



## CHLAMYDIA TRACHOMATIS AND ASSOCIATED RISK FACTORS AMONG INFERTILE MALES WITH OLIGOSPERMIA AND AZOOSPERMIA IN MBAITOLI LGA OF IMO STATE

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**Received:** 31<sup>st</sup> Jan., 2024

**Accepted:** 18<sup>th</sup> Mar., 2024

**Published:** 1<sup>st</sup> June, 2024

### ABSTRACT

**Background:** Globally, *Chlamydia trachomatis* is the most prevalent cause of sexually transmitted infections and can result in severe genital disease and consequently, Oligospermia and Azoospermia among males resulting in infertility in males as well as females alike.

**Aim:** This study was carried out to determine the prevalence of *Chlamydia trachomatis* and associated risk factors of oligospermia and azoospermia among males with Oligospermia and Azoospermia (referred cases).

**Materials and Methods:** A Case-Control study design was adopted and 396 urethral swabs were collected from cases, while, 396 of urethral swabs were also collected from controls. Questionnaires were also filled. The samples were analyzed using Chlamydia Rapid Test Device (CRTD), a Qualitative Lateral Flow Immunoassay for the detection of Chlamydia antigen from urethral swab. The data obtained from both tests and questionnaires were analyzed using simple percentages, Odd ratios and Chi-square analytical statistical tools.

**Results:** Out of 396 samples from cases, 183(46.2%) were infected ( $p < 0.05$ ), while, 213(53.8%) were not. Only 28(7.1%) were positive in the control and 368 (92.9%) were not infected with Chlamydia. While proportions of the infected people were highest within the 22-25 years (OR=2.8) and 26-30 years (1.9) age cohorts, followed by 31-35 years (OR=1.9), as 46-50 years (OR=1.4) remain the least infected. Occupational status ( $p = 0.001$ ), sexual lifestyle/ partners ( $p = 0.002$ ), smoking ( $p = 0.003$ ), alcohol intake ( $p = 0.001$ ) and number of children ( $p = 0.004$ ) by male partners were the predisposing/risk factors associated with Oligospermia and Azoospermia among the infertile men in the study area.

**Conclusion:** Chlamydia infection is significantly associated with oligospermia and azoospermia among males with oligospermia and azoospermia (infertility) and more among the younger males.

**Keywords:** *Chlamydia trachomatis*, Risk factors, Couple, Oligospermia, Azoospermia, Genital infection.

### INTRODUCTION

*Chlamydia trachomatis* infections are prevalent all over the world, but many research studies, as well as the screening, and the treatment concentrate on females. The prevalence of Chlamydia infection is similar in men and women. Scores of individuals

infected with *Chlamydia trachomatis* is increasing worldwide (Anderson *et al.*, 2002) and at least 30 million men suffer from infertility, and 15% of couples are affected (Agarwal *et al.*, 2015) and this accounts for half of the infertile cases (Gnoth *et al.*, 2005).

While, Gurunath *et al.*, (2011), described Infertility as the failure to achieve a clinical pregnancy after over one year of regular unprotected sexual intercourse, Inhorn and Patrizio, (2015), said that infertility is a highly prevalent global condition and the incidence is on the rise, which is estimated to affect around 9% of reproductive-aged couples worldwide. The causes for male infertility vary, and genital tract infection is one of the major concerns (Schuppe *et al.*, 2017). *Chlamydia trachomatis* is the most common pathogen responsible for bacterial sexually transmitted infections (Kim *et al.*, 2017) and genital infection with *Chlamydia trachomatis* is regularly found in association with other pathogens (Okoroiwu, 2007). In men, 40 percent of non-gonococcal and post-gonococcal urethritis is due to *Chlamydia trachomatis* (Okoror and Agbonlarhor, 2012). As *Chlamydia trachomatis* is often asymptomatic, much infection go unrecognized and untreated, thereby sustaining the infectious pool in the population (WHO, 2019). The current number of *Chlamydia trachomatis* infections diagnosed globally is likely to be grossly underestimated as 50% of male and 75% of female infections are asymptomatic (Kumar and Singh, 2015). *Chlamydia trachomatis* is the most common cause of nongonococcal urethritis in men. As in women, infections are often asymptomatic (40 to 96%) (Stamm *et al.*, 1984). Moreover, Chlamydial infection may result in inflammation of the epididymides and testes as it has been said that *C. trachomatis* is one of the most frequent pathogens in epididymitis among sexually active men <35 years of age (Hedger, 2011).

In a study termed "Molecular detection of *Chlamydia trachomatis* and semen quality of sexual partners of Infertile Women", Lopez-Hurtado *et al.*, (2017), discovered *Chlamydia trachomatis* in 37(31.9%) out of 116 semen samples of men with oligospermia and azoospermia whose couples were infertile, this ascending urethral infection to the sites of spermatogenesis provides a plausible

means by which *Chlamydia* can interact with and impair sperm functions and thus, affect fertility. Equally, in a study "Chlamydial Infection and its Role in Male Infertility", Mary *et al.*, (2014), discovered 0.3% of *Chlamydia trachomatis* in a population of infertile men with oligospermia and azoospermia, positing that the variability in the incidence was due to variation in the population studied and detection technique.

A large number of studies have also found out that *Chlamydia trachomatis* infection correlates with reduced sperm motility (Mary *et al.*, 2014; Jackiel *et al.*, 2004), increased proportion of sperm abnormalities (Godoura *et al.*, 2001), significant reduction in semen density, sperm morphology and viability (Benzold *et al.*, 2007), and increased likelihood of leukocytospermia (Sellami *et al.*, 2014). In parts of sub-Saharan Africa and other countries in Africa including Nigeria, 30 to 50 percent of couples are unable to conceive due to Pelvic Inflammatory Diseases, Epididymitis and urethritis (Guiton and Drevet, 2023)). Furthermore, Gallegos *et al.*, (2008) in 2002 discovered 38.6 percent of *Chlamydia trachomatis* among males with oligospermia and azoospermia partners of infertile couples in Santiago, Chile and, adding voice to this assertion, Greendale *et al.*, (1993) posited that globally, *Chlamydia trachomatis* infection is most prevalent in young women and men (14-25 years) likely driven by asymptomatic infection, inadequate partner treatment and delayed development of protective immunity.

On the risk factors of oligospermia and azoospermia, Vigil *et al.*, (2002), showed that *Chlamydia trachomatis* was found in all types of seminal infertility, particularly in oligospermia and azoospermia. While, Ugwuja *et al.*, (2008) revealed that semen abnormalities are more common among civil servants than other professionals and that workers that are involved in social activities such as smoking and excessive alcohol consumption that may interfere with semen qualities, develop semen abnormalities like oligospermia and azoospermia.

And in Iran, Osazuwa *et al.*, (2023), posited that manual workers were more at risk of infertility than office workers. The authors attributed this situation to strenuous physical work and testicular damage and its effect on the quality of sperm, compared to respondents who had office jobs, as Catherine and Morgan, (2016), established that male infertility was significantly higher among men who had not fathered a child with their present wife or another wife than those who had. However, some studies have reported that Chlamydia trachomatis infection does not directly affect sperm quality but induces an inflammatory response, leading to obstruction of the ejaculatory duct (Malibbi *et al.*,2014) or generation of antisperm antibodies (Okonfua *et al.*,2005). Moreso, one other study have found that it has no negative impact on semen quality and male fertility (Catherine and Morgan, 2016).

Despite the potential role of *Chlamydia trachomatis* in causing infertility in both male and female, as well as stillbirth and miscarriages of pregnancies, its pattern and prevalence remains a mirage among the people of Imo State, especially people of Mbaitoli Local Government Area of Imo State. Therefore, the study aimed to determine the prevalence of *Chlamydia trachomatis* among males with Oligospermia and Azoospermia in Mbaitoli Local Government Area of Imo State, of Nigeria in order to create more awareness and provide baseline data of oligospermia and azoospermia (infertility) for future reference as well as fill the gap that has been created due to lack of knowledge and ignorance.

## MATERIALS AND METHODS

### Study Area

Mbaitoli Local Government Area is one of the Local Government Area in Imo state and has an area of 204 Km<sup>2</sup>. Imo State with an area of 5.530 Km<sup>2</sup> has a population of 4.928 million as at 2017, while, Mbaitoli Local Government Area with a 1,904Km<sup>2</sup> population density has a total population of 5,167,722 as at 2019. Mbaitoli LGA has

about fifty (50) health facilities including hospitals and Clinics (Nnadozie et al., 2010, Hospitalbook, 2022).

### Study Population

This study was carried out among confirm cases of male partners of infertile couples who were attending clinics in primary healthcare centres and General Hospitals in Mbaitoli LGA.

### Ethical Consideration

Permission to carry out the study was obtained from the Research Ethical Committee in charge of health in the Local Government Area and informed consent was obtained from the infertile partners after explaining what they would gain by participating. Right to withdraw from the study and confidentiality were assured.

### Research Design

This is a Case-control study of the prevalence of *Chlamydia trachomatis* among males with Oligospermia and Azoospermia (-referred cases) in Mbaitoli LGA, Imo State, Nigeria.

### Sample Size Determination

A suitable sample size of male partners of infertile couples of referred cases was selected within the target population. Thus sample size was derived as follows:

A prevalence rate of 62.6% (12) was chosen according to (Naing *et al.*,2006), margin of a sampling error or precision tolerated was set at 5%, at 95% confidence interval using the formula:

$$n = N^2P(1-P)/d^2$$

n=sampla size, N= 1.96 (Statistical constant), P = 62.6% (Population based) d= 5% ( marginal error or precision).

$$n = (1.96)^2 \times 0.626 (1-0.626)/(0.05)^2 = 3.8416 \times 0.626 \times 0.374/0.0025 = 360 +36(\text{attrition}) = 396$$

### Sampling Technique

**Simple random** technique was used in this study. I assigned a number to every identified man that has either oligospermia or azoospermia in the Clinics and hospitals visited who agreed to be part of the study from 1 to 400 and use a random number generator to select a sample size of 396 numbers.

**Sample Collection, Processing and Analysis**

Urethral smears were collected using commercial sterile swab sticks.

The samples were analysed using the Chlamydia Rapid Test Device(CRTD), this is a qualitative lateral flow technique in which the antigens reacts or combine with antibodies and a coloured red line is produced, the test is positive when double red lines appear. Questionnaires were also administered and filled.

**Data Analysis**

Data obtained were analysed using simple percentages, Odd Ratios and Chi-square analytical methods.

**RESULTS**

Out of 396 tested confirmed cases of infertile men with Oligospermia and Azoospermia,

183(46.2%) of them were infected with *Chlamydia trachomatis*, while, 213 of them representing 53.8% had no chlamydia infection. Those in 22-25 years age-group recorded the highest infection rate with 50.8% (OR=2.8), followed by 26-30 years with 47.8% (OR=1.9) and 31-35 years age cohort with 47.7% (OR=1.9). Others are 41-45 years with 46.9% (OR=1.7); 36-40years with 43.9% (OR=1.6) and 46-50 years with 41.5% (1.4). In controlled groups, however, out of 396 tested, 28 of them representing 7.1% were positive for Chlamydia infection, while, 386(92.9%) had no chlamydia infection. Occupational status, sexual life style, smoking, alcohol intake and whether a man has had children or not were also identified as risk factors of oligospermia and azoospermia

Table1: Prevalence of *Chlamydia trachomatis* amongst Oligospermia and Azoospermia (CASES)

Age-groups	number tested	number positive (%)	number negative (%)	OR
22-25	65	33(50.8)	32(49.2)	2.8
26-30	67	32(47.8)	35(52.2)	1.9
31-35	65	31(47.7)	34(52.3)	1.9
36-40	66	29(43.9)	37(56.1)	1.6
41-45	68	31(45.6)	37(54.4)	1.7
46-50	65	27(41.5)	38(58.5)	1.4
Total	396	183(46.2)	213(53.8)	

*P*<0.05

Table 1 is the overall and age-related prevalence of Chlamydia trachomatis infection among the infertile men with Oligospermia and Azoospermia. Of the 396 confirmed cases of infertile men with Oligospermia Azoospermia tested, 183(46.2%) of them were infected with Chlamydia trachomatis, while proportions of the infected people were highest within the 22-25 years(OR=2.8).

Table.2: Prevalence of Chlamydia trachomatis among the Controls

Age-groups	Number tested	Number Positive (%)	Number Negative (%)
22-25	65	15 (23.1)	50(76.9)
26-30	67	8 (11.9)	59(88.1)
31-35	65	0(00.0)	65(100.0)
36-40	66	3(04.0)	63(96.0)
41-45	68	2(03.0)	66(97.0)
46-50	65	0(00.0)	65(100.0)
Total	396	28(07.1)	368(92.9)

Table 2 is the prevalence and age-related prevalence of Chlamydia trachomatis among the Controls. Of the 396 Controls tested, 28(7.1%) of them were infected with

Chlamydia trachomatis, while, the proportions of the Controls infected were highest within the 22-25 years(23.1%) age bracket.

Table.3 Multivariate Analysis of other Predisposing/Associated Risk Factors of Oligospermia and Azoospermia among Infertile men with Oligospermia and Azoospermia other than *Chlamydia trachomatis*.

Variables value	No Screened	No Positive(%)	X <sup>2</sup>	P-
<b>Educational Status</b>				
None	97	47(48.5)	64.70	
Primary	110	50(45.5)		
0.683				
Secondary	91	41(45.1)		
Tertiary	98	45(45.9)		
<b>Occupational Status</b>				
Farming	93	35(37.6)	74.90	
Driving	95	60(63.2)		
0.001*				
Civil Servant	105	41(39.0)		
Trading	103	48(46.6)		
<b>Sexual life/Partners</b>				
Single	190	70(36.8)	72.23	
0.002*				
Multiple	206	113(54.9)		
<b>Smoking</b>				
Smokers	196	101(51.5)	82.01	
0.003*				
Non-Smokers	200	82(41.0)		
<b>Alcohol Intake</b>				
Drinkers	199	106(53.3)	74.90	
0.001*				
Non-drinkers	197	77(39.1)P		
<b>Number of Children</b>				
Had Child before	200	76(38.0)	75.43	0.004*
No Child	196	107(54.6)		

Table 3 showed the predisposing/associated risk factors of Oligospermia and Azoospermia among infertile men with Oligospermia and Azoospermia. Occupational status, Sexual life/partners, Smoking, Alcohol intake and Number

children (whether a male partner has had a child or not) were identified as predisposing/associated risk factors of Oligospermia and Azoospermia other than *Chlamydia trachomatis* among the study population.

## DISCUSSION

In this case-control study, the result showed a high prevalence (46.2%) of *Chlamydia trachomatis* infection among men with Oligospermia and Azoospermia in Mbaitoli

LGA of Imo State of Nigeria and this is in consonance with the report of Baud *et al.*, (2019), Lijun *et al.*, (2022); Okoroiwu and Wachukwu (2014) who revealed 62.6%, 54.0% and 38.6% in their various studies.

It is however, not in agreement with Osazuwa *et al.*, (2014) who reported 19.5% in his study in Delta State of Nigeria.

In the results between the Infertile males and normal males, the infertile men has 42.6 percent, while, that of the normal/control is 7.1 percent, it is, therefore, reasoned that *Chlamydia trachomatis* infection is significantly associated with men's infertility and this corroborates the work of Jackiel *et al.*, (2004) who made a discovery of 30.0 percent of *Chlamydia trachomatis* in cases and 4.0 percent in healthy controls.

On the age-related prevalence of *Chlamydia trachomatis* among the infertile male partners with oligospermia and azoospermia, the study showed that the proportions of the infected people were highest within the 22-25 years (OR=2.8) and 26-30 years (1.9) age cohorts, followed by 31-35years (OR=1.9), as 46-50 years (OR=1.4) remain the least infected. This agrees with Lijun *et al.*,(2022) who posited that globally, infection is most prevalent in young women and men of 14-25 years, likely driven by asymptomatic infections, inadequate partner treatment and delayed development of protective immunity. On the risk factors, the study revealed that occupational status ( $p=0.001$ ), sexual lifestyle/partners ( $p=0.002$ ), smoking ( $p=0.003$ ), alcohol intake ( $p=0.001$ ) and number of children ( $p=0.004$ ) by male partners were the predisposing/risk factors associated with oligospermia and

azoospermia among infertile men in the area. However, educational status ( $p=0.683$ ) of the study population was not found to be a significant associated risk factor of oligospermia and azoospermia. This corroborates with the work of Osazuwa *et al.*, (2013), who reported that manual workers were more at risk of infertility than office workers, the authors attributed this situation to strenuous physical work and testicular damage and its effect on the quality of sperm, which is similar to the case of drivers (mostly distance truck drivers) sitting for long hours driving as this heats up the testicles resulting to semen damage.

## CONCLUSION

In conclusion, the study has shown that there is high prevalence (42.6%) of *Chlamydia trachomatis* among the infertile males with oligospermia and azoospermia, noting that that the prevalence is highest among the age-groups of 22-25 years. Occupational status, Sexual lifestyle/partners, smoking, alcohol drinking and whether has fathered a child or not were found to be associated risk factors of oligospermia and azoospermia among infertile men with oligospermia and azoospermia. Effective cooperation of health educators, clinicians, medical Laboratory Scientists and other health workers is highly needed in the management and control of the menace.

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