

Chlamydia trachomatis and *Neisseria gonorrhoea* Co-infection Among Patients Attending a Teaching Hospital in Nairobi County: A Retrospective Study

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ABSTRACT

Background: *Chlamydia trachomatis* and *Neisseria gonorrhoea* are microbes that have been associated with urethritis in both male and female genders, which often may lead to complicated conditions such as pelvic inflammatory disease (PID) and infertility globally among others health complications. In Kenya and other developing countries, sexually transmitted infections associated with *Chlamydia trachomatis* and *Neisseria gonorrhoea* still pose a challenge in public health.

Methods: A retrospective study was conducted by reviewing laboratory data from Jan 2018 to Dec 2018 to estimate the prevalence of *C trachomatis* and *N gonorrhoea* coinfections in patients attending a tertiary institution and its satellite clinics spread across the country. A total of 1228 patient's data aged 3-69 years was reviewed; with age, gender and *Chlamydia trachomatis* and *Neisseria gonorrhoea* status being analyzed.

Results: A total of 1228 patients who visited the hospital in 2018 had their urine samples being tested for *Chlamydia trachomatis* and *Neisseria gonorrhoea* by use of a PCR technique. Majority of the patients were males (63.7%). The patients who tested for *Chlamydia trachomatis* and *Neisseria gonorrhoea* had an average age of 34 years (range: 3-69 years). Of those 1.4% tested positive for both *Chlamydia trachomatis* and *Neisseria gonorrhoea* infections, and males were more infected than females (1.1% vs 0.3).

From the information gathered during the study period, the proportion of patients with *Chlamydia trachomatis* infection was (16.1 %) (95 % CI 9.5, 17.9), and with *N. gonorrhoea* infection was 5.4%. Coinfection was highest among sexually active group that is those aged between 21 years to 40 years.

Conclusion: The prevalence of *C. trachomatis* is significantly high among male patients. We recommend the implement a molecular screening for *Chlamydia trachomatis* and *Neisseria gonorrhoea* to identifying asymptomatic female cases. This study further provides evidence on the importance of contact tracing in the management of *Chlamydia trachomatis* and other STIs. There is an urgent need for studies designed to investigate the prevalence and risk factors of *Chlamydia trachomatis* and *Neisseria gonorrhoea* among female patients who are majorly asymptomatic in Kenya.

INTRODUCTION

Neisseria gonorrhoea and *Chlamydia trachomatis* are microbes that have been associated with urethritis in both males and females, which often may lead to complicated conditions such as pelvic inflammatory disease (PID) and infertility globally.¹ Therefore, early detection and clinical management are important in eliminating these

complications. Gonococcal urethritis is caused by a gram-negative diplococci bacterium commonly associated with sexually transmitted infections (STI) in males and female patients that manifests either symptomatic or asymptomatic.² Early gonococcal infection in women is always asymptomatic which may further spreads to the upper part of the genital tract causing salpingitis. According to WHO, the estimated global prevalence of *Chlamydia trachomatis*

and gonorrhoea stands at 4.2% and 0.8% respectively. In 2014 for instance over 1 million sexually transmitted disease (STD) cases were thought to be reported per day.³ A study by Kularatne *et al*⁴ in South Africa estimated that the prevalence of *N. gonorrhoea* and *Chlamydia trachomatis* was at 6.6% and 14.7% among female patients respectively. The male had a prevalence of 3.5% and 6.0% for *N. gonorrhoea* and *Chlamydia trachomatis* respectively in 2017 among adult patients aged between 15–49 years.⁴ Screening for STIs among patients is, therefore, an important way of identifying asymptomatic individuals earlier enough before any complications.^{5,6} Indeed, studies have shown that earlier detection of STIs minimizes their sequelae effect in the affected individuals.^{7,8}

Information currently available from surveillance data on most common STIs among patients in Kenya has been largely from studies done among high-risk groups^{9,10} and special categories like expectant mothers.¹¹ There is however missing knowledge about the point prevalence of STIs among patients in the general population. This is because the surveillance of STIs, although recommended^{12,13,14}, has not been well implemented; with the major focus in Kenya in the last 10–15 years being on HIV, Tb, and Malaria. This is further complicated by the fact that surveillance guidelines exist for the screening of general patients for curable STIs and utilization of laboratory data to monitor disease patterns in the communities. Further, studies have demonstrated that a large number of infected people with no reported clinical symptoms act as a disease reservoir and act as a source of infection to susceptible groups if not detected on time.⁶ Therefore, this study aimed to determine the point prevalence for *C. trachomatis*, *N. gonorrhoea* coinfection in the general patient population attending a tertiary teaching institution. Knowledge generated from this study is important for clinicians and health policy makers to aid them in coming up with comprehensive diagnostic guidelines.

METHODS

This was a retrospective descriptive observational study conducted at tertiary teaching and referral hospital in Nairobi, Kenya by reviewing laboratory data between January to December 2018. The hospital offers comprehensive laboratory services, with its main laboratory opened for 24 hrs. The laboratory offers molecular diagnostic services for the detection of infectious disease including *Chlamydia trachomatis* and *Neisseria gonorrhoea*. The study reviewed all patient's laboratory data that included the patient's age, gender and laboratory molecular results for *Chlamydia trachomatis* and *Neisseria gonorrhoea*. The study inclusion criteria were all the patients served during the selected review period. Patients with missing a laboratory report were excluded from the study. Data collected were entered into Microsoft Excel and statistically analyzed using IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp. Chi-square and Fisher's exact tests were used to determine univariate social demographic factors associations of *C. trachomatis* and *N. gonorrhoea* co-infection. A p-value of <0.05 was considered to be statistically significant.

RESULTS

A total of 1228 patients had their urine samples tested for *Chlamydia trachomatis* and *Neisseria gonorrhoea* by use of a PCR molecular technique in 2018. The patients had an average age of 34 years with an age range between 3–69 years as shown in Table 1. The patients that were tested for *Chlamydia trachomatis* and *Neisseria gonorrhoea* were aged between 31-40 years (6.9%, 2.8%), followed by those between 21-30 (6.0%, 1.4%). The majority of the patients were men 781 (63.6 %) and 447 (36.4 %) were female as summarized in Table 2.

TABLE 1: Calculated mean age and distribution of the review participants

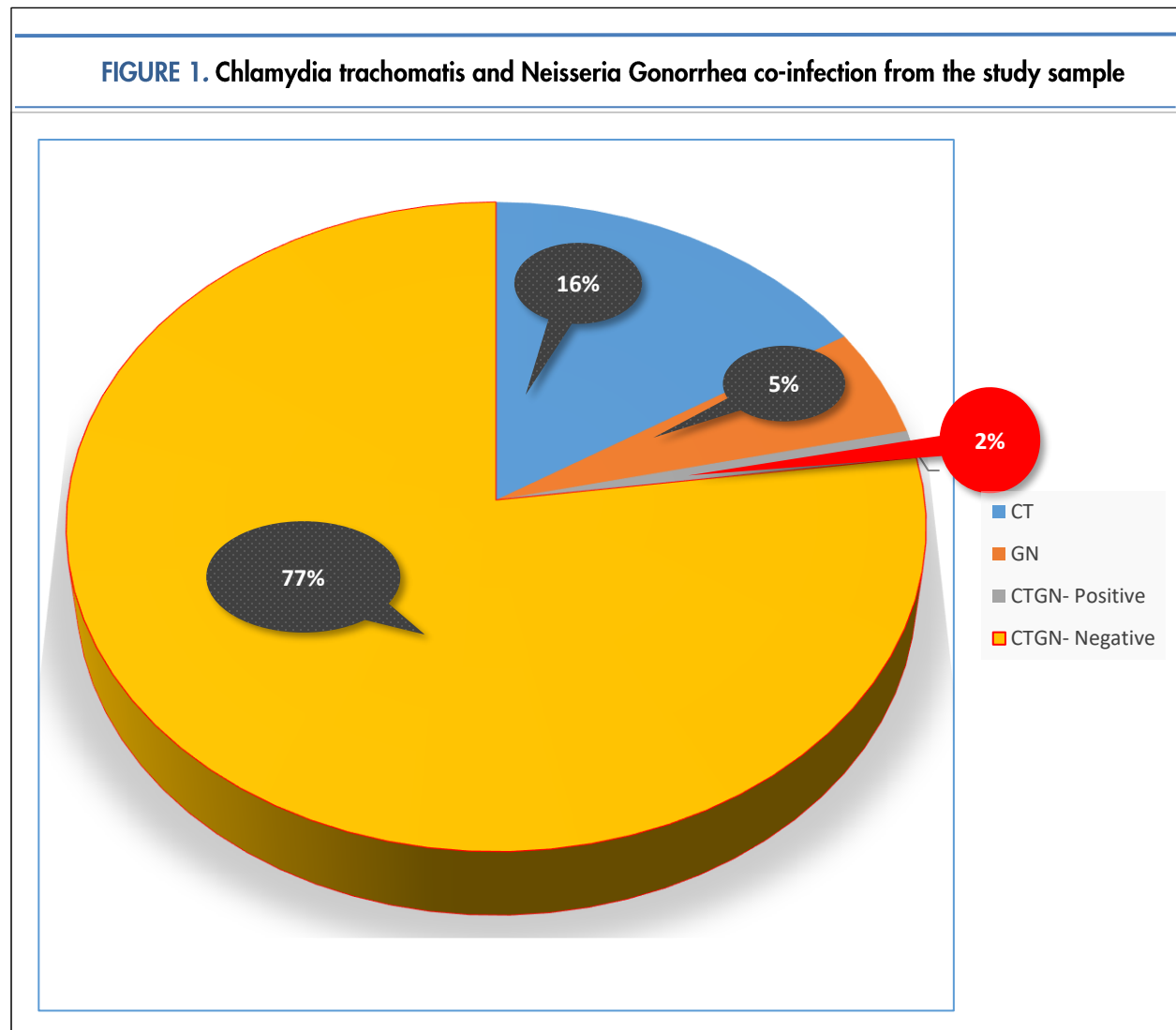
	Frequency
Mean Age	34
SD	9
Median	33
Max	69
Min	3
Age groups	
Below 20	52
21-30	421
31-40	502
41-50	187
Above 50	66

TABLE 2: Distribution of C trachomatis and N gonorrhoea infection across age groups and gender.

	<i>C trachomatis</i> <i>N gonorrhoea</i>				<i>n</i> (%)
	CTNG-Negative <i>n</i> (%)	CT-Positive <i>n</i> (%)	NG-Positive <i>n</i> (%)	CTNG-Positive <i>n</i> (%)	
Under 20	39 (3.2%)	9 (0.7%)	4 (0.3%)	1 (0.08%)	53 (4.3%)
21-30	321 (26.1%)	74 (6.0%)	17 (1.4%)	9 (0.7%)	421 (34.3%)
31-40	378 (30.8%)	85 (6.9%)	34 (2.8%)	7 (0.6%)	504 (41.0%)
41-50	159 (12.9)	20 (1.6%)	9 (0.7%)	0 (0.0%)	188 (15.3%)
above 50	50 (4.1%)	10 (0.8%)	2 (0.2%)	0 (0.0%)	62 (5.0%)
Male	559 (45.5%)	148 (12.1%)	61 (5.0%)	13 (1.1%)	781 (63.6%)
Female	388 (31.6%)	50 (4.1%)	5 (0.4%)	4 (0.3%)	447 (36.4%)

From the information gathered during the study, *Chlamydia trachomatis* had the highest prevalence of 16 % (198/1228) (95 % CI 9.5, 17.9), and *N gonorrhoea* at 66/1228 (5 %) as shown in Figure 1. A co-infection of *Chlamydia trachomatis* and *N gonorrhoea* was found in 17/1228 (2 %) of the sampled data. Of all the patients 947 (77%) were found to have no *Chlamydia trachomatis* and *Neisseria*

gonorrhoea infection during the review period Figure 1.



Higher frequency of *Chlamydia trachomatis* and *N gonorrhoea* were observed among patients aged 31–40 years which was at 6.9% and 2.8% respectively and lowest (0.7%, 0.3%) among patients aged below 20 years respectively. The male patients exhibited the highest prevalence of n=148/198 (74.7%) as presented in Figure 1. Coinfection was highest at 9/17 (52.2%) among patients aged between 21-30 years and among

the male patients at 13/17 (76.5 %). Least prevalence was seen in the age groups above 40 years Table 2.

DISCUSSION

This study estimated point prevalence of *C. trachomatis* and *N. gonorrhoea* co-infection among patients whose urine sample were tested by a PCR technique. The point prevalence of *C. trachomatis* and *N. gonorrhoea* co-infection as reported by this study stood at 1.4% (in the year 2018. With the highest prevalence being seen in the male patients aged between 31-40 yrs. with a p-value of 0.31. However, patients above 40 years had the least prevalence was recorded. These study findings were comparable to 2.8 % reported in previously published studies among female patients at a US juvenile centre and with a lower prevalence as compared to 4.6 % reported among men how to have sex with men.^{15,16}

A higher *Chlamydia trachomatis* prevalence of 16 % was also reported in this study among patients aged 30-41 years. Similar studies have found a prevalence of between 6 and 16 % among female patients attending family planning clinics in Nairobi- Kenya.^{17,10,18} What we can learn from this is that the prevalence of *C. trachomatis* is of great concern among the male patients and individuals in their mid-years. This high numbers could be attributed to the symptomatic nature of *C trachomatis* among the male gender and increased sexual activities among individuals in their mid-years. Therefore, introducing a molecular screening procedure for routine screening of STIs will help in reducing the burden of the disease.⁷

However, a point prevalence of 5% for *N. gonorrhoea* is less than what is seen in initially published work by Marx et al¹⁹ from a similar setting who found an *N. gonorrhoea* prevalence of 6 % among HIV-1 infected pregnant patients in Nairobi; in another study by Fonck et al.²⁰ he found a prevalence of 6 % for *Chlamydia trachomatis* and 4 % for *Neisseria gonorrhoea* among patients with complaints of vaginal discharge attending a sexually transmitted diseases (STD) referral clinic in Nairobi. While Daly et al.²¹ found a *Neisseria gonorrhoea* prevalence of 3.2 % among patients seeking treatment in Nairobi which is lower as compared to what was found in this study.

It was not clear why this study recorded a lower prevalence of *Chlamydia trachomatis* and *gonorrhoea* among female patients as most studies have shown that a higher prevalence among female patients. However, the female patients were the minority in our study as compared to male patients. The higher *Neisseria gonorrhoea* and *Chlamydia trachomatis* prevalence could be attributed to a good precision of the molecular method as compared to traditional culture methods.^{22,23}

All the patients that turned out to be positive *Chlamydia trachomatis* and *N gonorrhoea* were aged between the 21-50 and the male patients being the majority. These findings, therefore, suggest that the male patients were symptomatic as compared to the female gender. These further depict the importance of contact tracing, testing, and treatment to reduce re-infection.²⁴

The high proportion of symptomatic patients who tested positive for *C. trachomatis* that is in agreement with other findings and further emphasizes the importance of molecular techniques in the diagnosis and management of curable STIs.²⁴ However, due to the high cost of molecular techniques and poorly equipped laboratory in most of the developing countries, the WHO guidelines recommend a syndromic approach in the management of STIs.²⁵ Syndromic management consists of a group of symptoms and easily recognized signs that are identified before treatment.²⁶

CONCLUSION

The prevalence of *C. trachomatis* is significantly high among male patients. We recommend the implement a molecular screening for *Chlamydia trachomatis* and *Neisseria gonorrhoea* to identifying asymptomatic female cases. This study further provides evidence on the importance of contact tracing in the management of *Chlamydia trachomatis* and other STIs. There is an urgent need for studies designed to investigate the prevalence and risk factors of *Chlamydia trachomatis* and *Neisseria gonorrhoea* among female patients who are majorly asymptomatic in Kenya.

Ethical consideration

Ethics approval was not sorted for this retrospectively obtained and anonymized data non-interventional study.

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Conflict of interest

There was no conflict of interest

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