

## Prevalence of Asymptomatic Bacteriuria in Pregnancy

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### Abstract

*Background and Objectives:* Asymptomatic bacteriuria is a major factor for the development of urinary tract infections. In addition to complications of urinary tract infections, a variety of conditions have been reported to be associated with asymptomatic bacteriuria. Of these pre-term labor, low birth weight, prematurity, pre-eclampsia and chronic renal disease that have been cited as significant adverse obstetric outcomes. Thus, early detection and treatment can possibly decrease the occurrence of these effects. The relatively high prevalence of asymptomatic bacteriuria during pregnancy, the adverse effects on the pregnancy, the opportunity to avoid sequelae with treatment; justify screening pregnant women for bacteriuria. Objectives are to determine the prevalence of asymptomatic bacteriuria in pregnancy, the type of bacteria causing the asymptomatic bacteriuria and the antibiotic sensitivity and resistance of the organism. *Materials and Methods:* This is a cross-sectional, observational study conducted at the Out Patient Department of Obstetrics and Gynaecology of Navodaya Institute of Medical Sciences, Raichur. All pregnant women with no genitourinary complaints, no histories of fever and without any intake of antibiotics for any

indication during the current pregnancy were included in the study. The women were asked to submit urine specimens for culture and sensitivity tests. *Results:* 200 pregnant women were studied of whom 7, (3.5 percent) were identified to have asymptomatic bacteriuria. The most common isolates were Escherichia coli (28.5 percent) Staphylococcus aureus (28.5 percent). The organisms were found to be sensitive to Amikacin, Cefoperazone, Ciprofloxacin and Cefaclor in decreasing order. The organisms were comparatively more resistant to amoxicillin. *Conclusion:* Asymptomatic Bacteriuria during pregnancy may cause serious maternal and perinatal, morbidity. All pregnant women should be screened for bacteriuria by urine culture in their first visit and they should be treated if the results are found positive. So it is recommended to do urine culture as a routine screening during pregnancy.

**Keywords:** Asymptomatic Bacteriuria; Prevalence; Pregnancy.

### Introduction

Urinary tract infection (UTI) is one of the commonest diseases encountered in the today's clinical practice. Nearly 50% of all women develop symptoms of urinary tract infection at some stage during their life [3] and approximately 5-10% of all pregnancies are associated with UTI. Urinary infections can be defined as the proliferation of active micro organisms inside the urinary tract which are harmful [20].

In pregnancies, Urinary tract infections can be seen in three different forms- Asymptomatic bacteriuria, acute cystitis and acute pyelonephritis [20].

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The term asymptomatic bacteriuria refers to the presence of high quantities of uropathogen in the urine of an asymptomatic person. Asymptomatic bacteriuria, in which urine culture reveals a significant growth of pathogens that is greater than  $10^5$  colony forming units/ml of a single pathogen, can be found in both pregnant and non-pregnant women.

The impact of asymptomatic bacteriuria on pregnancy has been a focus of controversy since the development of quantitative urine culture technique in the mid 1950's which allowed clear differentiation between women with bacteriuria and those without [13].

In the past years researchers have spent considerable time and effort investigating the frequency of occurrence and consequences of asymptomatic bacteriuria in pregnancy [17,18,23]. Earlier studies showed that prevalence of asymptomatic bacteriuria in the range of 2.5%-15% [19]. Recent figures showed 4-7% [8,10,15]. This variation is explained by population characteristics and by screening methodology.

Most patients with asymptomatic bacteriuria don't need treatment because the bacteria are not really harmful. However; certain groups of people are at high risk for kidney infections if they develop asymptomatic bacteriuria [22]. Those at high risk are

- People with diabetes,
- Elderly people,
- Pregnant women,
- Kidney transplant patients
- Young children with vesicoureteral reflux and
- Patients with infected kidney stones
- AIDS patients and immunocompromised people

Symptomatic bacteriuria is an iceberg of total bacteriuria. Pregnancy is a provocation for the asymptomatic to become symptomatic which could lead to acute pyelonephritis, anemia, hypertension and adverse outcomes such as preterm labor, low-birth weight babies, intrauterine growth retardation and higher fetal mortality [3].

Some physiological changes occurring during the pregnancy, which expedite the emergence of urinary infections and cause a higher incidence. As a result of hormonal changes, tonus of urinary bladder and ureter is reduced, and subsequently dilatation in the ureter and renal pelvis, incidence of urinary stasis and vesicourethral reflux increase. Increased plasma volume and glomerular filtration rate result in reduction in the urinary concentration. Moreover, there is an increase in the

incidence of glycosuria and aminoaciduria and a reduction in the resistance of urinary tract system against bacteria in pregnancy. Due to these factors, the incidence of symptomatic urinary tract infections is increased in pregnancy [20].

Screening for asymptomatic bacteriuria has clinical importance during pregnancy. Symptomatic bacteriuria poses no problems because of diagnosis and treatment due to its overt symptoms. But asymptomatic bacteriuria is difficult to diagnose and it's more common in pregnant women. A high co-relation has been found between a negative urine culture at early pregnancy and no bacteriuric complications later in pregnancy. By identification and appropriate treatment of patients at the stage of asymptomatic bacteriuria, the complications like acute pyelonephritis, anemia, hypertension and adverse outcomes such as preterm labor, low-birth weight babies, intrauterine growth retardation and higher fetal mortality in future can be prevented. The present study was designed to screen pregnant women for asymptomatic bacteriuria, to ascertain its prevalence, and to observe the spectrum of urine isolates [5].

The relative high incidence of asymptomatic bacteriuria during pregnancy, its adverse consequences both for the mother, the fetus and the ability to avoid sequelae with proper treatment justify screening pregnant woman for bacteriuria. This study is cost-effective, non-invasive, easy and simple to do. Thus should be made available to all the pregnant women.

#### *Aims and Objectives*

1. The study was undertaken to determine the prevalence of asymptomatic bacteriuria in pregnancy.
2. To determine the type of bacteria causing the asymptomatic bacteriuria.
3. To determine the antibiotic sensitivity and resistance of the organism.

#### **Materials and Methods**

##### *Sample Size*

The study group consisted of 200 patients attending as out patients of Obstetrics and Gynaecology department of Navodaya Institute of Medical Sciences, Raichur.

##### *Inclusion Criteria*

Antenatal women of all gestational ages irrespective of parity and without the signs and symptoms of urinary tract infection.

### Exclusion Criteria

#### Antenatal Women having

1. Sign and symptoms of UTI. (Increased frequency of micturition, burning micturition, pyrexia, dysuria and urgency of micturition.)
2. History of antibiotics, during the previous two weeks.
3. Active vaginal bleeding

*Study Design:* Observational cross-sectional clinical based study.

### Ethical Committee Approval

Approval was taken from the ethics committee.

### Consent Form

The patients were given consent forms and were explained about the study and the methodology. The urine samples were taken after the consent was given by the patients.

### Techniques

Mid stream Urine samples were obtained from asymptomatic antenatal mothers.

*Data Collection Techniques:* Both primary and secondary data was collected. The secondary data was collected from journals, obtained from websites and from the library.

Primary data was collected using a pre-designed questionnaire. The questionnaire consisted of open ended questions.

With the aid of a questionnaire, demographic features including parity, age, and gestational age of pregnancy were collected. After being instructed on the correct mode of self collection of mid stream urine sample and the importance of a clean catch of urine, pregnant women were provided sterile white mouthed screw capped universal containers. At least four hours stay of urine was ensured before collection.

These were transported within half an hour to the microbiological laboratory and processed immediately otherwise it was refrigerated for a maximum of two hours before plating.

### Processing of Urine Samples

Specimens were processed in the laboratory for culture and sensitivity. Culture was done on CLED (Cystine-Lactose-Electrolyte-Deficient Media) agar with the help of standardized loop.

Incubation was done at 37°C aerobically for 18 hours. Colony count equal to or more than  $10^5$  colony forming units per ml was considered as significant growth. Pure growths were identified and sub-cultured in an appropriate medium. Then identification (biochemical) tests were done for the species, sensitivity test were carried out to establish the drug susceptibility pattern. A panel of drugs was used for testing the resistance pattern of the organisms present.

### Microbiology Antibiotic Drugs

Ak	Amikacin	Ci	Ceftriaxone
Am	Amoxicillin	Cj	Cefaclor
Ac	Amoxyclave	Cpm	Cefepime
At	Azithromycin	Cf	Ciprofloxacin
E	Erythromycin	G	Gentamicin
Ca	Ceftazidime	Of	Ofloxacin
Ce	Cephalexin	Ox	Oxacillin
Cs	Cefoperazone	Pt	Piperacillin/ Tazobactam
<u>Gram Positive Cocci</u>		Ak, Am, E, Cj, Cs, Cf, Of, Ac	
<u>Gram Negative Bacilli</u>		Am, Ak, G, Cf, Of, Cj, Ci	

### Results

#### Distribution of Pregnant Women according to Age

In the age group of 20 years, 84 pregnant women were screened out of which 1 pregnant woman was found positive 1.19 percent. In the age group of 21 to 25 years, 106 pregnant women were screened out of which 5 pregnant women were found positive 4.7 percent. In the age group of 26-30 years 10 pregnant women were screened out of which 1 pregnant woman was found to be positive 10 percent.

The Tables 1, Figure 1 and Figure 2 represent Age-wise distribution of pregnant women. In this study the minimum age found was 17 and maximum was 30 and the mean age was found to be  $21.45 \pm 2.43$ . The mean age of the asymptomatic positive women were  $23.428 \pm 3.35$ s.

#### Distribution of pregnant women according to parity

Out of the 106 Primigravida pregnant women screened, 6 pregnant women found to be positive

**Table 1:** Distribution of pregnant women according to age

Age	No. of Positive Urine Culture	Total Number
≤ 20 yrs	1 (1.1%)	84
21 to 25 yrs	5 (4.7%)	106
26 to 30	1 (10.0%)	10
TOTAL	7 (3.5%)	200

$$\chi^2 = 3.042 \quad df = 6 \quad p = 0.80 (\text{not-significant})$$

5.6 percent. Out of the 74 pregnant women screened in First Para, 1 of them was found to be positive 1.35 percent. Out of the 20 pregnant women in Second Para none were found to be positive.

The Table 2, Figure 3 and Figure 4 represent parity wise distribution in pregnant women.

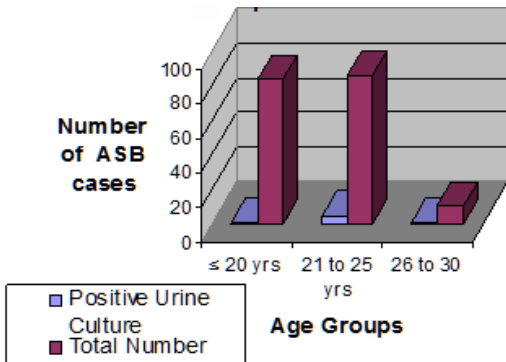


Fig. 1:

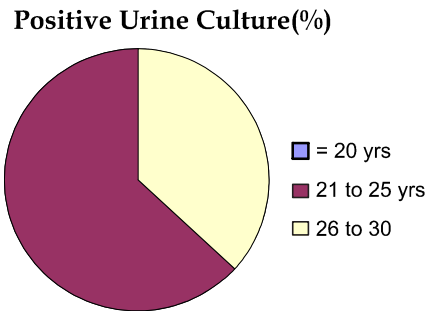


Fig. 2:

Table 2: Distribution of pregnant women according to parity

Parity	No. of Positive Urine Culture	Total Number
Primigravida	6 (5.6%)	106
First Para	1 (1.35%)	74
Second Para	0	20
TOTAL	7	200

$\chi^2 = 3.202$  df = 6 p = 0.78 ( not significant)

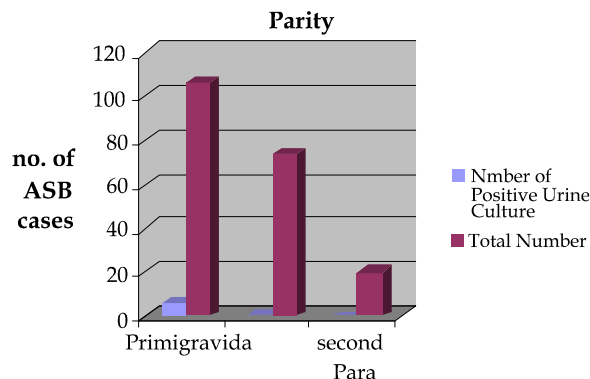


Fig. 3:

Distribution of women according to trimester

In first trimester out of 20 pregnant women screened, 1 was found to be positive. Out of 95 pregnant women in second trimester, 3 were found positive. In third trimester out of 85 pregnant women, 3 were found to be positive.

The Tables 3, Figure 5 and Figure 6 represent Trimester-wise distribution of patients.

In Table 4, Figure 7 and Figure 8, the spectrum of the organisms is represented.

Positive Urine Culture(%)

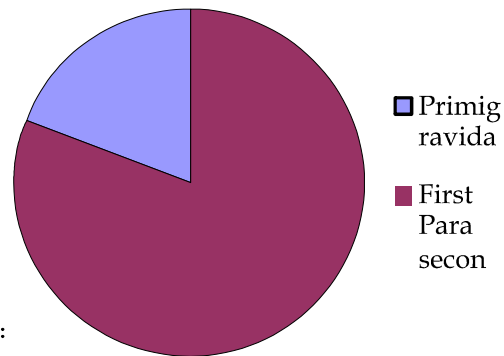


Fig. 4:

Table 3: Distribution of women according to trimester

Pregnancy Trimester	No of Positive Urine Culture	Total Number
First	1 (5%)	-
Second	3 (3.15%)	95
Third	3 (3.52%)	85
Total	7	200

$\chi^2 = 0.1664$  df = 6 p = 0.999 (not significant)

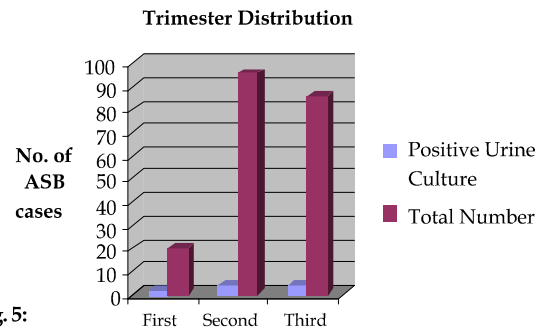


Fig. 5:

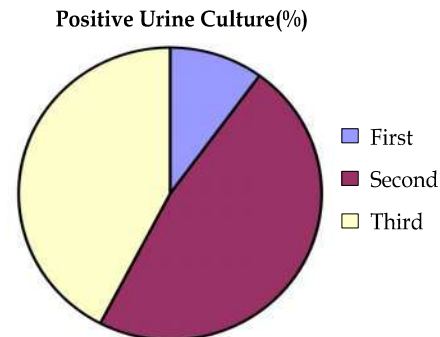


Fig. 6:

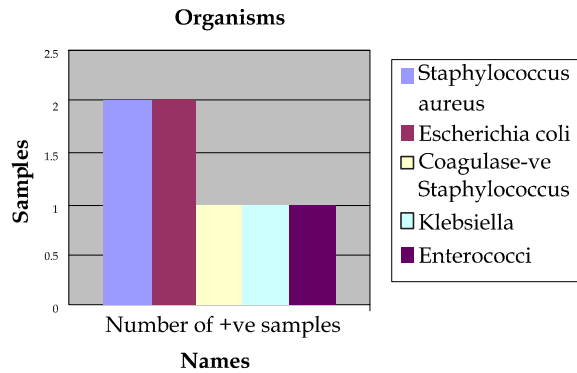


Fig. 7:

Table 4: Causative Pathogen isolation

Pathogen Isolated	No. of positive cultures
Staphylococcus aureus	2 (28.5%)
Escherichia coli	2 (28.5%)
Coagulase-ve Staphylococcus	1 (14.2%)
Klebsiella	1 (14.2%)
Enterococci	1 (14.2%)
Total	7

In the present study the most common organisms were found to be *Staphylococcus aureus* (28.5%) and *Escherichia coli* (28.5%). The other pathogens found were *Coagulase-ve Staphylococcus*, *Klebsiella* and *Enterococci*.

The majority of the organisms were found to be sensitive to Amikacin, Cefoperazone, Cefaclor, Ciprofloxacin and Ofloxacin in the decreasing order. Organisms were comparatively more resistant to Amoxicillin than the other antibiotics.

*Staphylococcus aureus* was found to be sensitive to Amikacin, Erythromycin, Ciprofloxacin and intermediate sensitivity was found to Amoxyclave, Cefoperazone, Cefaclor, Ofloxacin and resistance was found to Amoxicillin.

Table 5: Antibiotic sensitivity pattern of the organisms

	Staphylococcus aureus	Escherichia coli	Coagulase-ve Staphylococcus	Klebsiella	Enterococci
Amikacin	S	S	S	S	S
Amoxicillin	R	R	S	R	S
Amoxyclave	I	NT	NT	NT	S
Erythromycin	S	NT	NT	NT	S
Ceftazidime	NT	NT	R	NT	NT
Cephataxime	NT	NT	S	NT	NT
Cefoperazone	I	S	S	NT	S
Ceftriaxone	NT	NT	S	I	NT
Cefaclor	I	S	NT	I	S
Ciprofloxacin	S	R	S	I	S
Gentamicin	NT	S	NT	S	NT
Ofloxacin	I	R	S	I	S

NOTE: S-Sensitive, R-Resistant, I-Intermediate, NT-Not Tested.

*Escherichia coli* was found sensitive to Amikacin, Cefoperazone, Cefaclor, Gentamicin and resistance to Amoxicillin, Ciprofloxacin and Ofloxacin.

### Discussion

Urinary tract infections are remarkably common in women. About 20 percent women in the age range of 20-65 years suffer from at least one attack per year, 50 percent develop a urinary tract infections within their life time. Infections of the urinary tract are the most common bacterial infections encountered during pregnancy. These can be both symptomatic and asymptomatic.

Asymptomatic bacteriuria had no relationship with gestational age, parity, which is in corroboration with the study conducted by Samad Hazhir [17] in Iran. In our study the highest age specific prevalence was found to be in 26-30 yr old which was 10% and the lowest in less than or equal to 20 yrs which is in corroboration with the study conducted by Turpin CA [19], Ghana in which highest age specific prevalence was found to be in the 35-39 years old 13 percent and the lowest in 15-19 yr old. Both of them state that asymptomatic bacteriuria has a considerably lower prevalence in the lower age group.

The microbiology of bacteriuria in this study is similar to most reported studies. *Escherichia coli* are 28.5 percent and *Staphylococcus Aureus* 28.5 percent were the most common pathogens responsible for bacteriuria. Gram positive received more attention as causing bacteriuria and urinary tract infections. *Coagulase-ve Staphylococcus*, *Klebsiella*, *Enterococci* were also seen in small

**Table 6:** Prevalence of Asymptomatic Bacteriuria

Study	Prevalence of Asymptomatic Bacteriuria	Sample Size
Present study	3.50 %	200
Nerissa Isabel C. Sescon, Philippines [12]	1.90 %	2345
A A Abdullah, M I Al-Moslih, Sharjah UAE [1]	4.80 %	505
Samad Hazhir, Iran [17]	6.10 %	1100
Turpin CA, Ghana [19]	7.30 %	220
Lavanya SV, AMC, Vishakapatnam [9]	8.40 %	500
Uncu Y, Uncu G, Turkey [21]	9.31 %	270

From the study prevalence of asymptomatic bacteriuria was found to be 3.5 percent.

**Table 7:** Most Common Pathogens

Studies	Most common organisms
Present study	Escherichia coli (28.5%) Staphylococcus aureus (28.5%)
Nerissa Isabel C. Sescon, Philippines <sup>12</sup>	Escherichia coli (50%) Staphylococcus Saprophyticus (12%)
A A Abdullah, M I Al-Moslih, Sharjah UAE <sup>1</sup>	Escherichia coli (66.75%)
Nicolle Lindsay E, Canada <sup>13</sup>	Escherichia coli (38.89%) Staphylococcus Saprophyticus (16.68%)
Turpin CA, Ghana <sup>19</sup>	Escherichia coli (37%) Staphylococcus aureus (31.0%)
Lavanya SV, AMC, Vishakapatnam <sup>9</sup>	Escherichia coli (83%) Staphylococcus aureus (2.1%)

**Table 8:** Most sensitive antibiotics

Studies	Most Sensitive antibiotic
Present study	Amikacin, Cefaclor
Lavanya SV, AMC, Vishakapatnam <sup>9</sup>	Cephalexin, Nitrofurantoin
Turpin CA, Ghana <sup>19</sup>	Nitrofurantoin, Cefuroxime
A A Abdullah, M I Al-Moslih, Sharjah UAE <sup>1</sup>	Gentamicin, Amoxicillin- clavulanic acid

numbers. In most of the studies listed above Escherichia coli was found to be most predominant organism but in our study both Escherichia coli and Staphylococcus aureus were found in equal numbers.

It is well known that in case asymptomatic bacteriuria is detected in pregnancy it should be treated; however it is still controversial which treatment agent should be used and how long the treatment should last.

The findings of the study indicate that Amikacin, Cefaclor are highly effective to the urinary pathogens. The findings of the study were not consistent with the findings of other studies. This fact indicates that the urinary pathogen became resistant day by day to the commonly used antibiotics in our country, this may be due to widespread and indiscriminate use of the drugs.

Analyzing the outcome of each patient who has bacteriuria would also help determine the cost effectiveness of treating asymptomatic bacteriuria in pregnant women using one urine culture as bases for definition.

## Conclusion

The prevalence of asymptomatic bacteriuria among pregnant women in study was 3.5 percent. The most common isolates were Escherichia coli 28.5 percent and Staphylococcus aureus 28.5 percent.

The pregnant women who were found to be positive for asymptomatic bacteriuria were treated according to the antibiotic sensitivity obtained.

The current recommendation given by American college of obstetrics and gynecology is routine screening for bacteriuria to be done at the first prenatal visit.

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