



SEXUALLY TRANSMITTED INFECTIONS IN WOMEN OF REPRODUCTIVE AGE IN A TERTIARY CARE HOSPITAL IN NAVI MUMBAI WITH EMPHASIS ON *C. TRACHOMATIS*.

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Conflicts of Interest: Nil

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Abstract:

Lower genital tract infections, including *C. trachomatis* are a major cause of gynecological morbidity and a great public health concern in India. Inadequate laboratory diagnostic facilities in all the levels of health maintenance, limited resources in material and manpower, stigma and discrimination associated with (Reproductive tract infections) RTIs services are some of the causes of lack of exact incidence/prevalence rate of RTIs in India. The present study was designed to determine the prevalence of RTIs including *C. trachomatis* in women attending a OBGY outpatient department in a tertiary care hospital in Navi Mumbai.

Keywords: *C. trachomatis*, Reproductive tract infections (RTIs)

Introduction

Globally sexually transmitted infections (STIs) are a public health concern. The global burden of sexually transmitted infections (STIs) remains high with an estimated 357.4 million new infections (roughly 1 million per day) of the four curable STIs -Chlamydia (130 million), gonorrhea (78 million), Syphilis (5.6 million) and Trichomoniasis (142 million). The load of viral STIs is similarly high, with an estimated 417 million prevalent cases of Herpes Simplex virus infection and approximately 291 million women infected with Human Papilloma Virus ^[1]. Transmission occurs sexually, but can also occur vertically, during pregnancy from the female parent to child and through blood products or tissue transfer. There are over 30 pathogens that can be transmitted sexually. These include parasites, bacteria and viruses.

Sexually Transmitted Infections can be generally classified into curable and non-curable infections. Among the non-curable are usually viral infections caused by Human Immunodeficiency Virus (HIV), Herpes Simplex Virus types 1 and 2 (HSV-1 and HSV-2) and Human Papilloma Virus. Some of the examples of the curable STIs include *Trichomonas vaginalis*, *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, *Treponema pallidum*, *Haemophilus ducreyi* and Lymphogranuloma venereum ^[2,3]. Common reproductive tract infections (RTIs) can present as asymptomatic infection or as an overt disease which may manifest as genital ulceration, discharge or inguinal swelling. Both symptomatic and asymptomatic diseases

can contribute to chronic infections and delayed effects such as sterility, ectopic pregnancy, cancer of the cervix, and untimely death of infants and adults.

Complications due to STIs rank among the top ten causes of morbidity among patients seeking attention from health facilities in most developing nations, and drain both national and family incomes^[2]. The complications are especially bad among women. After pregnancy-related causes, STIs, excluding HIV infection, are the second leading cause of loss of healthy life years in women^[1]. Other consequences of STIs include social costs such as differences between sexual partners and domestic violence^[2,4]. These infections are also associated with stigma, which negatively affects health care seeking. An estimated 75-85% of STIs occur in growing countries^[5]. Sexually Transmitted Infections mostly affect young adults (15-35 years), poor populations and urban dwellers^[6]. Migrant workers, situations that displace populations such as warfare, low socioeconomic status and inadequate access to health care contribute to the high burden of STIs. Despite the danger presented by these infections, STIs are poorly addressed in many contexts, particularly in developing nations where the need is greater^[6,7].

C. trachomatis infection is seen as one of the most common (Sexually transmitted infection) STI. Asymptomatic infection does occur in the population. The sequelae of this infection are also well established. In India studies carried out in the northern parts of the country have shown a high to moderate (14%-40%) infection rate while studies in Mumbai as well in the southern parts of the country were

contrary, with a low incidence of (0.2%-3.3%) among symptomatic subjects^[8].

Usage of less sensitive techniques in different studies does not highlight the true prevalence of *C. trachomatis* and calls for more serious definition of the extent of *C. trachomatis* infectivity in our population.

Control of STDs has become a major public health priority due to high risk of acquiring HIV infection^[9]. Seroprevalence and molecular study of *C. trachomatis* and its association with other vaginal infections namely Candidiasis, *N. gonorrhoeae*, Syphilis, Bacterial Vaginosis (BV) and Trichomonas has not been studied in our hospital before. Hence this study was conducted to provide a reliable laboratory based data on the occurrence of lower genital tract infections.

Materials and Methods

Type of study: Prospective and Experimental

Period of study: 3 years (Aug 2014 to July 2017)

Place of study: Hospital Microbiology Laboratory (NABL Accredited), MGM Medical College and Hospital, Navi Mumbai and Department of Infectious Disease & Biology, ICMR-National Institute of Research in Reproductive Health (NIRRH), Parel, Mumbai.

Ethical Aspects: The study was submitted to research and ethics committee of the institute and approval was obtained on 27th March 2015.

Sample size: 100 samples were taken and analyzed.

Specimens: Endocervical swabs / secretions, Vaginal swabs & Blood/Serum.

Selection of Cases:

Inclusion criteria –

Consent to participate.

Age limit of 16-45 years.

The group comprised of women with histories of Spontaneous Abortions, Infertility, Lower Genital Tract Infections and Pregnant Women attending Ante Natal Care (ANC).

Normal semen analysis of husband's of infertile women.

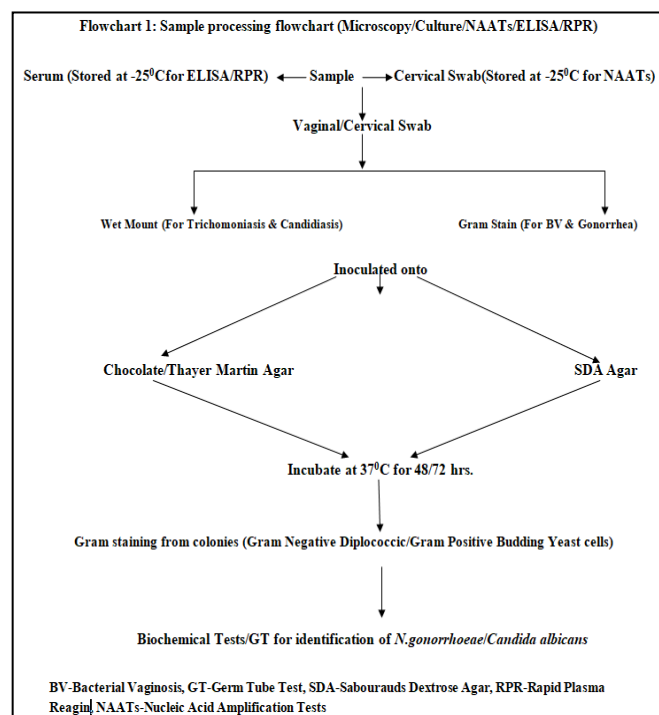
Exclusion criteria-

1. Women having per vaginal bleeding.
2. Recent antibiotic use.
3. Subjects in menopausal age.
4. HIV positive subjects.

On each of the 100 samples collected, the following tests were performed:

Table 1:

Sr No.	Test Performed	Detection of
1.	(Microscopy) Wet Mount	<i>T. vaginalis</i> , <i>Candida</i> spp.
2.	(Microscopy) Grams Stain	Bacterial Vaginosis, <i>Candida</i> spp. Candidiasis, <i>N. gonorrhoeae</i>
3.	Culture (on SDA)	<i>Candida</i> spp.
4.	Culture (on Chocolate Agar)	<i>N. gonorrhoeae</i> / <i>Candida</i> spp.
5.	Culture (on Thayer Martin Agar)	<i>N. gonorrhoeae</i>
6.	Serology (RPR)	<i>T. pallidum</i>
7.	Serology (<i>C. trachomatis</i> IgG ELISA)	<i>C. trachomatis</i> specific IgG antibodies
8.	Serology (<i>C. trachomatis</i> Heat Shock Protein-Chsp60 ELISA)	<i>C. trachomatis</i> IgG antibodies to Heat Shock Protein 60
9.	Molecular Methods (<i>C. trachomatis</i> PCR)	<i>C. trachomatis</i> MOMP gene
10.	Molecular Methods (<i>C. trachomatis</i> Southern Blotting)	Confirmation of <i>C. trachomatis</i> PCR
Total Test Performed=1000 (N)		



RESULTS

A total of 100 subjects/women were included in this study over the time period from April 2015 to May 2017.

A. Age group of subjects

The participants were between 20 to 45 years old, most of the subjects were in the 25-29 age groups; they had a mean age of 32.1 ± 8.3 years and on the basis of their clinical history and presentation were subdivided into four clinical sub groups (Table-1,2).

Table 1: Subjects enrolled in different age groups

Age group in years	Number of subjects	Percentage
20 – 24	16	16.0
25 – 29	27	27.0
30 – 34	19	19.0
35 – 39	21	21.0
40 – 44	17	17.0
Total	100	100.0

B. Study subjects

Enrolled women were grouped on the basis of their clinical history and presentation into four clinical sub groups (**Table-2, Figure-1**).

1. **Bad Obstetric History (BOH):** Women having history of one ,two or more than two spontaneous abortions or Recurrent Spontaneous Abortion (RSA) , those operated for ectopic pregnancies and pre term delivery cases were included in this group.

2. **Infertility:** Women who were living with their husbands but not conceiving and desirous of having a child were enrolled in this group. Infertile women were subdivided into Primary/^{1st} degree Infertile i.e. who did not conceive and Secondary/^{2nd} degree Infertile having one full term delivered child but not conceiving subsequently.

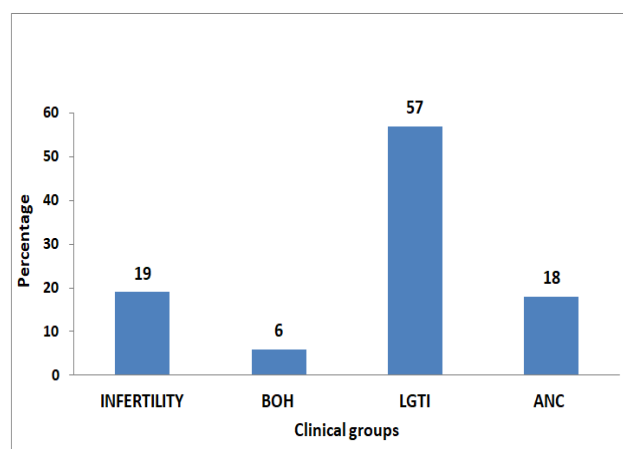
3. **Lower Genital Tract Infections (LGTI):** Women with signs and symptoms of cervicitis and vaginitis on per speculum examination or having complaints like burning micturation, leucorrhoea, abdominal pain and lower backache were included in this group.

4. **Asymptomatic/Control:** Women attending Ante Natal Care(ANC) clinic without any of the above mentioned conditions and with a confirmed pregnancy of more than 12 weeks gestation were enrolled in this group. In the ANC/Control group the gestational period of the pregnant women varied from 2 to 4 months.

These 100 subjects/women were tested for past as well as current *C.trachomatis* infection by IgG-ELISA and PCR tests respectively as well as for presence of other Reproductive Tract Infections (RTIs) by microscopy, culture and serological tests. Age wise distribution of these enrolled women are given in **Table 3** and **Figure 2**.

Table 2: Defined group of subjects (n=100) enrolled for specimen collection

Clinical groups	Number of patients(N)	Percentage
Infertility{Primary(n=13)+ Secondary(n=6)}	19	19.0
Bad Obstetric history (BOH)	6	6.0
Lower Genital Tract Infection (LGTI)	57	57.0
Ante Natal Care-ANC (Control group)	18	18.0
Total	100	100.0

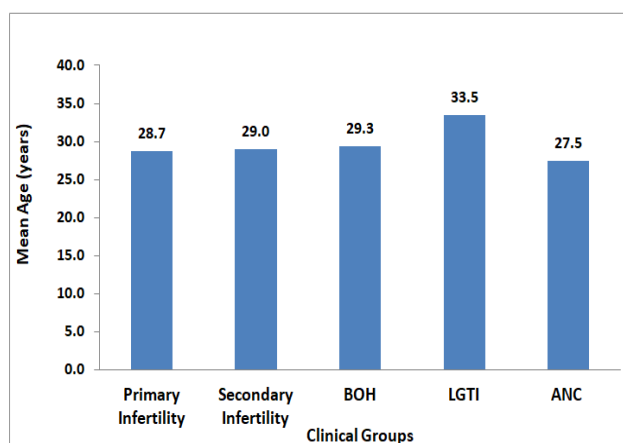
**Figure 1:** Defined group of subjects (number) enrolled for specimen collection

BOH-Bad Obstetric Hsitory, LGTI-Lower Genital Tract Infection, ANC-Ante Natal Care,

Table 3: Age wise distribution of subjects in different clinical groups

Clinical groups	N	Age (yrs)	
		Range	Mean $\pm$ SD
Primary Infertility	13	22 – 40	28.7 $\pm$ 6.1
Secondary Infertility	6	26 – 35	29 $\pm$ 4.2
ANC /Control	18	20 – 32	27.5 $\pm$ 3.9
LGTI	57	20 – 44	33.5 $\pm$ 7.1
BOH	6	21 – 36	29.3 $\pm$ 5.9

BOH-Bad Obstetric Hsitory, LGTI-Lower Genital Tract Infection, ANC-Ante Natal Care.

**Figure 2:** Average age of subjects in different clinical groups

BOH-Bad Obstetric Hsitory, LGTI-Lower Genital Tract Infection, ANC-Ante Natal Care.

C. Age and associated *C.trachomatis* infection

C.trachomatis past infection was highest among women in the 20-24 age group, while both current and past infection

was seen more among the 30-44 age group (**Table-4, Figure-3,4**). There was no association between age groups and *C. trachomatis* infection (p -value= 0.292).

Table 4: *Chlamydia trachomatis* infection in different age groups

Age group	Number of Patients	Past infection (CT-IgG ELISA)		Current infection (CT-PCR)		Total	
		N	%	N	%	N	%
20 – 24	16	2	12.5	0	0.0	2	12.5
25 – 29	27	0	0.0	1	3.7	1	3.7
30 – 34	19	1	5.3	0	0.0	1	5.3
35 – 39	21	1	4.8	1	4.8	2	9.5
40 – 44	17	0	0.0	1	5.9	1	5.9
Total	100	4	4.0	3	3.0	7	7.0

CT-PCR: *Chlamydia trachomatis* PCR, CT-IgG ELISA-*Chlamydia trachomatis* Immunoglobulin G ELISA.

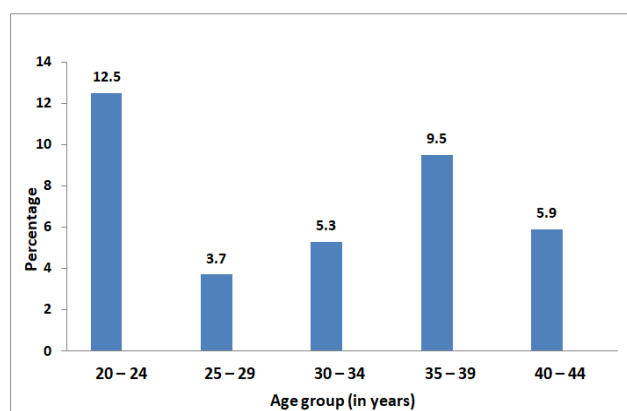


Figure 3: *Chlamydia trachomatis* infection in different age groups

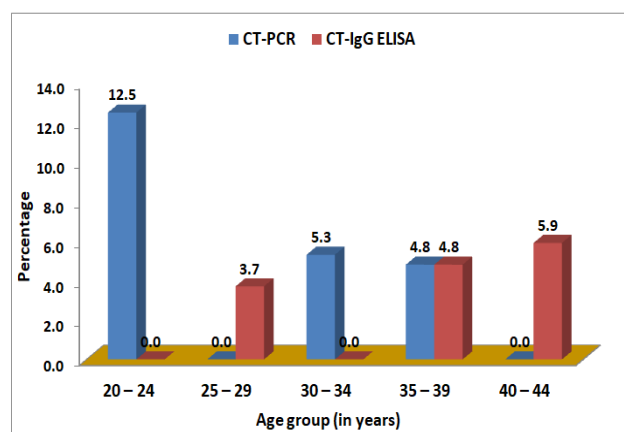


Figure 4: *Chlamydia trachomatis* (current and past) infection in different age groups

CT-PCR: *Chlamydia trachomatis* PCR, CT-IgG ELISA-*Chlamydia trachomatis* Immunoglobulin G ELISA, Current infection: CT-PCR, Past infection: CT-IgG ELISA

D. Presence of *C. trachomatis* and other reproductive tract infections

Of the 100 subjects 3(3%) had acute *C. trachomatis* infection while past infection was observed in 4(4%) of the cases. Vaginal Candidiasis was seen in 17% of the subjects, 4% had Bacterial Vaginosis (BV), 2% were infected with *Trichomonas vaginalis* while 1% was diagnosed with Syphilis. Gonorrhea was not detected (**Figure-5**). **Table 5** shows the infection rate in the defined population.

Table 5: Infection rate in the defined population (n=100)

Acute <i>C. trachomatis</i> infection	Past <i>C. trachomatis</i> infection	Other Reproductive Tract Infections (RTIs)				
		Candidiasis	N.gonorrhoeae	Syphilis	BV	Trichomonas
3(3%)	4(4%)	17(17%)	0	1(1%)	4(4%)	2(2%)

CT-PCR: *Chlamydia trachomatis* PCR, CT-IgG ELISA-*Chlamydia trachomatis* Immunoglobulin G ELISA, BV- Bacterial Vaginosis

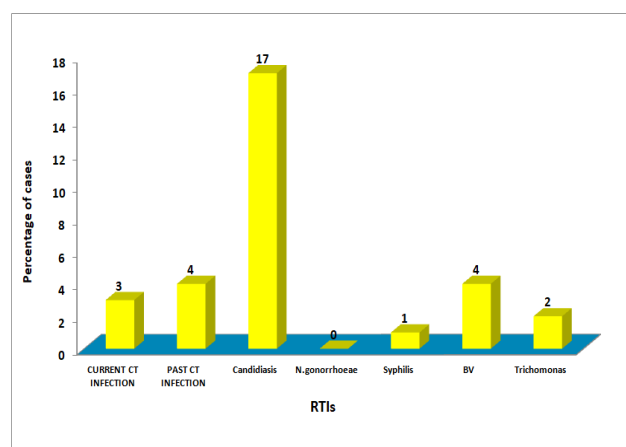


Figure 5: Infection rate in the studied population

CT-*Chlamydia trachomatis*, RTIs-Reproductive tract infections

E. *C. trachomatis* infection in the defined population

The prevalence of acute *C. trachomatis* infection in this study population varied from 3.5% to 16.7% (as per PCR test) while with respect to past infection the prevalence varied from 1.8% to 33.3% (as per IgG ELISA test) in different clinical groups (**Table- 6**).

IgG antibody was detected in 4 cases while 8 cases showed intermediate positive results. Intermediate samples were not taken into consideration.

Among the Infertility group a higher proportion of secondary infertility women (33%) had past *C. trachomatis* infection as compared to primary infertility cases (0%). Acute *C. trachomatis* was also higher in this group (16.7%) while infection rate was low in the BOH (n=6),

LGTI(n=57) and ANC/Control group(n=18) ie (0 - 5.6%) when compared to infected infertile women(33%)(Table-6,Figure-6).

Table 6: Prevalence of *C.trachomatis* (current and past) infection in defined clinical groups

Clinical Groups		N	Current <i>C.trachomatis</i> infection (CT-PCR)	Current <i>C.trachomatis</i> infection (Confirmation by CT-SB)	Past <i>C.trachomatis</i> infection (CT-IgG ELISA)
			Number(%)	Number (%)	Number (%)
Infertility	Primary	13	0(0.0)	0(0.0)	0(0.0)
	Secondary	6	1(16.7)	1(16.7)	2(33.3)
ANC		18	0(0.0)	0(0.0)	1(5.6)
LGTI		57	2(3.5)	2(3.5)	1(1.8)
BOH		6	0(0.0)	0(0.0)	0(0.0)
Total		100	3(3.0)	3(3.0)	4(4.0)

CT-PCR:*Chlamydia trachomatis* PCR , CT-IgG ELISA-*Chlamydia trachomatis* Immunoglobulin G ELISA,CT-SB-*Chlamydia trachomatis* Southern Blotting. BOH-Bad Obstetric History, LGTI-Lower Genital Tract Infection, ANC- Ante Natal Care

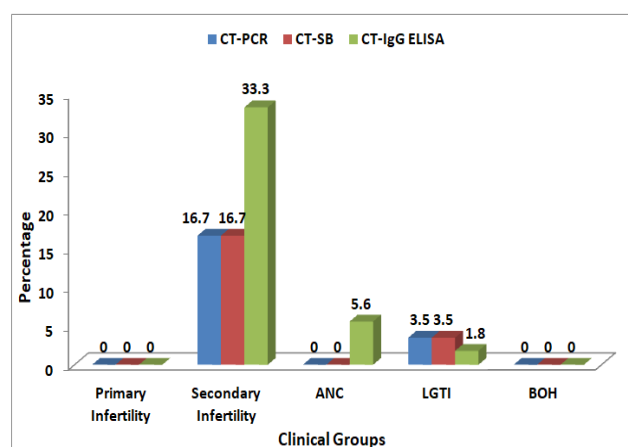


Figure 6: Prevalence of *C.trachomatis* (current and past) infection in defined clinical groups

CT-*Chlamydia trachomatis*, CT-PCR:*Chlamydia trachomatis* PCR , CT-IgG ELISA- *Chlamydia trachomatis* Immunoglobulin G ELISA,CT-SB- *Chlamydia trachomatis* Southern Blotting,.

F. Reproductive Tract Infections (RTIs) in defined clinical groups

Results showed that the ANC subjects had a high rate of Vaginal Candidiasis(33%) while Bacterial Vaginosis(BV)(16.7%) and Trichomonas(3.5%) was more common in the BOH and LGTI group respectively. Only 1 patients sample was reactive for anti lipoidal antibodies by Rapid Plasma Reagin (RPR) test, while Gonorrhea was absent (Table –7, Figure-7).

Table 7: Prevalence of reproductive tract infections(RTIs) in defined clinical groups

Parameters	Clinical groups	N	Candidiasis N(%)	N.gonorrhoeae N (%)	Syphilis N (%)	BV N(%)	Trichomonas N (%)
Infertility	Primary	13	4(30.8)	0	0	1(7.7)	0
	Secondary	6	0	0	0	0	0
ANC		18	6(33.3)	0	0	0	0
LGTI		57	6(10.5)	0	0	2(3.5)	2(3.5)
BOH		6	1(16.7)	0	1(16.7)	1(16.7)	0
Total		100	17(17.0)	0	1(1.0)	4(4.0)	2(2.0)

BV-Bacterial Vaginosis

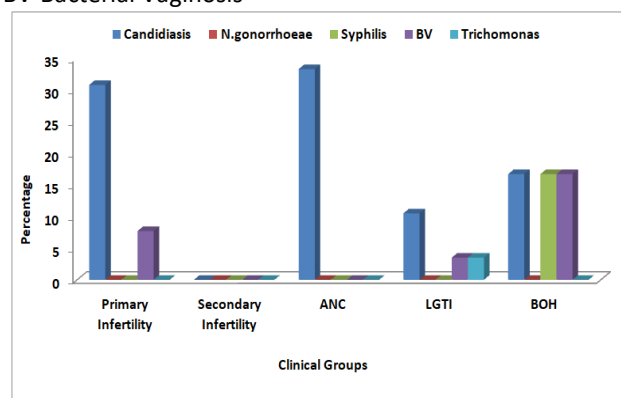


Figure 7: Prevalence of reproductive tract infections (RTIs) in defined clinical groups

F. *C.trachomatis* and associated infections

Association of *C.trachomatis* with other common RTIs was studied. It was seen that 14.3% of *C.trachomatis* infected subjects had concomitant BV and Candida. There was no association of *C.trachomatis* with Gonorrhea, Trichomonas or Syphilis (Table-8, Figure-8).

Table 8: *C.trachomatis* and associated infections

Infections	BV N(%)	Candida N(%)	Trichomonas N(%)	Syphilis N(%)	N.gonorrhoeae N(%)
<i>C.trachomatis</i>	1(14.3)	1(14.3)	0	0	0
N=7(3 PCR+ 4 ELISA)					

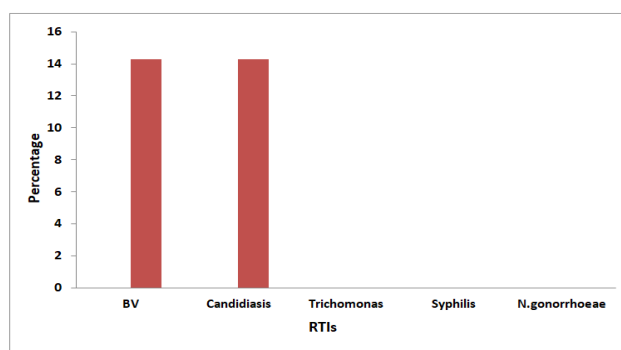


Figure 8: *C.trachomatis* and associated infections

Table 9 and 10 shows the association variables of acute as well as chronic *C.trachomatis* infection with other RTIs. Table 10 shows an association between past *C.trachomatis* infection with BV (OR: 10.33, p=0.029).

Table 9: Presence or absence of other reproductive tract infections and their association with acute *C.trachomatis* infection

RTIs	Acute <i>C.trachomatis</i> infection			Chi square test	P value	Significant At 5% level	Odds Ratio (95% CI)	
	Positive	Negative	Total				Row (1/2)	Col.1 (+ve value)
Candidiasis								
Positive	1	16	17	0.585	0.444	No	2.531 (0.216 to 29.616)	2.441 (0.234 to 25.420)
Negative	2	81	83					
Total	3	97	100					
N.gonorrhoeae								
Positive	0	0	0	0	1.00	No	0.0	0.0
Negative	3	97	100					
Total	3	97	100					
Syphilis								
Positive	0	1	1	0.031	0.860	No	0.0	0.0
Negative	3	96	99					
Total	3	97	100					
BV								
Positive	0	4	4	0.129	0.720	No	0.0	0.0
Negative	3	93	96					
Total	3	97	100					
Trichomonas								
Positive	0	2	2	0.063	0.802	No	0.0	0.0
Negative	3	95	98					
Total	3	97	100					

p>0.05, BV- Bacterial Vaginosis

Table 10: Presence or absence of other reproductive tract infections and their association with past *C.trachomatis* infection

RTIs	Past <i>C.trachomatis</i> infection			Chi square test	P value	Significant At 5% level	Odds Ratio (95% CI)	
	Positive	Negative	Total				Row (1/2)	Col.1 (+ve value)
Candidiasis								
Positive	0	17	17	0.853	0.356	No	0.0	0.0
Negative	4	79	83					
Total	4	96	100					
<i>N.gonorrhoeae</i>								
Positive	0	0	0	0.00	1.00	No	0.0	0.0
Negative	4	96	100					
Total	4	96	100					
Syphilis								
Positive	0	1	1	0.042	0.837	No	0.0	0.0
Negative	4	95	99					
Total	4	96	100					
BV								
Positive	1	3	4	4.785*	0.029	Yes	10.33(0.816 to 130.82)	2.18 (0.37 to 13.02)
Negative	3	93	96					
Total	4	96	100					
Trichomonas								
Positive	0	2	2	0.085	0.771	No	0.0	0.0
Negative	4	94	98					
Total	4	96	100					

p<0.05, BV- Bacterial Vaginosis

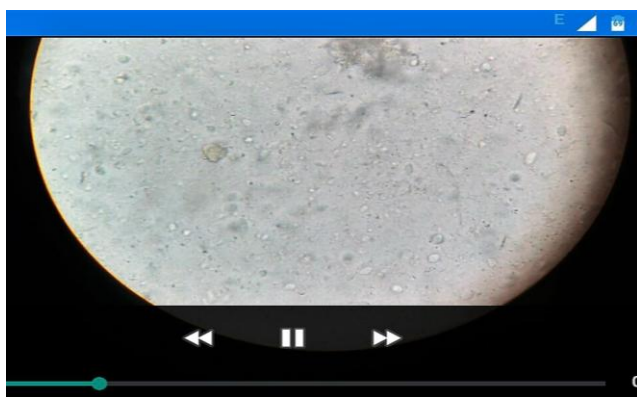


Image 1: Wet mount showing *Trichomonas vaginalis*



Image 2: Wet mount showing germ tube positive isolates of *C. albicans*

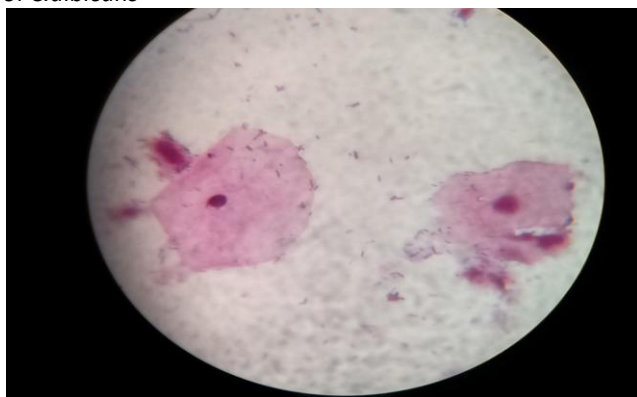


Image 3: Gram stain showing normal vaginal squamous epithelial cells

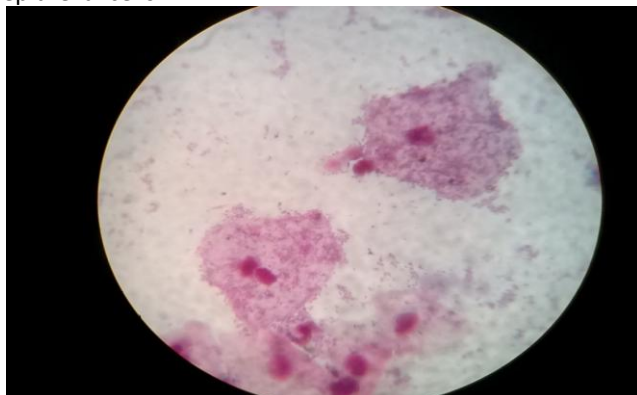


Image-3: Gram stain showing normal vaginal clue cells



Image 4: *C. albicans* isolates on SDA slants

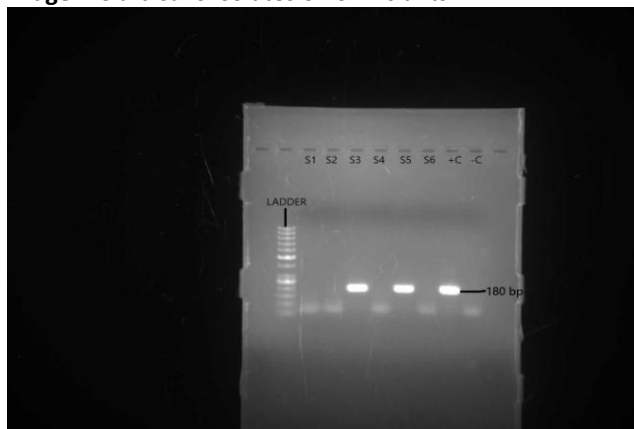


Image 5: Agarose gel electrophoresis (*C. trachomatis* PCR)

Discussion

Health is defined as “physical, mental and social well being” includes the capacity for fertility and sexual pleasure^[10]. Since *C. trachomatis* can have a devastating impact on fertility and sexual health, appropriate screening of asymptomatic females improves capacities for good health^[11]. *C. trachomatis* is considered one of the major causes of STD and as such a major public health problem. The personal and financial consequences of Chlamydial infection to individuals and the community at large are enormous. Early diagnosis is therefore an important prerequisite for effective therapy and management of *C. trachomatis*. Owing to the asymptomatic nature of lower genital tract infections with *C. trachomatis* as well as other Reproductive Tract Infections (RTIs), screening remains the only option to identify infected women. Screening tests should be rapid, sensitive and highly specific.

Our prevalence study had several unique strengths. The sample size in each defined clinical groups represented the proportion of subjects attending an OPD in any clinical set up of a hospital. The mean age of each group was also equally represented.

Study of other reproductive tract infections (RTIs) in the defined population had revealed that Vaginal Candidiasis was more common among ANC subjects (33.3%) than in other groups. The average infection rate was 17%.

The prevalence rate of *C.trachomatis* as well as other common RTIs correlated well with other studies in the country.

Murugesan et al(2016)^[12], in Chennai observed that among 110 women laboratory diagnosis of lower genital tract infections was positive in 43 subjects (39.09%). By Real time PCR assay among the 110 samples, 9 (8.8%) of the samples were positive for *Chlamydia trachomatis* while detection rates of other RTIs was Candida 15.45%, BV and Trichomonas 2.7% each. Mania-Pramanik et al(2012)^[13] from Mumbai observed that among 788 female participants, *C.trachomatis* specific antibody was present in 14 women, 80 women had other infections such as BV, Candida and Trichomonas and the related infection rates were 14.5%, 4.3% and 0.9% respectively.

Few studies however showed a higher prevalence of RTIs. Saikia et al(2009)^[14] from Assam observed that of 985 STD clinic attendees Candidiasis was found to be the most common STD, 21.5% followed by Syphilis 17.2% while Bala et al(2011)^[15] in Delhi observed that of 5871 male and female subjects the detection rates of various RTIs was *Candida albicans* 23.3% while BV, *C. trachomatis*, *Trichomonas vaginalis* and *N.gonorrhoea* accounted for 5.3%, 4.2%, 1.8 % and 6% of the cases.

These findings with respect to different RTIs/STIs in different population are linked with the time of the reports published. After the implementation of NACO guidelines for syndromic treatment, there is a reduction of RTIs/STIs(NACO, 2007).

Our findings correlated well with other studies outside the country. Anh et al(2003)^[16] observed that in 1,000 Vietnamese women the overall prevalence of Candida spp was 11.1%, *T.vaginalis* was 1.3% *C.trachomatis* was 4.4%, Bacterial vaginosis 3.5%, no Gonococcal infection was detected.

Lower RTI rates was observed by Zhang et al(2017)^[17] from China who examined 1195 married Chinese women the detection rates of various RTIs was - bacterial vaginosis BV(10.5%), yeast infection (3.7%), *C.trachomatis* (2.2%), and *Trichomonas vaginalis* (1.7%) was observed. While higher rates was reported by Khan et al(2005)^[18] from USA who examined 210 couples visiting STD clinic and observed a high incidence of STDs namely *C.trachomatis* 46%; *N.gonorrhoea* 18% and Trichomonas 14%.

Vaginal yeast infections is a relatively common phenomenon in pregnancy probably related to high estrogen

levels, although these infections are not essentially a risk to pregnancy but they can cause uncomfortable symptoms.

Bacterial Vaginosis(BV) was the next most common RTIs in our study, more common among BOH cases(33%) with an average infection rate of 4% which was similar to studies conducted by Bala et al (2011)^[15], Anh et al(2011)^[16].

However lower rates were reported by Nayyar et al (2015)^[19] who observed that in 200 patients attending STD clinic in Delhi, were evaluated for the bacterial STIs the causative agents were Chlamydia 8%, Gonorrhea 7.5%, Bacterial Vaginosis 2.7% and Syphilis 2%. Murugesan et al(2016)^[12] in Chennai detected BV in 2.7% of 110 samples.

Higher incidence was reported Chauhan et al(2014)^[20] in Baroda, Gujarat. They observed that out of 180 females, BV was detected in 18%, *T vaginalis* 3.8%, *C. albicans* in 11.5%, *N gonorrhoeae* and Chlamydia in 6% of the cases while Marconi et al (2012)^[21] reported 23.9% *C.trachomatis*, 18% BV, 13% Vaginal Candidiasis in 142 symptomatic Brazilian women.

The average infection rate of *Trichomonas vaginalis* in our study was 2% which was similar to studies carried out by Murugesan et al(2016)^[12], Bala et al(2011)^[15], Anh et al (2011) and Dai Zhang et al(2017)^[17], although a few studies showed a higher incidence such as that of Meda et al(1997)^[22] and Khan et al(2005)^[18].

Infections such as BV, Vaginal Trichomoniasis was expected to be more common in Mumbai in view of the poor and unsatisfactory housing conditions under which many of them live but our results were contrary. Even existence of common RTIs along with *C.trachomatis* was observed to be low in this clinic based prevalence study.

Association of *C.trachomatis* with other common RTIs revealed that 14.3% of *C.trachomatis* infected subjects had concomitant BV and Candida. our findings were similar to studies carried out in other parts of India. -Mal hotra et al(2008)^[23] in Delhi observed that in 276 symptomatic women *C.trachomatis* was detected in 20% of subjects using DFA and ELISA, co-infection of *C. trachomatis* with bacterial vaginosis was seen in 12.7 per cent, candidiasis in 10.9 per cent of the cases, however, co-infection with *N. gonorrhoeae* was not found. Atul R et al (2014)^[24] in Nagpur observed that out of 226 patients Chlamydial Inclusion bodies was detected in 69/226 (30.53%) patients by Giemsa staining. *Chlamydia trachomatis* was found to be most commonly associated with Candida albicans (29.41%). Similar observation was seen in studies outside India. Wiesenfeld HC et al(2003)^[25] from USA examined 255 non pregnant female subjects aged 15-30 and observed that subjects with bacterial vaginosis were more likely to test positive for *Chlamydia trachomatis* (OR, 3.4; 95% CI, 1.5-7.8), while a review article by Bautista et

al(2017)^[26] from Maryland, USA observed that the prevalence of BV was higher among chlamydia cases than their controls (21.4% vs 15.6%). However our findings differed from that of Camila Marconi et al(2012)^[21] from Brazil who reported that *Chlamydia trachomatis* was strongly associated with the presence of Aerobic Vaginitis but not BV.

The control of STD is a public health priority and one that has become even more significant with the HIV pandemic. Efforts to encourage individuals to modify sexual behaviors and to adopt safer sexual practices will have a beneficial impact.

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