

RESEARCH ARTICLE

# Urinary Tract Infection During Pregnancy: Prevalence, Associated Risk Factors and Treatment Outcome Based on Antimicrobial Sensitivity Pattern

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## Abstract

Urinary tract infection is common among pregnant women. It can be either asymptomatic or symptomatic. This study was done on 225 pregnant women which comprised of both asymptomatic and symptomatic urinary tract infection in the Department of Microbiology Patna Medical College and Hospital, Patna and Department of Biotechnology and Microbiology GLA University, Mathura. The prevalence of asymptomatic bacteriuria in the present study was 7.42%, while for symptomatic cases it was 76%. *E.coli* was the commonest organism responsible for bacteriuria. Semi quantitative culture remains the gold standard for detecting bacteriuria. Of the different antibiotics used Amikacin, Nitrofurantoin, Meropenem, Piperacillin-Tazobactam were the most effective drugs in order to treat bacteriuria.

**Keywords:** UTI, Bacteriuria, Semi quantitative culture, *E.coli*, Screening tests.

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## INTRODUCTION

During pregnancy urinary tract infection is one of the commonest infection encountered in clinical practice. It may be asymptomatic or symptomatic. Asymptomatic bacteriuria which is also known as covert bacteriuria is defined as finding more than  $10^5$  colony forming units on culture of urinary samples from pregnant women. Symptomatic bacteriuria presents with symptoms like dysuria, fever, abdominal pain, urgency, increased frequency of micturition. Untreated ASB can lead to symptomatic cystitis in approximately 30% of patients and Pyelonephritis in 50% of patients<sup>1</sup>. Semiquantitative urine culture of midstream urine sample is the gold standard in screening and diagnosis of bacteriuria<sup>2</sup>. The prevalence of asymptomatic bacteriuria from reported studies is 2-11%<sup>3</sup>. There are varied physiological, anatomical and hormonal factors responsible for urinary tract infection during pregnancy. Commonest organism responsible are *E.coli* followed by *Klebsiella*, *Proteus*, *coagulase negative staphylococci* and *Pseudomonas*<sup>4-8</sup>. Untreated bacteriuria can lead to low birth weight infants and preterm birth. Different screening tests has been tried to detect bacteriuria during pregnancy but none was found to be adequate to replace semiquantitative urine culture. It has been found that antibiotic treatment reduces the incidence of adverse perinatal outcomes and various maternal complications.

### Associated Risk Factors

The risk factors include short urethra and its proximity to the anal canal which predisposes to bacterial colonization. Certain hormonal changes which occur during pregnancy which results in smooth muscle relaxation of ureter and bladder, leading to dilation of ureter and increased ureterovesical reflux. Pressure of the foetus on the ureter causes obstruction to the ureters leading to stasis and infection. Glycosuria during pregnancy may be an additional factor.

## MATERIAL AND METHODS

This prospective study was conducted on pregnant women with both asymptomatic and symptomatic urinary tract infection in the department of Microbiology Patna Medical College and Hospital, Patna and department of

Biotechnology and Microbiology GLA University, Mathura. Pregnant women of varying gestational period coming for antenatal check up in the outpatient department and admitted in the obstetrics and Gynaecology Department during the period from March 2017 to December 2017 were studied. Informed consent was obtained for participation in this study.

### Sample Size

A total of 225 pregnant women were studied.

### Sample Collection

A clean catch midstream urine sample was collected in a sterile universal container.

### Investigations

Samples thus collected were subjected to urine microscopy and culture was done by semiquantitative method on MacConkey and Cystine Lactose Electrolyte Deficient (CLED) medium by using a calibrated loop and incubated at 37 degree Celsius. Gram staining, Motility test, catalase test, oxidase test, coagulase test and different biochemical tests were done for organism identification.

Antibiotic sensitivity tests was done by Kirby- Bauer method on nutrient agar and Muller Hinton agar plate.

## RESULTS

### Urine Microscopy for Pyuria

Out of 175 asymptomatic bacteriuria studied sample 47 (26.85%) were microscopically positive and 128(73.14%) were negative (Table 1).

Out of 50 symptomatic pregnant women studied sample 41(82%) were microscopically positive and 9(18%) were negative (Table 2).

### Findings of Culture for Asymptomatic Bacteriuria cases

Out of 175 Studied Sample 13 (7.42%) were culture positive and 162 (92.58%) were culture negative (Table 3).

### Findings of Culture for Symptomatic Pregnant Women

Out of 100 studied sample 38(76%) were culture positive and 12(24%) were culture negative (Table 4).

### Commonest Pathogen Isolated

The commonest pathogen isolated was *E.coli* (Table 5).

**Table 1.** Urine Microscopy for Asymptomatic Bacteriuria

Microscopy	Number	Percentage
Positive	47	26.85
Negative	128	73.14
Total	175	100

**Table 2.** Urine Microscopy for Symptomatic Pregnant women

Microscopy	Number	Percentage
Positive	41	82
Negative	9	18
Total	50	100

**Table 3.** Culture for Asymptomatic Bacteriuria

Asymptomatic bacteriuria	Number	Percentage
Culture Positive	13	7.42
Culture Negative	162	92.58
Total	175	100

**Table 4.** Findings of Culture for Symptomatic Pregnant women

Symptomatic Bacteriuria	Number	Percentage
Culture Positive	38	76
Culture Negative	12	24
Total	50	100

**Table 5.** Bacterial isolates in asymptomatic and symptomatic Bacteriuric cases.

Organisms	No. of cases	Percentage
<i>E. coli</i>	30	56.66
<i>Klebsiella pneumoniae</i>	8	15.09
Coagulase negative <i>Staphylococcus</i>	5	9.43
<i>Staphylococcus aureus</i>	3	5.66
<i>Pseudomonas aeruginosa</i>	2	3.77
<i>Proteus mirabilis</i>	4	7.54
<i>Candida</i>	1	1.88
Total	53	100.00

**Table 6.** Antibiotic Sensitivity test

	<i>E.coli</i> (30)	<i>Klebsiella</i> spp. (8)	Coagulase Negative Staph(5)	<i>S.aureus</i> (3)	<i>Pseudomonas</i> spp.(2)	<i>Proteus</i> spp.(4)	<i>Candida</i> (1)
Ampicillin	1(3.33%)	0	1(20%)	0	0	1(25%)	0
Amoxycillin	4(13.33%)	0	2(40%)	1(33.33%)	0	1(25%)	0
Clavulanic acid							
Amikacin	24(80%)	5(62.5%)	0	1(33.33%)	1(50%)	2(50%)	0
Cotrimoxazole	12(40%)	2(25%)	2(40%)	1(33.33%)	0	2(50%)	0
Cephalexin	5(16.66%)	2(25%)	3(60%)	1(33.33%)	0	0	0
Ceftriaxone	6(20%)	2(25%)	3(60%)	1(33.33%)	0	0	0
Meropenem	19(63.33%)	6(75%)	4(80%)	2(66.66%)	1(50%)	1(25%)	0
Nitrofurantoin	21(70%)	6(75%)	3(60%)	1(33.33%)	0	1(25%)	0
Piperacillin	16(53.33%)	4(50%)	2(40%)	1(33.33%)	0	1(25%)	0
Tazobactam							
Cefoperazone	18(60%)	5(62.5%)	1(20%)	1(33.33%)	1(50%)	1(25%)	0
Subactam							

**Treatment Outcome**

The pregnant women treated as per Culture and sensitivity report were followed up for recurrence of symptoms during pregnancy. Repeat urine culture was done after 15 days of completion

of antimicrobial therapy. All treated pregnant women were found to be cured of bacteriuria after initial antimicrobial therapy, however 30 pregnant women(13.33%) again became symptomatic and routine urine microscopy and culture was done

and were treated as per sensitivity report. They were also advised to get thoroughly investigated after delivery for urinary tract abnormalities.

## DISCUSSION

The prevalence of asymptomatic bacteriuria in the present study was 7.42% (13/175), while for symptomatic cases it was 76% (38/50). This is within the reported range of 3-10% by other workers. Mathew et al, 1998 reported a prevalence of 6.8% in his study at Christian Medical College, Vellore<sup>9</sup> and Lavanya et al, 2002 reported prevalence of 8.4% in a study at AIIMS Delhi<sup>10</sup>. Studies conducted in different countries like, Etopia (1998), USA (2000), Malaysia (2002), Turkey (2005), Iran (2007) showed a prevalence of 3-10%<sup>11,12,13,14,15</sup>.

Bacterial detection by microscopy in asymptomatic cases was 26.85% while in symptomatic group it was 82% this is in line with findings of other studies.

Commonest organism isolated in this study was *E.coli* (56%) followed by *Klebsiella* (15%). Other organisms isolated were Coagulase negative Staphylococci (9.4%), *Staphylococcus aureus* (5.6%), *Pseudomonas* spp (3.7%), *Proteus* spp ( 7.5%) and *Candida* (1.8%). Gayathree et al from Karnataka found *E.coli* in 51.6% of samples from asymptomatic pregnant women and *Staphylococcus* and *Klebsiella* in 9.6% of cases<sup>16</sup>. In another study by Kheya Mukherjee et al from West Bengal, *E.coli* was the commonest organism isolated (57.14%)<sup>17</sup>. Study conducted by Nithyasree et al, from Tamil Nadu *E.coli* was isolated in 65.11% followed by *Klebsiella* and *Staphylococcus aureus* in 11.62% cases<sup>18</sup>.

Of the different antibiotics used for the sensitivity tests most effective antimicrobials for *E.coli* found in this study were Amikacin (80%), Nitrofurantoin (70%), Meropenem (63.3%), Piperacillin- tazobactam (53.3%) while Ampicillin was the least sensitive drug. This finding is almost similar to findings of Anu Mary Bose et al from Kerala<sup>19</sup>.

## CONCLUSION

This study was done on 225 samples which comprised of both asymptomatic and symptomatic bacteriuria. Our study showed *E.coli* as the commonest organism. Screening of all

pregnant women should be done during their first antenatal visit followed by urine culture in order to detect bacteriuria. Pregnant women who are detected with bacteriuria should be treated with appropriate antibiotics based on the antibiotics sensitivity tests. Educational status and level of personal hygiene of all women should be improved specially those belonging to low socio-economic group in order to eradicate bacteriuria.

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None.

## CONFLICT OF INTEREST

The author declares that there are no conflict of interest.

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