Estimation of Frequency of Urinary Tract Infection in Females Presenting in Emergency with Preterm Labor

Nazli Hameed,[1] Sara Rashid,[2] Faiza Iqbal[3]

Abstract

Objective: To determine the prevalence of urinary tract infection in women who are experiencing premature labor.

Material & Methods: This was a Cross sectional study, was conducted in the Emergency Department of Obstetrics & Gynecology, Shalamar Hospital Lahore. Duration of this study was from July 31, 2020 till Jan 30, 2021.Data collection procedure: About 248 cases, according to our inclusion criteria, were taken from emergency department of gynaecology, Shalamar Hospital, Lahore. Basic gestational and demographic information, contact details, was taken from all subjects. All booked cases were taken to control bias. The midstream sample of urine was collected by the staff nurse in a sterilized container and was sent to the same hospital Laboratory for urine analysis and urine culture. Urinary tract infection was labeled as per operational definition. All females were treated to prolong the pregnancy till 37 completed weeks of gestation.

Results: The average age of females was 31.81 ± 7.52 years, ranging from 18 to 45 years. The average gestational age was 30.01 ± 3.89 weeks, with the lowest and highest gestational ages recorded as 24 and 36 weeks, respectively. A total of 103 individuals, accounting for 41.5% of the population, were females who had urinary tract infection.

Conclusion: It is concluded that the frequency of urinary tract infections in pregnant females presenting with preterm labour was high i.e. 41.5%. Females must be questioned about lower urinary tract symptoms during each antenatal visit so that they can be investigated and treated, accordingly, to reduce the risk of preterm labour. This will reduce the complications arising due to undiagnosed and untreated urinary tract infection which is associated with neonatal morbidity and mortality.

Keywords: Pregnancy, urinary tract infection, Preterm labour, low birth weight, neonatal mortality.

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Introduction

Preterm labour is characterized as the initiation of labour after twenty eight weeks and before thirty seven weeks of gestation, when the membranes around the foetus remain intact. Approximately 6-8% of all births occur before the full term, with over 75% of them occurring between 34 and 37 weeks of gestation.[1] There are various risk factors predisposing to preterm labour including urinary tract infection.[2,3] Pregnancy is frequently accompanied by structural and physiological vagaries in urinary tract, which can result in lower urinary tract infections. Urinary tract infections present a significant treatment challenge as there is a risk of complications for both; pregnant females and her fetus.[4] A healthy cervicovaginal flora is essential for defence against the development and spread of infections. Lactobacilli act as a local defensive mechanism by producing lactic acid and hydrogen peroxide and hence optimizing vaginal pH[5]. An unbalanced vaginal flora during pregnancy stimulates the colonization of the urogenital

1-3. Department of Gynae & Obs, Shalamar Hospital, Lahore.

Correspondence:
Dr. Faiza Iqbal , *Senior Registrar , Department of Gynae & Obs Shalamar Hospital, Lahore, Pakistan E-mail. Faizaiqbalshehzadi@gmail.com*

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system by bacteria, which might make pregnancy more difficult.[5] A urinary tract infection is identified if there are more than 105 colony forming units (cfu)/ml of bacteria in the midstream urine and additional specific symptoms such urgency, frequent urination, and painful urination (dysuria).[6] Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis, Enterococcus faecalis, and Staphylococcus saprophyticus are among the bacteria that frequently cause urinary tract infections.[7]

According to a report, 5% of all pregnant females have urinary tract infections, which are linked to poor maternal and fetal outcomes[2]. Another study found that pregnant women have a considerable bacteriuria. The prevalence of 17.7% for Escherichia coli, 50.8% for Klebsiella pneumoniae, 17.0% for Staphylococcus aureus has been reoprted8. Multi-drug resistant bacteria make up about 37.5% of all bacteria; 84.3% being gram negative and 15.7% being gram positive bacteria.[8] Uncontrolled lower genital tract infection can lead to premature labour and unfavourable pregnancy outcomes in 20–40% of cases[3]. It can also progress to severe cystitis and pyelonephritis[3]. According to one study, 30% of women who presented with preterm labour had a urinary tract infection, while another study reported 36.7% of women with preterm labour having a urinary tract infection.[5,1]

For our local population, one study reported a higher frequency of urinary tract infection in females, presenting with Preterm labour[9]. It implies that the females presenting with urinary tract infection during pregnancy must be monitored and appropriate intervention should be done to reduce the chance of Preterm labour. This will reduce the neonatal morbidity and morality.

Material and Methods

This was a Cross sectional study, was conducted in the Emergency Department of Obstetrics & Gynecology, Shalamar Hospital Lahore. Duration of this study was from July 31, 2020 till Jan 30, 2021. After the taking approval from IRB Committee Ref No Ref No: CPSP/REU/OBG-2017-073-8495 Dated: May 31, 2021. Sampling technique was Non-probability, consecutive sampling and Sample size was 248 females presenting with Preterm labour was included. The sample size is estimated using percen-tage of urinary tract infection at 36.7% 5, at 6% absolute precision and 95% confidence levels. Preterm labour was recorded based on the ACOG criteria, which state that there should be at least 4 uterine contractions in 20 minutes or 8 contractions in 60 minutes, combined with a progressive change in the cervix, namely a dilation of more than 1 cm and an effacement of the cervix of at least 80%, all occurring before 37 weeks of gestation. It was diagnosed as if there are > 105colony forming units (cfu)/mL of bacteria in midstream urine along with patient-reported symptoms such as painful urination (dysuria), urgency, and frequent urination. Females aged 18-45 years, Singleton pregnancy, Gestational age between 24 and 36weeks and Having at least 4 antenatal visits. History of urinary tract infection before pregnancy, Female having GDM (BSF > 120 mg/dl) and hypertensive disorder (> 80/120 mm Hg), Multiple pregnancy, vPatients having less than 4 antenatal visits and Congenital renal disorders. All subjects meeting inclusion criteria were taken in this study. An informed consent was taken. A total of 248 cases were recruited from emergency department of gynecology Shalamar Hospital Lahore. Basic gestational and demographic information and contact details were taken from all subjects. All booked cases were taken to control bias. The urine sample was collected by the staff nurse in a sterilized container and was sent to the same hospital Laboratory for urine analysis. Urinary tract infection was labeled as per operational definition. All females were treated to prolong the pregnancy till 37 completed weeks of gestation. The data was collected by the researcher on attached proforma. Data was entered and analyzed using SPSS version 22. For numerical information including age, gestational age, weight, height, and BMI, the mean and standard deviation were determined. For parity and categorical variables like urinary tract infection, frequency (percentage) was employed.

Results

The mean age of females was 31.81±7.52 years, ranging from 18 to 45 years. The average gestational age was 30.01±3.89 weeks, with the lowest and highest gestational ages recorded as 24 and 36 weeks, respectively. The average weight, height, and BMI were 70.65±3.89 kg, 1.60±0.06 meters, and 27.53±4.54, respectively. (Table -1) There were 156 (62.9%) females who had parity < 3 and 92 (37.1%) females who had parity of 3-5. According to operational definition 103 (41.5%) females had urinary tract infection (Table -2) The frequency of urinary tract infection was statistically same in 18-29 years old females (45%) and 30-45 years old females (38.7%), p-value >0.05. The urinary tract infection was statistically same in females having gestational age as 24-29 weeks (39%) and 30-36 weeks (43.8%),

p-value >0.05. The urinary tract infection was statistically same in obese females (34.1%) and non-obese females (45.4%), p-value >0.05. The urinary tract infection was also statistically same in females having parity <3 (42.3%) and among females with parity of 3-5 (40.2%), p-value > 0.05. (**Table -3)**

Table 1: *Baseline features of patients included in the study.*

	F (%), mean ± SD
n	248
Age (years)	31.81 ± 7.52
Gestational age (weeks)	30.01 ± 3.89
Weight (kg)	70.65 ± 11.17
Height (m)	1.60 ± 0.06
Body mass index	27.53 ± 4.54
Parity	
<3	156 (62.9%)
≥3	92 (37.1%)

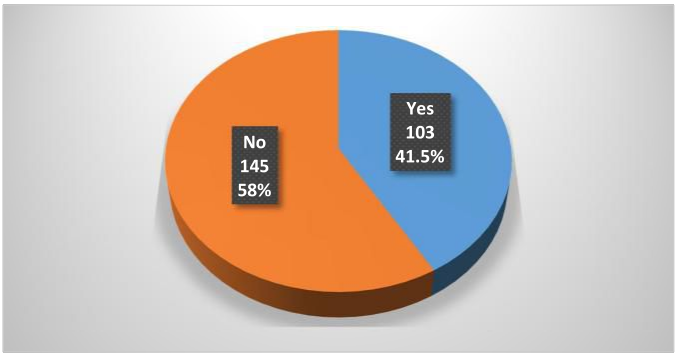

Figure 1: *Distribution of Urinary tract infection*

Table 2: *Comparison of urinary tract infection in different stratified groups*

		Urinary tract infection	
		Yes	**No**
Age (years)	18-29	50(45%)	61(55%)
	30-45	53(38.7%)	84(61.3%)
P- value		0.312	
Gestational age (weeks)	24-29	46(39%)	72(61%)
	30-36	57(43.8%)	73(56.2%)
P- value		0.438	
BMI (kg/m^2)	Obese	29(34.1%)	56(65.9%)
	Non-obese	74(45.4%)	89(54.6%)
P- value		0.087	
Parity	<3	66(42.3%)	90(57.7%)
	≥3	37(40.2%)	55(59.8%)
P- value		0.747	

Discussion

Preterm labour is a complex condition that carries a high risk of health problems and death for newborns, especially when it occurs at earlier stages of pregnancy. It has several linked social and medical risk factors. To address the issue of morbidity and mortality related to urogenital infections, evaluation of the extent in such settings is crucial. There is a strong evidence that urinary tract infection is a major factor in triggering preterm labour.[10]

Urogenital infections are more common with poor sanitary conditions and during pregnancy. They are a significant contributor to preterm labour. Preterm labour is a significant factor contributing to both the illness and death of newborns. India has a reported incidence rate of 21% for premature labour. India represents 23.6% of all preterm births worldwide. The urinary system of pregnant women experiences substantial physiological changes from early pregnancy to the end of the pregnancy.[11]

Enlargement of the urinary tract and renal pelvis, a reduction in ureteric peristalsis, and a decrease in bladder tone all take place. These alterations make women more prone to upper and lower urinary tract infection. Asymptomatic bacteriuria is the condition when there is a substantial presence of bacteria in the urine without any accompanying symptoms of sickness. Significant bacteriuria is the term used to describe the presence of 10^5 colony-forming units of bacteria per milliliter of urine when a single uropathogen is detected in a clean catch specimen of urine.[12]

Due to these difficulties, the majority of pregnant women must undergo routine testing and treatment for asymptomatic bacteriuria. All of these issues can put the patient at risk for going from an asymptomatic urinary tract infection to a symptomatic infection that can lead to difficulties during pregnancy.[13,14] Preterm labour is frequently caused by urogenital tract infections in mothers. "Initiation n of labour with intact membranes after 28 weeks of gestation and before 37 completed weeks of gestation" is the definition of preterm labour. Most data indicate that 6 to 8% of deliveries are preterm and that about 2/3 of them occur between 34-37 weeks of gestation. (15) Antibiotic treatment has been proven to reduce the risk of asymptomatic bacteriuia, dramatically, in pregnant women having preterm birth.[15]

In current study, 103 (41.5%) females had urinary tract infection. The prevalence of significant bacteriuria among pregnant women was reported as 17.7% by Cypher

et al.[16] But, in our study the frequency was higher compared to the other studies quoted.

Hygienic conditions of females belong to our community are poor due to lack of awareness, populated homes use of common washrooms in home, and weak immunity. These are the major causes of urinary tract infection and rates are high because of these factors. If these factors could be controlled, the rate can be reduced. A recent research was undertaken to evaluate the likelihood of premature delivery in pregnant women who sought medical attention at the emergency department or were admitted to the hospital due to a urinary tract infection.[17] Among a total of 2,892,756 pregnant women, regardless of the stage of pregnancy, 140,910 of them (4.9%) were diagnosed with a urinary tract infection that required immediate medical attention or hospitalisation. In the study, it was found that 3.1% of the 8,622 women who were hospitalised with a single episode of urinary tract infection in the second trimester had a spontaneous birth. This was compared to 0.7% of the reference group. The adjusted relative risks were 3.1, with a 95% confidence interval of 2.7-3.5. Additionally, 14.7% of the pregnancies in the study were preterm, with an adjusted relative risk=1.7 (95% confidence interval; 1.7-1.8). Thus, it was determined that preterm births, especially spontaneous preterm births are more likely in women who had urinary tract infection.[17] A separate investigation examined 94 cases of urogenital tract infections that were detected at the onset of labour in pregnancies of both full-term and preterm. Microbiological testing was conducted on urine, vaginal, and perianal samples obtained from 49 women experiencing preterm labour and 45 women in full-term labour. Urinary tract infections were found in 36.7% and 22.2% of women in the preterm and full-term labour groups, respectively. Thus, both preterm and full-term labouring women frequently had urogenital infections; nonetheless, there were no discernible differences between the groups.[18]

Another similar observational study showed that 27.58% of the 116 women who went into premature labour had urinary tract infections. The most prevalent bacteria found in urine samples were E. Coli (15.51%). A 33.62% of women had vaginal infections. The most prevalent microorganism found in High vaginal swab cultures was Candida albicans. Therefore, screening for genitourinary infections during pregnancy is essential, particularly in females who live with low income resources. Preterm labour is less common when genitourinary infections are identified early and treated quickly.[(19)]

Another research was done to determine the effects of a urinary tract infection occurring late in pregnancy on the weight and length of gestation of the foetus. There was no statistically significant link seen between the incidence of preterm deliveries and low birth weight ($P>0.05$) and the number of urinary tract infection episodes. Consequently, it was shown that urinary tract infection during pregnancy had a notable impact on pregnancy outcomes, namely increasing the risk of preterm labour and low birth weight. Timely identification and treatment of urinary tract infection during pregnancy may significantly alleviate the adverse experiences of pregnant women and their unborn offspring.[20]

Another prospective case-control research was conducted in 2016. The research revealed that 11 people experiencing preterm contractions had asymptomatic bacteriuria, resulting in a prevalence rate of 22% for asymptomatic bacteriuria in preterm labour among the study group. E.coli accounted for around 20% of the identified pathogenic organisms, whereas Klebsiella accounted for just 2%. Both the case (14%) and control (12%) groups had mixed development, suggesting the presence of contamination. Out of the individuals who had asymptomatic bacteriuria, 4 cultured samples (36.36%) showed sensitivity to nitrofurantoin. Hence, asymptomatic bacteriuria is a prevalent infection during pregnancy, and its associated morbidity can be avoided with antibiotic therapy. Therefore, pregnant women should have a bacteriuria screening and get the right antibiotic treatment based on the sensitivity.[20] Similar to this; Patel et al. undertook a study to compare preterm deliveries with full-term deliveries in order to determine the prevalence of genitourinary infections in preterm deliveries. In a hospital providing tertiary care, a case-control study was conducted. The research included 50 preterm births occurring between 28 and 37 weeks of gestation (case group) and 50 full-term deliveries serving as a comparison group (control group). Every patient had microbiological tests, which included the collection of two high vaginal swabs for the purpose of inspecting aerobic bacteria, fungi, and protozoa. Additionally, urine samples were obtained for standard evaluation, bacteriological examination, culture, and antibiotic sensitivity testing. Out of a total of 50 instances of preterm labour, the prevalence of genital tract infection, urinary tract infection, and combined genitourinary infection was determined to be 44%, 30%, and 16%, respectively. In contrast, the control group (consisting of term labour cases) had rates of 10%, 6%, and 0% for these infections. This suggests

a statistically significant link between preterm labour and genital and urinary tract infections. The intervention group had considerably more low birth weight infants than the control group. Direct infection screening as part of standard prenatal care may minimise preterm labour and enhance mother and infant outcomes.[8]

Conclusion

It is concluded that the frequency of urinary tract infection in females presenting with Preterm labour was high i.e. 41.5%. This is quiet high as compared to other studies mentioned above Hence, females must be investigated regarding symptoms of urinary tract infection at each antenatal visit as it provides excellent opportunity to pick urinary tract infection. By reducing urinary tract infection, preterm birth and neonatal mortality can be reduced. Further counseling sessions and seminars must be implemented to improve awareness among females about urinary tract infection and its relate complications, whether the female is pregnant or not.

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Authors Contribution

NH: Conceptualization of Project
SR: Data Collection
SR: Literature Search
NH: Statistical Analysis
NH: Drafting, Revision
FI: Writing of Manuscript