

## Asymptomatic bacteriuria in pregnancy

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### ABSTRACT

**Aims:** To estimate the prevalence of asymptomatic bacteriuria, its causative agents and their antimicrobial susceptibility pattern; and to determine the relationship of asymptomatic bacteriuria and pyuria in pregnant women.

**Methods:** A cross sectional study was conducted in a total of 240 asymptomatic pregnant women in Paropakar Maternity and Women's Hospital from August 2016 to January 2017. Clean catch midstream urine samples were collected from each participant. Urine samples were cultured using standard microbiological methods. Identification of isolates and antibiotic sensitivity testing were done.

**Results:** Out of 240 pregnant women, 17 (7.1%) were positive for asymptomatic bacteriuria [colony forming unit (CFU) >10<sup>5</sup>/ml]. There was no any significant difference in the prevalence of asymptomatic bacteriuria with respect to age, gestational age and parity. The prevalence of asymptomatic bacteriuria was significantly different with respect to education level (p=0.01) and number of pus cells in urine specimen (p=0.04). The most frequently isolated microorganisms were E.coli (70.6 %) followed by Klebsiella spp (11.8%). Ciprofloxacin followed by Nitrofurantoin and Norfloxacin had the highest sensitivity to all the isolates.

**Conclusions:** Asymptomatic bacteriuria is common in pregnancy. Routine urine culture should be done on all pregnant women to detect asymptomatic bacteriuria. Treatment should be based on antimicrobial sensitivity pattern due to increased antibiotic resistance to commonly used antimicrobial agents.

**Keywords:** asymptomatic bacteriuria, pregnant women, urinary tract infection, urine culture

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### INTRODUCTION

An infection in any organs of the urinary tract is collectively referred to as the urinary tract infection. Urinary tract infections (UTIs) can be asymptomatic (i.e. presence of bacteria in the urine without any symptom) or symptomatic. For asymptomatic women, bacteriuria is defined as 2 consecutive voided urine specimens with isolation of the same bacterial strain  $\geq 10^5$  CFU/mL. The detection of  $\geq 10^5$  CFU/mL in single voided midstream urine is accepted as a more practical and adequate alternative.<sup>1</sup> Asymptomatic bacteriuria is the most common UTI in pregnancy due to pregnancy associated changes. Asymptomatic bacteriuria in pregnancy is associated with adverse

maternal and fetal outcomes. If not treated, 20-40% cases will develop pyelonephritis.<sup>2</sup> Pyelonephritis in pregnancy has been associated with many maternal complications including bacteremia, respiratory insufficiency, anemia, renal disease, hypertension; and adverse pregnancy outcomes including preterm labor and low birth weight.<sup>3</sup> Treatment of bacteriuria during pregnancy reduces the incidence of

perinatal complications and lowers the long term risk of sequelae following asymptomatic bacteriuria.<sup>4-8</sup>

The urine microbiologic culture remains the gold standard for laboratory diagnosis of UTI.<sup>9</sup> E. coli is the most common pathogen associated with both asymptomatic and symptomatic bacteriuria.<sup>10</sup>

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The aim of the study was to estimate the prevalence of asymptomatic bacteriuria, its causative agents and the antimicrobial susceptibilities of the isolated microorganisms; and also to determine the relationship between asymptomatic bacteriuria and pyuria in pregnant women attending the antenatal clinic of Paropakar Maternity and Women's Hospital.

## METHODS

This hospital-based cross-sectional study was conducted in the antenatal clinic of Paropakar and Maternity Women's Hospital, Thapathali, Kathmandu, Nepal. A total of 240 asymptomatic pregnant women were taken. Duration of data collection was 6 months from August 2016 to January 2017. The pregnant women attending antenatal clinic from 13-28 weeks of gestation with all age group, parity and those who give informed consent were taken. Pregnant exhibiting clinical signs and symptoms of UTI, those who were on antibiotics treatment 2 weeks prior to the visit and with history of urolithiasis and documented deranged renal function were excluded from the study.

Sample of urine free from urethral or genital contamination was taken. Urine samples were collected in sterile containers, labeled and transported to laboratory. They were microscopically examined for pus cells, bacteria and ova. Urine samples were cultured using a standard loop calibrated to hold 0.02 ml urine on MacConkey and nutrient agar. Then the inoculated plates were incubated at 37°C in an aerobic environment for 24 hours. The plates were read after 24 hours to see the growth if any. Colonies were counted and multiplied by the loop volume. Bacterial isolates with growth of 105CFU/mL of urine were considered significant bacteriuria. Bacterial growths on the culture media were identified using their growth characteristics, Gram staining, and biochemical and sugar fermentation tests. Antimicrobial susceptibility test were performed using Kirby-Bauer disk diffusion test. The antibiotic sensitivity test was performed against Ampicillin, Cotrimoxazole, Ciprofloxacin, Nitrofurantoin, Cefixime and Norfloxacin.

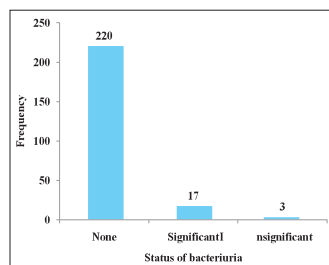


Figure-1: Status of bacteriuria in pregnant women between 13 to 28 weeks of gestation (n=240)

Data were analyzed using SPSS and were depicted in diagrams, charts and tables. Subgroup analysis was done using Chi-square test to test association between two categorical variables. Approval was taken from the institutional review committee of the hospital and the written consents from the patients.

## RESULTS

Out of 240 asymptomatic pregnant women of 13 to 28 weeks of gestation between 16 to 38 years of age (mean: 24.81±4.79); there was 8.3% culture positive and 7.1% had significant bacteriuria [Figure-1]. Significant bacteriuria ranged from 6% to 10% below 30 years of age [Table-1] and there was no significant difference in the prevalence of asymptomatic bacteriuria with respect to age ( $p=0.79$ ). Maximum number (12, 70.6%) of significant bacteriuria was seen in first half of second trimester but it was not statistically significant ( $p=0.21$ ) [Table-2]. Similarly, no association was observed in the prevalence of significant bacteriuria with respect to parity ( $p=0.62$ ), gravida ( $p=0.758$ ) and ethnicity ( $p=0.71$ ).

Significant bacteriuria was more prevalent in asymptomatic pregnant women with low education level (less than intermediate level) compared to women with higher education level which was significant ( $p=0.01$ ).

Table-1. Age group wise distribution of cases and bacteriuria (n=240)

Age group (years)	No growth	Culture positive		Total
		Insignificant bacteriuria	Significant bacteriuria	
16-20	43	0	5 (10%)	48 (20%)
21-25	86	1	7 (7.4%)	94 (39.2%)
26-30	59	2	4 (6.1%)	65 (27.1%)
31-35	27	0	1 (3.5%)	28 (11.6%)
36-40	5	0	0	5 (2.1%)
	220	3	17 (7.08%)	240

( $\chi^2=4.60$ ,  $p=0.79$ )

The highest prevalence among 17 bacterial isolate was *Escherichia coli* (70.6 %) followed by *Klebsiella* spp (11.8%). Other organisms isolated included *Staphylococcus saprophyticus*, *Proteus* and *Morganella* [Figure 2].

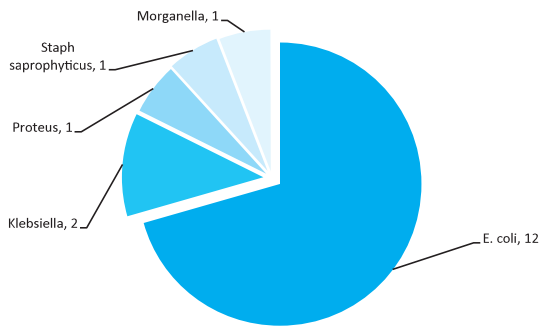


Figure-2. Frequency of the bacterial isolates [n=17]

**Table-2. Gestational age wise distribution of cases (n=240)**

Gestational Age	No growth	Culture positive		Σ
		Insignificant bacteriuria	Significant bacteriuria	
13-16 wk	55	1	6	62 (25.8%)
17-20 wk	46	0	6	52 (21.7%)
21-24 wk	60	2	1	63 (26.3%)
25-28 wk	59	0	4	63 (26.3%)
Σ	220	3	17	240

( $\chi^2=8.38$ ,  $p=0.21$ )

More than 90% asymptomatic pregnant women had less than 6 pus cells per high power field. Remaining cases (7.6%) had pyuria (presence of  $\geq 6$  pus cells per HPF). Women with pyuria had significantly higher asymptomatic bacteriuria which is statistically significant ( $p=0.04$ ) [Table-3].

**Table-3. Distribution of asymptomatic bacteriuria by urinary pus cells**

Pus cells per HPF	Urine culture outcome			Σ
	No growth	Insignificant bacteriuria	Significant bacteriuria	
0-5	207	3	12(5.4%)	222(92.5%)
6-10	7	0	3(30%)	10(4.2%)
11-16	3	0	1(25%)	4(1.7%)
Plenty	3	0	1(25%)	4(1.7%)

( $\chi^2= 12.98$ ,  $p= 0.04$ )

**Table-4. Drug sensitivity pattern of bacterial isolates to each drug**

Bacterial isolates	Drug sensitivity pattern					
	Ciprofloxacin	Ampicillin	Cefixime	Nitrofurantoin	Cotrimoxazole	Norfloxacin
	Sensitive	Sensitive	Sensitive	sensitive	sensitive	sensitive
E. coli	100%	8.3%	58.3%	91.7%	75%	91.7%
Klebsiella	100%	0%	0%	100%	100%	100%
Proteus	100%	100%	100%	100%	100%	100%
Staphylococcus Saprophyticus	100%	100%	100%	100%	100%	100%
Morganella	100%	0%	100%	100%	0%	100%

E.coli was highly resistant (91.7%) to Ampicillin but highly sensitive to Norfloxacin and Nitrofurantoin (91.7%). Ciprofloxacin was 100% sensitive to all bacterial isolates followed by Nitrofurantoin and Norfloxacin (94.11%); and Ampicillin was least sensitive (17.64%) [Table-4].

## DISCUSSION

The prevalence of asymptomatic bacteriuria among the pregnant women in this study was 7.1% which was similar to those seen in various other studies.<sup>11,12</sup> Prevalence rate as low as 3.3% to 5.5% have been reported.<sup>13-15</sup> In contrast, some studies have reported higher rates of prevalence of asymptomatic bacteriuria reporting prevalence from 18.8% to 45.3%.<sup>16-21</sup>

In analyzing my study, the highest prevalence of asymptomatic bacteriuria ranged from 6% to 10% in pregnant women with age group 16-30 years age group. This finding was similar where significant bacteriuria was commonest in age group below 30 years.<sup>11,17</sup> On the contrary, some studies have reported a high prevalence of asymptomatic bacteriuria in age over 30 years.<sup>12,14,16,22</sup> However, like various other studies, no statistical significance was observed in the prevalence of significant bacteriuria with respect to age group.<sup>16,23,24</sup> Imade et al showed significant difference in the prevalence of asymptomatic bacteriuria with respect to age ( $p < 0.0001$ ) where 26-30 years age group had the highest percentage of infection.<sup>20</sup>

In this study, maximum number (12, 70.6%) of significant bacteriuria was seen in first half of second trimester and it was not statistically significant ( $p=0.21$ ). Turpin et al<sup>12</sup> reported the highest prevalence in first and early second trimesters which was similar to the study by Stenqvist et al<sup>25</sup> with highest prevalence between the 9th and 17th gestational week. The highest prevalence of asymptomatic bacteriuria was reported in the second trimester.<sup>19,22</sup> Other studies revealed

no difference in the prevalence of asymptomatic bacteriuria with respect to trimester.<sup>16,20,24</sup>

Gravid had no significant difference in the prevalence of asymptomatic bacteriuria in my study ( $p = 0.758$ ). Sujatha et al observed multigravida had 52.1% and primigravidae had 48.9% incidence in culture positive cases showing no significant differences.<sup>11</sup> There was no significant difference in the prevalence of asymptomatic bacteriuria with respect to parity ( $p=0.622$ ) in my study. This agrees with various other studies.<sup>12,22-24</sup>

This study has found that significant bacteriuria was more prevalent in asymptomatic pregnant women with low education level (less than intermediate level) compared to women with higher education level. This was statistically significant ( $p=0.01$ ). This finding is consistent with the earlier studies.<sup>26-28</sup> Some studies reported that the prevalence of asymptomatic bacteriuria showed no significant associations with educational status.<sup>14,24</sup>

The most prevalent bacterial isolate was *Escherichia coli* which was 12 (70.6 %). This finding agrees with earlier studies.<sup>11,13,15,17,18,29,30</sup> Like other reports, *Klebsiella* spp (11.8%) was the second most common urinary isolate.<sup>11,17,18,22,27</sup> Other organisms isolated in my study included *Staphylococcus saprophyticus*, *Proteus* and *Morganella*. The highest prevalence of *E. coli* was found because they are the most common micro-organism in the vagina and rectum. However, varying strains and percentages of urinary isolates were found in different studies.

## CONCLUSIONS

Prevalence of asymptomatic bacteriuria in second trimester pregnant women was found to be 7.1%. The most common isolated bacteria in urine sample was *E. coli*. Pregnant women with higher number of pus cells in urine had significantly higher asymptomatic bacteriuria. All bacterial isolates were sensitive to ciprofloxacin.

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