

## Asymptomatic bacteriuria among pregnant women attending tertiary care teaching hospital

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### Abstract

**Introduction:** One of the causes for adverse perinatal outcome is asymptomatic bacteriuria (ASB). The aim of this study is to determine the prevalence of asymptomatic bacteriuria among pregnant women.

**Materials and Methods:** A total of 205 urine specimens were collected by clean catch method from pregnant women attending Vinayaka Missions Medical College and Hospital, to screen asymptomatic bacteriuria. Collected urine samples were sent to microbiology laboratory and subjected to standard microbiological procedures to identify the pathogen.

**Results:** Out of 205 midstream urine specimens, 21 samples yielded significant bacterial growth and accounted for 10% asymptomatic bacteriuria. Asymptomatic bacteriuria was predominantly found between the age group of 18-25 years (52.38%). Significant bacterial growth was found in the specimens collected during three trimesters. Predominantly growth was seen from the urine specimens collected during second 8 (38.10%) and third trimester 8 (38.10%). *Escherichia coli* was the predominant bacteria isolated and accounted for 33.33%. Nitrofurantoin was found to be the most effective towards Gram positive and Gram negative bacteria.

**Conclusion:** In our study, prevalence of asymptomatic bacteriuria among pregnant women was 10%. Predominantly isolated bacteria was *Escherichia coli*. Among commonly used antibiotics to treat urinary tract infections, Nitrofurantoin was found to be the most effective drug.

**Keywords:** Asymptomatic bacteriuria, *Escherichia coli*, Nitrofurantoin.

### Introduction

One of the most commonly encountered health problems in community and hospital setting is Urinary tract infection (UTI). Urinary tract infections are categorized into two based on symptoms, symptomatic and asymptomatic. Pregnant women are at high risk for UTIs. The altered physiological, anatomical and hormonal changes during Pregnancy makes the antenatal mother more prone to Urinary tract infection. Presence of one lakh or more than one lakh bacteria per ml of urine specimen collected by clean catch method and without typical symptoms of urinary tract infection (UTI) is pertained as asymptomatic bacteriuria (ASB).<sup>1</sup> Asymptomatic bacteriuria among pregnant women ranged between 2 to 15%.<sup>2,3,4</sup>

During pregnancy ASB may increase the chances of complications such as, higher incidence of preterm labour, i.e. about 13.3% as compared to 7.6% in pregnant women without ASB. More possibilities of preterm amniotic sac rupture, oligohydramnios or polyhydramnios and higher incidence of recurrent pregnancy loss.<sup>5</sup> Acute pyelonephritis is the most severe complication among pregnant women with ASB which may further leads to urosepsis, higher maternal and foetal morbidity.<sup>6</sup>

The most commonly reported etiologic agent of bacteriuria is *Escherichia coli*, followed by *Proteus mirabilis* (*P. mirabilis*), *Klebsiella pneumonia* (*K. pneumonia*) and *Pseudomonas aeruginosa* (*P. aeruginosa*). Gram-positive organisms, including *B*

*streptococci*, *Enterococcus faecalis* (*E. faecalis*) and coagulase-negative staphylococci (CoNS), are less commonly recognised as etiologic agents of bacteriuria.<sup>7</sup> Detection of asymptomatic bacteriuria in pregnant women has become a part antenatal care and majority of antenatal guidelines contain routine screening for asymptomatic bacteriuria.

The aim of this study was to determine the prevalence of asymptomatic bacteriuria among pregnant women attending our tertiary teaching hospital.

### Material and Methods

This was a prospective, observational study in which a total of 205 urine samples were collected by clean catch method from pregnant women attending Obstetrics and Gynaecology at Vinayaka Mission's Medical College and Hospital, over a period of fourteen months. Before sample collection details from participants such as maternal age, gravidity, parity, age of gestation, along with emphasis on past medical and obstetric history were taken. Informed verbal consent was obtained from all the participants. Urine specimens collected from the participants were sent to the department of microbiology and processed as per standard microbiological methods. The samples were inoculated for semi-quantitative culture on bacteriological culture media. Specimen inoculated plates were kept in incubator at 37° C for overnight. If the colony count was  $\geq 10^5$  was as significant bacteriuria

and if the colony count is below  $10^5$  considered as insignificant growth. Further Gram's staining and biochemical reactions were performed. More than one type of colonies on culture plate was considered as contamination and repeat sample was requested.<sup>8</sup> Disc diffusion technique was used to determine antibiotic susceptibility of isolates.<sup>8</sup>

**Exclusion criteria:** UTI symptoms (like frequency, urgency or dysuria), Fever, Diabetes mellitus or Gestational diabetes, Renal stones or urinary tract anomalies, Antibiotic intake in preceding 2 weeks.

**Results**

A total of 205 urine specimens from pregnant women were screened for asymptomatic bacteriuria.

21(10%) urine specimens yielded significant bacterial growth. Majority of urine specimens yielded significant bacterial growth were belonged to the age of 18-25 years (52.38%) followed by 26-35 years (33.33%). Bacterial growth was significant in three urine samples collected from the pregnant women belonged to between the age group of 36-40 years (14.28%).(Table.1)

Significant bacterial growth was found in the specimens collected during three trimesters. Predominantly growth was seen from the urine specimens collected during second 8 (38.10%) and third trimester 8 (38.10%). Least isolation rate was seen in first trimester 5(28.8%). (Table.1)

**Table 1: Age and gestation wise distribution of asymptomatic bacteriuria**

Age(in years)	Asymptomatic bacteriuria
18-25	11(52.38%)
26-35	7(33.33%)
36-40	3(14.28%)
Gestational age	
First trimester	5(28.8%)
Second trimester	8(38.10%)
Third trimester	8(38.10%)

Escherichia coli was the predominant bacteria isolated and accounted for 33.33% followed by Klebsiella species and Proteus species which accounted for 23.81and 19.04% respectively. Stahylococcus saprophyticus was found to be least isolated bacteria which accounted for 4.76%. (Table.2)

**Table 2: Bacteria isolated from urine specimens**

Bacteria	Number (%)
Escherichia coli	7(33.33%)
Klebsiella species	5(23.81%)
Proteus species	4((19.04%)
Enterococcus	2(9.52%)
Stahylococcus aureus	2(9.52%)
Staphylococcus saprophyticus	1(4.76%)
Total	21(100%)

Among the antibiotics tested against bacteria isolated from urine samples. All isolated Gram negative bacilli were susceptible to Imipenam and piperacillin/tazobactum (100%) except klebsiella species and accounted for 80% susceptibility to piperacillin/tazobactum. Other than imipenam and piperacillin/tazobactum, nitrofurantoin was found to be highly effective toward all Gram negative and Gram positive bacteria. But Proteus species showed 50% resistance towards nitrofurantoin. Majority of uropathogens were resistance ampicillin. (Table.3)

**Table 3: Susceptibility pattern of uropathogens**

Bacteria(N=21)	Ampicillin	Amoxyclav	Nitrofurantoin	Norfloxacin	Imipenam	Piperacillin/Tazobactum
E.coli(7)	2(28.57%)	4(57.14%)	7(100%)	3(42.85%)	7(100%)	7(100%)
Klebsiella species(5)	1(20%)	4(80%)	4(80%)	2(40%)	5(100%)	4(80%)
Proteus species(4)	2(50%)	4(100%)	2(50%)	2(50%)	4(100%)	4(100%)
Enterococci(2)	1(50%)	2(100%)	2(100%)	0(0%)	NT	2(100%)
S.aureus(2)	0(0%)	2(100%)	2(100%)	2(100%)	NT	2(100%)
S.saprophyticus(1)	0(0%)	1(100%)	1(100%)	1(100%)	NT	1(100%)

NT-Not tested

## Discussion

In the present study, the prevalence of asymptomatic bacteriuria was found to be 10%. This is in agreement with the studies conducted by Kehinde et al (10.7%)<sup>9</sup> and Alemu et al (10.4%)<sup>10</sup>. According to Turpin et al,<sup>11</sup> the prevalence of asymptomatic bacteriuria was found to be 7.3% and another study conducted by Gayathree et al showed 6.2% of asymptomatic bacteriuria among pregnant women. Least prevalence was shown Sheiner et al,<sup>12</sup> only 2.5% ASB among pregnant women.

Few studies conducted previously showed high prevalence of asymptomatic bacteriuria among pregnant women. According to the study conducted by Akerele et al<sup>13</sup> prevalence rate of asymptomatic bacteriuria was 86.6% among pregnant women. As per Rajarathnam et al, prevalence rate of asymptomatic bacteriuria among pregnant women was 13.2%.<sup>14</sup> These varying results may have been due to differences in the areas being studied, in the social habits of the communities being studied and in the socio-economic statuses, standards of personal hygiene and education levels of the patients being studied.

Asymptomatic bacteriuria was predominantly found between the age group of 18-25 years (52.38%) followed by 26-35 years (33.33%). As per the study conducted by Shirazi et al<sup>15</sup> prevalence was 13.8% in age group less than 21 years compared to 3% in age group over 30 years. As per Alghalibiet al.,<sup>16</sup> prevalence of ASB was high in pregnant women whose age ranged between 21-25 years of age. But in the study conducted by Turpin et al.<sup>11</sup> higher prevalence of ASB in pregnant women was ranged between 35-39 years of age. This high incidence of ASB in the young reproductive age group is due to early pregnancy and multiparity in our country, particularly in the rural areas.

In our study, prevalence rate asymptomatic bacteriuria during second and third trimester was 38.10%. Prevalence rate of ASB among urine specimens collected during first trimester showed only 28%. According to the study conducted by Gayathree et al,<sup>17</sup> asymptomatic bacteriuria was found to be high in IIIrd trimester (61.77%) compared to IIInd trimester (32.35%) and in the Ist trimester (5.88%) of pregnancy.

According to the study conducted by Prasanna et al,<sup>18</sup> majority of the women with ASB were in 3<sup>rd</sup> trimester (49%). The incidence of ASB is more pronounced in the third trimester, may be due to the changes related to advancing gestational age. This leads to stasis of urine and encourage bacterial multiplication.

In the present study, *Escherichia coli* was the predominant bacteria isolated and accounted for 33.33% followed by *Klebsiella* species and *Proteus* species which accounted for 23.81 and 19.04% respectively. *Stahylococcus saprophyticus* was found to be least isolated bacteria which accounted for 4.76%.

Senthilnath et al<sup>19</sup> and Sujatha et al<sup>20</sup> have also showed that *Escherichia coli* as the commonest isolate. In the present study, *Pseudomonas aeruginosa* was not isolated whereas other studies showed *P.aeruginosa* as uropathogen in urine specimens collected from pregnant women.<sup>21</sup>

Antimicrobial susceptibility of uropathogens vary from region to region and even from hospital to hospital due to the emergence of resistant strains caused by the indiscriminate use of antibiotics. In our study majority of bacteria were resistant commonly used antibiotic ampicillin. Resistance to ampicillin was exhibited by majority of strains of *E. coli* in European countries and Canada averaged 29.8%, but was as high as 53.9% in Spain.<sup>22</sup> In our study nitrofurantoin was found to be the most effective antibiotic among commonly used antimicrobials against uropathogens. According to NCCLS data from 2000, only 1% resistance rate was observed towards nitrofurantoin among uropathogens.<sup>23</sup> But certain limitations restricts the usage of nitrofurantoin. Efficacy of nitrofurantoin was found to be poor towards *Proteus* species. It may cause haemolytic anaemia in patients who have glucose-6-phosphate dehydrogenase deficiency.<sup>24</sup>

## Conclusion

In our study, prevalence of asymptomatic bacteriuria among pregnant women was 10%. *Escherichia coli* was the predominant pathogen isolated. Nitrofurantoin was found to be the most effective drug among commonly used antibiotics to treat urinary tract infections.

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