

## Screening for Asymptomatic Bacteriuria in Pregnant women

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### Abstract

Urinary tract infections are one of the most common infections encountered in clinical practice. Untreated bacteriuria during pregnancy is associated with adverse maternal and perinatal outcomes. This study was done to detect the prevalence of asymptomatic bacteriuria in pregnancy and the bacterial profile and antibiotic susceptibility pattern of the uropathogen. This was a hospital based prospective study conducted in the Obstetrics and Gynecology Department of a tertiary care teaching hospital. Total of 232 women were included in the study after using exclusion criteria. Clean catch mid stream urine sample was collected and the sample was cultured. The organism was identified and antibiotic susceptibility was tested and data obtained was analyzed. Total of 86 patients (37.1%) were identified to have significant bacteriuria. Maximum numbers of patients were in the age group 20-25 years (37.3%) followed by 34.8 % in the age group 25-30 years. Asymptomatic bacteriuria was more frequent in multigravida (72.1%) than in primigravida (27.9%). Asymptomatic bacteriuria was most frequent in third trimester (39.5%) followed by first trimester (32.6%) and least in second trimester (27.9%). E coli was found to be the most common organism followed by Staph Aureus and Acinetobacter

baumannii. Most of the organisms were sensitive to nitrofurantoin, cefotaxime, clindamycin and ciprofloxacin. High incidences of undiagnosed asymptomatic bacteriuria in pregnancy lead to complication during pregnancy to mother and fetus. Hence it is important to do urine culture in all trimesters of pregnancy and treat appropriately if bacteriuria is detected.

**Keywords:** Asymptomatic Bacteriuria; Pregnancy; Urinary Tract Infection.

### Introduction

Urinary tract infections are one of the most common infections encountered in clinical practice. About 50% of women experience at least one episode of urinary tract infection during their lifetime [1]. Urinary tract infection during pregnancy could be symptomatic or asymptomatic [2]. Asymptomatic bacteriuria is defined as the presence of more than  $10^5$  colonies of a single bacterial species per milliliter of urine cultured from midstream sample in the absence of declared symptoms [3]. Asymptomatic bacteriuria accounts for 2-10% of pregnancies in affluent countries [4] and the incidence is much more in developing and undeveloped countries. The reported prevalence rate in the Indian scenario is as high as 8% [4-6]. Females are more susceptible to these infections because of the short length of urethra along with proximity to warm moist anal canal [7]. The pregnant women are two times more commonly affected than age matched non pregnant females [8,9]. This is due to urinary stasis due to progesterone effect in pregnancy in addition to different morphological and physiological changes during pregnancy.

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Increased bladder volume and decreased bladder tone along with decreased ureteral tone contributes to increased urinary stasis and vesicoureteral reflux. Additionally, pregnant women develop glycosuria which encourages bacterial growth in the urine [10]. These multiple factors contribute to the development of urinary tract infection during pregnancy. Commonest organisms responsible are *Escherichia coli* (80-85%) followed by *Coagulase negative Staphylococcus spp*, *Klebsiella spp*, *Pseudomonas spp* and *Proteus spp* [9,11-15]. Untreated bacteriuria during pregnancy is associated with adverse maternal and perinatal outcomes. Maternal outcomes include anemia, hypertension, pre-eclampsia, amnionitis, endometritis, symptomatic cystitis and acute Pyelonephritis leading to preterm labor and delivery. Adverse fetal outcomes include prematurity, low birth weight and increased perinatal mortality [16,17]. The gold standard investigation for detection of asymptomatic bacteriuria is urine culture [1,12,18-20]. Early detection and treatment of asymptomatic bacteriuria is of considerable importance not only to prevent acute pyelonephritis and chronic renal failure in the mother but also to reduce prematurity and fetal mortality [21,22]. This study was done to detect the prevalence of asymptomatic bacteriuria in pregnant women and the bacterial profile and antibiotic susceptibility pattern of the uropathogen.

### Materials and Methods

This was a hospital based prospective study conducted in the Obstetrics and Gynecology Department of a tertiary care teaching hospital. Pregnant women irrespective of their period of pregnancy attending the antenatal Outpatient Department were chosen for the study.

#### *Exclusion Criteria*

1. Women with symptoms suggestive of urinary tract infections like fever, lower abdominal pain, dysuria, frequency and urgency.
2. History of antibiotic therapy in the last two weeks.
3. Patients with Diabetes, chronic Hypertension and other pre-existing medical disorders.

A detailed history was taken and complete general physical examination and Obstetric examination was carried out. Total of 232 pregnant women were included in this study. Informed consent was taken from these women and they were counseled regarding collection of clean catch mid stream urine sample. The sample was collected in a sterile wide mouthed

leak proof container and the sample was transported to the microbiology department immediately and processed. The sample was cultured using blood agar and chocolate agar for gram positive bacteria and Mac Conkey agar for gram negative bacteria and incubated at 37°C for 48 hours. Conventional methods and biochemical tests were performed and the organism was identified as per NCCLS guidelines [23]. It was reported as significant if the number of colonies corresponded to 10<sup>5</sup> colony forming units (CFU) per ml. It was reported as insignificant growth if colony count was less than 10<sup>5</sup> CFU per ml. Antibiotic susceptibility to the standard antibiotics was tested using Kirby-Bauer disc diffusion methods by incubating at 37 °C for 24 hours. Data obtained was analyzed using SPSS software version 23. Based on the data analysis, results were obtained regarding the relation of asymptomatic bacteriuria to age, parity, period of gestation, infectivity pattern and antibiotic sensitivity pattern. The pregnant women who tested positive for asymptomatic bacteriuria were treated with a course of antibiotic as per the sensitivity testing.

### Results

Total of 232 antenatal patients were included in the study. Total of 86 (37.1%) were identified to have significant bacteriuria. Table 1 shows the frequency and percentage of women with asymptomatic bacteriuria in the different age groups in the study. Maximum numbers of patients with asymptomatic bacteriuria were in the age group 20-25 years (37.3%) followed by 34.8 % in the age group 25-30 years.

Table 2 shows frequency of women with asymptomatic bacteriuria in relation to parity. In our study asymptomatic bacteriuria was more frequent in multigravida (72.1%) than in primigravida (27.9%).

Table 3 shows frequency of women with asymptomatic bacteriuria in relation to the different trimesters. Asymptomatic bacteriuria was most frequent in third trimester (39.5%) followed by first trimester (32.6%) and least in second trimester (27.9%).

Table 4 shows frequency of the different organisms grown in urine culture of patients with asymptomatic bacteriuria. *E coli* was found to be the most common organism grown at 18.7% followed by *Staph Aureus* and *Acinetobacter baumannii* at 16.3% each. Next common was *Klebsiella Pneumoniae* and *Streptococcus Epidermidis* at 11.6% each. With regards to the antibiotic sensitivity most of the organisms were sensitive to nitrofurantoin, cefotaxime, clindamycin and ciprofloxacin with only

14.3% of *Acinetobacter* Resistant to Nitrofurantoin, 40% *Klebsiella Pneumonia* resistant to cefotaxime, 25% of *Enterococcus Fecalis* resistant to Clindamycin and *Clostridium* species being resistant to Ciprofloxacin.

**Table 1:** Age related frequency of asymptomatic bacteriuria in pregnancy

Age in Years	Frequency
20 years	10(11.6%)
20-25 years	32(37.5%)
26-30 years	30(34.8%)
30-35 years	12(13.9%)
35 years	2(2.4%)
Total	86(100%)

**Table 2:** Frequency of women with asymptomatic bacteriuria in relation to parity

Parity	Frequency
Primigravida	24(27.9%)
Multigravida	62(72.1%)
Total	86(100%)

**Table 3:** Frequency of women with asymptomatic bacteriuria in relation to the period of gestation

Period of gestation	Frequency
Ist trimester	28(32.5%)
IInd trimester	24(27.9%)
IIIrd trimester	34(39.5%)
Total	86(100%)

**Table 4:** Frequency of the different organisms grown in urine culture of patients with asymptomatic bacteriuria

Organism	Frequency
<i>Escherichia coli</i>	16(18.7%)
<i>Staphylococcus aureus</i>	14(16.3%)
<i>Acinetobacterbaumani</i>	14(16.3%)
<i>Klebsiella pneumonia</i>	10(11.6%)
<i>Streptococcus epidermidis</i>	10(11.6%)
<i>Enterococcus faecalis</i>	8(9.3%)
<i>Klebsiellaoxytoca</i>	8(9.3%)
Group D streptococci	2(2.3%)
<i>Citrobacter</i>	2(2.3%)
<i>Clostridium freundi</i>	2(2.3%)
Total	86(100%)

## Discussion

Asymptomatic bacteriuria is very common in pregnancy and needs special attention due to lack of symptoms and its adverse consequences in pregnancy [24]. In our study, the incidence of significant bacteriuria in asymptomatic pregnant women was 37.1%. Similar incidence was shown by Rohini UV et al (30.5%) and Neupane et al (26.5%) [25,26] and a higher incidence by Imade et al (45.3%) and Oladeinde et al (55%) [11,27]. Lower incidence of asymptomatic bacteriuria was shown by Lata R Chandel et al (7.34%), Lavanya SV (8.4%), Kerure RD(11%), Annie Rajarathnam (13.2%), Sujatha R et

al (7.2%), Mukherjee K et al (8.4%), Kerure SB(9%) and Prasanna B(17%) [9,13,24,28-32]. The increased incidence in our study could be explained by the lower socio economic status of patients in our hospital with their poor genital hygiene, social habits, due to variations in environmental conditions and low educational level of the patients in our study population.

In our study, the highest incidence of asymptomatic bacteriuria was in the age group 20-25 years (37.3%) followed by 25-30 years (34.8%). This was in contrast to most studies by Imade et al, Kerure RD, Rohini UV, Sujatha R, Mukherjee K, Kerure SB, Prasanna B and Bose AM et al [11,24,25,29-33] who found highest

percentage of infection in age group 26-30 years. In our study, incidence of asymptomatic bacteriuria was higher in multigravida (72.1%) than in Primigravida (27.9%). Similar higher incidence in multigravida was seen by Imade et al, Rohini UV et al and Prasanna B et al [11,25,32] while Lavanya SV et al, Kerure RD, Mukherjee K et al, Kerure SB and Bose Am et al [13,24,30,31,32] found increased incidence in primigravida. The higher incidence in multigravida could be due to increased colonization of urinary tract by pathogens due to repeated exposure to urinary stasis or previous infection [32].

In our study, increased incidence of asymptomatic bacteriuria was seen in third trimester (39.5%) followed by first trimester (32.6%). A similar high incidence in third trimester was found by Gayathree L et al, Rohini UV et al, Oladeinde et al and Prasanna B et al [22,25,27,32] while Nath et al, Girishbabu RJ, Kerure RD, Mukherjee K et al and Kerure SB (9%) [8, 21,24,30,31] found higher incidence in second trimester. High incidence of asymptomatic bacteriuria in first trimester was found by Lata R Chandel and Bose AM [9,33]. Pregnant women in the third trimester of pregnancy were more at risk as several anatomical and hormonal changes in pregnant women leads to urethral dilatation and urinary stasis which contribute to increased risk of developing urinary tract infection [34]. Urinary stasis increases with advancing pregnancy [35].

In our study, the most common organism was *Escherichia Coli* (18.7%) followed by *Staph Aureus* and *Acinetobacter baumannii* at 16.3%, followed by *Klebsiella Pneumoniae* and *Streptococcus Epidermidis* at 11.6% each. *Escherichia coli* was found to be the most common organism, followed by *Klebsiella Pneumonia* by Chandel Lata, Lavanya SV, Gayathree et al Kerure RD, Rohini UV et al, Neupane MS, Mukherjee K et al, Kerure SB, Prasanna B and Bose AM [9,13,22,24-26,30-33]. Most of these studies have reported higher isolation rates of *E Coli* than in our study. *E coli* being a commensal of the intestine has common access through the fecal material into the female urinary tract [25]. In our study, *Staph Aureus* was second common. This finding was similar to that of Imade and Oladeinde [11,27]. There is an increasing trend in the prevalence of *Staph Aureus* infection in a study by Madhu Udawat et al [36]. One study by Ajayi AB shows *Staph Aureus* as the most common pathogen [37].

This dramatic increase in prevalence rate of *Staph Aureus* can be attributed to the emergence and global spread of *Staph Aureus*. Hence, it is important to recognize this change in the spectrum of uropathogens which will guide us to changes in empirical antimicrobial therapy [33]. Most of the

isolates were most sensitive to Ciprofloxacin, Nitrofurantoin, Clindamycin and Cefotaxime.

## Conclusion

There is a high incidence of undiagnosed asymptomatic bacteriuria in pregnant women which if left untreated leads to complications during pregnancy to both mother and fetus. Hence it is important to do urine culture in all trimesters of pregnancy and to properly treat the bacteriuria depending on the susceptibility pattern. Empirical use of antibiotics is to be avoided due to the present high incidence of drug resistance. This will help us to reduce the maternal and fetal morbidity and mortality.

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