e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(8); 1291-1300

Original Research Article

Clinical and Microbiological Profile of Maternal Genitourinary Tract Infections among Women with Spontaneous Preterm Labour: A Tertiary-Care Hospital-Based Study

Ambika B. Patil[1], Veeresh M. Nagathan[2], Sushma Rachel S.[3]

[1]Postgraduate in Department of OBG, S. Nijalingappa Medical College and HSK Hospital and Research Center, Bagalkot, Karnataka, India

[2]Professor and Unit Chief, Department of OBG, S. Nijalingappa Medical College and HSK Hospital and Research Center, Bagalkot, Karnataka, India

[3]Assistant Professor, Department of OBG, Raichur Institute of Medical Sciences and Teaching Hospital, Raichur, Karnataka, India

Received: 01-05-2026 / Revised: 15-06-2026 / Accepted: 21-07-2026

Corresponding author: Dr. Ambika B Patil

Conflict of interest: Nil

Abstract

Background: Spontaneous preterm labor is a major cause of neonatal morbidity and mortality. Maternal genital and urinary tract infections have been linked to inflammatory pathways involved in spontaneous preterm birth, but the role of individual microorganisms varies greatly among different populations. Characterization of the local clinical and microbiological spectrum may be useful in guiding appropriate diagnostic workup and management.

Objective: To determine the clinical and microbiological profile of maternal genitourinary tract infections among women presenting with spontaneous preterm labour at a tertiary-care hospital.

Materials and Methods: A hospital based prospective study was done among 100 women with singleton pregnancies presenting with spontaneous preterm labor between 28 and 36+6 weeks of gestation at S. Nijalingappa Medical College and HSK Hospital & Research Center, Bagalkot, Karnataka from August 2022 to February 2024. Clinical and obstetric characteristics were documented. Urine specimens and high vaginal swabs were cultured, examined microscopically and tested for antimicrobial susceptibility. Microorganisms were identified by standard microbiological methods and by VITEK-based identification. Participants were classified based on genital, urinary or combined genitourinary infection. Data were analysed by SPSS version 19.0. Chi-square test and Student's t test were applied appropriately with $p<0.05$ considered statistically significant.

Results: Among the 100 participants 49% were aged between 20–24 years and 63% of them were multigravida. Most women (67%) were between 34 and 37 weeks of gestation. The most common comorbidity noted in the study was hypothyroidism (35%). Genital infection was present in 55 %, urinary infection in 33 % and combined genitourinary infection in 12 %. Candida species was the most common isolate from vaginal specimens (33%) followed by Escherichia coli (15%) and Gardnerella vaginalis (9%). Candida species was isolated in 60% of women with genital infection. E. coli was the most common urinary pathogen (48.48%) and was also isolated in 75% of combined genitourinary infections. We found significant association between microorganism and maternal co-morbidities ($p=0.045$).

Conclusion: Among the genitourinary infections, genital infection was found to be most common infection in women with spontaneous preterm labor. Candida species was the most common pathogen for genital isolates and E. coli was the predominant pathogen for urinary and combined genitourinary isolates. These results support the careful clinical assessment and appropriate microbiological evaluation of suspected maternal genitourinary infection. The study was a prospective observational study without a term-control group, so the findings describe the infection profile among women with spontaneous preterm labor and do not establish a causal relationship between infection and preterm birth.

Keywords: Spontaneous Preterm Labour; Genitourinary Infection; Genital Infection; Urinary Tract Infection; Candida; Escherichia Coli; Pregnancy.

DOI: 10.25258/ijcpr.18.8.193

Introduction

Preterm birth (PTB), defined as birth before 37 completed weeks of gestation, continues to be a leading cause of neonatal morbidity and mortality worldwide. The pathogenesis is multifactorial and involves maternal, fetal, placental and environmental factors. Infection and inflammation are important components of the biological pathways involved in spontaneous preterm birth, although the specific infectious triggers and host responses are not fully characterised [1,2].

The lower genital tract is a dynamic microbial ecosystem in which Lactobacillus dominated communities generally co-exist with a diverse range of microorganisms. Spontaneous preterm birth has been investigated in relation to changes in the microbial environment including bacterial-vaginosis-associated dysbiosis and changes in Lactobacillus abundance [3,4].

A systematic review and network meta-analysis identified specific vaginal community-state patterns that might be associated with preterm birth, but the strength and consistency of these associations differ among populations and microbiological methodologies [3].

Bacterial vaginosis has been long under scrutiny as a potential risk factor for preterm delivery. Meta-analyses have shown an association between bacterial vaginosis and preterm birth, especially when infection or dysbiosis occurs early in pregnancy [5,6]. The relationship is not uniform and culture-based identification of individual organisms should not be confused with causation. Molecular studies have also shown considerable geographic and population-level diversity in vaginal microbial communities [4].

Another clinically important aspect of genitourinary infection during pregnancy is maternal urinary tract infection. Previous studies on women who had preterm labor have shown the prevalence of urinary infection to be in the range of 28% to 30% and E.coli is usually the predominant urinary isolate [7]. Genital and urinary infections can occur together but the combined microbiology of both sites has been less well studied than genital or urinary infection individually.

Indian studies have shown wide variation in prevalence and microbiological spectrum of genital and urinary infections among women with preterm labor. Yarlagadda et al. observed 33.62% vaginal infection and 27.58% urinary infection in women who came with preterm labor, with Candida being the most common among vaginal isolates and E. coli among urinary isolates [7].

A study from Gujarat reported genital infection in 44%, urinary infection in 30% and combined genitourinary infection in 16% of women with preterm labor [8]. These findings indicate that local microbiological data may be helpful to understand the clinical spectrum of infection in different obstetric populations. While there is biological plausibility for a role of infection-related pathways, it remains difficult to establish a causal relationship between maternal genital or urinary colonisation/infection and spontaneous preterm labor. Differences between studies may be due to variation in gestational age, geography, host characteristics, diagnostic criteria and microbiological techniques [3,4]. Hence, the characterisation of clinical presentation and microbiological spectrum in individual tertiary care set up remains relevant.

The present study was undertaken to find out clinical and microbiological profile of maternal genitourinary tract infections among women presenting with spontaneous preterm labor attending a tertiary care hospital in Karnataka, India. The study was aimed to determine the distribution of genital, urinary and combined genitourinary infections and the microorganisms identified from vaginal and urine specimens.

Materials and Methods

Study Design and Setting: This was a hospital based case-series study conducted in the Department of Obstetrics and Gynecology, S. Nijalingappa Medical College and HSK Hospital & Research Center, Bagalkot, Karnataka, India. The study was conducted between August 2022 and February 2024. Pregnant women admitted in the labor room or inpatient department satisfying the pre-defined eligibility criteria were recruited.

Study Population: Women with singleton pregnancies of 28 to 36 + 6 weeks of gestation with spontaneous preterm labor were included. Diagnosis of labor was made on the basis of regular uterine contractions with cervical dilatation >1 cm and cervical effacement >80%. The study protocol also required singleton pregnancy and allowed for premature rupture of membranes less than 12 hours in duration.

Inclusion criteria

1. Pregnant women who presented between 28 and 36+6 weeks of gestation;
2. Pregnant women who presented with the spontaneous onset of premature labor;
3. Singleton pregnancy
4. Premature rupture of membranes for less than 12 hours.

Exclusion Criteria: Women with uterine malformations, multifetal gestation,

polyhydramnios, gestational or pre-existing diabetes mellitus, cervical length <25 mm on first- or second-trimester ultrasonography, hypertensive disorders of pregnancy, conception following in-vitro fertilization, intrauterine fetal demise or immunodeficiency were excluded.

Sample Size: Sample size estimation was performed using OpenEpi version 2.3.1. Sample size was calculated assuming prevalence of vaginal infection of 33%, 95% confidence level and 10% absolute precision and was found to be 88, hence 100 women with preterm labor were studied.

Clinical Assessment: After obtaining informed consent, all the participants were subjected to detailed history taking and systemic and obstetric examination. A speculum examination was conducted to assess the cervix and vagina and to detect clinically evident infection. Maternal blood was collected for complete blood count and C-reactive protein. A midstream clean catch specimen was collected for microscopy and culture of urine. A high vaginal swab was collected for microscopy, culture and susceptibility testing.

The presenting complaints were abdominal pain, vaginal discharge, per-vaginal fluid leak and dysuria. Follow-up of participants was continued until delivery or discharge without delivery.

Collection of urine and microbiological examination: Appropriate perineal cleaning was performed and midstream clean catch urine was collected in approximately 20 mL. Specimens were submitted for microscopy, semiquantitative culture and antimicrobial susceptibility testing. Urine was plated on MacConkey and cystine-lactose-electrolyte-deficient agar and read at 24-48 hours. A colony count > 10CFU/ml was considered significant and counts of between 10 3 and 10 5 CFU/ml were interpreted in conjunction with clinical findings.

High vaginal swab: Specimens were collected from the posterior fornix of vagina under clean condition. Swabs were sent for wet mount and Gram stain microscopy, culture and antimicrobial susceptibility testing. The specimens were plated on MacConkey and blood agar and examined at 24 to 48 hours.

Classification of infection

Participants were grouped into three categories for analysis according to clinical and microbiological assessment:

- Genital infection: evidence of infection of the genital tract.
- Urinary infection: signs of urinary tract infection.
- Combined genitourinary infection: simultaneous genital and urinary infection

Statistical Analysis: Data were entered in Excel spreadsheet and analysed using SPSS version 19.0. Quantitative variables were summarised as mean and standard deviation or median and range as appropriate and categorical variables were summarised as frequencies and percentages. Quantitative variables were compared using the Student's t test and categorical variables with the chi-square test. Statistical significance was set at p-value <0.05.

Ethical Considerations: Ethics approval was obtained from the institutional ethics committee. All participants gave written informed consent in their local language prior to enrolment.

Results

Baseline Characteristics: A total of 100 women with spontaneous preterm labour were included. Nearly half of the participants (49%) were aged 20–24 years, 36% were aged 25–29 years and 15% were aged 30–35 years. Sixty-three percent were multigravida and 37% were primigravida.

Most participants (67%) presented between 34 and 37 weeks of gestation, while 18% presented at 28–30 weeks and 15% at 31–33 weeks. Forty-eight percent had no recorded comorbidity. Hypothyroidism was the most frequently reported comorbidity (35%), followed by anaemia (16%) and ureteric calculi (1%).

Table 1: Baseline demographic and obstetric characteristics

Characteristic	n	%
Age, years		
20–24	49	49.0
25–29	36	36.0
30–35	15	15.0
Gravidity		
Primigravida	37	37.0
Multigravida	63	63.0
Gestational age, weeks		
28–30	18	18.0
31–33	15	15.0
34–37	67	67.0
Comorbidity		

None	48	48.0
Hypothyroidism	35	35.0
Anaemia	16	16.0
Ureteric calculi	1	1.0

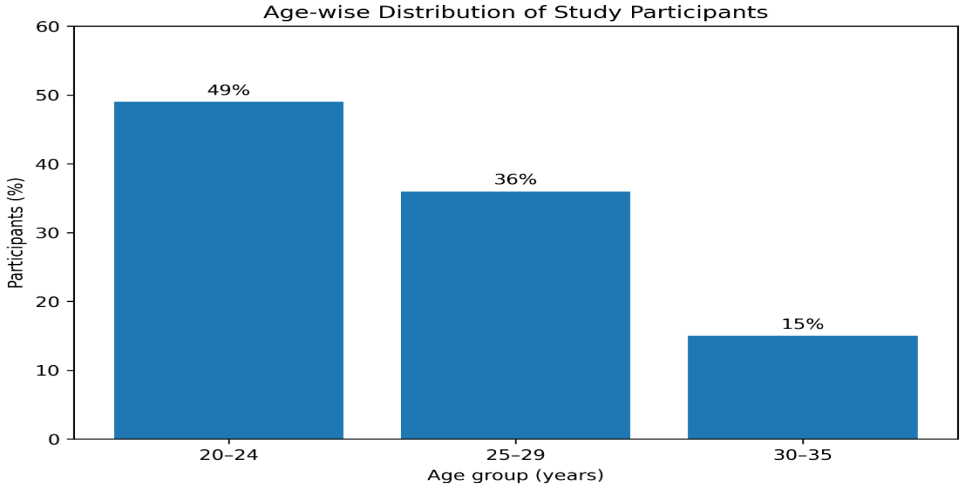

Figure 1: Age wise distribution of participants

Clinical Presentation: Among women with genital infection, the most common presentation was abdominal pain accompanied by vaginal discharge (27.3%), followed by abdominal pain alone (25.5%) and abdominal pain with per-vaginal fluid leak (21.8%). Among participants with combined genitourinary infection, abdominal pain with dysuria and vaginal discharge was the predominant complaint (58.3%), followed by per-vaginal fluid leak with dysuria (25.0%).

In women with urinary infection, abdominal pain with dysuria was the predominant presentation (90.9%).

Table 2: Predominant presenting complaints according to infection category

Infection category	Predominant complaint	n (%)
Genital infection	Abdominal pain + vaginal discharge	15 (27.3)
Combined genitourinary infection	Abdominal pain + dysuria + vaginal discharge	7 (58.3)
Urinary infection	Abdominal pain + dysuria	30 (90.9)

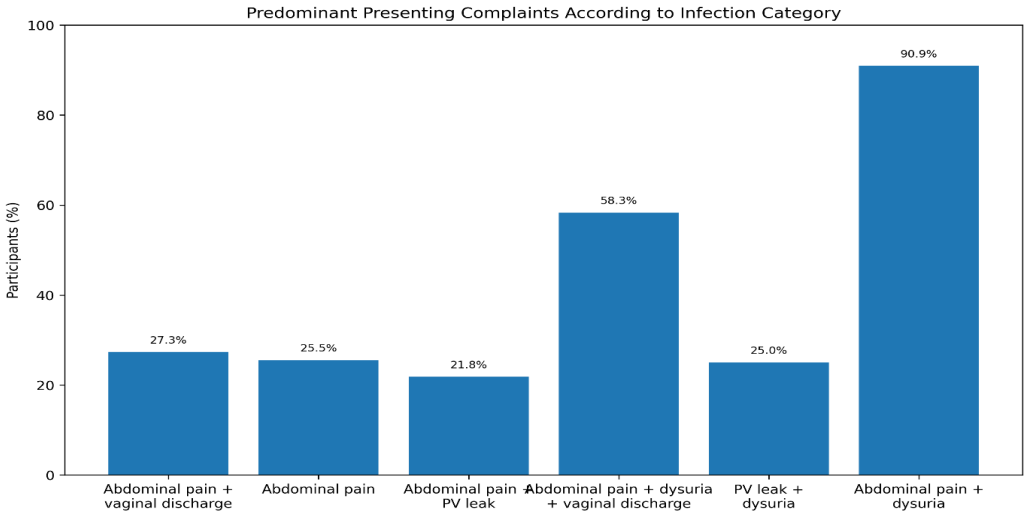

Figure 2: Distribution of infection

Genital infection was the most frequently identified category, occurring in 55 participants (55.0%), followed by urinary infection in 33 (33.0%) and combined genitourinary infection in 12 (12.0%).

Table 3: Distribution of genitourinary infection categories

Infection category	n	%
Genital infection	55	55.0
Urinary infection	33	33.0
Combined genitourinary infection	12	12.0
Total	**100**	**100.0**

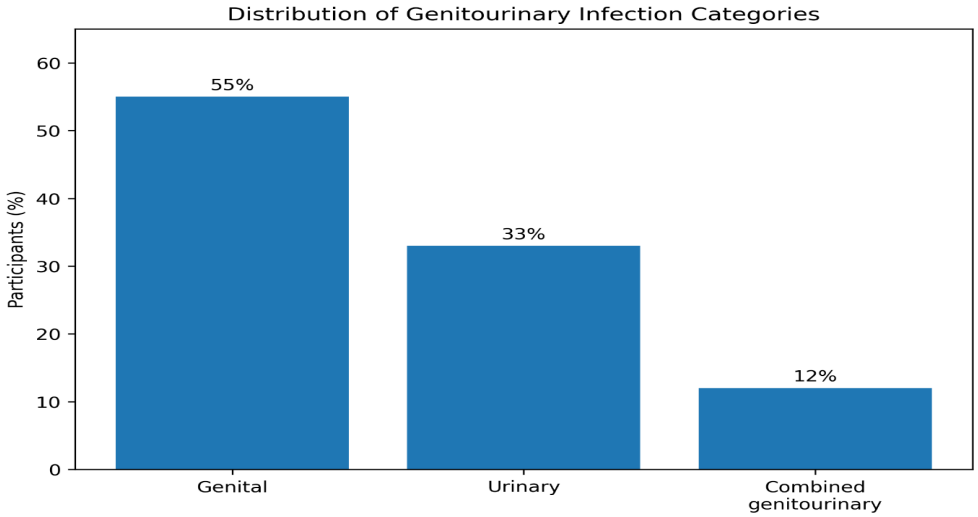

Figure 3: Distribution of Genitourinary infections

Vaginal microbiological profile: Among the 100 high vaginal swabs, Candida spp. was the most frequently identified organism (33%), followed by E. coli (15%) and Gardener vaginalis (9%). Staphylococcus species accounted for 4%, Acinetobacter baumannii complex for 3%, while Group B Streptococcus, Klebsiella species and Streptococcus species each accounted for 1%. No growth was reported in 33% of specimens.

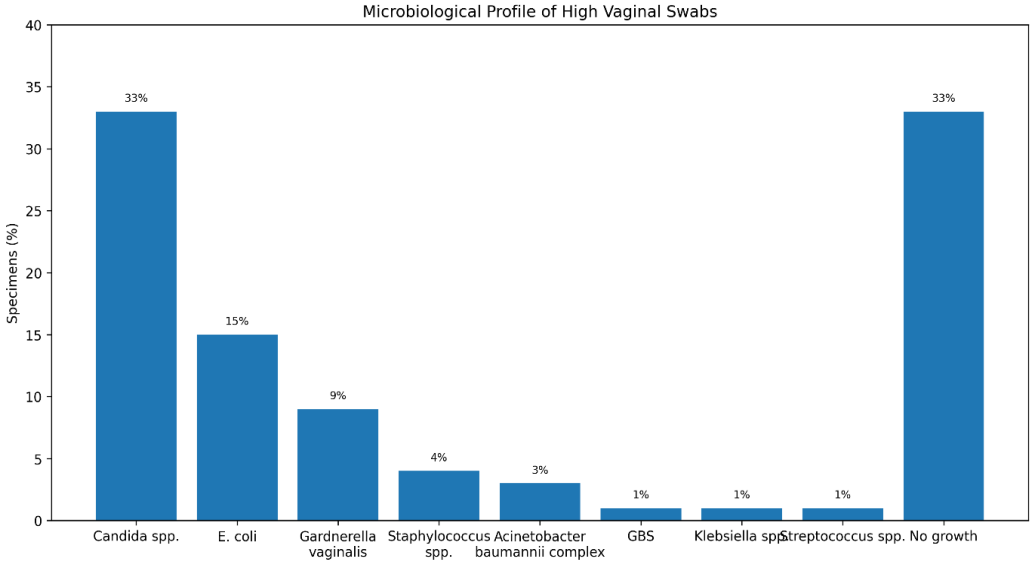

Figure 4: Microorganisms among women with genital infection

Among the 55 women classified as having genital infection, Candida spp. was predominant, accounting for 33 cases (60.0%). E. coli and Gardnerella vaginalis were each isolated in 6 cases (10.91%). Staphylococcus spp. was identified in 5 cases (9.09%), Acinetobacter baumannii complex in 3 cases (5.45%), and Group B Streptococcus and Klebsiella spp. in 1 case each (1.82%).

Table 4: Microorganisms isolated among women with genital infection

Microorganism	n	%
Candida spp.	33	60.00
E. coli	6	10.91
Gardnerella vaginalis	6	10.91
Staphylococcus spp.	5	9.09
Acinetobacter baumannii complex	3	5.45
Group B Streptococcus	1	1.82
Klebsiella spp.	1	1.82
Total	**55**	**100.00**

The predominance of Candida among genital isolates is consistent with the study by Yarlagadda et al., in which Candida was also the most frequently isolated organism from high vaginal swabs among women with preterm labour [7].

The present findings also differ somewhat from studies in which Gardnerella, or coagulase-negative staphylococci predominated, emphasizing variation in local microbiological profiles [8,9].

Urinary microbiological profile: Urinary infection was identified in 33 participants.

E. coli was the predominant urinary isolate, occurring in 16 cases (48.48%).

Insignificant bacteriuria was documented in 8 cases (24.24%), Klebsiella spp. in 5 (15.15%), and Group B Streptococcus and Staphylococcus haemolyticus in 2 cases each (6.06%).

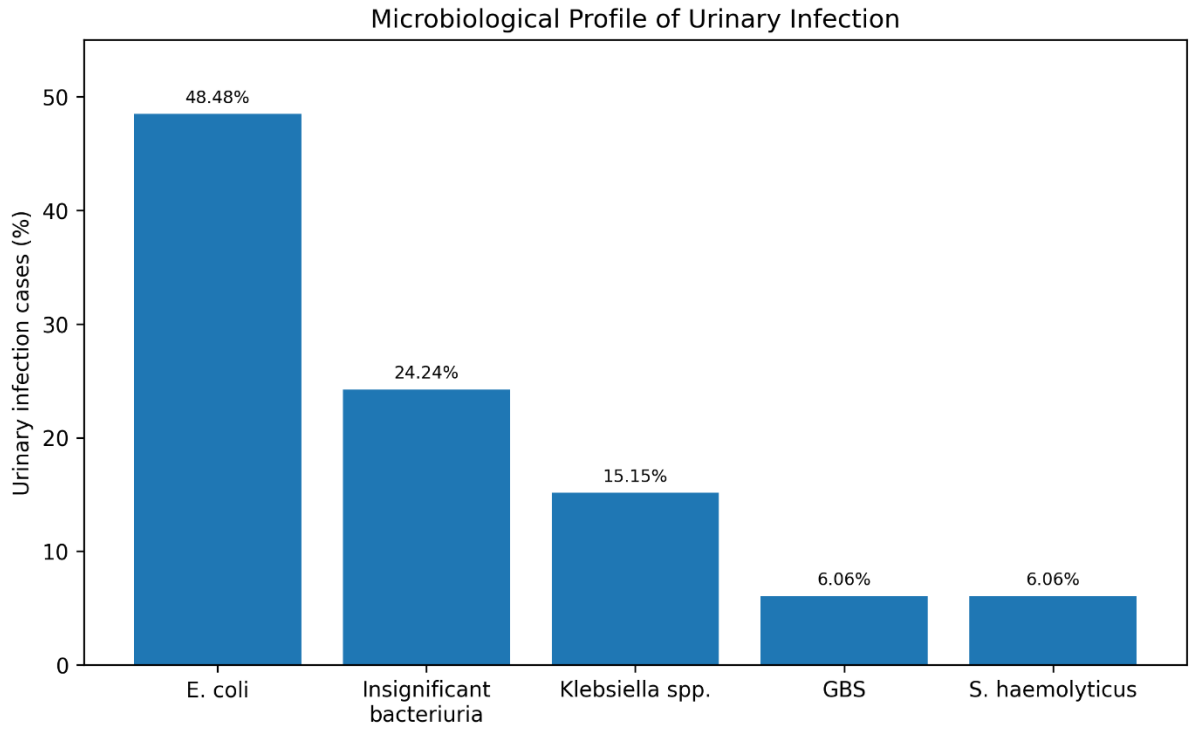

Figure 5: Microbiological profile of urinary infections

The predominance of E. coli is consistent with previous Indian data among women presenting with preterm labour [7].

Combined genitourinary infection: Twelve women (12%) had evidence of concurrent genital and urinary infection. E. coli was identified in 9 cases (75%), while Gardnerella vaginalis was identified in 3 cases (25%).

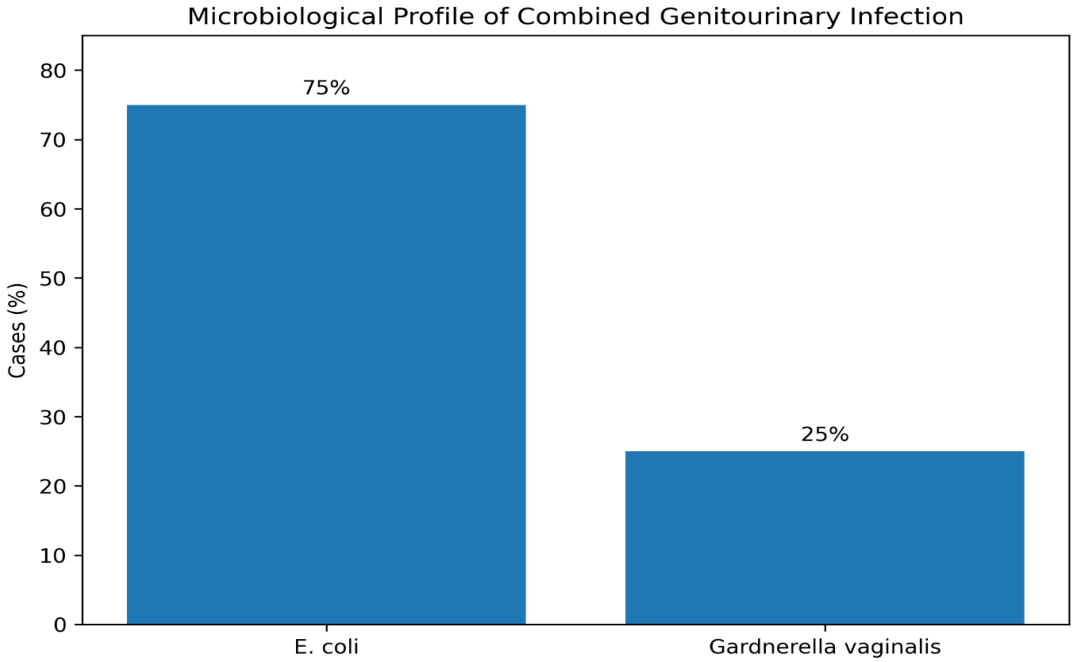

Figure 6: Microbiological profile of combined genitourinary infections

Infection according to gravity: Genital, combined genitourinary and urinary infections were all more frequently observed among multigravida women than primigravida women. Among women with genital infection, 67.3% were multigravida; the corresponding proportions were 58.3% for combined genitourinary infection and 66.7% for urinary infection.

Table 5: Infection category according to gravidity

Infection category	Multigravida, n (%)	Primigravida, n (%)
Genital infection	37 (67.3)	18 (32.7)
Combined genitourinary infection	7 (58.3)	5 (41.7)
Urinary infection	22 (66.7)	11 (33.3)

Microorganisms and maternal comorbidities: The distribution of microorganisms differed significantly according to maternal comorbidity (p=0.045). Candida and E. coli were the most frequently represented organisms in the overall analysis.

Table 6. Major microorganisms according to maternal comorbidity

Microorganism	Anaemia	Hypothyroidism	Ureteric calculi	No comorbidity
Candida spp.	6	13	0	20
E. coli	2	13	0	13
Gardnerella vaginalis	4	1	1	3
Klebsiella spp.	2	4	0	1
Other/remaining organisms	2	4	0	11

Overall association: p=0.045.

Because the number of women with some comorbidities was small, particularly ureteric calculi, this association should be interpreted cautiously.

Microorganisms and Presenting Complaints: A statistically significant association was observed between presenting complaint and microorganism (p=0.005). Candida and E. coli were the most frequently identified microorganisms in the overall clinical-correlation analysis.

Discussion

The present study was carried out to describe the clinical and microbiological profile of genitourinary infections in 100 women presenting with spontaneous preterm labor. Genital infection was the predominant category in 55% of participants, followed by urinary infection in 33% and genitourinary infection in 12%. Candida species was the most frequently isolated organism from vaginal samples, and E. coli was the most frequently isolated organism from urine samples and from combined genitourinary infections.

The demographic profile revealed that almost half of the women were in the age group of 20–24 years

and 63% were multigravidae. The majority were multigravida women similar to the findings of Yarlagadda et al. where 78.44% women in their study with preterm labor were multigravidae [7]. Other studies, however, have reported a higher proportion of primigravida women, showing that the distribution of parity differs between populations [8,9]. Differences in referral populations and demographic characteristics might explain these differences rather than a direct association between gravidity and infection.

In the present study, most of women were between 34 and 37 weeks of gestation. This predominance of late-preterm is clinically relevant since women presenting in this gestational window constitute a significant proportion of spontaneous preterm labor admissions whereas the infectious profile may be different at earlier gestations.

Almost half of the participants had no recorded comorbidity. Hypothyroidism and anemia were the most common comorbidities reported. The current study was not designed to evaluate these conditions as independent risk factors for preterm labor and therefore these findings should be interpreted descriptively.

Genital infection was detected in 55% of participants. This frequency is higher than the 33.62% reported by Yarlagadda et al. in 116 women with preterm labor [7]. In contrast, a case control study from Gujarat reported genital tract infection in 44% of women with preterm labor, urinary infection in 30% and combined genitourinary infection in 16% [8]. Differences between studies may be due to variation in definition, specimen collection, laboratory techniques and study populations. Important to point out that only women with spontaneous preterm labor were included in the present study; there was no term-control group.

Candida species was the most frequent organism found in vaginal specimens, accounting for 33% of all specimens and 60 percent of organisms in women classified as having genital infection. Similarly, Candida was the most common isolate in high vaginal swabs among women with preterm labor reported by Yarlagadda et al. [7]. Other Indian studies have reported different prevalent organisms including coagulase negative staphylococci and Gardnerella vaginalis [9, 10]. Such differences reflect the heterogeneity of genital microbiological profiles.

But Candida should not be taken as an indicator that a candidal infection is the cause of pre-term labor. One systematic review and meta-analysis cited in our study found no clear evidence that vulvovaginal yeast infection was associated with increased preterm birth risk [11]. Culture-based identification does not differentiate between symptomatic infection and colonisation.

Gardnerella vaginalis was identified in 9% of vaginal specimens. Gardnerella is frequently found in bacterial-vaginosis-type microbial communities and bacterial vaginosis has been extensively studied in relation to preterm delivery [5, 6]. But the relationship between individual bacterial species and preterm birth is complicated. Molecular studies have revealed considerable variation in vaginal microbial communities within and between individuals and populations. Several studies have not demonstrated a significant difference in overall community composition between women with preterm and term deliveries.

Urinary infection was present in 33 percent of the study population. The most common urinary isolate was E. coli which accounted for 48.48 % of the urinary infections followed by Klebsiella. These findings are in line with the observations of Yarlagadda et al. who found urinary infection in 27.58% of women with preterm labor and E. coli as the most common urinary pathogen [7]. The predominance of E. coli is also consistent with the general epidemiology of urinary tract infection in pregnancy.

The finding that 12% of women had combined genitourinary infection is important. This group was composed of 75% of E. coli and 25% of Gardnerella vaginalis. Previous Indian studies have also reported combined genital and urinary infection among women with preterm labor [8]. The involvement of both sites at the same time suggests that both genital and urinary symptoms should be assessed in women presenting with spontaneous pre-term labor.

The presenting complaint varied according to the type of infection. The most common symptoms in women with genital infection were abdominal pain with vaginal discharge and in women with urinary infection abdominal pain with dysuria. The most common presentation in mixed genitourinary infection was abdominal pain with dysuria and vaginal discharge. There was a significant association between clinical complaints and microorganisms ($p=0.005$), suggesting that the presenting symptoms may be useful in giving clues as to the site or type of infection. However, diagnosis based on symptoms alone is not sufficient to identify microbiological etiology.

There was also a significant correlation between microorganism distribution and maternal comorbidities ($p=0.045$). The study was not designed to identify the underlying mechanism but this observation may be due to variations in host characteristics or healthcare exposure. This finding should be considered exploratory given the

relatively small numbers in some of the comorbidity categories, particularly ureteric calculi.

The biological link between infection and spontaneous preterm birth is still complicated. Microbial colonisation does not equate with invasive infection or causality [1,2], but infection-associated inflammatory pathways may contribute to cervical remodelling, membrane rupture, and uterine activation. Molecular studies have also shown contradictory results concerning the association between vaginal community composition and preterm birth [3,4]. Thus, the relatively high frequency of infection found in this cohort should not be taken as evidence that the identified organisms initiated preterm labor.

This study is clinically relevant because genital and urinary infections are potentially recognizable and treatable conditions. The predominance of Candida in genital and E. coli in urinary specimens provides useful local microbiological information.

The selection of antimicrobial therapy, however, should be based on clinical assessment, culture and susceptibility results, and established obstetric and microbiological guidelines rather than the distribution of organisms in this single-centre study.

Study Strengths: Strengths included simultaneous assessment of genital and urinary infection, inclusion of clinical and microbiological variables, and characterisation of specific microorganisms by laboratory culture and identification methods. The study has only considered the combined genitourinary infection and not the genital and urinary infection as separate entities.

Limitations : This study has some limitations. First, it was done in a single tertiary-care center and only 100 participants were included; thus, generalisability is limited. Second, the case-series design did not include a term-control group, thus preventing the estimation of relative risks or odds ratios for preterm birth, and causal relationships cannot be established. Third, the microbiological evaluation was primarily based on conventional microscopy and culture, and thus may not cover the entire vaginal microbial community detectable by molecular techniques. Fourth, the study protocol excluded some potentially important maternal conditions that may further limit generalisability. Finally, a few of the outcome analyses in this study had incomplete denominators. As such those analyses should not be extrapolated to the entire cohort without appropriate qualification.

Conclusion

Maternal genitourinary infections were frequently identified in women presenting with spontaneous preterm labor in this tertiary care hospital based case series. The most common type of infection was genital, followed by urinary and combined genitourinary infections. Candida species was the most common organism in genital samples. E. coli was the leading urinary pathogen and the most common organism in combined genitourinary infection.

There were significant associations between microorganism distribution and maternal comorbidities and between microorganisms and presenting clinical complaints. These results support careful clinical and appropriate microbiological assessment in women presenting with symptoms suggestive of genital or urinary infection in preterm labor.

Nevertheless, the findings should be considered as a description of the clinical and microbiological profile and not as proof of causation. Multi-centre controlled studies, employing standardised microbiological and molecular techniques, are required to determine whether specific maternal genitourinary infections contribute independently to spontaneous preterm delivery and whether screening and treatment aimed at such infections can improve maternal and neonatal outcomes.

References

1. Cappelletti M, Della Bella S, Ferrazzi E, Mavilio D, Divanovic S. Inflammation and preterm birth. J Leukoc Biol. 2016;99(1):67-78. doi:10.1189/jlb.3MR0615-272RR. (OUP Academic)
2. Agrawal V, Hirsch E. Intrauterine infection and preterm labor. Semin Fetal Neonatal Med. 2012;17(1):12-19.
3. Gudnadottir U, Debelius JW, Du J, Hugerth LW, Danielsson H, Schuppe-Koistinen I, et al. The vaginal microbiome and the risk of preterm birth: a systematic review and network meta-analysis. Sci Rep. 2022;12(1):7926. doi:10.1038/s41598-022-12007-9. (Nature)
4. Gulavi E, Mwendwa F, Atandi DO, Okiro PO, Hall M, Beiko RG, et al. Vaginal microbiota in women with spontaneous preterm labor versus those with term labor in Kenya: a case control study. BMC Microbiol. 2022;22:270. doi:10.1186/s12866-022-02681-0. (PubMed Central (PMC))
5. Flynn CA, Helwig AL, Meurer LN. Bacterial vaginosis in pregnancy and the risk of prematurity: a meta-analysis. J Fam Pract. 1999;48(11):885-892.
6. Leitich H, Bodner-Adler B, Brunbauer M, Kaider A, Egarter C, Husslein P. Bacterial vaginosis as a risk factor for preterm delivery: a meta-analysis. Am J Obstet Gynecol. 2003;189(1):139-147.
7. Yarlagadda S, G S, Narra PJL. Association of vaginal infections in preterm labour. Int J

Reprod Contracept Obstet Gynecol. 2018;7(6): 2174-2179. doi:10.18203/2320-1770.ijrcog20 182030. (IJRCOG)
8. Patel UM, Jani PS, Kakani CR. A case control study on correlation between genitourinary infection and preterm labour. Natl J Med Res. 2015;5(1):83-86.
9. Shivaraju P, Purra P, Bheemagani N, Lingegowda K. Vaginal infections and its relation to preterm labour, PPROM, PROM and its outcome. Int J Reprod Contracept Obstet Gynecol. 2015;4(5):1422-1426.
10. Philip T, Devassia N. A case control study of the association of vaginal infections with preterm labour and neonatal outcome. J Evid Based Med Healthc. 2018;5(46):3205-3209.
11. Gigi RMS, Buitrago-Garcia D, Taghavi K, Dunaiski CM, van de Wijgert JHHM, Peters RPH, et al. Vulvovaginal yeast infections during pregnancy and perinatal outcomes: systematic review and meta-analysis. BMC Womens Health. 2023;23(1):116.