



Original Research Article

## Asymptomatic Bacteriuria in Pregnancy: Bacteriological Profile and Antibiotic Sensitivity Pattern in a Tertiary Care Hospital, Bengaluru

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### ABSTRACT

**Background:** Urinary tract infection (UTI) is predominantly a disease of the females due to short urethra and proximity to the anus. It is one of the most common clinical symptom seen in general and gynaecological patients. In pregnancy, it leads to poor pregnancy outcome. UTI can present as symptomatic or asymptomatic and 30% of untreated asymptomatic patients can become symptomatic. Diagnosis and treatment of asymptomatic bacteriuria (ABU) markedly improves outcomes as well as reduces incidence of acute pyelonephritis.

**Objectives:** To determine the proportion and bacteriology of asymptomatic bacteriuria among antenatal patients in our centre and to know the antibiotic sensitivity pattern of the isolates.

**Methods:** This was a cross sectional study done for a period of 3 months. Sample size was statistically determined. 165 antenatal women who consented were interviewed and mid stream urine samples were collected and processed in the microbiology laboratory according to the standard microbiological methods.

**Results:** Out of 165 women studied, 14(8.5%) had significant bacteriuria with Escherichia. Coli (E. coli) being the commonest isolate 9(64%) followed by Klebsiella pneumonia 2(14%), group B Streptococcus 1(7%), coagulase negative Staphylococcus (CONS) 1(7%) and Enterococcus faecalis 1(7%). All the isolates were susceptible to cefuroxime, ceftriaxone, amikacin, imipenem, meropenem and least sensitive towards ampicillin and amoxicillin.

**Conclusion:** Notable degree of ABU (8.5%) was seen in antenatal women in our centre. Screening of bacteriuria in pregnancy and proper treatment must be considered as an essential part of antenatal care in order to prevent complications associated with asymptomatic bacteriuria.

**Key words:** Asymptomatic bacteriuria, pregnancy, pyelonephritis.

### INTRODUCTION

Urinary tract is second only to respiratory tract in acquiring microbiological infection, especially in females. It is mainly significant in pregnant women. <sup>[1,2]</sup> By convention, UTI is defined as lower tract

(acute cystitis) or upper tract (acute pyelonephritis) infection. It can also be defined as microbial colonisation of urine as well as tissue invasion of any structure in the urinary tract. UTI can be symptomatic and asymptomatic, while 90% of the patients

complain of symptoms like dysuria and frequency, 1/3<sup>rd</sup> of them are asymptomatic. [3] Significant bacteriuria is generally defined as, at least 10<sup>5</sup> colony forming units of bacteria in 1 ml of mid stream urine sample. [4,5]

Asymptomatic bacteriuria is defined as presence of persistent and actively multiplying bacteria in the urinary tract and urine culture showing a significant growth of pathogen that is greater than 10<sup>5</sup> CFU/ml, but without patient showing symptoms of UTI. It is also known as covert bacteriuria. [6] Though bacteria are the predominant agents, viruses and fungi can also cause UTI. Asymptomatic bacteriuria can be seen both in pregnant and non-pregnant woman with incidence being the same in both but pregnancy can enhance the complications like pyelonephritis, prematurity, low birth weight and foetal mortality rates. [7] The various factors which predispose a pregnant woman to pyelonephritis are several

## **MATERIALS AND METHODS**

This was a cross sectional study conducted on 165 pregnant women attending obstetric OPD at our tertiary care teaching hospital, for a period of 3 months. Sample size was calculated to be 165 based on the previous study with 18.21% prevalence taking 32% relative precision and 90% confidence interval. Age group of pregnant women included in the study was between 18 and 36 yrs.

Sample was collected with informed consent from consecutive women without any signs and symptoms of UTI. Exclusion criteria were, women who had underlying renal pathology or chronic renal disease, history suggestive of UTI (frequency, loin pain, urgency, etc.), history of recent use of antibiotics, history of fever, history of recent per vaginal bleeding, history of diabetes and hypertension. Demographic data like patient's age, gestation age, parity were

anatomic and physiologic changes seen in pregnancy like dilatation of renal pelvis and ureter as early as 8th week of pregnancy, mechanical compression due to enlarging uterus, smooth muscle relaxation due to progesterone which causes decreased peristalsis of ureters, increase bladder capacity and urinary stasis. Difference in urine pH, osmolality, pregnancy induced glycosuria and aminoaciduria may also facilitate bacterial growth. [8] About 10% of those with asymptomatic bacteriuria (ABU) develop symptomatic bacteriuria during pregnancy. 30-40% of pregnant women with asymptomatic bacteriuria develop acute pyelonephritis. [9] UTI in pregnancy if untreated can lead to various complications like intrauterine growth restriction, pre-eclampsia, caesarean delivery, preterm delivery and low birth weight babies. [10]

This study was conducted to know the proportion of ABU in our hospital and their antimicrobial susceptibility pattern. collected. Mid stream clean catch urine samples collected into sterile wide mouth bottle were sent to microbiology lab and processed within 1 hr.

Samples were screened by counting pus cells in uncentrifuged urine ( $\geq 5$  pus cells/hpf) and by gram staining. Presence of at least one organism per oil immersion field and after examining 20 fields was considered to correlate with significant bacteriuria. Culture was done on MacConkey's agar medium by standard quadrant streaking technique and incubated overnight at 37<sup>o</sup>C. The cultures were interpreted as significant if the colony count of  $> 10^5$  of single type of bacteria except in case of gram positive cocci where 10<sup>2</sup> cfu/ml were taken as significant and as insignificant bacteriuria if counts were between 10<sup>5</sup> and 10<sup>3</sup> cfu/ml. Samples yielding 3 or more types of organisms were considered contaminated and asked for a repeat sample. Negative cultures were

declared after 48hrs. The isolates were identified by standard biochemical tests. [11] Antibiotic sensitivity of the organisms was done by Kirby Bauer Disc Diffusion method. The antibiotics used were cefuroxime, ceftazidime, ceftriaxone, gentamicin, nitrofurantoin, nalidixic acid, ampicillin, amoxycylav, amikacin, imipenem, meropenem, cotrimoxazole, norfloxacin, cefoxitin, clindamycin, doxycycline, erythromycin, linezolid, penicillin G, teicoplanin. The patients whose urine was culture positive were followed up for the outcome.

### Statistical Analysis

Simple descriptive statistics to find out proportion of women with bacteriuria, proportion of different microbiological isolates resistant to different antibiotics was used.

## RESULTS

Among the 165 study group, most of the patients belonged to the age group 20-30 years (108). Significant bacteriuria was seen in 14(8.5%), insignificant bacteriuria was seen in 26 (15.8%), 4(2.4%) samples were contaminated which yielded no growth on repeat culture, 121 (73%) samples showed no growth.

The most commonest bacteria isolated was Escherichia Coli 9(64.3%) followed by Klebsiella pneumonia 2(14.3%), group B Streptococci 1(7%), coagulase negative Staphylococcus 1(7%) and Enterococcus faecalis 1(7%). Gram negative bacilli showed highest sensitivity (100%) towards cefuroxime, ceftriaxone, amikacin, imipenem, meropenem and least towards ampicillin and amoxicillin. Gram positive cocci were sensitive to all antibiotics recommended.

Considering the trimester, 62 (37.6%) were in first trimester, 39 (23.6%) in second trimester and 64 (38.8%) in third trimester. Most of the patients were

multipara. ABU was seen more in 3<sup>rd</sup> trimester and in women more than 30 years. (Table1)

**Table 1: Demography of Pregnant women.**

Demography	Total no of urine samples (165)	No. of urine cultures positive (14)
Pregnancy Trimester		
First	62	2
Second	39	5
Third	64	7
Age		
<20 yrs	35	3
20 to 30	108	3
>30yrs	30	8

12 out of 14 positive on initial culture were cured after treatment for 7 days with sterile repeat culture and 2 had a positive urine culture for the second time wherein repeat course of antibiotic was given.

## DISCUSSION

Symptomatic and asymptomatic bacteriuria are both common in pregnancy. Prevalence of asymptomatic bacteriuria is more common in people with history of previous UTI, rural population and low socioeconomic status due to poor sanitation, lack of hygiene and failure to attend antenatal OPD. [8] Though it is a sociomedical problem, it has not been given much attention and screening of asymptomatic bacteriuria has not been included as a routine antenatal check up. [12]

Women with asymptomatic bacteriuria in the antenatal period are more likely to deliver premature or low birth weight babies and develop pyelonephritis. Adherence is an important virulent factor which leads to pyelonephritis and is present in 75% of women with pyelonephritis. [13]

In our 165 study group, 8.4 % of patients had significant bacteriuria. This prevalence rate is almost similar to other studies in India quoting 8-10%. [14-16] Studies

have shown that urine culture is a gold standard screening test for ABU during pregnancy. [15,17]

*E. coli* (64%) was the commonest isolate similar to other studies [14] followed by *Klebsiella pneumoniae*. Reasons may be due to colonisation of lower gastro-intestinal tract with *E. coli* and its close proximity to urinary tract and also because of *E. coli*'s inherent virulence for urinary colonisation due to its adhesive abilities. Recent studies show increased incidence of gram positive bacteriuria like coagulase negative *Staphylococcus* and group B streptococcus. [9,16,18] In our study, one sample yielded the growth of group B streptococcus. Group B streptococcus in pregnancy is associated with preterm rupture of membrane, premature delivery and early onset neonatal sepsis. Since group B streptococcus occurs as commensal in the vaginal tract in 25% of women, in pregnancy it can cause premature rupture of membrane, preterm labour, UTI in 5% of patients and neonatal meningitis and sepsis in the newborn. Therefore, pregnant women having group B streptococcus bacteriuria should be treated as carriers and should receive appropriate treatment during antenatal follow up and intrapartum prophylaxis. [19] One of our patients with group B streptococcus isolation delivered outside and so the outcome of the baby was not known. Two of the patients with ABU had preterm babies, one among them showed intrauterine growth retardation.

Most of the patients who had urine culture positive were above 30 years of age. Other studies [7,12] have also observed ABU in higher age groups. In young females, due to hormonal action there is increase deposition of glycogen which favours the growth of lactobacillus. Lactobacillus makes the pH more acidic and prevents colonisation of other pathogens. This mechanism is decreased in older age group

predisposing the patient to urinary colonisation by pathogens. [12] In our study 3<sup>rd</sup> trimester patients showed a higher presence of ABU which correlates with other studies [20] which probably could be due to anatomic and physiological changes as mentioned earlier. McIsaac and colleagues evaluated the urine cultures obtained from pregnant women before 20 weeks' gestation, at 28 weeks and 36 weeks of gestation. They found that a single urine culture before 20 weeks of gestation missed more than one-half of the ABU cases and therefore recommended urine culture in each trimester to identify most cases. [21]

Multiparity too played a role in ABU and studies have mentioned multiparity as one of the risk factor for acquiring ASB. [22]

Most of the gram negative bacilli were sensitive to cefuroxime, amikacin, gentamicin, imipenem, Ampicillin was the least sensitive drug. Group B streptococcus, *CONS* and *Enterococcus faecalis* were sensitive to all antibiotics recommended. The frequency of isolated pathogens and antimicrobial pattern varies from community to community and hospitals. In our study the isolates showed almost the same sensitivity pattern as other studies. [14] Treatment of ABU in pregnancy prevents pyelonephritis and avoids 20% of preterm deliveries. [23]

## CONCLUSION

Asymptomatic bacteriuria (ABU) in pregnancy needs special attention as lack of symptoms can lead to complication of pregnancy. Since pyelonephritis usually arises from pre-existing bacteriuria experts recommend screening and eradication of silent infection as a routine prenatal practice for which studies have shown that urine culture, a gold standard technique should be done in all trimesters as ABU could be missed if a single urine culture is done.

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