Section: Obstetrics and Gynaecology

Original Research Article

ASSESSMENT OF ASYMPTOMATIC BACTERIURIA AMONG PREGNANT WOMEN ATTENDING THE ANTENATAL CLINIC OF TERTIARY CARE HOSPITAL IN NORTH MAHARASHTRA REGION

Nishigandha Raut[1], Chetan Pawar[2], Jitendra Ghumare[2]

[1]*Assistant Professor, Department of Obstetrics and Gynaecology, Mahatma Gandhi Institute of Medical Sciences, Maharashtra, India*
[2]*Associate Professor, Department of Obstetrics and Gynaecology, Shri Bhausaheb Hire Government Medical College, Dhule, Maharashtra, India.*

Received *: 01/02/2025*
Received in revised form *: 20/03/2025*
Accepted *: 06/04/2025*

Corresponding Author:
Dr. Nishigandha Raut,
Assistant Professor, Department of Obstetrics and Gynaecology, Mahatma Gandhi Institute of Medical Sciences, Maharashtra, India.
Email: nishigandharaut1994@gmail.com

DOI: 10.70034/ijmedph.2025.2.93

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (2); 519-523

ABSTRACT

Background: Asymptomatic bacteriuria (ASB) in pregnancy is a significant concern due to its potential complications, including pyelonephritis, preterm labor, and low birth weight. Early detection and treatment are essential for preventing adverse maternal and fetal outcomes. This study aims to assess the prevalence, microbial profile, and antibiotic sensitivity of ASB among pregnant women attending a tertiary care hospital in North Maharashtra.

Materials and Methods: This hospital-based observational study included 150 pregnant women attending the antenatal clinic. Participants were selected using simple random sampling, and those with symptomatic urinary tract infections or recent antibiotic use were excluded. Midstream urine samples were collected and analyzed for bacterial growth. Isolated organisms were identified using conventional biochemical methods, and antibiotic sensitivity testing was performed according to CLSI guidelines. Data were analyzed using SPSS software, with chi-square tests applied to determine associations.

Results: The prevalence of ASB was highest in the 20-25 years age group (74%), among primigravidae (52.7%), and in the second trimester (70%). Most participants (60%) belonged to the lower socioeconomic class. Escherichia coli (84%) was the predominant pathogen, followed by Klebsiella pneumoniae (8%). Nitrofurantoin exhibited the highest sensitivity (59.3%), while resistance was noted against ciprofloxacin and cefotaxime. Hygiene and occupation showed significant associations with ASB ($p < 0.05$), while gravida, trimester, and water consumption were not statistically significant.

Conclusion: ASB is prevalent among pregnant women, particularly in those with lower socioeconomic status and poor hygiene. Screening during early pregnancy and targeted antibiotic treatment are essential to reduce complications.

Keywords: Asymptomatic bacteriuria, pregnancy, Escherichia coli.

INTRODUCTION

Asymptomatic bacteriuria (ASB), defined as the presence of bacteria in the urine without accompanying symptoms, is a prevalent condition among pregnant women, with reported rates ranging from 2% to 10% globally.[1] This condition is particularly concerning during pregnancy due to physiological and anatomical changes in the urinary tract, such as ureteral dilation and urinary stasis, which increase susceptibility to bacterial colonization.[2] If left untreated, ASB can progress to symptomatic urinary tract infections (UTIs), including acute pyelonephritis, posing significant risks to both maternal and fetal health.[3]

The maternal complications associated with untreated ASB are substantial and include acute pyelonephritis, which can lead to sepsis, anemia, and hypertensive disorders of pregnancy.[4] Fetal risks are equally concerning, encompassing preterm birth, low

birth weight, and increased perinatal mortality. These adverse outcomes underscore the critical importance of early detection and appropriate management of ASB to safeguard maternal and neonatal health.[5,6]

Screening for ASB is a vital component of prenatal care. The gold standard for detection is urine culture, which, despite being time-consuming, accurately identifies bacterial presence and guides targeted antibiotic therapy.[7] Urine dipstick tests are commonly used as a rapid, cost-effective method for detecting urinary tract infections, including asymptomatic bacteriuria (ASB). This method involves testing a urine sample with a chemically treated strip that detects the presence of nitrites, which are produced by certain bacteria, and leukocyte esterase, an enzyme released by white blood cells in response to infection. While dipstick testing provides quick results, its sensitivity and specificity are generally lower than that of urine culture, often leading to false negatives or positives. Despite these limitations, urine dipstick tests remain an essential tool in initial screening for ASB in pregnant women due to their ease of use and rapid turnaround time. Implementing effective screening protocols ensures timely intervention, reducing the likelihood of complications.[8]

The prevalence and etiology of ASB can vary based on geographic location, socioeconomic factors, and healthcare practices. In India, studies have reported prevalence rates ranging from 5% to 17% among pregnant women, with Escherichia coli identified as the predominant pathogen.[9] However, data specific to the North Maharashtra region remain limited. Understanding regional prevalence, common bacterial isolates, and their antimicrobial susceptibility patterns is essential for developing tailored screening and treatment strategies. This study aims to assess the prevalence of ASB among pregnant women attending the antenatal clinic of a tertiary care hospital in North Maharashtra, identify the common bacterial isolates, evaluate their antibiotic sensitivity profiles, and explore associated maternal and fetal outcomes.

MATERIALS AND METHODS

This hospital-based observational study was conducted at a tertiary care hospital in the North Maharashtra region. The study included pregnant women attending the antenatal clinic who met the inclusion criteria. Ethical approval was obtained from the institutional ethics committee, and written informed consent was taken from all participants. A total of 150 pregnant women were recruited using a simple random sampling technique. Women with symptomatic urinary tract infections (UTIs), known chronic renal disease, recent antibiotic use, or history of recurrent UTIs were excluded.

Demographic and clinical details were recorded using a structured questionnaire, including age, socioeconomic status, educational background, and obstetric history. Parity, gestational age, and comorbid conditions such as anemia, pregnancy-induced hypertension (PIH), and gestational diabetes mellitus (GDM) were noted. Lifestyle factors such as water intake, hygiene practices, and frequency of micturition were also assessed. Clinical examination was performed for all participants, and hemoglobin levels were measured.

Midstream clean-catch urine samples were collected from all participants under sterile conditions. In addition to standard culture techniques, urine dipstick tests for nitrites and leukocyte esterase were performed on each sample to provide a rapid, preliminary screening for asymptomatic bacteriuria (ASB). Samples were processed in the microbiology laboratory using standard culture techniques. The presence of asymptomatic bacteriuria (ASB) was confirmed based on bacterial colony counts of $\geq 10^5$ CFU/mL on culture. Isolated organisms were identified using conventional biochemical methods. Antibiotic susceptibility testing was performed using the Kirby-Bauer disk diffusion method following Clinical and Laboratory Standards Institute (CLSI) guidelines.

Data were entered into Microsoft Excel and analyzed using SPSS software. Descriptive statistics such as mean and standard deviation were used for continuous variables, while categorical variables were expressed as frequencies and percentages. Chi-square tests were used to determine associations between ASB and maternal characteristics, with a p-value <0.05 considered statistically significant.

RESULTS

The study included 150 pregnant women, with a majority (74%) belonging to the age group of 20-25 years, while the remaining 26% were between 25-38 years. Regarding obstetric history, 52.7% were primigravida, and 47.3% were multigravida. The gestational age distribution showed that 70% of participants were in the second trimester, whereas 30% were in the third trimester. Socioeconomic status assessment revealed that 60% of the study population belonged to the lower class, followed by 20.7% in the lower middle, 18.7% in the upper middle, and only 0.7% in the lower upper category [Table 1].

Table 1: Demographic and Clinical Characteristics of Study Participants

Variable		Frequency (n=150)	Percentage (%)
Age Group	20-25 years	111	74
	25-38 years	39	26
Parity	Primigravida	79	52.7
	Multigravida	71	47.3

Gestational Age (weeks)	13-27 (2nd trimester)	105	70
	27-40 (3rd trimester)	45	30
Socioeconomic Status	Lower	90	60
	Lower middle	31	20.7
	Upper middle	28	18.7
	Lower upper	1	0.7

Educational status analysis demonstrated that 23.3% of participants were illiterate, 20.7% had completed the 10th grade, 24% had completed the 12th grade, and 11.3% were graduates. Occupational data showed that 54% of women were laborers, 34.7% were housewives, and 11.3% had other occupations, including clerks and peons. Water consumption patterns revealed that 96.7% of participants consumed less than 3 liters of water daily, while only 3.3% consumed at least 3 liters per day. Hygiene practices indicated that 27.3% of the women had poor hygiene maintenance, whereas 72.7% maintained good hygiene [Table 2].

Table 2: Lifestyle and Hygiene Factors

Variable		**Frequency (n=150)**	**Percentage (%)**
Education Level	Illiterate	35	23.3
	10th grade	31	20.7
	12th grade	36	24
	Graduate	17	11.3
Occupation	Labourer	81	54
	Housewife	52	34.7
	Others (Clerk, Peon, etc.)	17	11.3
Water Consumption	<3 litres/day	145	96.7
	≥3 litres/day	5	3.3
Hygiene Maintenance	Poor	41	27.3
	Well-maintained	109	72.7

Among medical conditions, anemia was the most prevalent comorbidity, observed in 60.7% of the participants, while 39.3% were non-anemic. Pregnancy-induced hypertension (2.7%), gestational diabetes mellitus (0.7%), GDM with PIH (0.7%), and heart disease (0.7%) were noted as additional comorbidities. Sexual activity during pregnancy was reported by only 5.3% of participants, while 94.7% abstained [Table 3].

Table 3: Medical History and Comorbidities

Variable		**Frequency (n=150)**	**Percentage (%)**
Anaemia	Yes	91	60.7
	No	59	39.3
Other Comorbidities	Pregnancy-Induced HTN	4	2.7
	Gestational Diabetes Mellitus (GDM)	1	0.7
	GDM + PIH	1	0.7
	Heart Disease	1	0.7
Sexual Activity During Pregnancy	Present	8	5.3
	Absent	142	94.7

Microbiological analysis revealed that Escherichia coli was the predominant organism isolated (84%), followed by Klebsiella pneumoniae (8%), Pseudomonas aeruginosa (3.3%), Staphylococcus aureus (1.3%), and Staphylococcus saprophyticus (3.3%). Antibiotic susceptibility testing showed that Nitrofurantoin was the most effective antibiotic, with a sensitivity rate of 59.3%, followed by Cephalexin (16%), Cotrimoxazole (8.7%), Norfloxacin (6.7%), and both Cefotaxime and Ciprofloxacin (4.7% each) [Table 4].

Table 4: Microbiological Profile and Antibiotic Sensitivity

		Frequency (n=150)	**Percentage (%)**
Organism Isolated	Escherichia coli	126	84
	Klebsiella pneumoniae	12	8
	Pseudomonas aeruginosa	5	3.3
	Staphylococcus aureus	2	1.3
	Staphylococcus saprophyticus	5	3.3
Antibiotic Sensitivity	Nitrofurantoin	89	59.3
	Cephalexin	24	16
	Cotrimoxazole	13	8.7
	Norfloxacin	10	6.7
	Cefotaxime	7	4.7
	Ciprofloxacin	7	4.7

Statistical analysis revealed significant associations between occupation and organism isolated ($p < 0.01$) and between hygiene practices and organism isolated ($p < 0.05$). However, no significant associations were found between anemia, trimester, water consumption, frequency of micturition, or sexual activity with the type of bacterial organism isolated [Table 5].

Table 5: Association between variable and organism isolated

Variable	p-Value	Significance
Anaemia	0.631	Not Significant
Trimester	0.418	Not Significant
Occupation	<0.01	Significant
Hygiene	<0.05	Significant
Water Consumption	>0.05	Not Significant
Micturition Frequency	0.203	Not Significant
Sexual Activity	0.181	Not Significant

DISCUSSION

The inadequate progress in antenatal care within the Indian health system has resulted in insufficient screening for asymptomatic bacteriuria (ASB) during pregnancy. According to the National Family Health Survey, only 51% of women receive at least four antenatal visits, with 17% having no visits at all. Routine urine culture tests for ASB screening are often omitted, with empirical treatments based on urine strip tests being the common practice. This gap in detection may lead to maternal and fetal complications, emphasizing the need for systematic screening. In our study, out of 7317 antenatal clinic attendees over 11 months, 16% (1170 patients) tested positive for ASB using nitrate dipstick tests. After applying inclusion and exclusion criteria, 150 patients were enrolled for further evaluation. Similar studies by Sonkar et al,[10] and Edae M et al,[11] reported ASB prevalence rates of 16.7% and 19.9%, respectively, supporting the significance of ASB screening in pregnancy.

ASB prevalence was highest among women aged 20-25 years (74%), with a mean age of 24.4 years, standard deviation of 3.8, and a higher occurrence in primigravida women (52.7%). The prevalence was significantly higher in the second trimester (70%), aligning with findings from Sonkar et al,[10] who observed a mean maternal age of 26 years, and Totadhri M et al,[12] who reported a mean age of 26.6 years with 50% of cases occurring in the second trimester. The increase in culture positivity during the second trimester may be attributed to physiological changes such as ureteral dilation and urinary stasis, which peak between 22-24 weeks. While studies by Imade PE et al,[13] and Kasinathan A et al,[14] found higher ASB prevalence among multiparous women, our study showed higher rates in primigravidae, possibly due to physiological adaptations in first-time pregnancies.

Education, socioeconomic status, and occupation also played crucial roles in ASB prevalence. In our study, 23.3% of participants were illiterate, while only 11.3% were graduates. The majority (60%) belonged to the lower socioeconomic class, with 54% being laborers and 34.7% housewives. Kasinathan A et al,[14] similarly observed that 45.5% of ASB cases occurred in women with only primary-level education, belonging to lower socioeconomic classes. However, Paari P et al,[15] reported a lower ASB prevalence in low-income groups, highlighting regional variations in risk factors. Poor hygiene and nutritional deficiencies in lower socioeconomic groups likely contribute to higher ASB rates, reinforcing the need for improved maternal health education and hygiene awareness.

The most commonly isolated pathogen in our study was Escherichia coli (84%), followed by Klebsiella pneumoniae (8%), Pseudomonas aeruginosa (3.3%), and Staphylococcus species (3.3%). These findings are consistent with studies by Imade PE et al,[13] and Sonkar N et al,[10] who reported E. coli as the predominant uropathogen. Antibiotic sensitivity testing revealed the highest sensitivity to nitrofurantoin (59.3%), followed by cephalexin (16%) and cotrimoxazole (8.7%). Resistance to ciprofloxacin and cefotaxime was notable, reflecting global concerns about antimicrobial resistance. Edae M et al,[11] reported similar resistance patterns, underscoring the need for judicious antibiotic use. Hygiene and occupation were found to have a significant association with ASB, while other factors such as gravida, trimester, and water consumption were not statistically significant. Further large-scale studies could help validate these findings and identify additional risk factors for ASB in pregnancy.

CONCLUSION

Asymptomatic bacteriuria (ASB) is a common pregnancy complication with a 16% prevalence, most frequent in the second trimester, primigravida women, and lower socioeconomic groups. Poor hygiene and inadequate water intake contributed to its occurrence. Escherichia coli (84%) was the predominant pathogen, with the highest antibiotic sensitivity to nitrofurantoin (59.3%). If untreated, ASB leads to maternal and fetal complications, including pyelonephritis, anemia, preterm birth, and low birth weight. Early screening, preferably in the first trimester, and prompt antibiotic treatment are essential to prevent adverse outcomes.

REFERENCES

1. Nicolle LE, Gupta K, Bradley SF, Colgan R, DeMuri GP, Drekonja D, et al. Clinical practice guideline for the management of asymptomatic bacteriuria: 2019 update by the Infectious Diseases Society of America. Clin Infect Dis 2019; 68: e83– 110.
2. The American College of Obstetricians and Gynecologists. Urinary Tract Infections in Pregnant Individuals. Obstetrics & Gynecology. 2023;142(2):435.
3. Glaser AP, Schaeffer AJ. Urinary Tract Infection and Bacteriuria in Pregnancy. Urol Clin North Am. 2015;42(4):547-60.
4. Sujatha R, Nawani M. Prevalence of asymptomatic bacteriuria and its antibacterial susceptibility pattern among pregnant women attending the antenatal clinic at kanpur, India. J Clin Diagn Res. 2014;8(4):DC01-DC3.
5. Mishra D, Kalra A, Bhide AR, Singh M. Risk Factors and Clinical Outcomes of Asymptomatic Bacteriuria in Pregnant Women: A Comprehensive Analysis. Cureus. 2024;16(5):e59557.
6. Mayomba C, Matovelo D, Kiritta R, Kashinje Z, Seni J. Asymptomatic bacteriuria and its associated fetomaternal outcomes among pregnant women delivering at Bugando Medical Centre in Mwanza, Tanzania. PLoS One. 2024;19(10):e0303772.
7. Lumbiganon P, Laopaiboon M, Thinkhamrop J. Screening and treating asymptomatic bacteriuria in pregnancy. Curr Opin Obstet Gynecol. 2010;22(2):95-9.
8. Hans A, Yadav A, Kaur P, Kumari A. Evaluation of Leukocyte esterase and Nitrite dipstick tests with routine urine microscopic analysis in detecting urinary tract infections. Indian Journal of Pathology and Oncology. 2024 Apr 15;11(1):3–7.
9. Hamida A, Amal A. Urinary Tract Infections among Pregnant Women at Tripoli. International Archives of Medical Microbiology. 2023;5(1):1-8.
10. Sonkar N, Banerjee M, Gupta S, Ahmad A. Asymptomatic Bacteriuria among Pregnant Women Attending Tertiary Care Hospital in Lucknow, India. Dubai Med J. 2021; 4 (1): 18–25.
11. Edae M, Teklemariam Z, Weldegebreal F, Abate D. Asymptomatic Bacteriuria among Pregnant Women Attending Antenatal Care at Hiwot Fana Specialized University Hospital, Harar, Eastern Ethiopia: Magnitude, Associated Factors, and Antimicrobial Susceptibility Pattern. Int J Microbiol. 2020;2020: 1763931.
12. Totadhri M, Lakshmanan A, Saraswathy MP, Mane MS. Asymptomatic bacteriuria of pregnant women in a tertiary care centre. J Educ Health Promot. 2022;11:249.
13. Imade PE, Izekor PE, Eghafona NO, Enabulele OI, Ophori E. Asymptomatic bacteriuria among pregnant women. N Am J Med Sci. 2010;2(6):263-266.
14. Kasinathan A, Thirumal P. Prevalence of asymptomatic bacteriuria in antenatal women attending a tertiary care hospital. Int J Reprod Contracept Obstet Gynecol. 2017;3(2):437-41.
15. Paari P, T. P. S, Dhinakaran S, Paul CMP. A cross-sectional study on asymptomatic bacteriuria among antenatal women attending an urban tertiary health care center in Southern India. Int J Reprod Contracept Obstet Gynecol. 2017;6(10):4522-5.