these in Africa.<sup>11</sup> Different forms of social stigma due to infertility are seen in many cultures globally, which is seen even more in African societies where marriage can be

Department of Medical Laboratory Science,<sup>1</sup> Faculty of Health Allied Sciences, Bayero University Kano, Nigeria  
Department of Medical Laboratory Services,<sup>2</sup> Ahmad Sani Yariman Bakura Specialist Hospital Gusau, Zamfara State, Nigeria

\*Corresponding author: askumurya.med@buk.edu.ng

considered a failure when the couple cannot conceive. Reports show the impact of *C. trachomatis* infection on asymptomatic infertile males. As the etiology of approximately 55% of male factor infertility is unknown, it is possible that Chlamydia is contributory in some of these cases.<sup>12</sup> Indication of preceding disease with *C. trachomatis* has been related to a reduction in semen quality. This organism causes a wide range of infections which may lead to infertility. This infection in man has a significant effect on reproductive health which may lead to infertility by means of non-specific urethritis, epididymitis and prostatitis leading to stenosis of the duct system.<sup>13</sup> The purpose of this research was to discover the prevalence, knowledge and relationship between *C. trachomatis* and male infertility in Aminu Kano Teaching Hospital (AKTH) Kano. There is a shortage of data about *C. trachomatis* infection from this centre.

## MATERIALS AND METHODS

### Study Area

This research was conducted in AKTH, a tertiary health care institution which serves as a referral centre for all primary and secondary health care providers within the geopolitical zone, located along Zaria road within Kano metropolis, Kano state. The state is situated at the north-western region of Nigeria, between latitude 11°30'N and longitude 8°30'E with a total land area of 20,760sq kilometers. It also shares boundaries with Katsina state to the north-west, Jigawa state to the north-east, Bauchi state to the south-east and Kaduna state to the south-west.

### Research design

This was a cross-sectional study, with a calculated sample size of 133. The study population comprised of 146 infertile males attending infertility clinics at AKTH between October to December 2017. Twenty apparently fertile individuals were recruited as controls.

### Inclusion criteria

Infertile males at 22-55 years of age attending AKTH.

### Exclusion criteria

All fertile males and non-consenting fertile males below andropause.

## Ethical considerations

Ethical approval was given to conduct the research by AKTH research and ethical committee. The participant's consents were also sought and obtained prior to the administration of the questionnaire and sample collection.

## Sample collection, processing and preservation

About 15-30 ml of clean early morning midstream urine was collected in a sterile urine container. The urine specimen was mixed by inverting the container and 10ml of the urine specimen was transferred into a centrifuge tube, 10ml distilled water was added and centrifuge at 3,000 rpm for 15 minutes. The supernatant was carefully discarded, and the tube was kept inverted, to remove any supernatant from the rim of the tube by blotting onto absorbent pad. The urine specimens were stored at 2-8°C for 24 hours before testing.<sup>14</sup>

## Sample analysis

Samples were analyzed using Chlamydia Rapid Test kit (Swalife China) 6 drops of extraction reagent 2 (0.2 M HCl) was added to the urine sediment in the centrifuge tube, it was then shaken vigorously until the suspension was homogeneous and it was allowed to stand for 1 minute, subsequently 5 drops extraction reagent 1 (0.2M NaOH) was added into the mixture, the bottom of the tube was tap to mixed the solution, it was allowed to stand for 2 minutes, the test cassette was placed on a clean and level surface with the aid of pipette 3 full drops of the solution (approx. 100ul) was added to the specimen well of the test cassette, then timer was started, waited for 10 minutes for the color to developed and the result was read and recorded, the presence of colored line in the test line (T) region indicates a positive result, while its absence indicates a negative result, a colored line will always appear in the control line (C) region indicating that proper volume of specimen has been added, also that the specimen has been received and treated according to the comprehensive directives in the maker's insert leaflet.<sup>13</sup>

## RESULTS

A total of 166 males were recruited and screened for the presence of *C. trachomatis* antigen in their urine, 146 were from infertile

male and 25 from known fertile men as negative controls. All of the recruited negative controls tested negative to Chlamydia infection. Among the infertile males, 8(5.4%) were positive for *C. trachomatis* antigen in their urine. The study showed that subjects aged 22-26 years had the highest prevalence (42.9%) of *C. trachomatis* antigen; this was followed by age group 32-36 years (10.5%). The 37-41 years, 42-46 years and >47 years age groups had the lowest positivity rate having 6.4%, 6.3% and 4.0% respectively with p-value - 0.7694, which was not statistically significant -  $p > 0.05$  (Table 2).

The majority of the patients 140(95.8%) were not aware of the existence of *Chlamydia trachomatis* while only 6(4.2%) were aware. Altogether 7(5.0%) out of 8 diseased individuals were ignorant of this disease ( $P > 0.05$ ) (Table 3).

The study compared the relationship between *C. trachomatis* antigen with type of infertility as shown in (Table 4), with a total of 7(5.7%) of those with primary infertility and 1(4.2%) of those with secondary infertility tested positive. The difference was not statistically significant ( $p > 0.05$ ).

Table 1: Showing the frequency distribution of subjects and the percentage based on their knowledge on *C. trachomatis*, the type of infertility they present and their status of chlamydial antigen

| Parameter                      | No of subjects | % of subjects |
|--------------------------------|----------------|---------------|
| Knowledge on Chlamydia         | 6              | 4.1           |
| Without Knowledge on Chlamydia | 140            | 95.8          |
| Primary infertility            | 124            | 84.9          |
| Secondary infertility          | 22             | 15.0          |
| Positive for Chlamydia         | 8              | 5.4           |
| Negative for Chlamydia         | 138            | 94.5          |

Table 2: Showing the prevalence of *C. trachomatis* in relation to age

| Age in years | No Positive (%) | No Negative (%) | Total | $\chi^2$ | P-value |
|--------------|-----------------|-----------------|-------|----------|---------|
| 22-26        | 3(42.9)         | 4(57.1)         | 7     | 0.0859   | 0.7694  |
| 27-31        | 3(9.4)          | 29(90.6)        | 32    |          |         |
| 32-36        | 2(10.5)         | 17(57.1)        | 19    |          |         |
| 37-41        | 3(6.4)          | 44(93.6)        | 47    |          |         |
| 42-46        | 1(6.3)          | 15(93.7)        | 16    |          |         |
| >47          | 1(4.0)          | 24(96.0)        | 25    |          |         |

Table 3: Showing the prevalence of *C. trachomatis* in relation to attentiveness

| Attentiveness | No. Screened (%) | No. Positive (%) |
|---------------|------------------|------------------|
| Attentive     | 6(4.1)           | 1(0.6)           |
| Not attentive | 140(95.8)        | 7(4.7)           |

Table 4: Comparing *C. trachomatis* antigen with type of infertility

| Type of infertility | No Positive (%) | No Negative (%) | Total | $\chi^2$ | P-value |
|---------------------|-----------------|-----------------|-------|----------|---------|
| Primary             | 7(5.7)          | 115(94.3)       | 122   |          |         |
| Secondary           | 1(4.2)          | 23(95.6)        | 24    | 3.886    | 0.065   |
| Total               | 8               | 138             | 146   |          |         |

## DISCUSSION

The overall occurrence of Chlamydia antigen in the urines of infertile men suggestive of Chlamydia infection in this study was 5.4%. Although regional prevalence is variable; the reasons for this are likely multifactorial, related to actual differences in infection rates, testing methodology, and body fluid tested. While the impact of *C. trachomatis* infection on female fertility is well established, its role in male infertility is less clear. The prevalence obtained in the study is in agreement with the report obtained in USA by Schillinger *et al.*, which ranged from 3.7% to 5.3% and that of Kokab *et al.* in Iran (5%) and in Ethiopia (5.9%).<sup>15,16</sup> In Owerri, South East Nigeria the prevalence of *C. trachomatis* in the male population studied was 4.7% in multiple partners and inconsistent condom use was recognized as an important predictor of *C. trachomatis* infection.<sup>17</sup> In Australia, a prevalence of 5.6% and 7.5% were also reported by Bandea *et al.*<sup>7</sup> Similar research conducted in Canada and Switzerland by Mary *et al.*<sup>12</sup> showed that the respective prevalence of *C. trachomatis* was 0.304% and 1.2%.<sup>7</sup> This is in contrast to studies in Enugu and Ibadan which noted prevalence rates of 29.5% and 18.7% respectively.<sup>17</sup> In Ghana, Nyarko *et al.* reported that the prevalence of the disease was higher in males - 15.2%.<sup>18</sup>

This study suggests that participants aged 22-26 years had the highest prevalence rate (42.9%) for *C. trachomatis* antigen, followed in descending order by age group 32-36 years (10.5%). These are age groups with high sexual activity and this may be responsible for the high prevalence observed. This test is only used in detecting the presence Chlamydia antigen in samples from both viable and nonviable Chlamydia, performance with specimens other

than female cervical swabs, male urethral swabs and male urine has not been evaluated.<sup>14</sup> Also during the data collection some of the participant denied some information which virtually affected some of the questionnaire result.

## CONCLUSION

In the present study, the prevalence of *C. trachomatis* in infertile males was found to be 5.4% and there is a low knowledge on infertility among participants of the study. Also, there was no significant association between *C. trachomatis* and infertility. Increased awareness and screening of a larger populace on *C. trachomatis* is required.

**Authors Conflict:** Declared no conflict of interest

## REFERENCES

- 1 Everett KD, Bush RM, Andersen AA. Amended description of the order Chlamydiales, proposal of Parachlamydiaceae fam. *J Sys Bacteriol* 1999; 49:415-40.
- 2 Meenakshi M, Seema S, Anjan M, Sumathi M, Manju B. Genital *C. trachomatis*. *Indian J Med Res* 2013; 138:303-13.
- 3 Mawak JD, Dashe N, Agabi YA, Panshak BW. Prevalence of Genital *C. trachomatis* Infection among Gynaecologic Clinic Attendees in Jos, *Nigeria Med J* 2011; 12:1-10.
- 4 Adesiji YO, Iyere SI, Ogah IJ. Low prevalence of *C. trachomatis* infection in women from southern Nigeria, Nitte University. *J Hea Sci* 2015; 5:2249-711.
- 5 Kalpana R, Harpreet V, Praveen B, Deepali T, Vijay P. Microorganisms and Male Infertility: Possible



- Pathophysiological Mechanisms. *Adva Clin Med Microbiol* 2016;1:1-10
- 6 Ifeanyichukwu MO, Dele-Ochie PE, Ngwu AM, Inege LC, Ebunu E. Seroprevalence of anti-chlamydia trachomatis IgG antibody in Ekpan Community of Delta State, Nigeria. *Eur J Pharm Med Res* 2015;1:1-12
  - 7 Bandea CI, Debattista J, Joseph K, Igiotseme J, Timms P, Black CM. *C. trachomatis* Serovars among Strains Isolated from Members of Rural Indigenous Communities and Urban Populations in Australia. *J Clin Microbiol* 2008;46:355-6.
  - 8 Okoror LE, Otoickian C, Eniolorunda T, Omoniyi FH. Prevalence and risk of *C. trachomatis* in symptomatic patients attending clinics in South West Nigeria. *Arc Clin Microbiol* 2014;5:2.
  - 9 Centre for disease control and prevention. Sexually Transmitted Diseases Treatment Guidelines. *Morbidity and mortality weekly report* 2015;55:56-7.
  - 10 Inhorn MC. Global infertility and the globalization of new reproductive technologies. *Egy Soc Sci Med* 2003;56:1837-51.
  - 11 Patrick OU, Abiodun ME. Male infertility in Nigeria: A neglected reproductive health issue requiring attention. *J Basic Clin Rep Sci* 2015;4:45-54.
  - 12 Mary KS, Trustin D, Keith AJ. Review Article Chlamydial Infection and Its Role in Male Infertility. *Adv Andro* 2014;1:3-7.
  - 13 Ogiogwa IO, Motayo BO, Okerentugba PO, Innocent AHC, Tafeng Y. *Et al.* Detection of *C. trachomatis* Antigen among Attendees of a Fertility Clinic in Abeokuta, Ogun State, Nigeria. *Res* 2012;4:96-100.
  - 14 Sanders JW. Evaluation of an Enzyme Immunoassay for Detection of *C. trachomatis* in Urine of Asymptomatic Men. *J Clin Microbio* 1994;32:24-7.
  - 15 Schillinger JA, Dunne EF, Chapin JB, Ellen JM, Gaydos CA *et al.* *C. trachomatis* infection among men. *Am J sex tran dis* 2005;32:74-7
  - 16 Kokab MM, Akhondi MR. Sadegh. Raised inflammatory markers in semen from men with asymptomatic chlamydial infection. *J Andr* 2010;31:114-20
  - 17 Ikeme AC, Ezegwui HU, Ikeako LC, Agbata I, Agbata E. Seroprevalence of *C. trachomatis* in Enugu, Nigeria. *Niger J Clin Prac* 2011;14:176-80.
  - 18 Nyarko CC, Unson C, Nyarko KP, Koduah M. *C. trachomatis* prevalence in Ghana- A study at a municipal district in Western Ghana. *Int J Sci Technol Res* 2014;3:1-10.