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Original Research Article

Prevalence of sexually transmitted infections in symptomatic women of reproductive age group in a tertiary care centre

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ABSTRACT

Background: Sexually transmitted infections (STIs) remain a significant global health challenge, affecting millions of individuals daily. This study aimed to investigate the prevalence and causative organisms of common STIs in women aged 18-49 years who presented with symptomatic vaginal discharge at a tertiary care hospital in India. The primary objective was to assess the prevalence of common STIs, including syphilis, gonorrhoea, chlamydia, trichomoniasis, human immunodeficiency virus (HIV), and candidiasis, through the use of specific diagnostic tests.
Methods: A total of 100 non-pregnant women aged 18-49 years with vaginal discharge (excluding physiological discharge) were enrolled in the study. The research was conducted in the Department of Obstetrics and Gynecology LLRM Medical College, Meerut. Each participant was subjected to a detailed medical history and clinical examination. Vaginal and cervical swabs were taken for laboratory testing, and specific tests were performed for the detection of syphilis, gonorrhea, chlamydia, trichomoniasis, HIV, and candida. Data were analyzed using Microsoft Excel and statistical software such as GraphPad Prism 8.4.2 and statistical package for the social sciences (SPSS) version 25.
Results: The study found that 15% of participants were diagnosed with an STI, with *Candida* infection being the most prevalent, affecting 66.67% of those with STIs. *Chlamydia* and *Trichomonas* infections each accounted for 13.33% of the cases, while one case of syphilis was reported. Significant correlations were observed between the type of vaginal discharge and the presence of STIs, with blood-stained and mucopurulent discharge being more common among STI-positive women.
Conclusions: The prevalence of STIs observed in this study was consistent with findings in the broader epidemiological literature. *Candida* infection was the most frequently diagnosed, underscoring the need for targeted interventions, early detection, and awareness among women of reproductive age in both urban and rural settings.

Keywords: Sexually transmitted infections, Human immunodeficiency virus, Trichomoniasis

INTRODUCTION

Sexually transmitted infections (STIs) continue to be a pervasive public health problem, causing severe morbidity and even mortality, particularly among women of reproductive age. Over the past several decades, the incidence and prevalence of STIs have increased substantially, posing a significant burden on healthcare systems worldwide. Women are particularly vulnerable to the negative consequences of untreated STIs, including pelvic inflammatory disease (PID), infertility, ectopic pregnancies, and an increased risk of acquiring and transmitting human immunodeficiency virus (HIV).

Globally, the burden of STIs has been consistently high. A study by Fu et al reported that incident cases of STIs increased by 58.15% from 486.77 million in 1990 to 769.85 million in 2019, with an annual change in age-standardized incidence rates of just -0.04%.[1] The World Health Organization (WHO) has recognized the rapid rise in antimicrobial resistance, particularly for gonorrhea, as a

pressing concern. Given the global scale of this health challenge, it is critical to enhance the understanding of STI prevalence, patterns, and risk factors to implement effective public health interventions.[2] Despite significant progress in the prevention and treatment of STIs, many cases remain undiagnosed, particularly in low-resource settings. This is often due to a lack of access to healthcare services, social stigma, and the asymptomatic nature of many STIs.[3]

James et al on behalf of the WHO, in one of the recent assessments on diagnostic approaches to STIs, showed that STIs are often asymptomatic.[4] When symptoms occur, they can be non-specific and various laboratory tests rely on blood, urine, or anatomical samples. Viral infections, such as HIV, herpes simplex virus (HSV), and human papillomavirus (HPV), are particularly challenging due to their chronic and often incurable nature. Vaccines for HPV and hepatitis B provide crucial preventive measures, but there remains a significant gap in STI education, particularly in developing countries.

In India, the prevalence of STIs varies widely across regions and socio-economic strata, with higher rates reported in rural and underserved populations. Despite the large number of studies investigating STI prevalence globally, there is a relative lack of comprehensive data on the incidence of STIs among symptomatic women in tertiary care centers.[5] This study aims to address this gap by providing insights into the prevalence and risk factors associated with STIs in women of reproductive age who presented with vaginal discharge in a tertiary care setting.

METHODS

This cross-sectional study was conducted at the Suraksha Clinic, affiliated with the Department of Obstetrics and Gynecology, in collaboration with the Department of Microbiology at Lala Lajpat Rai Memorial (LLRM) Medical College, Meerut, from 01 October 2022 to 31 March 2024. The clinic serves as a major referral center, catering to women from both urban and rural backgrounds, making it an ideal setting for studying the prevalence of STIs.

A total of 100 non-pregnant women aged 18-49 years with vaginal discharge (excluding physiological discharge) were enrolled in the study. Ethical approval for the study was obtained from the Institutional Ethics Committee (IEC) of LLRM Medical College. Informed consent was obtained from all participants before enrollment. The sample size was calculated to ensure adequate statistical power to detect group differences.

Women aged 18-49 years who presented with abnormal vaginal discharge, with or without associated symptoms such as itching, lower abdominal pain, or burning sensation during urination, were included in the study. Pregnant women, women with physiological discharge, or those who were undergoing treatment for any known STIs were excluded.

Each participant was subjected to a detailed medical history and clinical examination. Data were collected on socio-economic status, sexual history, contraceptive use, menstrual hygiene, and other relevant factors. Vaginal and cervical swabs were taken for laboratory testing, and specific tests were performed for the detection of syphilis, gonorrhea, chlamydia, trichomoniasis, HIV, and candida. Blood samples were also taken for HIV, HBsAg, HCV, and VDRL testing.

Data were analyzed using MS Excel and statistical software such as GraphPad Prism 8.4.2 and statistical package for the social sciences (SPSS) version 25. Descriptive statistics were presented as proportions for categorical variables and means for continuous variables. Comparative analysis was done using the Chi-square test for categorical data and the Mann-Whitney test for continuous variables. A p value of <0.05 was considered statistically significant.

RESULTS

The study revealed that 15% of the women tested positive for at least one STI. The mean age of the participants was 30.57 years (±6.23), with a range of 20-45 years. Most women belonged to the middle class (59%) and were married (82%). The average age of women diagnosed with STIs was significantly lower (27.93±6.28 years) compared to those without STIs (31.04±6.14 years).

It was observed that 15% of patients in the study had a sexually transmitted infection. *Candida* infection was the most common amongst these patients (66.67% of patients, i.e., 10 out of 15). Two cases of chlamydia and 2 cases of trichomonas (13.33% each), with 1 case of syphilis, were seen in the study. The number of candida infections was 10, chlamydia and trichomonas were 25, and that of syphilis was 1 (Table 1).

Table 1: STI status.

Parameters	Number	Percentage (%)
STI status		
No	85	85
Yes	15	15
Candida	10	66.67
Chlamydia	2	13.33
Syphilis	1	6.67
Trichomonas	2	13.33
Prevalence rate (n=100)		
Candida	10	10
Chlamydia	2	2
Syphilis	1	1
Trichomonas	2	2

The type and quality of vaginal discharge were found to be significantly associated with STI presence. Blood-stained and mucopurulent discharges were more common in STI-positive patients compared to those without STIs. These findings indicate that blood-stained discharge and mucopurulent discharge were more frequently associated with STIs. The presence of curdy or mucoid discharge, however, was more common in patients without an STI (Table 2).

Additionally, women with STIs also exhibited higher total leukocyte count (TLC), elevated erythrocyte sedimentation rate (ESR), and increased urinary albumin levels, indicating a more severe inflammatory response. In terms of microbiological findings, women with STIs had lower Gardnerella counts and a lower Nugent score (4.93 versus 6.16), indicating alterations in the vaginal flora (Table 3).

It was seen that while a higher proportion of patients without STIs had white discharge (82.35% versus 53.33%), the incidence of dirty discharge (46.67% versus 2.35%), cervical erosions (20% versus 1.18%), and hypertrophy (66.67% versus 2.35%) were significantly higher in the patients with STIs (Table 4).

It was seen that a higher proportion of patients with STIs had cervical motion tenderness (66.67%), and fornicial tenderness (53.33%). The difference was significant statistically (Table 5).

Both groups had similar complaint profiles with no major difference in terms of the incidence of foul-smelling discharge, genital itching, genital ulcer, burning micturition, and lower abdominal pain. The results were not statistically significant (Table 6).

Table 2: Vaginal discharge parameters.

Vaginal discharge	No STI		STI		Chi-square values	P value (Chi-square test)
	Number	Percentage	Number	Percentage		
Duration (months)						
<3	21	24.71	3	20.00	0.1548	0.6940
≥3	64	75.29	12	80.00	0.1548	
Quality of discharge						
Blood stained	2	2.35	2	13.33	4.0033	0.0929
Curdy	1	1.18	1	6.67	1.9608	
Mucoid	73	85.88	10	66.67	3.3365	
Mucopurulent	9	10.59	2	13.33	0.0981	

Table 3: Gram staining findings.

Gram stain	No STI	STI	Chi-square values	P value (Chi-square test)
	Number	Number		
Lactobacillus				
0	10	2	0.0297	0.3421
1+	3	1	2.3028	
2+	18	1	1.8338	
3+	27	6	0.3911	
4+	28	7	1.0558	
Gardnerella				
0	4	4	7.6037	0.0119
1+	27	7	1.2618	
2+	18	1	1.8338	
3+	16	1	1.3354	
4+	20	3	0.0897	
Mobiluncus				
0	39	9	1.0181	0.3068
1+	15	2	0.2548	
2+	13	4	1.1687	
3+	11	1	0.4753	
4+	7	1	0.0426	
Clue cells				
0	12	5	3.3365	0.0678
1	73	10	3.3365	

Continued.

Gram stain	No STI	STI	Chi-square values	P value (Chi-square test)
	Number	Number		
Nugent scoring				
Mean	6.16	4.93		<0.0001
SD	1.38	1.83		

Table 4: Per speculum findings.

Findings	No STI		STI		Chi-square values	P value (Chi-square test)
	Number	Percentage	Number	Percentage		
White discharge	70	82.35	8	53.33	6.2571	0.0124
Dirty discharge (curdy/green/greyish/ blood stained	2	2.35	11	46.67	56.7969	<0.00001
Cervical erosions	1	1.18	3	20.00	11.7647	0.0006
Cervical hypertrophy	2	2.35	10	66.67	49.9406	<0.00001

Table 5: Per vaginum or bimanual examination findings.

Per vaginum findings	No STI		STI		Chi-square values	P value (Chi-square test)
	Number	Percentage	Number	Percentage		
Cervical motion tenderness	30	35.29	10	66.67	5.2288	<0.05
Fornicial fullness	20	23.52	5	33.33	0.6536	0.4188
Fornicial tenderness	18	21.17	8	53.33	6.8526	0.0088

Table 6: Other clinical complaints.

Complaints	No STI	STI	Chi-square values	P value (Chi-square test)
Foul smelling	67	11	0.2240	0.6378
Itching	58	9	0.3911	0.5335
Genital ulcer	2	1	0.8153	0.5507
Other perineal lesions	8	1	0.1173	0.7337
Burning micturition	41	5	1.1398	0.2878
Lower abdominal pain	75	14	0.3385	0.5632

DISCUSSION

The average age of the patients in the study was 30.57±6.23 years, with a range of 20-45 years and a median age of 30 years. The interquartile range was 25-35. Most of the patients were married females in the age group of 20-30 years (58%) and belonged to the middle class (59%).

Fifteen percent (15%) of patients in the study had a sexually transmitted infection. Candida infection was the most common amongst these patients, with 66.67% of patients (10 out of 15). Two cases of chlamydia and 2 cases of trichomonas (13.33%) with 1 case of syphilis were seen in the study. Doley et al showed that the prevalence of RTI/STI based on symptoms was 53.7%, clinical 39.2%, and laboratory confirmed 36.7%.[6] The prevalence of laboratory-confirmed RTI/STI among asymptomatic women was 21.6%. Chaudhary et al showed that the prevalence of reproductive tract infections was 9.7%.[7] The prevalence of candidiasis was maximum (11.5%), followed by chlamydia (4.1%), syphilis (4.1%), bacterial vaginosis (1.73%), and trichomoniasis (0.57%), which was in line with the findings of the current study. Mittal et al in a very recent study from Dehradun, also showed that 50% of females attending community health centers had laboratory-confirmed RTIs/STIs.[8] Bacterial vaginosis was the most prevalent infection (25.9%), followed by candidiasis (24.6%), Trichomonas vaginalis (2.6%), and syphilis (1.3%). Neisseria gonorrhoeae and Chlamydia trachomatis were not detected.

Profile of patients with STI and risk factors for STI

The average age of patients with STI was lower in the study (27.93±6.28 versus 31.04±6.14 in the non-STI group). A higher proportion of patients with STIs had blood-stained, curdy, and mucopurulent discharge compared to the normal group. This trend was statistically significant, with a p value of 0.0929. It was seen that while a higher proportion of patients with no STI had curdy white discharge (82.35% versus 53.33%), the incidence of dirty white discharge (46.67% versus 2.35%), green and greyish discharge (6.67% versus 0%), blood-stained

discharge (13.33% versus 0%), erosions (20% versus 1.18%), and hypertrophy (66.67% versus 2.35%) was significantly higher in the patients with STIs. Chaudhary et al showed that the most common presentation was genital discharge (52.8%), followed by lower abdominal pain (45.2%).[5] They also showed that the factors found to be significantly associated with RTI were illiteracy ($p<0.05$), unemployment ($p<0.05$), history of RTI in the patient ($p=0.001$), and the presence of RTI in their partner ($p<0.05$). Samanta et al showed that the most common symptoms were dysuria and vaginal discharge among males and females, respectively.[9] Almost half of the STI symptomatic (52% male, 50% female) did nothing for their symptoms. Ravi et al showed similar findings when they showed that thick white discharge and pain in the lower abdomen (not related to menses) were the most commonly experienced symptoms.[10] Gupta et al showed similar results when they highlighted that almost half of the symptom-positive women were of 25–34 years of age.[11]

Durga et al showed similar risk factors as seen in the current study when they highlighted that the important risk factors identified for STIs were age group between 26-30 years, high-risk sexual behaviors, poor socioeconomic factors, poor menstrual hygiene, and lack of contraception.[12] Rathod et al showed that the prevalence of RTI was found to be 36.1%, with a maximum prevalence of 42% in the age group of 35 years and above.[13] Also, the prevalence was high in illiterate women (53.2%), women having one or two children (54.1%), women using IUDs (54.5%), and women having per capita income <Rs. 1000/- (46.35 Doley et al showed that women using cloth during menstruation (odds ratio [OR] = 2.242), having a positive history of abortion (OR=2.373), not using condoms during the last sexual intercourse (OR=1.998), and washing the genital area with only water during menstruation (OR=1.929) had higher odds of having RTI/STI.[6]

Limitations

A major limitation of the study is that it is not a community-based survey, which would require randomized sampling, much effort, and would be costly. Another limitation is that the sample size is small to a pre-specified cohort of women; hence, generalization of the findings and conclusions will need to be interpreted with utmost care.

CONCLUSION

This study provides important insights into the prevalence and risk factors associated with STIs in women of reproductive age in a tertiary care setting in India. The findings underscore the need for comprehensive screening programs and public health interventions to reduce the incidence of STIs, particularly among younger women. The high prevalence of Candida infection suggests a need for greater awareness and education on menstrual hygiene and sexual health practices. Early detection and treatment of STIs are essential to prevent long-term complications such as infertility and to reduce the spread of infections within the community.

Future research should focus on expanding the study population to include women from different socio-economic backgrounds and geographic regions. Longitudinal studies may also help elucidate the long-term health outcomes associated with untreated STIs and the effectiveness of public health interventions in reducing STI rates.

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