

EVALUATION OF GENITOURINARY INFECTION IN PRETERM LABOUR: A DESCRIPTIVE CROSS-SECTIONAL STUDY

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ABSTRACT

Introduction: Preterm labour is defined as the occurrence of regular uterine contractions (≥ 4 in 20 minutes or ≥ 8 in 1 hour) and cervical changes (effacement $\geq 80\%$ and dilatation ≥ 1 cm) in women with intact fetal membrane and gestational age less than 37 weeks. Genitourinary infection is the most important cause of preterm labour. The aim of this study was to determine the role of Genitourinary infection in causation of preterm labour.

Methods: This is a descriptive cross sectional study done at National Medical College Teaching Hospital from 10 November 2021 to 9 November 2022 after obtaining IRC (F-NMC/549/078-79). Total of 90 patients in preterm labour fulfilling the inclusion criteria were enrolled in this study after taking informed consent. Clinical examination was done, vaginal swab, endocervical swab and urine samples were sent to microbiological department for examination. Preformed proforma were used to record the demographic, clinical finding and result of investigation. The data was analyzed statistically using SPSS 22 and mean age, frequency and prevalence of genitourinary infection were calculated.

Results: In this study, 90 patients of preterm labour were enrolled. The mean age group of patients was 23.61 ± 4.25 years. Genital infection compromised of 41%, high vaginal swab showed 30% prevalence and endocervical swab showed 20% prevalence. The most common organism identified in genital infection was *Gardnerella vaginalis* 55.55%. The prevalence of Urinary tract infection was 40% where *E.coli* was the most common organism 66.66%.

Conclusions: Genitourinary tract infection plays an important role in causation of preterm labour and can easily be diagnosed with routine urine examination, urine culture and vagina - cervical swab. The prevalence of genital infections and urinary tract infection was 41% and 40% respectively. *Gardnerella vaginalis* was the most common pathogen identified in genital tract whereas *E.coli* was leading cause of UTI in Preterm labour patients.

Keywords: Preterm Labour; Prevalence; Urinary Tract Infection

INTRODUCTION

Preterm labour (PTL) leading to preterm birth is worldwide the most challenging problem in obstetrics.¹ It is one of the leading cause of perinatal morbidity and mortality and is one of the major public health problems, especially with reference to mortality, disability and health care expenses.² It is onset of labour after the period of viability and before completion of 37 weeks.³ About 15 million babies are preterm each year (5% to 18% of all deliveries).⁴ Prematurity is the leading cause of neonatal deaths and now the second leading cause of death.⁴

Genitourinary infections (GUI's) are prevalent during pregnancy and are recognized as an important cause of premature labour. A imbalance in the vaginal flora favors the colonization of the urogenital system by microorganisms, which can complicate a pregnancy.⁵ It is mostly widespread during unhygienic conditions and during pregnancy and considered as an important

cause.⁶ Bacterial vaginosis, vulvovaginal candidiasis and trichomoniasis are responsible for 90% of cases of infectious vulvovaginitis, which lead to complications such as pelvic inflammatory disease, postabortion endometritis, chorioamnionitis, and premature labour.⁵ Majority of these cases of idiopathic prematurity are thought to be due to subclinically ascending urogenital infection.⁷ There is compelling evidence of a causal association between intrauterine infection and spontaneous preterm and delivery.⁸

This study aimed to determine the role of genitourinary infection in causation of preterm labour. Therefore, there is a need to assess preterm birth risk factors to predict preterm birth and prevent timely intervention to reduce the severity of complications.

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted in the Department of Obstetrics and Gynaecology of National Medical College and Teaching Hospital for a duration of one year from 10th November 2021 to 9th November 2022. The ethical approval was obtained from the Institutional Review Committee of the National Medical College and Teaching Hospital (Ref. F-NMC/549/078-79). Pregnant women with gestation age between 28 to 37 weeks in labour presenting in hospital were admitted. The patients fulfilling the inclusion criteria were included in this study. Genital swabs and urine samples were sent to Microbiology Department for analysis after clinical examination. The investigation was followed up and evaluated for this study.

History regarding antenatal care, number of visits in ANC clinic, place of visit and any antenatal investigations done were recorded. Detailed obstetric history including LMP, EDD and period of gestation of present pregnancy, past obstetric history and outcomes including history of abortions, preterm birth and IUFD were noted. Personal history like smoking, alcohol intake or any substance abuse were taken. Medical disorders, drug intake and any complication encountered during the index pregnancy were also noted. EDD was confirmed by date of last menstruation and/or ultrasound in first trimester.

Careful clinical examination including general examination and systemic examination was done. Blood pressure and pulse were recorded. On per abdominal examination, height of fundus, lie, presentation, characteristics of uterine contraction was noted and fetal heart sound was auscultated. Per speculum examination was done in all patients and evaluated for any abnormal vaginal discharge. The characteristic of the discharge like consistency, color and odor was noted. One endocervical swab and one high vaginal swab was collected. Per vaginam examination was done to see cervical changes like dilatation, effacement and status of the membrane. Routine blood investigations were sent like haemoglobin, blood grouping, random blood sugar, platelet, total leucocyte count, differential leucocyte count, prothrombin time, serology for HIV and HBsAg. A clean catch mid-stream urine was sent for routine microscopic examination, culture and sensitivity to antibiotics. Vaginal swab was used for the identification of organisms examined microscopically. Swab was used to test with 10% potassium hydroxide, to check for the release of amine odor and to see yeast like forms, budding or branching hyphae. It was also used for gram staining, culture and sensitivity to antibiotics. Endocervical swab was used for gram staining and for culture and sensitivity.

Selection Criteria

All participants who meet inclusion criteria in study period were enrolled in the study.

Inclusion criteria - Gestational age between 28 to 37 weeks, singleton, live pregnancy, uterine contractions occurring at a frequency of four in 20 minutes or eight in 60 minutes plus progressive change in the cervix, cervical dilatation greater than 1 cm, cervical effacement of 80% or greater, in addition to painful or painless uterine contraction, symptoms such as pelvic pressure, menstrual like clamps, watery or bloody vaginal discharge and pain in the low back have been empirically associated with impending preterm birth.

Exclusion criteria - Uterine anomaly, multiple pregnancy, clinical chorioamnionitis, antepartum hemorrhage, pregnancy induced hypertension, maternal diabetes mellitus, use of antibiotics in preceding two weeks.

The data collected were entered daily. Analysis of the data was done by using SPSS version 22 software. These findings were then presented in the form of tables, graphs and diagrams using Microsoft Excel 2021. SPSS version 22 was the software used for calculation and tabulation of data. The final results were discussed and the conclusion was derived.

RESULTS

A total number of 90 patients of Preterm labour attending in the department of Obstetric and Gynaecology of National Medical College Teaching Hospital, Birgunj who gave consent were included in this study. All the patients meeting the inclusion criteria were evaluated for genitourinary infection. Urine sample, one high vaginal swab and one endocervical swab were taken and sent for microbiological evaluation.

Table 1: Sociodemographic and Obstetric factors associated with Preterm labour

Characteristics	No. of cases (90)	Percentage
Age group		
16 – 20	28	31.1%
21 – 25	38	42.2%
26 – 30	18	20.0%
31 – 35	5	5.6%
36 – 40	1	1.1%
Antenatal checkup		
Yes	33	36.6%
No	57	63.3%
Previous History of Preterm Birth		
0 (Primi gravida)	70	77.8%
1	16	17.8%

2	4	4.4%
Previous History of Abortion		
0	66	73.3%
1	20	22.2%
2	4	4.4%
Gravida		
Primigravida	7	7.7%
Gravida 2	32	35.55%
Gravida 3	33	36.66%
Gravida 4	13	14.44%
Gravida 5	5	5.55%
Booking status		
Booked	33	36.6%
Unbooked	57	63.3%
Urine Routine Examination		
Pus cells detected	34	37.8%
No Abnormality Detected	56	62.2%
Prevalence of Urinary Tract Infection in Urine Culture		
Growth	36	40.0%
No Growth	54	60.0%
Isolated Organisms from Urine Culture		
Isolated Organisms	No. of cases (36)	Percentage
Escherichia coli	24	66.66%
Klebsiella species	4	11.11%
Enterobacter species	3	8.33%
Proteus species	2	5.55%
Staphylococcus saprophyticus	2	5.55%
Pseudomonas aeruginosa	1	2.77%
Prevalence of Genital Tract Infections		
Present	37	41%
Absent	53	59%
Prevalence of organism in High vaginal Swab		
Organism	No. of cases (90)	Percentage
Growth	27	30.0%
No Growth	63	70.0%
Organism in High Vaginal Swab		
Organism	No. of cases (27)	Percentage
Gardnerella vaginalis	11	40.74%
Candida albicans	6	22.22%
Trichomonas vaginalis	5	18.51%
E.coli	3	11.11%
Klebsiella species	1	3.70%
Staphylococcus Aureus	1	3.70%
Prevalence of organism in Endocervical swab		
Organism	No. of cases (90)	Percentage
Growth	18	20%
No Growth	72	80%
Organism in Endocervical Swab		
Organism	No. of cases (18)	Percentage

E.coli	9	50%
Staphylococcus	7	38.8%
Pseudomonas	2	11.11%

Majority of cases were between 21-25 years (42.2%) with mean age of distribution 23.61 ± 4.25 . The minimum age was 16 and maximum age was 37 years. Pregnancies with regular antenatal supervision (at least one visit in first and second and two visit in third trimester) were categorized as booked. Pregnancies with irregular or no antenatal supervision were categorized as unbooked. There were 36.6% (n=33) booked cases and 63.3% (n=57) unbooked cases. Most of the patients 77.8% (n=70) did not have previous history of preterm birth whereas 22.2% (n=20) of cases had previous history of preterm birth. Few patients had previous history of abortion. Among them 22.2% (n=20), 4.4% (n=4) patients had single and >1 history of abortion respectively. Majority of patients 36.6% (n=33) were gravida³, whereas 35.5% (n=32) were gravida 2 followed by 14.4% (n=13) were gravida 4 and only 5.5% (n=5) were gravida.⁵

Urine routine examination showed 37.8% prevalence of pus cell in the preterm patients.

Among 90 patients of preterm labour 36 patients had positive urine culture. Hence showing 40% prevalence of Urinary tract infection (UTI) in a PTL. Table no.1 shows that 40% women have UTI, E. coli was the commonest pathogen accounting 24 (66.66%), followed by klebsiella 4 (11.11%), Enterobacter 3 (8.33%), proteus sp. 2 (5.55%), Staphylococcus saprophyticus 2 (5.55%) and pseudomonas aeruginosa 1 (2.77%).

Prevalence of organism in high vaginal swab (HVS) was 30% in Preterm labour. HVS was collected in a sterile environment. After evaluation of wet mount, whiff test, gram's stain and culture; list of organisms were identified. The most common organism isolated was Gardnerella vaginalis followed by Candida albicans, Trichomonas vaginalis, Klebsiella and Staphylococcus aureus respectively. Gardnerella vaginalis was the commonest pathogen accounting 11 (40.74%), Candida albicans 6 (22.22%), Trichomonas vaginalis 5 (18.51%), E.coli 3 (11.11%), Klebsiella species and Staphylococcus aureus 1 each (3.70%). Above table shows there is 20% prevalence of endocervical infection in endocervical swab in PTL. In 18 patients organism was seen in endocervical swab and absent in 72 patients.

Endocervical Swab among 90 preterm patients 20% of women were positive for organism. E.coli was the commonest pathogen accounting 9 (50%), followed by Staphylococcus 7 (38.8%) and pseudomonas 2 (11.11%).

DISCUSSION

GUI's during pregnancy are an important cause of Preterm labour. GUI's generally present with multifactorial or unknown etiology. Several studies have addressed the association of GUIs with pregnancy.^{5,9} Majority of women belonged to the age group 21-25 years with mean age group 23 ± 4.25 years which is comparable study of Safari et al.¹⁰ published in 2017 which showed highest incidence of PTL observed in women of age group 23 ± 6.34 years. Edwards RK et al.¹¹ and Giraldo P C et al.⁵ reported mean age of 25 ± 5.7 years and 25 ± 3.2 years respectively.

In our study, we found the mother who had poor ANC (unbooked) 63.3% were more prone to genitourinary infection. The finding is comparable with the study conducted by Safari et al.¹⁰ who observed PTL who did not have ANC to be 70.55%, but Derakhshi et al.¹² patients who did not have ANC were 33.33% respectively.

It has been shown that in women with history of preterm birth there is 17.8% chance of next preterm and after two preterm there are 4.4% chances. Similarly study of Mohamed SS et al.¹³ observed 14% chance of next PTL but Derakhshi et al.¹² observed high chances of 31.2%. Pandey et al.¹⁴ and Singh et al.¹⁵ showed same results of 14% whereas Leal et al.¹⁶ and Wagura et al.¹⁷ showed higher associated of previous preterm of 27.9% and 35% respectively.

Singh et al.¹⁵ analyzing 14.4 % of preterm birth patients had previous history of abortion which was similar to finding of Pandey et al.¹⁴ (14%). But our study showed high association with previous history of abortion, 22.2% of preterm in previous single abortion and 4.4% of previous multiple abortion.

Present study shows that the overall prevalence of UTI in PTL was 40% which was detected by presence of organism in urine culture which was similar to the other report of Giraldo P C et al.,⁵ Akobi OA et al.¹⁸ The prevalence was similar to one study done in rural hospital of Nepal (51.8%) Yadav LK et al.¹⁹ which showed the prevalence of UTI in pregnancy.

This study reflect E.coli was most common isolated organism 66.66% of bacteriuric women. This was similar to study conducted by Acosta-Terriquez JE et al.²⁰ which was 74.4%. Similarly Kamal HA et al.²¹ Verma I et al.²² Tedesco RP et al.²³ study showed E.coli as the most common organism isolated from urine culture.

In this study, genital tract infection were evaluated by High vaginal swab and endocervical swab. The prevalence of High vaginal swab were 30% and endocervical swab were 20%. Genital tract infection prevalence was 41.11%. Similar prevalence were observed in a study

of Lamichhane P et al.²⁴ Edwards et al.¹¹ Verma I et al.²² with prevalence of 40%, 33.6%, 21.15% respectively. Spontaneous preterm deliveries that occur before 34 weeks of gestation, have been strongly associated with intrauterine infection.²⁵

Bacterial vaginosis (40.74%) was the most common organism isolated from the high vaginal swab in our study. Data presented in various work have demonstrated strong associations between prevalent infection of BV and preterm birth.^{8, 11, 26-28}

This study showed isolation of other organism too. Second most common organism was found to be *Candida albicans* 22.22% which showed similarity with the study of Lamichhane et al.²⁴ where 30.43% were observed. The study done by Tedesco RP et al.²³ showed prevalence of 13%, 18% observed with Cunningham M et al.²⁶ 16% in result of French JI et al.²⁹

Shivaraju V et al.³⁰ and Mahaseth BK et al.³¹ study also showed *Candida albicans* as a second most common organism identified.

Trichomonas vaginalis is responsible for the most prevalent sexually transmitted bacterial infection worldwide. 22.2% of preterm patient showed *Trichomonas vaginalis* infection which was almost similar to study conducted by French JL et al.²⁹

LIMITATIONS

The study was hospital based and findings might not be not representative of the general population. Due to the limited duration and number of samples, the projected result cannot be conclusively applied to large populations, so study of a larger multicentric trial is recommended.

CONCLUSION

This study showed Genitourinary infection plays an important role in causation of preterm labour and is a leading cause of Preterm birth. Genitourinary tract infection can easily be diagnosed with routine urine examination, urine culture and vagino-cervical swab. The prevalence of genital tract infection in preterm labour was 41% in this study. The prevalence of urinary tract infection in preterm labour was 40% in this study. *Gardnerella vaginalis* was the most common pathogen identified in genital tract infection in preterm labour patients accounting 15 (55.55%). *Escherichia coli* was the most common organism isolated in urinary tract infection in preterm labour patients accounting 24 (66.66%).

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