

Original Article

Associated Risk Factors of Asymptomatic Bacteriuria In Pregnancy

Mahnoor Shahid¹, Rubina Mushtaq², Nadia Jabeen³

Abstract

Objective: This study aimed to determine the prevalence of asymptomatic bacteriuria among pregnant women and to ascertain the associated risk factors.

Methods: This cross-sectional study was conducted in the Gynae/Obs department of the Rawal Institute of Health Sciences from 1st Sept 2024, to July 31, 2025. We included 300 pregnant women of any gestational age who attended their first antenatal visit and were asymptomatic for urinary tract infection. Patients with symptoms of acute urinary tract infection, on antibiotics for at least 72 h for any infection, acute or chronic kidney disease, or urinary stent were excluded. Midstream clean-catch samples were collected for analysis and culture. Information on maternal demographics, obstetric history, and potential determinants of asymptomatic bacteriuria was systematically recorded. SPSS version 25 was used for data analysis.

Results: Prevalence of ASB in our study was 22%. Regarding sociodemographic factors of patients (300), the maximum number of cases, 48%, presented between 26 and 32 years, with a mean age of 28 years. Urban residents 77%, 48% matriculate, 71 % from the middle class, 68% had parity from 1-4, 52% presented in the 3rd trimester. The predominant pathogen isolated was E. coli in 78%. The principal maternal complication was preterm labour (11%), 14% developed p-pyrexia. Multivariate logistic regression confirmed significant associations of ASB with low socioeconomic status, low education, rural residence, parity >4, and recurrent UTI, with a statistically significant P value<0.05.

Conclusion: This study highlights the notable prevalence of ASB in pregnancy and underscores the importance of targeted screening for women with identifiable risk factors.

Keywords: Asymptomatic bacteriuria, Infectious, Pregnancy Complications, Risk factors.

Introduction

Asymptomatic bacteriuria was defined as the growth of a single uropathogen at a concentration of $\geq 10^5$ (CFU/mL) in a clean-catch midstream urine specimen in the absence of urinary tract symptoms.¹

Globally, 2-15% of pregnant women have a urinary tract infection without specific symptoms.² A multicenter study conducted in Karachi prevalence of asymptomatic bacteriuria was 26.5%.³

The fluctuations in prevalence rates can be attributed to regional and cultural heterogeneity, which differ inherently across national boundaries. The incidence of asymptomatic bacteriuria is more common during pregnancy due to hormonal changes, such as urinary stasis and glycosuria, which promote bacterial growth in the urinary tract.⁴

Short female urethra and perineal colonisation by enteric microbes predispose pregnant women to urinary tract infections and pyelonephritis. Immunosuppression facilitates microbial proliferation in the urinary tract.⁵

The principal risk factors for asymptomatic bacteriuria are a prior history of urinary tract infection, multiparity, and structural or functional anomalies of the urinary tract.

Pregnant women frequently present with asymptomatic bacteriuria (ASB) that remains undiagnosed and suboptimally treated, a condition that has been consistently associated with adverse maternal and perinatal outcomes.⁶

Foetal complications may manifest as intrauterine growth restriction and preterm birth, whereas maternal sequelae can include ascending urinary tract infections, such as acute pyelonephritis, and pregnancy-related hypertensive disorders, including preeclampsia.⁷ Moreover, premature rupture of membranes, spontaneous preterm birth, and increased rates of perinatal mortality have been documented.⁸

Asymptomatic bacteriuria in pregnancy frequently remains undiagnosed, but contributes to significant maternal and foetal morbidity. Unveiling the associated risk factors is essential to facilitate early detection and effective intervention. This study aimed to delineate these determinants to improve pregnancy outcomes.

Materials And Methods

This cross-sectional study was conducted in the Gynae/Obs department of the Rawal Institute of Health Sciences from 1st Sept 2024 till 31st July 31, 2025. Ethical approval was obtained before the commencement of the study from the Institutional Review Board (reference number: RIHS/IRB/27/2024).

Sample size was calculated with the WHO sample calculator. The sample size turned out to be 300, keeping a confidence interval 95 %, population proportions are 26.5 % with a margin of error 5%. A consecutive (non-probability) sampling technique was used. A pre-structured questionnaire was used for data collection after informed consent was obtained.

Contributions:

MS - Conception, Design
RM NJ - Acquisition, Analysis, Interpretation
MS NJ - Drafting
RM - Critical Review

All authors approved the final version to be published & agreed to be accountable for all aspects of the work.

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Pregnant women of all gestational ages attending the antenatal clinic for their visit, with no clinical features suggestive of urinary tract infection, and those with $>10^5$ colony-forming units (CFU) per mL in clean voided midstream urine without fever or symptoms of urinary tract infection were included in the study, while patients with symptoms of acute urinary tract infection, receiving antibiotics at least 72 h before any infection, patients with acute or chronic kidney disease, urinary stent or nephrostomy tube, recipients of a kidney or other organ transplant, and patients on renal dialysis were excluded from the study.

Participants were instructed on the proper technique for collecting a clean-catch midstream urine sample using sterile containers. Bacteriuria was defined as the presence of $> 10^5$ colony-forming units of a single bacterial species per millilitre of urine in the laboratory report. Antibiotic susceptibility was assessed based on the urine culture report. Pregnant women with positive urine cultures received a single course of suitable antibiotics based on antimicrobial susceptibility results. To evaluate treatment efficacy, participants were instructed to return for a repeat urine test one week after completing the antibiotic course. Patients were followed up until delivery and observed for maternal and foetal outcomes, such as gestational age at the time of delivery, type of delivery, birth weight of the baby, 1- and 5-minute Apgar scores, neonatal intensive care unit (NICU) admission, and duration of the baby's stay in the NICU.

Data was analyzed on SPSS VS 25. Percentages were calculated for descriptive variables. The odds ratio was used to evaluate the impact of various factors on the development of asymptomatic bacteriuria (ASB). Logistic regression analysis was conducted to determine the risk factors associated with ASB while controlling for potential confounders. Percentages were calculated for clinical aspects, such as maternal complications and neonatal outcomes. A p-value of less than 0.05 was considered statistically significant.

Results

Out of 300 patients who fulfilled the inclusion criteria, 66 patients were found to be diagnosed as cases of asymptomatic bacteriuria, making 22% of the prevalence.

Table 1: Socio-demographic and maternal factors of patients(N=300)

Study Variable	Sub groups	Percentages
Age	18-25 years	136(45%)
	26-33 years	144(48%)
	34-41 years	20 (7%)
Education	Uneducated	10 (3%)
	Middle	89 (30%)
	Matric	143 (48%)
	Intermediate	50 (17%)
	Graduation	8 (2%)
Residence	Rural	69 (23%)
	Urban	231(77%)
Socio-economic status	Middle Income $>50,000$	213(71%)
	Lower class Income $<50,000$	87(29%)
	Primigravida	
Gravidity	1-4	204(68%)
	>4	
Gestation	First trimester	97(32%)
	2 nd trimester	47(16%)
	3 rd trimester	156(52%)

Regarding socio-demographic factors of patients (300), the maximum number of cases, 48%, were presented between 26–32 (144) years with a mean age of 28 years.

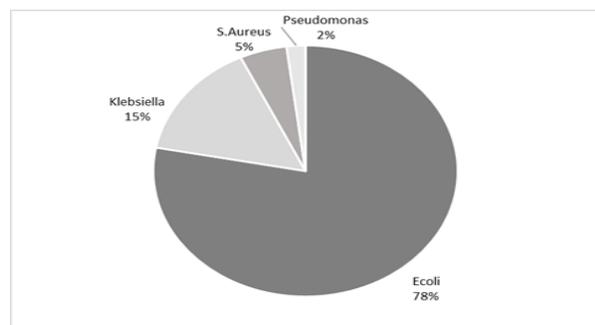


Figure 1: Pathogens isolated on urine culture in patients with asymptomatic bacteriuria

Out of 66 cases of asymptomatic bacteriuria, the predominant pathogen isolated was E. coli in 78% (51) of cases. (Figure 1)

Out of 66 patients, 25% (17) developed complications with asymptomatic bacteriuria. Maternal complications included 11% landed in preterm labor, 9% had rupture of membranes at term without labour, 9% lower urinary tract infection, and 1% developed pyelonephritis.

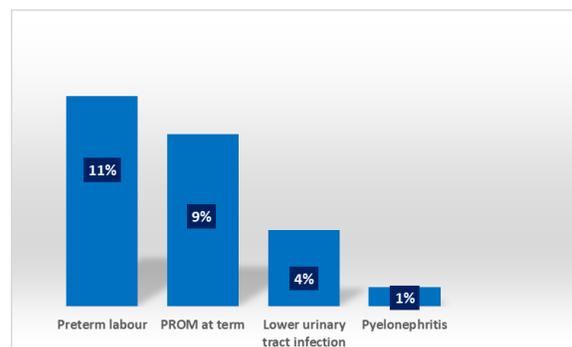


Figure 2: Maternal complications of asymptomatic bacteriuria in pregnancy

Regarding the reason for maternal complications, it was found that 25% (17) of cases that developed complications out of those 12 were non-compliant to treatment, and five patients could not afford treatment due to the high cost of antibiotics.

Regarding neonatal complications, 16%(11 cases) of babies of mothers with asymptomatic bacteriuria 11% needed NICU admission for observation, 3% had low APGAR scores, and 2% developed neonatal sepsis.

In our study, 14% of patients developed puerperal pyrexia, 8% developed lower urinary tract infection with significant bacteriuria, and in 3% of cases, the wound was infected.

Women with low socioeconomic status had more than twice the odds of developing asymptomatic bacteriuria compared to those with higher socioeconomic status (AOR = 2.20, 95% CI 1.50–3.30, $p < 0.001$). Women with low educational attainment were nearly two times more likely to have asymptomatic bacteriuria compared with higher education (AOR = 1.90, 95% CI 1.20–2.90, $p = 0.004$).

Table 2: Multivariate logistic regression analysis of risk factors of asymptomatic bacteriuria

Variables (Risk Factor)	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Low socioeconomic status	2.50 (1.70–3.60)	<0.001	2.20 (1.50–3.30)	<0.001
Low education level	2.10 (1.40–3.10)	0.001	1.90 (1.20–2.90)	0.004
Rural residence	2.00 (1.30–3.00)	0.002	1.80 (1.10–2.80)	0.020
Parity >4	2.40 (1.50–3.70)	<0.001	2.10 (1.30–3.40)	0.002
Recurrent UTI	3.40 (2.10–5.40)	<0.001	3.00 (1.80–5.10)	<0.001

*p-value < 0.05 was considered significant. Data is presented in terms of the odds ratio

Women residing in rural areas showed a significantly higher risk of asymptomatic bacteriuria compared to those living in urban settings (AOR = 1.80, 95% CI 1.10–2.80, p = 0.020). Women with parity >4 had approximately twice the odds of developing asymptomatic bacteriuria compared to women with lower parity (AOR = 2.10, 95% CI 1.30–3.40, p = 0.002). History of recurrent urinary tract infection was the strongest predictor, with women having nearly threefold increased odds of asymptomatic bacteriuria compared to those without such a history (AOR = 3.00, 95% CI 1.80–5.10, p < 0.001).

Discussion

Various clinical guidelines advocate screening for asymptomatic bacteriuria during the initial antenatal visit and initiating treatment in positive cases as a key preventive strategy to reduce the risk of adverse maternal and neonatal outcomes.⁹ In the present study, the prevalence of asymptomatic bacteriuria among pregnant women was 22%, which aligns with rates reported in several developed nations.¹⁰ The prevalence of asymptomatic bacteriuria in pregnancy varies significantly by region. Several Asian countries report higher rates (17%–25.3%), likely due to socioeconomic disparities, hygiene, education, and limited antenatal care access.¹¹

In our study, the maximum number of cases, 48%, presented between 26 and 32 years, with a mean age of 28 years. This is in comparison with another study, where women aged 25–34 years had the highest bacteriuria (24.0%), probably due to high sexual activity during childbearing age.¹²

In our study, 68% (204) were multigravida, 49% (149) presented in the third trimester. These findings align with evidence that advancing gestation predisposes to urinary tract infections, primarily due to ureteral dilation, bladder distension, and diminished urethral tone, collectively fostering urinary stasis and bacterial proliferation.¹³ The predominant pathogen isolated in our study was *E. coli* in 78%. *Escherichia coli*, a common perineal bacterium, acts as a key urinary pathogen when hygiene is poor. Its unique structures allow it to adhere to and invade the urinary tract lining, causing persistent infections.¹⁴

Out of 66 patients, 25% (17) developed complications with asymptomatic bacteriuria. Maternal complications included 11% landing in preterm labour, 9% had rupture of membranes at term without labour, 4% developed lower urinary tract infection, and 1% developed pyelonephritis.

This is in correlation with a study showing that PROM occurred in 30% of cases, while the occurrence of PROM was threefold higher in patients with asymptomatic bacteriuria.¹⁵ A prospective study by Hill et al. is in close association with our study, reporting an ASB-related pyelonephritis rate of 1.4%.¹⁶ According to our study, these complications have a strong association with non-compliance and non-affordability to antibiotics. Guidelines emphasise that untreated/undertreated ASB in pregnancy predisposes to pyelonephritis and adverse outcomes, highlighting why non-compliance or inability to afford antibiotics matters.¹⁷

Primary-care evidence also identifies patients' financial resources as a determinant of antibiotic adherence.

In our study of neonatal complications, 16% of babies of mothers with asymptomatic bacteriuria, 11% needed NICU admission for observation, 3% had low APGAR scores, and 2% developed neonatal sepsis.

These findings are in correlation with a study showing 13.6% of neonates born to mothers with asymptomatic bacteriuria required NICU admission, while 9.1% had low Apgar scores,¹⁸ and the incidence of neonatal sepsis ranged from 2.1% to 4.9%.¹⁹

In our study, 14% of patients developed puerperal pyrexia, 8% developed lower urinary tract infection with significant bacteriuria, and in 3% of cases, the wound was infected. Similar studies have linked ASB with higher rates of postpartum febrile morbidity and urinary tract infection. Kerure et al.²⁰ reported puerperal pyrexia in 18.6% of women with urinary infections, while Gundersen et al.²¹ noted increased postpartum UTIs in those with antenatal bacteriuria. Surgical-site infection rates after caesarean delivery range from 2–7%, with ASB as a contributing factor.²² Neonatal outcome analysis highlights the risks of untreated asymptomatic bacteriuria and emphasises the need for surveillance and integration into antenatal care to improve maternal and neonatal outcomes.

Regarding the associated risk factors of ASB, in the present study, multivariate logistic regression identified low socioeconomic status, limited education, rural residence, high parity, and recurrent urinary tract infection as independent predictors of asymptomatic bacteriuria in pregnancy, with recurrent UTI showing the strongest association. With a statistically significant p-value <0.05.

Our study compared a multivariable logistic regression and found ASB associated with lower socioeconomic status (bivariable), higher parity, and recurrent UTI.²³ Low education levels and rural residence were also associated with asymptomatic bacteriuria during pregnancy.²⁴

These results stress the significance of considering demographic and clinical characteristics during risk assessment.

Recommendations: Antenatal screening for asymptomatic bacteriuria should be implemented in antenatal clinics, with prompt initiation of targeted antimicrobial therapy upon detection. Strategies to enhance patient adherence, including counselling and mitigation of financial barriers, are essential. Post-treatment follow-up cultures should be incorporated into care protocols to ensure eradication and prevent recurrence.

Limitations:

The study was conducted at a single tertiary care centre, limiting the generalisability of findings to broader populations. Although the sample size was adequate for the primary outcome analysis, it may be insufficient to detect less frequent complications. Additionally, follow-up was limited to the immediate postpartum period, precluding the assessment of long-term maternal or neonatal outcomes.

Conclusions

This study underscores a significant association between gestational asymptomatic bacteriuria and adverse maternal–neonatal outcomes, including preterm labour, premature rupture of membranes, puerperal pyrexia, and neonatal morbidity. Although timely antimicrobial therapy

mitigates severe sequelae, such as pyelonephritis, its effectiveness is compromised by non-adherence and socioeconomic constraints, necessitating rigorous antenatal surveillance and adherence-focused interventions.

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