

## Study on Occurrence of Symptomatic Urinary Tract Infection and Asymptomatic Bacteriuria during Pregnancy and its Association with Maternal Outcome

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### Abstract:

**Background:** The likelihood that the illness may advance from asymptomatic bacteriuria (ABU) to a urinary tract infection (UTI) with symptoms, which may thereafter result in pyelonephritis and obstetric consequences, is increased by the pregnancy. The unfavourable outcome could lead to early delivery, poor birth weight, and increased fetal mortality. The goal of the current study is to evaluate the risk factors for UTI, the outcomes for mothers, the incidence of symptomatic and asymptomatic bacteriuria, and the bacteria that cause UTI during pregnancy.

**Methods:** Between April 2022 and March 2023 at SDH/CHC, Biraul, Darbhanga, a total of 152 pregnant women with and without signs of a urinary tract infection were included as study participants. Midstream urine samples were obtained and processed after bacteriological tests as per usual procedure.

**Results:** In the current study, 67 (44.1%) cases of bacteriuria were asymptomatic, while 85 (55.9%) cases had symptomatic UTIs. In 61 (49.6%) of the patients, E. coli was the most common bacterium identified, followed by Staphylococcus aureus in 24 (19.5%), Klebsiella pneumonia in 16 (13.0%), CONS in 12 (9.7%), and Enterococcus faecalis in 10 (8.1%) cases. The lower socioeconomic status was a factor in 65 (42.8%) cases, and the majority of the cases involved either high school (47.4%) or primary school (38.8%) as the only educational level. Of the 118 vaginal births, 101 (85.6%) were full-term normal births, however of the 17 (14.4%) preterm births, 12 (10.2%) had symptomatic UTIs and 05 (4.2%) had asymptomatic bacteriuria.

**Conclusion:** Our study results demonstrated that increased symptomatic UTI and ABU were primarily attributed to low socioeconomic position and educational level. Regarding gestational age, there was no discernible variation in the prevalence of UTI and ABU. The study came to the conclusion that early and fast treatment of ABU during pregnancy greatly lowers the likelihood of a negative pregnancy outcome. As a result, it is advisable to check for ABU before becoming pregnant. Our study also revealed that the third trimester had a greater frequency of UTIs. Therefore, in the first trimester, all pregnant women should be screened for the presence of ABU, treated vigorously with the appropriate antibiotics, and promptly followed up.

**Keywords:** Asymptomatic Bacteriuria, Symptomatic Urinary Tract Infection, Predominant Organism.

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### Introduction

Due to physiological differences, women experience a higher incidence of urinary tract infections (UTI) than men. In their lifetime, about 40% to 50% of women will experience at least one clinical episode. [1] The majority of urinary symptoms were brought on by changes in the urinary system associated with pregnancy.

Past UTI history, sexual activity, membership in a lower socioeconomic group, and multiparity are the main risk factors for UTI. [2] 90% of women who are pregnant experience ureteral dilatation, which lasts until birth and may be a factor in the rise in urinary stasis and ureterovesical reflex. [3] An increased risk of numerous maternal and new-born

problems, including preeclampsia, preterm birth, intrauterine growth restriction, and low birth weight, is linked to untreated urinary tract infections (UTIs) during pregnancy. [4] Pregnant women with bacteriuria are more prone to other pregnancy-related problems than pregnant women without the condition. [5]

Asymptomatic bacteriuria (ASB) during pregnancy increases the likelihood that the case will progress to a UTI with symptoms, which may then cause pyelonephritis and have unfavourable obstetric outcomes such as premature delivery, low birth weight, and increased foetal mortality. [6] In addition, preterm labor, preterm premature

membrane rupturing, anemia, intrauterine growth retardation, and postpartum endometritis. [7] In order to optimize the antibiotic regimens utilized for the empiric treatment, it is also critical to identify the uropathogens in the obstetric populations.

**Materials and Methods**

From April 2022 to March 2023, a prospective study was undertaken on patients who were receiving outpatient and inpatient care at SDH/CHC, Biraul, Darbhanga. This study includes primigravida and multigravida pregnant women in all trimesters who attend the antenatal OPD/IPD of SDH/CHC, Biraul, and Darbhanga. In this investigation, we eliminated women with known underlying renal pathology, chronic renal disease, diabetes mellitus, hypertension, immune suppressive medication, and HIV infection. Both inpatient and outpatient patients totalling 152 have been included in the study. The instructions given to the females were to wash the vulva in sterile water and collect the midstream clean catch pee in

a wide mouthed sterile container, being careful not to contact the container's corners.

The microbiology lab promptly received the urine samples. Each time a statistical analysis was required, SPSS 19.0 was used. Quantitative information was presented as frequencies and percentages. Fisher's exact test and the chi square test were used to determine the association between two variables. P values of less than 0.05 considered to be statistically significant, while p values <0.001 were highly significant.

**Result**

A total of 152 cases (30.4%) were included in the current investigation, out of which 123 (24.6%) had substantial bacteriuria in urine samples and 29 (5.7%) had UTIs that were clinically diagnosed but did not have any appreciable bacterial growth.

As indicated in Table 1, of the 152 cases chosen for the study, 85 (54.9%) cases had symptomatic UTIs and 67 (44.1%) cases had asymptomatic bacteriuria.

**Table 1: Occurrence of urinary tract infection during pregnancy**

Urinary Tract Infection		No. of cases	Percentage
Symptomatic UTI n=85 (55.9%)	• Significant growth on culture	56	36.8%
	• No significant growth on culture	29	19.1%
Asymptomatic Bacteriuria		67	44.1%
Total		152	

In order to evaluate the risk variables, sociodemographic data on pregnant women was collected (table 2). In 152 cases of pregnancy, women aged 26 to 30 made up 44.1% (67 cases), followed by women aged 21 to 25 with 40.8% (62 cases), and women aged 31 to 35 with 7.9% (12 cases). The lower socioeconomic position was a factor in 42.8% of the cases (65), the lower middle class in 40.1% of the cases (61 instances), and the higher middle class in 7.2% of the cases (11 cases). Most of the cases had either a high school diploma

(47.4%) or a primary school diploma (38.8%) as their level of education. However, there is no discernible difference between symptomatic UTI and ABU in terms of educational attainment. Third trimester UTIs were present in 108 (71.0%) cases overall, 38 (25%) cases in the second trimester, and 6 (3.9%) cases in the first trimester. According to the obstetric score, 81 (53.3%) pregnancies were the majority, followed by gravida II cases (47.9%), gravida III cases (23%) and gravida IV cases (0.7%).

**Table 2: Socio-demographic characteristics and associated risk factors of UTI among pregnant women**

Characteristics	Urinary Tract Infection Number (%)		
	Symptomatic UTI n (%)	ABU n (%)	Total n (%)
Age in years			
• ≤20	4(4.7%)	7(10.4%)	11(7.2%)
• 21-25	42(49.4%)	20(29.8%)	62(40.8%)
• 26-30	35(41.2%)	32(47.7%)	67(44.1%)
• 31-35	4(4.7%)	8(11.9%)	12(7.9%)
Socio-economic status			
• Upper	3(3.5%)	2(2.9%)	5(3.3%)
• Middle	4(4.7)	7(10.4%)	11(7.2%)
• Lower middle	6(7.0%)	4(5.9%)	10(6.6%)
• Lower	43(50.5%)	18(26.8%)	61(40.1%)
	29(34.1%)	36(53.7%)	65(42.8%)
Educational status			
• Read and write	9(10.5%)	8(11.9%)	17(11.2%)
• Primary school	38(44.7%)	21(31.3%)	59(38.8%)
• High school	35(41.2%)	37(55.2%)	72(47.4%)

• Higher education	3(3.5)	1(1.5%)	4(2.6%)
Gestational age			
• First trimester	2(2.3%)	4(5.9%)	6(3.9%)
• Second trimester	23(27.1%)	15(22.4%)	38(25.0%)
• Third trimester	60(70.6)	48(71.6%)	108(71.0%)
Obstetrics score			
• Primi	42(51.2%)	39(58.2%)	81(53.3%)
• Gravida II	34(40.0%)	13(19.0%)	47(30.9%)
• Gravida III	8(9.4%)	15(22.3%)	23(15.0%)
• Gravida IV	1(1.2%)	0(0%)	1(0.7%)

E. coli was the predominant organism isolated in 61 (49.6%) of the 123 significant bacteriuria cases of Symptomatic UTI and asymptomatic bacteriuria, followed by Staphylococcus aureus in 24 (19.5%), Klebsiella pneumonia in 16 (13.0%), CONS in 12 (9.7%), Enterococcus faecalis in 10 (8.1%) cases, as shown in Table 3.

**Table 3: Organisms isolated from urinary tract infection during pregnancy**

Organisms isolated (123)	No. of cases	Percentage
E.coli	61	49.6%
Staphylococcus aureus	24	19.5%
Klebsiella pneumonia	16	13.0%
CONS	12	9.7%
Enterococcus faecalis	10	8.1%

Out of 118 vaginal deliveries, 101 (85.6%) had full-term normal deliveries; however, of the 17 (14.4%) preterm deliveries, 12 (10.2%) had symptomatic UTIs and 5 (4.2%) had asymptomatic bacteriuria. When compared to asymptomatic UTI cases, the preterm vaginal delivery rate was considerably higher in symptomatic instances (p 0.05). Regarding assisted vaginal delivery or LSCS, there was no difference in the study group (table 4).

**Table 4: Urinary tract infection associated with delivery outcome**

UTI	Vaginal Delivery			Instrumental Vaginal delivery			LSCS		
	Term	Preterm	P-value	Term	Preterm	P-value	Term	Preterm	P-value
Symptomatic UTI	29	12	P=0.05	4	1	1.00	6	2	1.00
ABU	72	5	Chi=18.6 p=0.001	2	1	0.400	4	4	1.00
Total	101	17		6	2		10	6	

## Discussion

Preeclampsia, preterm birth, intrauterine growth restriction, and low birth weight have all been linked to the untreated UTI, according to reports. [4] Numerous obstetrical issues, which can be avoided with the right treatment plan, are also brought on by UTIs. [4,10-12] Various professionals reported a prevalence of UTIs between 2.3% and 17.9% during pregnancy. [13] The prevalence of UTI in our study was 17%, which is consistent with the research done by Mona Abdullah et al. [13] Similar to our study results of 13.4%, earlier investigations have found that asymptomatic bacteriuria occurs in a range of 2-14%.

Numerous factors, including gestational age, a history of urinary tract infections, diabetes mellitus, multiparity, and anatomic urinary tract anomalies, have been hypothesized to influence the prevalence of bacteriuria during pregnancy. [14,15] In pregnant women, both symptomatic and

asymptomatic bacteriuria is prevalent. Pyelonephritis in pregnancy is at risk from untreated asymptomatic bacteriuria. [16] Prenatal care now includes routine ASB screening and treatment, and the majority of antenatal guidelines recommend ASB screening as part of routine prenatal care. [17] It is crucial to understand the uropathogens present in each obstetric group while managing UTIs. The microorganisms that are most frequently found in UTIs during pregnancy have been the subject of numerous investigations. According to reports, Escherichia coli is the microorganism that needs to be kept in mind the most. [18-20] In addition, we found that E. coli is the most frequent bacteria causing UTIs in our study. In our investigation, Staphylococcus aureus, K. pneumonia, CONS, and E. faecalis were also the infecting agents.

Our investigation revealed that one of the characteristics that were substantially linked with an increase in symptomatic UTI and asymptomatic bacteriuria was poor socioeconomic level (42.8%).

In a related study on the same topic, Haider et al. found that pregnant women with low socioeconomic income levels had a higher risk of developing bacteriuria than pregnant women with high socioeconomic income levels. [21]

Another study on UTI by Dimetry et al. revealed the existence of a connection between UTI and low economic level. [22] This may be as a result of the correlation between low socioeconomic level and immunity and a healthy diet in pregnant women. Regarding gestational age, there was no discernible difference in the prevalence of UTI and asymptomatic bacteriuria. This result was consistent with earlier research. [23,24] In our study, 17 (14.4%) of the 118 vaginal births were preterm, and the frequency of symptomatic UTI patients was substantially higher ( $p < 0.005$ ). Prematurity and low birth weight will occur in individuals with UTI, according to Laura et al. retrospective investigations on perinatal outcomes. [25] According to earlier research by Kincaid-Smith et al., women with asymptomatic bacteriuria during pregnancy had a higher chance of giving birth to premature or low-birth weight babies and have a 20–30% higher risk of getting pyelonephritis while pregnant. [26] In comparison to women without bacteriuria, pregnant women with ABU have a 20–30-fold higher chance of having pyelonephritis and are more likely to have premature or low-birth-weight babies. [27]

### Conclusion

In conclusion, early asymptomatic bacteriuria treatment greatly lowers the risk of an unfavourable pregnancy outcome. As a result, it is advisable to check for ABU before becoming pregnant. In our investigation, we discovered that the third trimester had a greater frequency of UTIs. All pregnant women are advised to have their first trimester ABU screenings, aggressive treatment with the appropriate antibiotics, and early follow-up.

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