

Association of Urinary Tract Infection with Preterm Labor in Gravid Females in a Tertiary Care Hospital

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ABSTRACT

Objective: To compare the frequency of preterm labour in pregnant patients with and without urinary tract infection in a tertiary care hospital in Punjab.

Study Design: Cross-sectional comparative study.

Place and Duration of Study: Department of Obstetrics and Gynaecology, Combined Military Hospital, Lahore Pakistan, from Jul 2019 to Jan 2020.

Methodology: Three hundred and eighty-five pregnant women were inducted into the study. The midstream urine sample was collected from patients between 24-28 weeks of gestation with complaints of burning micturition and was sent for microscopic examination. Urinary tract infection was diagnosed on the urinalysis report. Patients were followed till delivery. Patients were labelled as preterm who delivered neonates <37 weeks of gestation.

Results: In this study, the mean age of the patients was 25.2±3.0. The majority of the patients were para 1-2. The mean body mass index was 25.3±1.9 kg/m². Urinary tract infection was found in 12 patients (3.2%), and preterm labour occurred in 52 patients (13.5%). The mean birth weight of neonates was 3.0±0.5kg. A comparison of preterm labour in patients with and without urinary tract infections revealed that patients with urinary tract infections were associated with preterm labour ($p<0.001$).

Conclusion: Urinary tract infection during pregnancy significantly impacts pregnancy outcomes, mainly preterm labour and low birth weight.

Keywords: Low birth weight, Preterm labour, Urinary tract infection.

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INTRODUCTION

In clinical practice, urinary tract infection is a frequently acquired bacterial infection in females, with a frequency of about 50-60%. In pregnancy, urinary tract infections (UTIs) are around 10%.¹ UTI can occur in any age group and gender, but pregnant females are especially susceptible. Pregnancy causes several hormonal and mechanical changes, such as urethral dilatation, urinary stasis, and vesicoureteral reflux and all these changes and an already short urethra (3-4cm in females) promotes UTIs.^{2,3}

Although bacteriuria in pregnancy is slightly higher than in non-pregnant females, the consequences for both the mother and the unborn child are deleterious. Therefore, Bacteriuria in pregnancy should not be ignored and should be treated promptly.^{4,5} Most antenatal guidelines recommend screening for bacteriuria in pregnancy, but there is a conflict of evidence regarding the association of preterm labour with urinary tract infection during pregnancy.⁶ Due to

limited resources, routine antenatal screening by midstream urinalysis is not done in many developing countries.⁷ As a result, many UTIs remain undetected, causing adverse outcomes for the pregnant mother and her unborn.⁸ In Pakistan, financial limitations and a lack of resources hinder data collection regarding preterm deliveries. It puts a huge financial burden on our paediatric healthcare setup and drains the fragile system.

This study aimed to determine the frequency of urinary tract infections in our set-up and compare the frequency of preterm labour and low birth weight, hence decreasing neonatal intensive care admissions of preterm babies.

METHODOLOGY

This cross-sectional comparative study was carried out at Combined Military Hospital, Lahore Pakistan. Female patients reporting to the antenatal clinic, from July 2019 to January 2020 in the outpatient department, fulfilling the inclusion criteria, were included in the study. The study was started after approval from the Ethical Committee (IERB 35/2017) of the Hospital. The sample size was calculated taking

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the expected frequency of urinary tract infection to be 2.3% among gravid females.⁷

Inclusion Criteria: Gravid females who presented with 24-28 week gestation on a dating scan on clinical record, for routine antenatal check-ups were included in the study.

Exclusion Criteria: Patients with UTI who had taken ≥2 courses of antibiotics as per history and clinical record, patients with a history of previous preterm birth, multiple pregnancies (on ultrasonography), polyhydramnios (amniotic fluid index) AFI >24, BP>140/90 mmHg or chronic hypertensive were excluded from the study.

A total of three hundred and eighty-five cases were selected by non-probability, consecutive sampling technique.

Midstream urine samples were collected from each patient and sent for microscopic examination. All gravid women with urine reports showing bacteriuria >105 organisms/ml per high power field were labelled UTI. Patients were followed till delivery, and preterm labour was labelled as women who gave birth to a neonate <37 weeks of gestation. After informed consent, all the data were noted and recorded in the attached proforma.

Statistical Package for Social Sciences (SPSS) version 23.0 was used for the data analysis. Quantitative variables were expressed as Mean±SD and qualitative variables were expressed as frequency and percentages. The frequency of preterm labour was compared between pregnant females with and without urinary tract infections. Chi-square test was applied to find out the association. The *p*-value of ≤0.05 was considered statistically significant.

RESULTS

A total of 385 patients were included in the study. Most patients 353(91.7%) were aged between 20 and 30. Two hundred and nine 209(54.3%) had a BMI≤25. A parity of 1-2 was predominant, accounting for 209 patients (75.3%) (Table-I).

Comparison of preterm labour in patients with and without urinary tract infection showed that patients with urinary tract infection significantly had an incidence of preterm labour (*p*<0.001), as observed in Table-II. The demographic data, i.e., maternal age, parity, BMI & neonatal birth weight about UTI, was stratified, and no statistical significance was found between the two groups (Table-III). The association of neonatal birth weight (kg) with preterm labour in

patients with UTI was statistically significant between the two groups, with a *p*-value of 0.003. Association of age, parity and BMI had *p*-values of 0.190, 0.408, and 0.776 which were not statistically significant (Table-IV).

Table-I: Descriptive Statistics (n=385)

Distribution of Patients By Age (Years)	Number	Mean±SD
20-30	353(91.7%)	25.2±3.0
31-35	32(8.3%)	
Distribution of Patients by BMI (Kg/m ²)		
≤25	209(54.3%)	25.3±1.9
≥25	176(45.7%)	
Distribution of Patients by Parity		
1-2	290(75.3%)	
2-4	95(24.7%)	

Table-II: Comparison of Preterm Labour in Patients with and without Urinary Tract Infection (n=385)

Preterm Labor	Urinary Tract Infection		<i>p</i> -value	Odds Ratio
	Yes	No		
Yes	7(13.46%)	45(86.53%)	<0.001	10.2044
No	5(1.50%)	328(98.49%)		95% CI

Table-III: Association of Study Parameters with Urinary Tract Infections (n=385)

Age(years) with Regard to UTI	Urinary Tract Infection		<i>p</i> -value
	Yes	No	
20-30	10(2.8%)	343(97.1%)	0.287
31-35	2(6.25%)	30(93.7%)	
Parity			
1-2	8(2.75%)	282(97.2%)	0.480
3-4	4(4.2%)	91(95.7%)	
BMI(kg/m ²)			
≤25	7(3.3%)	202(96.7%)	0.776
≥25	5(2.8%)	171(97.15%)	
Neonatal Birth Weight(kg)			
≤2.5	6(6.6%)	84(93.3%)	0.775
≥2.5	6(2%)	289 (97.9%)	

Table-IV: Association of Study Parameters in Preterm Labour Patients with Urinary Tract Infections (n=12)

Age(years)	Preterm Labour		<i>p</i> -value
	Yes	No	
20-30	5(50%)	5(50%)	0.190
31-35	2(100%)	0	
Parity			
1-2	4(50%)	4(50%)	0.408
3-4	3(75%)	1(25%)	
BMI(kg/m ²)			
≤25	4(57%)	3(42%)	0.931
≥25	3(60%)	2(40%)	
Neonatal Birth Weight(kg)			
≤2.5	6(100%)	0	0.003
≥2.5	1(16%)	5(83%)	

DISCUSSION

Perinatal morbidity and mortality are high in preterm labour globally. Multifaceted risk factors have been identified, but the ability to pinpoint when labour occurs still exactly remains unanswered. Evidence suggests bacterial colonization in the lower and upper genital tract infection leads to preterm labour and adverse pregnancy outcomes.⁸ Bacteria are the main causative agents for infection among humans.⁹ The predominance of UTIs among women during pregnancy is a complex issue yet to be understood completely.

The frequency of UTI attending the antenatal outpatient department in our study is 3.2%. A higher prevalence of 8.9% (4.4% symptomatic UTI, 4.5% asymptomatic bacteriuria) was seen in a rural population of Bangladesh.¹⁰ The prevalence of UTI varies between 1-18% and 28.8% in various studies,^{7,11} highlighting the need to address this condition to reduce adverse pregnancy outcomes. Bacterial colonization may occur in the lower and upper urinary tracts, and the normal physiologic changes of pregnancy facilitate the predisposition of pregnant women to UTI.¹²

In this study, 91.7% of pregnant patients were in their twenties, with the majority in their mid-twenties, as seen in another study conducted in Kenya.¹³ The current study did not show any association between maternal socio-demographic factors regarding UTI. In the current study, seven patients out of 12 with urinary tract infections had preterm labour, and six neonates (out of 12 patients with UTI) had low birth weight. A large-scale study of 2,892,756 pregnant women, of which 4.9% had UTI on Emergency department visits, was conducted in the USA. It observed that UTIs increase a woman's risk of a preterm birth (PTB), particularly a spontaneous PTB. This risk is elevated regardless of the trimester of pregnancy. Women hospitalized with a UTI during their second trimester are at greatest risk, suggesting that more severe infections further elevate the risk during this time period.¹⁴ Several studies supported these results, John and Michael documented that women exposed to UTI were found to be at higher risk of delivering infants with low birth weight, and they were likely to go into premature labour even after adjusting for potentially confounding variables.¹⁵

A study conducted in Mississippi on UTI and its association with preterm labour suggests that early diagnosis followed by immediate therapy is essential during pregnancy to identify pregnant women with UTI and prevent poor pregnancy outcomes.^{16,17}

Similar steps should be taken in our health care. Glaser conducted a study on bacteriuria in pregnancy and suggested that all bacteriuria in pregnancy should be treated with antimicrobials which are safe for both the mother and the fetus. Furthermore, after treatment of bacteriuria, close monitoring of pregnant women should be done to reduce the risk of recurrent bacteriuria.¹⁸ Urine culture should be done for asymptomatic bacteriuria in pregnancy so that proper antimicrobial agents are used to reduce the associated complications.¹⁹

Our study aimed to identify pregnant women with urinary tract infections and compare the frequency of preterm labour and low birth weight. Early booking, diagnosis of UTI and treatment of pregnant women will lower the incidence of preterm delivery, prematurity, and all its complications. Special guidance to women with recurrent urinary tract infections regarding characteristics of reinfection and relapse, ensuring personal hygiene and proper way to practice postcoital voiding should be routinely carried out in pregnant women with urinary tract infections.

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CONCLUSION

Urinary tract infections during pregnancy significantly impact its outcome, mainly preterm labour and low birth weight. Early screening and prompt treatment of UTI in pregnancy will reduce neonatal complications and improve maternal health, hence reducing the financial and hospital burden on the health care system.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

SB: Conception, study design, drafting the manuscript, approval of the final version to be published.

HOJ: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

VA & SH: Critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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