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Original Research Article

Proportion of pregnancy associated asymptomatic bacteriuria in a tertiary care hospital

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ABSTRACT

Background: Urinary tract infections are a common occurrence in pregnancy. The physiological and anatomical changes associated with pregnancy predispose to UTIs. Main aim of the study is to determine the prevalence of asymptomatic bacteriuria in pregnant women, to identify the commonest microorganisms and antibacterial susceptibility of the isolated organism and to study the adverse maternal and fetal outcome.

Methods: Prospective cross sectional study, conducted between July 2016 to July 2017 in a tertiary hospital. All pregnant women without the symptoms of UTI attending prenatal checkups were included, they were evaluated with urine microscopy and culture sensitivity.

Results: Out of 250 pregnant women, 24 urine samples were contaminated and were excluded from the study. 165 pregnant women had sterile culture. 10 women had insignificant bacteriuria. 30 women had significant growth on culture. 2 of the culture positive women and 21 culture negative women lost for follows. So total number of culture positive women were 28 so incidence of asymptomatic bacteriuria is 13.7%.

Conclusions: Routine urine culture sensitivity even in asymptomatic women should be offered during antenatal visits so that adverse maternal and fetal outcomes can be prevented.

Keywords: Asymptomatic bacteriuria, Culture and sensitivity, Microorganisms, Urine analysis, UTI

INTRODUCTION

Urinary tract infections are a common occurrence in pregnancy. The physiological and anatomical changes associated with pregnancy predispose to UTIs.

They are of two types: symptomatic and asymptomatic.

Asymptomatic bacteriuria (better terminology being screening bacteriuria) is a microbiological diagnosis where actively multiplying bacterium are isolated in a number greater than 10⁵ CFU/ml from the urine of a person suffering from no symptoms of UTI. Risk of ASB increases with low socioeconomic status, multiparity, increasing maternal age and previous history of UTI.¹

Patients may often seek treatment for symptomatic UTIs but asymptomatic bacteriuria has a high probability of being left untreated and is associated with diverse maternal and fetal complications.²

Fetal complications include low birth weight and associated perinatal morbidity and mortality. Several studies suggest association between asymptomatic bacteriuria and increased prevalence of symptomatic UTI and pyelonephritis which in turn can lead to preterm labour. It has also been indirectly linked to preeclampsia and anemia.

Hence, it is recommended to regularly screen and treat asymptomatic bacteriuria.

Several screening methods have been tried to diagnose asymptomatic bacteriuria but none have been shown to be highly sensitive or specific in pregnant women and hence urine culture remains the gold standard for diagnosis. The most common organism causing ASB in pregnancy is *E. coli* though it is also known to be caused by other organisms such as *Staphylococcus*, *Proteus*, *Citrobacter* and *Klebsiella*.

Sensitivity of organisms to various antibiotics may vary from region to region or even from time to time. Hence the most common organisms causing asymptomatic bacteriuria and their antibiotic susceptibility in a region needs to be studied at regular intervals for effective treatment of pregnant women. This study aims to achieve the same.

METHODS

This was a prospective cross-sectional study conducted from July 2016 to July 2017 in the department of Obstetrics and Gynecology in Lady Goschen Hospital, Mangalore, India. 250 women were included in the study after taking their consent for participation.

Inclusion criteria

All pregnant women without symptoms of UTI.

Exclusion criteria

- Patients who did not give consent
- Patients with a history of fever > 38-degree C, dysuria, urinary hesitancy, urgency, slow stream, incontinence, frequency, incomplete voiding, flank / suprapubic / hypogastric pain
- Those who have had a history of intake of antibiotics for any indication during the current pregnancy in the last month.

A detailed history including the demography, complaints (symptoms of UTI), period of gestation of these patients was taken.

Laboratory evaluation

Mid-stream clean catch urine samples of pregnant women attending pre-natal check-ups was collected into sterile uricol bottles. The samples were transported to the laboratory without delay. Microscopic examination of urine was done for pus cells. All samples were cultured on blood agar, nutrient agar and Mac Conkey agar plates. The isolates were identified by standard biochemical tests. Antimicrobial susceptibility test was performed using Kirby-Bauer disc diffusion test.

Statistical analysis

Descriptive statistical analysis has been carried out in the present study. Chi-square test has been used to find the

significance of study parameters between two groups (contingency table Chi Square statistic). P value <0.05 was considered statistically significant.

RESULTS

In this study, 250 pregnant patients were evaluated. 24 urine samples were found to be contaminated and were excluded from the study.

165 women had sterile culture, 10 women had insignificant bacteriuria and culture was not repeated and they were considered non bacteriuric women and 30 women had significant growth on culture. 2 of the culture positive women and 21 culture negative women were lost to follow up and final culture positive women were 28 with final proportion of asymptomatic bacteriuria being 13.7%.

With respect to socioeconomic status, 52% belonged to upper middle class, 29% to lower middle class, 10% to lower class and 9% to upper lower class as per the Kuppaswamy classification. Maximum percentage of bacteriuric women were seen in the lower middle (35.7%) followed by lower class (25%).

Out of 28 culture positive women, maximum (26%) belonged to the 30-35-year age group.

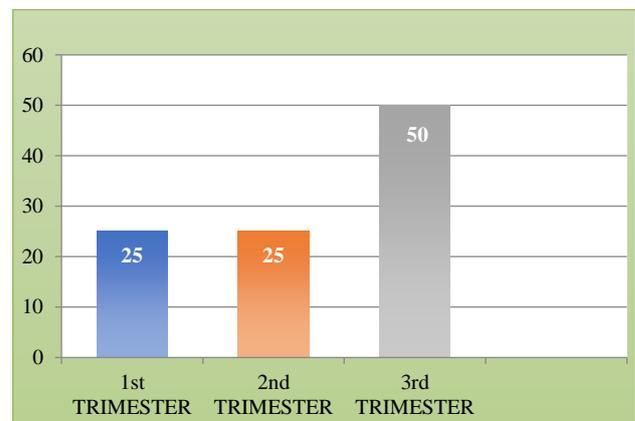


Figure 1: Asymptomatic bacteriuria in each trimester.

Significant bacteriuria was most frequently found in women in the third trimester. 50% of the cases were in the third trimester (Figure 1).

Asymptomatic bacteriuria was found to be more common in multigravidas (64.30%) than primigravidae but the difference was not statistically significant.

Significant pyuria which was taken as more than 6 pus cells in urine, was present in only 33.3% of the women who went on to have significant growth in culture. It was absent in 67% of these women. Pyuria was also present in 20% of the women who had no growth in urine culture (Table 1).

Table 1: Significant pyuria.

| | Present | Absent |
|--------------|-----------|-----------|
| ASB positive | 7 (33.3%) | 21 (67%) |
| ASB negative | 35 (20%) | 139 (80%) |

25% of the ASB positive women had symptomatic bacteriuria during the course of pregnancy whereas only 8% of ASB negative women developed symptomatic bacteriuria which was statistically significant (p=0.006) (Table 2).

Table 2: Development of symptomatic bacteriuria.

| | Developed SB | Did not develop SB | Percentage |
|--------------|--------------|--------------------|------------|
| ASB positive | 7 | 21 | 25 |
| ASB negative | 14 | 161 | 8 |

2 women out of 28 bacteriuric women and 1 woman out of 175 non- bacteriuric women developed pyelonephritis. It was found to be statistically significant (p=0.007) (Table 3).

Table 3: Incidence of pyelonephritis.

| | Developed pyelonephritis | Did not develop pyelonephritis |
|--------------|--------------------------|--------------------------------|
| ASB positive | 2 (7.14%) | 26 (92.86%) |
| ASB negative | 1 (0.5%) | 174 (99.5%) |

28.66% of the bacteriuric women who reached viability had preterm labour whereas only 19.48% of non-bacteriuric women who reached viability had the same which was statistically significant (p=0.001) (Figure 2).

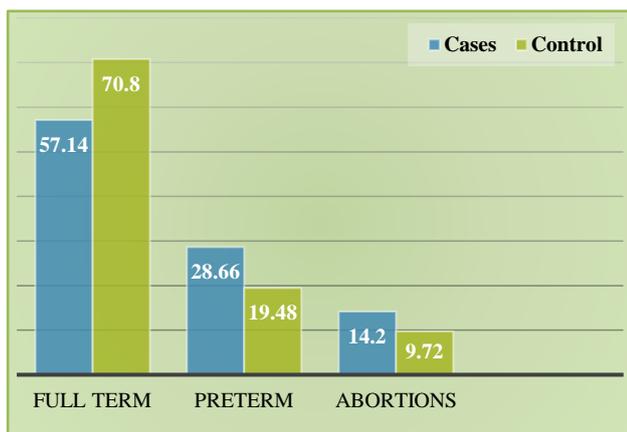


Figure 2: Incidence of preterm labour/ abortions.

45.8% of ASB positive women and 32.9% of ASB negative women had premature rupture or preterm premature rupture of membranes (Table 4).

Table 4: Incidence of premature rupture of membranes.

| PROM | ASB positive | ASB negative |
|-------|--------------|--------------|
| Yes | 11 (45.8%) | 52 (32.9%) |
| No | 13 (54.2%) | 106 (67.1%) |
| Total | 24 | 158 |

The mean birth weight in bacteriuric women was 2.55kg and in non-bacteriuric women, it was 2.77kg which was statistically significant (p=0.020).

In ASB positive women, 9 out of 24 babies (37.5%) had NICU admissions and in ASB negative women, 23 out of 157 babies had NICU admissions which was not statistically significant. 1 patient had an IUD in the ASB negative group.

Among ASB positive patients, the most common reason for admission was low birth weight (31%) followed by sepsis (23%). Respiratory distress contributed to 16% and MSAF and Jaundice 15% each.

In ASB negative women, the most common reason for admission was Jaundice (30%) followed by MSAF (30%). Low birthweight was the next most common with 22% incidence. Sepsis was present in only 9% and RDS in 4%.

Table 5: Bacterial isolates in cases.

| Organism | No. of cases | Percentage |
|------------------------------|--------------|------------|
| <i>Escherichia coli</i> | 13 | 48 |
| <i>Klebsiella pneumoniae</i> | 2 | 8 |
| Proteus M. | 3 | 12 |
| Streptococcus | 1 | 4 |
| Pseudomonas | 2 | 8 |
| Staphylococcus | 5 | 20 |

The most common bacterial isolate was *Escherichia coli* followed by *Staphylococcus aureus* (Table 5).

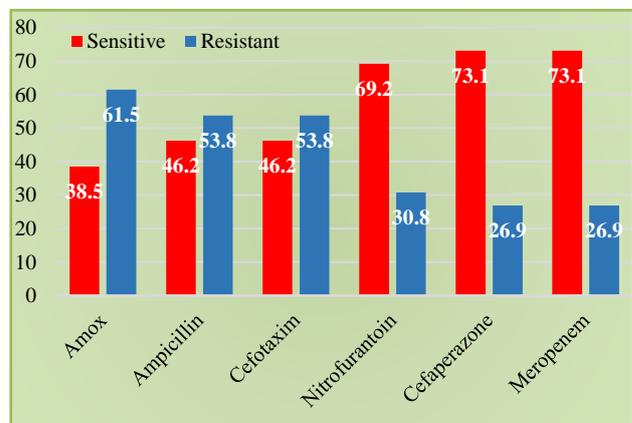


Figure 3: Antibiotic susceptibility of culture isolates.

Higher antibiotics like Imipenem and meropenem showed maximum sensitivity which were 98% and 84% respectively. Cefaperazone showed 73.1% sensitivity followed by Nitrofurantoin which had 69.2% sensitivity. Cefotaxim and ampicillin had 46.2 sensitivity each and very low sensitivity (38.5%) was present for Amoxicillin (Figure 3).

DISCUSSION

Asymptomatic bacteriuria is associated with several maternal and foetal adverse outcomes and hence requires adequate diagnosis and treatment. The prevalence of asymptomatic bacteriuria worldwide is quoted around 2 to 11%.¹

Proportion

Proportion in my study was found to be 13.7% which is similar to findings of Rajaratnam et al (13.2%) and slightly more than Jayachandran et al (11.6%).^{2,3}

On the other hand, Sujatha et al quotes a prevalence of 7.3% and in Chandel et al it is 7.34%.^{4,6} Prasanna B et al reported a higher prevalence of 17%.⁵ These variations between different studies may be due to the difference in the socioeconomic conditions and environmental conditions of the participants in different studies.

Parity

With respect to parity there are conflicting results where Chandel LR et al found it to be more prevalent in Primigravidae (52.9%) and Sujatha R et al found it to be more prevalent in multigravidas (51%).⁶ Present study found ASB more prevalent in multigravidas (64.3%). The difference however was not statistically significant.

Trimester

As per the present study, higher incidence of ASB was seen in the third trimester of pregnancy (50%). Jayachandran AL et al, Nath et al and Roy et al have all reported higher incidence of ASB in the second trimester of pregnancy in contrast to this study.^{3,7,8} Yasodhara et al has reported higher incidence of ASB in the first trimester of pregnancy.⁹ Udayagiri Venkata Rohini et al reports higher incidence in third trimester.¹⁰

Age

Incidence of ASB was found to be increasing with increasing maternal age with greatest incidence in my study in the age group of 30-40 years. This is comparable to Prasanna B et al.¹¹

Socioeconomic status

Previous studies conducted such as Gayathree et al and Whally et al show higher occurrence of ASB in Low

SES. In present study the occurrence was found to be higher in the Lower middle and lower social classes (Kuppuswamy classificaton).^{12,13}

Risk factors

Anemia and ASB had a significant association in present study and 41% were ASB positive among 102 cases of anemia in the study.

In present study 24 cases of pre-eclampsia were diagnosed during the 3rd trimester, and 10 cases (43%) were ASB positive and significant statistically. Findings in the study of Hill JA et al also found a similar association with preeclampsia and is a significant risk factor for ASB.¹⁴ There was no significant association between diabetes and ASB in the present study.

Progression to symptomatic UTI

Development of symptomatic UTI as well as pyelonephritis were found to be statistically significant among culture positive cases in our study with 25% of the cases developing significant bacteriuria during the course of pregnancy and 7.41% having hospital admission for pyelonephritis.

In study conducted by Jain et al the occurrence of UTI or pyelonephritis was not found to be significantly higher among women with asymptomatic bacteriuria but Sreekumary et al found ASB a significant risk factor for developing UTI but not pyelonephritis.^{15,16}

Preterm labour

28.2% had preterm labour in culture positive cases whereas 19.48% in culture negative cases had preterm labour. So preterm labour showed significant correlation with asymptomatic bacteriuria according to this study. These findings are comparable to several studies such as Sreekumary et al and Jain V et al which also found a positive correlation between ASB and preterm labour.¹⁵

Premature rupture of membranes (PROM)

There was no statistical significance between culture positive and culture negative cases who had premature rupture of membranes. This is in contrast to study conducted by Jain V et al where incidence of PROM was found to be significant.¹⁵

Low birth weight

Culture positive women had a mean birth weight of 2.55kg, lower than culture negative women with mean birth weight of 2.77kg. This finding is similar to previous studies showing greater chance of LBW with asymptomatic bacteriuria. Present findings were similar to Jain et al but in Rajaratnam et al low birth weight was not found to be significant in culture positive women.

NICU admissions

In this study, NICU admissions were seen in 37% of babies born to culture positive women but was not statistically significant. Sreekumary et al showed 30% rate of NICU admissions. However, reasons for NICU admissions among babies born to ASB positive women were mainly low birth weight and sepsis, which could indirectly be contributed by presence of asymptomatic bacteriuria.

Bacterial isolates

Most common isolate in my study was found to be *Escherichia coli* (48%) which is comparable to R Sujatha et al as well as B. Prasanna et al. The second most common organism was *Staphylococcus aureus* which is similar to Chandel R et al as well as Jayachandran AL et al.^{3,5} These organisms are usually inhabitants of the perineum and gut and cause UTI by ascending infections.

Antibiotic sensitivity

In the present study, it was found that most of the organisms were sensitive to Imipenem (98%) and Meropenem (84%) followed by Cefaperazone (73.1%) and Nitrofurantoin (69.2%). Very low sensitivity was shown by Amoxicillin (38.5%).

CONCLUSION

The incidence of ASB according to this study was 13.7% among the 250 antenatal women studied. Most common isolates were *Escherichia coli* and *Staphylococcus aureus*. Significant pyuria was present in only 33% of cases and cannot be considered a reliable indicator. Therefore, routine urine culture sensitivity even in asymptomatic antenatal women should be offered during antenatal visit. Routine screening and treatment are advisable to prevent adverse maternal and fetal outcomes. Sensitivity patterns may differ among countries, among different regions and may even change from time to time. Hence similar studies at regular intervals are required to provide effective empirical treatments.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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