

# Prevalence of Reproductive Tract Infections/Sexually Transmitted Infections and Their Determinants in Women of Reproductive Age Group, Attending STI Clinic at a Tertiary Care Centre in Lucknow, India

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**Abstract:** ***Introduction:** In India, RTIs/STIs are an important cause of morbidity and mortality among women, especially those with poor access to appropriate health facilities. In our country, many community based studies have been conducted so far to determine prevalence of RTI/STIs utilizing syndromic approach but limited data is available based on laboratory assisted/ etiological approach. **Objective:** The aim of the study was to assess the prevalence of RTI/STIs among women of reproductive age group utilizing laboratory assisted approach and to evaluate various socio-demographic determinants indicating vulnerability to them. **Material & Methods:** It was a hospital based prospective observational study conducted in King George's Medical University, Lucknow from July 2015 to August 2016 and the study protocol was approved by Institutional Ethics Committee. Women with complaints suggestive of RTIs/STIs attending or referred to STI Clinic in King George's medical University, Lucknow were enrolled. **Results:** Syndromic diagnosis was confirmed with laboratory procedures in only 92 patients i.e. prevalence of laboratory confirmed RTI/STIs in our study was 27%. Candidiasis was detected in 48 (14.1%) cases and BV in 37 (11%), trichomoniasis was diagnosed in 12 (3.5%), syphilis in 2 (0.6%), chlamydial infections in 1 (0.3%). Mixed infections were also observed in the study. **Conclusion & Key message:** The prevalence rates of RTIs for a particular geographical area need to be assessed as it varies from region to region; more local studies are needed for the same. Health education and awareness campaigns should be organized to empower the general population especially women on the causes, risk factors and transmission of RTIs; as most of them are preventable. In addition, efforts should be made to develop affordable, rapid, and effective diagnostic techniques that will improve RTI/STIs detection in every level of health care setting.*

**Keywords:** RTIs, STIs, prevalence, reproductive age group women, laboratory assisted approach

## 1. Introduction

Reproductive tract infections/Sexually transmitted infections (RTI/STIs), even without including the Human immunodeficiency virus (HIV)/Acquired immunodeficiency syndrome (AIDS), are persistently among the most common conditions leading to health care visits regardless of national resources. In developing countries, RTIs result in substantial productivity losses for individuals and communities, particularly where the majority of the population is less than 40 years of age. RTIs are among the leading causes of disability adjusted life years (DALYs) lost for women of reproductive age, exceeded only by maternal causes and HIV<sup>[1]</sup>.

Globally, it is estimated that more than 1 million STIs are acquired every day worldwide. STIs have a profound impact on sexual and reproductive health of people. Each year, there are estimated 357 million new infections with 1 of 4 STIs: chlamydial infections (131 million), gonorrhoea (78 million), syphilis (5.6 million) and trichomoniasis (143 million). Other endogenous diseases adding to the worsening scenario are Bacterial vaginosis (BV) and vaginal candidiasis, which further add to reproductive morbidities. Moreover, the importance of STIs has been more widely recognized since the advent of the HIV/AIDS pandemic and

there is good evidence that the control of STIs can reduce HIV transmission<sup>[2]</sup>.

In India, RTIs/STIs are an important cause of morbidity and mortality among women, especially those with poor access to appropriate health facilities. In our country, many community based studies have been conducted so far to determine prevalence of RTI/STIs utilizing syndromic approach but limited data is available based on laboratory assisted/ etiological approach. Furthermore, prior literature has also emphasized the importance of using the laboratory techniques to diagnose variety of RTI/STIs<sup>[3,4]</sup>.

## 2. Objectives

The aim of the study was to assess the prevalence of RTI/STIs among women of reproductive age group utilizing laboratory assisted approach and to evaluate various socio-demographic determinants indicating vulnerability to them.

## 3. Material & Methods

It was a hospital based prospective observational study conducted in King George's Medical University, Lucknow from July 2015 to August 2016 and the study protocol was

approved by Institutional Ethics Committee. Women with complaints suggestive of RTIs/STIs attending or referred to STI Clinic in King George's medical University, Lucknow were enrolled.

**Inclusion criteria**

All women of reproductive age group above 18 years of age consenting to participate and willing to give vaginal swabs, cervical swabs and/or blood samples.

Appropriate samples (in duplicate) were taken from 341 women satisfying inclusion criteria set beforehand. After recruiting the study subjects, a preformed questionnaire was used to collect data by the investigator. Samples were transported immediately and further processing was done in department of Microbiology, K.G.M.U, Lucknow.

In case of vaginal swab, pH of vaginal secretions, wet mount, Gram stain, culture on Sabouraud dextrose agar (SDA) and Inpouch™ TV culture for *Trichomonas vaginalis* (Biomed diagnostics) was done. In case of cervical swab, Gram stain, Direct Fluorescent Assay (DFA) for *Chlamydia trachomatis* antigen and culture on Chocolate agar was done. In suspected cases of syphilis, serum samples were screened using non treponemal Venereal Disease Research Laboratory (VDRL) test and further confirmation by was done by *Treponema pallidum* Haemagglutination assay (TPHA). Vulvovaginal candidiasis was diagnosed by visualizing budding yeast like cells with pseudohyphae on Gram staining and confirmed by culture on SDA. *Trichomonas vaginalis* (Tv) was identified by its typical morphology and motility on the direct wet mount microscopy of vaginal secretions and/or in Inpouch TV (BioMed Diagnostics) culture. Bacterial vaginosis (BV) was confirmed on basis of Nugent's criteria or presence of clue cells on Gram staining. For chlamydial infection, Direct fluorescent assay (DFA) was done and positive diagnosis was confirmed when at least 10 elemental fluorescent *Chlamydia trachomatis* bodies were found associated to cells, in a clinical sample. For diagnosing Gonorrhoea, oxidase positive Gram negative cocci with suggestive colony morphology on Chocolate agar were considered. Quantitative VDRL test with a titre ≥ 1:8 was considered suggestive of syphilis and TPHA was done.

Statistical analysis of data was performed using SPSS software (version 21). *P* < 0.05 was considered as significant.

**4. Results**

Among 341 women, vaginal discharge was reported as the most frequent symptom (56.60%) followed by lower abdominal pain (19.90%), urinary complaints (17.60%), vulval itching (16.10%), backache (15.20%), dyspareunia (3.80%), dysmenorrhoea (3.80%), infertility and rash (2.60%), genital ulcers (0.90%).

Syndromic diagnosis was confirmed with laboratory procedures in only 92 patients i.e. prevalence of laboratory confirmed RTI/STIs in our study was 27%. Candidiasis was detected in 48 (14.1%) cases and BV in 37 (11%), trichomoniasis was diagnosed in 12 (3.5%), syphilis in 2

(0.6%), chlamydial infections in 1 (0.3%). Gonorrhoea was not detected in any of the study subjects.

Mixed infections were also observed in the study. BV with candidiasis was detected in 0.90% of the patients whereas BV with trichomoniasis in 0.90% of the patients. On the contrary, trichomonal and candidal mixed infection was noteworthy in 0.60% of the patients.

**Table 1:** Association between Socio-demographic profile and presence of RTI/STIs (n=341)

Characteristic	RTI/STIs present (n=92)	RTI/STIs absent (n=249)	P value
<b>Age</b>			
≤20	4	7	0.225
21-30	41	142	
31-40	37	77	
>40	10	23	
<b>Residence</b>			
Urban	66	219	0.00**
Rural	26	30	
<b>Education</b>			
Illiterate	26	35	0.00**
Primary	28	59	
High school	12	36	
Secondary	18	66	
Graduate	6	47	
Postgraduate	2	6	
<b>Occupation</b>			
Unemployed	89	235	0.655
Unskilled worker	0	2	
Skilled worker	3	10	
Professional	0	2	
<b>Marital status</b>			
Married	91	249	0.99
Unmarried	1	0	
<b>Spouse's Occupation</b>			
Unemployed	0	2	0.159
Unskilled	4	15	
Skilled worker	2	0	
Govt. job / Pvt. Job / Businessman	84	225	
Professional	2	7	
<b>Socioeconomic Status</b>			
Lower	67	244	0.00**
Upper Lower	20	3	
Middle	5	2	

The prevalence of RTI/STIs was found to be higher in women residing in urban area than in rural area. This difference was found to be statistically highly significant (P=0.00). Similarly, another parameter found to be significantly associated was education status of the patients (P=0.00).

The prevalence of various RTI/STIs was found to be higher among women affiliated with lower socioeconomic status than those belonged to the middle socioeconomic status. This difference was also found to be statistically significant. (P=0.00). [Table.1.]

**Table 2:** Association between Obstetric / Fertility profile and presence of RTI/STIs (n=341)

Characteristic	RTI/STIs present (n=92)	RTI/STIs absent (n=249)	P value
Parity			
0	8	51	0.04*
1	18	55	
2	50	114	
≥3	16	29	
H/o Previous abortions			
0	69	200	0.182
1	22	41	
2	1	8	

Association between parity and prevalence of RTI/STIs was found to be statistically significant. (P=0.04). Most of the women having RTIs were para 2 and had no history of abortion. [Table 2]

**Table 3:** Association between Hygiene practices and presence of RTI/STIs. (n=341)

Characteristic	RTI/STIs present (n=92)	RTI/STIs absent (n=249)	P value
Menstrual hygiene			
Sanitary pads	16	123	0.00**
Ordinary cloth	51	76	
Both	25	50	
Cleaning genital area after intercourse / toilet			
Yes	4	25	0.94
No	88	224	

Prevalence of RTIs was more in patients using ordinary cloth (singly or alternatively with sanitary pads) during menstruation; as compared to those using only sanitary pads. This difference was statistically highly significant (P=0.00). [Table.3.]

**Table 4:** Association between Partner and contraceptive details and presence of RTI/STIs (n=341).

Characteristic	RTI/STIs present (n=92)	RTI/STIs absent (n=249)	P value
Husband stay with the respondent			
Stay together	61	210	0.00**
Occasionally away	25	39	
Stays away	6	0	
Contraceptive usage			
No contraception	84	200	0.014*
Condoms	4	39	
OCPs	2	1	
IUCDs	2	9	
Partner history			
Husband	91	249	0.099
Not elicited	1	0	

The association between prevalence of RTI/STIs and staying together with the husband was statistically highly significant (P=0.00), in addition similar association with usage of contraception was also found to be significant. (P=0.014). [Table.4.]

## 5. Discussion

Prevalence data have a key role in control strategies for RTI/STIs. The prevalence of laboratory confirmed RTI/STIs in our study was found to be 27%. Prior literature had also

emphasized the importance of using the laboratory techniques to diagnose variety of RTI/STIs and found that the syndromic approach reported higher results than laboratory assisted approach<sup>[3,4]</sup>.

Similar rates have been reported in a few hospital based studies utilizing laboratory assisted approach. In Goa, where a similar population group was studied; prevalence was found to be 30% whereas in Delhi it was observed to be 52%. Data available is however very limited as majority of the studies done earlier were based on syndromic approach. As no single set of estimates for RTIs, could apply in such a large and diverse country as India; the prevalence rates of RTIs for a particular geographical area need to be assessed so as to help the administrators formulating better policies for their treatment and control (Bote and Shinoy)<sup>[3,5,6]</sup>.

In our study, endogenous infections i.e. vaginal candidiasis and BV were the most prevalent (25%) and vaginal candidiasis was found to be the commonest RTI; the other three sexually transmitted infections (*T. vaginalis*, Syphilis, *Chlamydia*) were relatively infrequent (4.4%). BV, candidiasis, and trichomoniasis were together responsible for 97% of the entire Laboratory diagnosed vaginitis/vaginosis detected in our study.

Gonorrhoea was not detected in any of the patient in our settings. Nearly 80% of the women with gonorrhea remain asymptomatic or have only minor symptoms and do not seek medical care. Thus, women with subclinical infection accumulate in the population, hence transmission continues. Appropriate screening should be done in sexually active women in areas with high prevalence rates<sup>[8]</sup>.

Mixed infections were also observed in the study, highlighting the importance of etiological approach for undertaking appropriate therapeutic strategy for individual cure. A number of biological mechanisms operate in co-infections; infection with one pathogen may increase the probability of acquiring another pathogen and infection with one may increase the severity, as well as alter the natural history of another. Many studies have established that co-infections are marker of high-risk behaviors and networks facilitating transmission of these pathogens. Empirical data on such co-infections rates are limited in developing countries; conclusively we need to look upon it. In addition, K Ray *et al* and Sangeetha S Balamurugan, ND Bendigeri have reported mixed infections in their studies in Delhi and Karnataka respectively<sup>[7,9]</sup>.

We also looked into a variety of socio-demographic variables influencing the incidence and prevalence of RTI/STIs based on literature available. Age is an important influencing factor. Approximately, half of the patients enrolled in the study belonged to age group 21-30 years; which is the period of maximal sexual and reproductive activity rendering these women more prone to RTI/STIs<sup>[127]</sup>. Similar age group distribution had been documented in prevalence studies conducted in various parts of the country<sup>[9,10,11]</sup>.

Education is one of the significant parameter indicating health; however similar prevalence rates in educated women

found can be explained by the gap between knowledge and practice. Majority of the women who participated in the study belonged to lower and upper lower socioeconomic status and only few of them belonged to middle socioeconomic status. [Modified B G Prasad's scale]. The lower socioeconomic status was observed to be a significant risk factor for developing RTIs in the present study; and it may be attributed to the fact that people in this strata find it more difficult to stay sexually healthy when they cannot afford basic requirements to stay so. These findings were in accordance with the similar hospital based studies done in Delhi and Lucknow<sup>[12,13]</sup>.

The prevalence of RTI/STIs was found to be significantly higher amongst women residing in urban areas as compared to those belonging to rural areas; findings might be biased in our study since hospital is located in urban area. This proportion is higher than reported in a study done in Lucknow. Whereas, in a community based study conducted in Delhi to compare the prevalence rates of RTIs in women residing in rural and urban areas, the prevalence rates were not found to be different in residents belonging to either<sup>[13,14]</sup>.

Almost all the women who participated in the study were homemaker and were unemployed. Unemployed women have a different life style as compared to their working counterparts; entirely dependent on their partner for their each and every basic need and moreover, the homemakers do not find much time to take care of them and thus tend to neglect their own health. On the other hand, we observed a higher prevalence in those women whose partners were in jobs or were businessmen. This is relevant in view of migratory nature of most of the jobs; thus travel playing a role in the spread of STIs. These findings were supported by a study conducted in South India and in Dhaka<sup>[15,16]</sup>.

The prevalence of the symptoms was observed to be significantly increasing with parity. Overall, two-third of women were multipara in the study. This association might be due to longer periods of unprotected sex as couples seek to conceive and thus increasing their vulnerability. Increasing number of pregnancies may also have deleterious effects on a woman's health and literature supports the fact that pregnancy itself is a predisposition factor to many endogenous RTIs. Similar findings were accounted in various other studies conducted in Surat, Ludhiana, Bangalore<sup>[11,17,18]</sup>.

Adequate menstrual hygiene is crucial for the health of the women. Out of all, about two-third of the symptomatic patients were found to use ordinary cloth at the time of menstruation, singly or along with commercial sanitary pads. This association was found to be statistically highly significant. Many women belonging to lower socio-economic class were found to reuse them after washing. The biggest challenge for them is to dry those pieces of cloth out in sun without any men or family member noticing them. The result is that they never get properly dried, resulting in the same unhygienic cloth being used over and over again. Similar association had been observed in some community based studies<sup>[10,17]</sup>.

Practice of cleaning genital area after intercourse or urination was not followed by majority of women in the study. Higher prevalence of RTIs among these women indicates a role of life style and personal hygiene in the causation of RTIs. Similar finding have been documented in a hospital based study conducted in Lucknow and a community based study done in North East Delhi<sup>[10,13]</sup>.

Contraception is a much discussed aspect in this regard especially STIs. Majority of women in our study, who reported to have symptoms of RTI/STIs, were not using any method of contraception. Among contraceptive users, maximum protection was observed to be provided by barrier methods (condoms); it is to be emphasized that barrier methods should be regularly used by the couples so that effective protection can be ensured. It is one of the cost effective strategy to combat these infections. Similar findings have been observed in studies conducted in Meerut and Thane<sup>[19,20]</sup>.

The stay with the husband is an important factor in association with the increased prevalence of RTIs in married women. Many factors seem to be operating in this scenario; increased number of sexual activity episodes and proper hygiene practices not being followed can lead to increased incidence. Similar findings have been documented in a community based study conducted in Mumbai (Bote & Shinoy). History of multiple sexual partners could not be illicited.

## 6. Conclusion

The prevalence rates of RTIs for a particular geographical area need to be assessed as it varies from region to region; more local studies are needed for the same. Health education and awareness campaigns should be organized to empower the general population especially women on the causes, risk factors and transmission of RTIs; as most of them are preventable. In addition, efforts should be made to develop affordable, rapid, and effective diagnostic techniques that will improve RTI/STIs detection in every level of health care setting.

## 7. Acknowledgment

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## 8. Conflicts of Interest

There are no conflicts of interest.

## References

- [1] Sexually transmitted infections in developing countries: current concepts and strategies on improving STI prevention, treatment, and control. Washington, DC: World Bank. Available from: <http://www.documents.worldbank.org/curated/en/867421468313772326/Sexually-transmitted-infections-in-developing-countries-current-concepts-and-strategies>

- on-improving-STI-prevention-treatment-and-control [Accessed 19<sup>th</sup> January 2017].
- [2] Sexually transmitted infections (STIs) Fact sheet N°110 Updated December 2015. Available from: <http://www.who.int/mediacentre/factsheets>. [Accessed 19<sup>th</sup> January 2017].
- [3] Prabhav Aggarwal, Sonali Bhattar, Satyendra Kumar Sahani, Preena Bhalla. Utility of Laboratory Diagnosis for Confirmation of the Syndromic Case Management in Married Indian Women with Vaginal Discharge. *International Journal of Health Sciences* 2016; 10:516-21.
- [4] Vidyalaxmi Chauhan, Maitri Shah, Sejal Thakkar, Sangita V. Patel, Yogesh Marfatia. Clinical and laboratory diagnosis of vaginal discharge syndrome. *Indian Dermatology Online Journal* 2014; 5(1)Suppl:1-5.
- [5] Bote M, Shenoy AG. An epidemiological study to find out the prevalence of RTI/STI and various factors associated with it among ever married women of reproductive age group in an urban slum community of Mumbai. *Journal of Dental and Medical Sciences* 2014; 13:09-15.
- [6] V Patel *et al.* The burden and determinants of reproductive tract infections in India: a population based study of women in Goa, India. *Sex Transm Infect* 2006; 82:243-9.
- [7] Sangeetha S Balamurugan, ND Bendigeri. Community-Based Study of Reproductive Tract Infections Among Women of the Reproductive Age Group in the Urban Health Training Centre Area in Hubli, Karnataka. *Indian J Community Med* 2012; 37:34-38.
- [8] Jeanne M. Marrazzo, Michael A. Apicella. *Neisseria gonorrhoeae (Gonorrhoea)*. Bennett J E, Dolin R, Martin J Blaser, editors. *Mandell, Douglas, and Bennett's Principles and practice of infectious diseases*, 8<sup>th</sup> ed. Philadelphia: Elsevier; 2010. p.3281.
- [9] K Ray, *et al.* Prevalence of RTI/STI agents and HIV infection in symptomatic and asymptomatic women attending peripheral health set-ups in Delhi, India. *Epidemiol. Infect* 2008; 136:1432-40.
- [10] Meenakshi Bhilwar, Panna Lal, Nandini Sharma, Preena Bhalla, Ashok Kumar. Prevalence of reproductive tract infections and their determinants in married women residing in an urban slum of North-East Delhi, India. *Journal of Natural Science, Biology and Medicine* 2015; 6(1):Suppl:29-34.
- [11] J. K. Kosambiya, Vikas K. Desai, Pankaj Bhardwaj, Tanuja Chakraborty. RTI/STI prevalence among urban and rural women of Surat: A community-based study. *Indian J Sex Transm Dis* 2009; 30:89-93.
- [12] Charu Nayyar, Ram Chander, Poonam Gupta, B. L. Sherwal. Evaluation of risk factors in patients attending STI clinic in a tertiary care hospital in North India. *Indian J Sex Transm Dis* 2015; 36:48-52.
- [13] Uma Gupta, Parul Sinha, Lubna Inam, Shuchi Gupta. Socio-demographic profile of reproductive tract infections and sexually transmitted diseases in reproductive aged women. *Int J Reprod Contracept Obstet Gynecol* 2015;4:595-600.
- [14] Anjana Verma, Jitendra Kumar Meena, and Bratati Banerjee. Comparative Study of Prevalence of RTI/STI Symptoms and Treatment Seeking Behaviour among the Married Women in Urban and Rural Areas of Delhi. *International Journal of Reproductive Medicine* 2015;1:8.
- [15] Bogaerts J, Ahmed J, Akhter N. Sexually transmitted infections among married women in Dhaka, Bangladesh: unexpected high prevalence of herpes simplex type 2 infection. *Sex Transm Inf* 2001; 77:114-9.
- [16] Jasmin Helen Prasad *et al.* Reproductive Tract Infections among Young Married Women in Tamil Nadu, India, *International Family planning perspective* 2005;31:73-82.
- [17] Philip PS, Benjamin AI, Sengupta P. Prevalence of symptoms suggestive of reproductive tract infections/sexually transmitted infections in women in an urban area of Ludhiana. *Indian J Sex Transm Dis* 2013;34:83-8.
- [18] Ratnaprabha GK, Sulekha Thimmaiah, Avita Rose Johnson, Naveen Ramesh. RTI in women in underprivileged areas of Bangalore. *International Journal of Medical Science and Public Health* 2015 ;4:1691-6.
- [19] Pant B, *et al.* Social correlates in reproductive tract infection. *Social Correlates in Reproductive Tract Infections among Married Women in Rural Area of Meerut*. *Indian Journal of Community Medicine* 2008;33:52-3.
- [20] Mehul T Parmar, Harsha M Solanki, Vibha V Gosalia. A study of prevalence of Sexually Transmitted Infections & response to syndromic treatment among married women of reproductive age group in rural area of Parol Primary Health Centre under Thane district. *GJMEDPH* 2013;2:1-8.