

## Original Research Article

# Prevalence of Asymptomatic Bacteriuria in Pregnant Women, Isolates and their Culture Sensitivity Pattern

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## ABSTRACT

### Keywords

Asymptomatic bacteriuria, Antibiotic sensitivity, Urinary tract infections, Pregnancy

The present study is undertaken to provide an insight into the prevalence of asymptomatic bacteriuria(ASB), its causative agents in pregnant women attending Narayana Medical College Hospital, Nellore. This study included 500 pregnant women attending to antenatal OPD. Isolates were identified by conventional methods to know the prevalence of ASB. Antibiotic sensitivity was tested in 85 women who were culture positive for ASB. In 500 cases 85 (17%) were positive for significant bacteriuria. 54% were in the age group of 26-35years, 62% were multigravidae and 49% in third trimester. *E.coli* was the commonest organism isolated (62%) followed by *Klebsiella sp* (18%), and *Staphylococcus sp* (12%). Most of the isolates in our study were sensitive to drugs like Meropenem (90%), Amikacin (80%), Nitrofurantoin (76%) and Norfloxacin(72%). Prevalence of ASB is common in rural areas of low socioeconomic status. Single urine culture could detect most cases of ASB. If unrecognized and untreated ASB leads to adverse maternal and perinatal outcomes. Hence screening and treatment of ASB should be incorporated as a routine in antenatal care. Health education about personal hygiene should be emphasized to all pregnant women during their antenatal visits.

## Introduction

Asymptomatic bacteriuria (ASB) accounts for 2-10% pregnancies in affluent countries<sup>1</sup>, incidence is much more in developing and under- developed countries. ASB is a major risk factor for the development of urinary tract infections (UTIs) during pregnancy resulting in serious medical & obstetrical complications if untreated.

In pregnancy various hormonal, mechanical changes leads to significant alterations in the urinary tract like dilatation, decrease in peristalsis in the ureter and decrease in bladder tone. In addition, the physiological increase in plasma volume during pregnancy, decrease urine concentration leading to decreased ability of the lower

urinary tract to resist invading organisms.<sup>2,3</sup> These changes have a profound impact on the acquisition and natural history of bacteriuria and lead to an otherwise healthy woman susceptible to serious infectious complications.

In addition, a number of conditions like low socio economic status, multiparity, illiteracy, medical disorders like diabetes mellitus & sickle trait are also associated with increased incidence of asymptomatic bacteriuria in pregnancy.

Symptomatic bacteriuria poses no problems because of its easy diagnosis and treatment due to its overt symptoms but asymptomatic bacteriuria is difficult to diagnose which is more common in pregnant women.<sup>4</sup> Therefore to prevent untoward complications in the mother and baby that may arise due to ASB, it has been suggested to do routine screening for all pregnant women attending the Antenatal clinic even in the absence of symptoms.<sup>5</sup>

The main objectives of this includes Prevalence of asymptomatic bacteriuria in pregnant women attending the Department of Obstetrics and Gynecology, Narayana Medical College & Hospital, Nellore. And also to know the spectrum and frequency of microorganisms causing asymptomatic bacteriuria in pregnancy.

## **Materials and Methods**

This is a randomized case-control hospital based study done in the department of Obstetrics and Gynecology, Narayana Medical College Hospital, Nellore for a period of 2 years (October 2011- September 2013) India. 500 pregnant women were recruited for the study after their consent for participation.

**Inclusion criteria:** Pregnant women with

varying gestational periods attending the antenatal clinic for their first visit.

## **Exclusion criteria:**

1. Pregnant women with symptoms of urinary tract infections like lower abdominal pain, fever, burning micturition, frequency of micturition, dysuria.
2. Patients with history of UTI in the past one year or during this pregnancy.
3. Patients with diabetes, chronic hypertension and other preexisting medical disorders.
4. Patients who had taken antibiotics in last 6 months.

A detailed history including the demography, complaints (symptoms of UTI), period of gestation of these patients was taken. Emphasis was made on previous obstetric history and medical history. Complete general physical examination was carried out along with examination of the cardiovascular system and respiratory system. Obstetrical examination was carried out. Apart from routine antenatal profile, urine culture was done. Women with significant bacteriuria were treated and followed up throughout the pregnancy.

## **Laboratory evaluation**

Urine samples were collected by standard mid-stream "clean catch" method from all the pregnant women and immediately transported to the laboratory. Microscopic examination of urine was done for pus cells. All samples were cultured on blood agar, nutrient agar and Mac Conkey agar plates. A colony count of  $10^5$  or more pure isolates were processed further for identification. The isolates were identified by standard biochemical tests. Antimicrobial susceptibility test were performed using Kirby-Bauer disc diffusion test. The isolates

were tested against the following antibiotics: Ampicillin (10µg), Cefuroxime (30µg), Cotrimoxazole (25µg), Gentamicin (10µg), Tetracycline (30µg), Nalidixic acid (30µg), Nitrofurantoin (300µg) and pipemidic acid (20µg). Zone diameter was measured by Clinical Laboratory Standard Institute (CLSI) Sensitivity.

**Descriptive statistical analysis** has been carried out in the present study. Chi-square test ( $\chi^2$ ) 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. The statistical software namely graph pad was used for the analysis of the data. Microsoft word and Excel have also been used to generate graphs, tables, etc.

## Results and Discussion

In the present study, a total of 500 pregnant women, 85(17%) of them had culture positive and considered as cases (Table 1). In the present study age distribution varied from 18-38 years and highest number of culture positive cases were in the age group of 26-35 years (54%) followed by 37% in age group below 26 years and 9% above 35 years (Figure 2). In our study majority of women (71%) with culture positive belonged to low socio economic status and multigravidae (62%)(Figure 3).

In the present study, with respect to trimester majority of the culture positive cases were found in 3<sup>rd</sup> trimester (49%) followed by 29% and 22% in second trimester and first trimester respectively (Table 1). Pyuria (>5 pus cells/HPF) was seen in 90% of culture positive cases and 21% of control group. There is Significant association of pyuria (> 5 pus cells/HPF) with ASB is seen our study (p value -0.001).

In the present study, Gram negative bacteria were more frequently (86%) isolated organism than Gram positive bacteria (14%) (Table 2). *E.coli* was the commonest organism isolated (62%) in the present study, followed by *Klebsiella sp* (18%), *Staphylococcus sp* (12%), *Enterococci* (4%), *Pseudomonas*, *Streptococcus*, *Proteus*, *Acinetobacter* 1% each (Figure 4). Most of the isolates in our study were sensitive to drugs like Nitrofurantoin (76%), Norfloxacin (72%), Ceftriaxone (71%), Amikacin (80%), and Meropenem (90%)(Table 3 & 4).

500 women were screened for ASB to know the prevalence. Out of these 85 women were cultured positive. ASB is common in pregnancy; its prevalence varies between communities and in different ethnicities. The global prevalence of bacteriuria in pregnancy varies from 4% to 23.9% in various studies.<sup>8</sup> The prevalence of ASB in the present study is 17% which correlates with the studies done by *Vaishali et al*<sup>6</sup> and *Ansari HQ et al*<sup>8</sup>. This high prevalence is attributed to their socioeconomic status, lack of personal and environmental hygiene.

Majority of the women in our study belonged to the age group of 26-35 years (54%) which correlates with other studies done by *Nawal et al* (53%)<sup>16</sup> and *Sudha et al* (52%)<sup>11</sup>. This high incidence of ASB in the young reproductive age group is due to early pregnancy and multiparity in our country, especially in the rural sector. Many studies show advancing age as a risk factor for acquiring ASB in pregnancy because there is decrease in glycogen deposition and reduction in the lactobacillus as a part of ageing process which enhances bacterial adherence and invasion by pathogens and make them more susceptible.<sup>7</sup>

**Table.1** Gestational age

Trimester	n/t	%
1 <sup>st</sup> trimester	19/85	22%
2 <sup>nd</sup> trimester	24/85	29%
3 <sup>rd</sup> trimester	42/85	49%

**Table.2** ASB – gram staining

Organism	n/t	%
Gram-negative	73/85	86%
Gram positive	12/85	14%

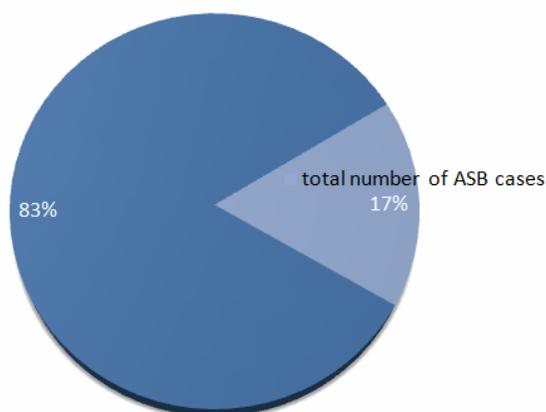
**Table.3** Antibiotic sensitivity

Antibiotic	No of cases (sensitivity)	%
Amoxycillin	17	20%
Amikacin	68	80%
Ampicillin	17	20%
Cefixime	52	61%
Cephalexin	25	30%
Nitrofurantoin	65	76%
Ceftriaxone	60	71%
Norfloxacin	61	72%
Piperacillin+ Tazobactam	51	60%
Meropenem	76	90%

**Table.4** Culture isolates

Organism	No of isolates	AM	AK	AP	CF	CP	NF	CT	NO	PT	MR
<i>Escherichia coli</i>	53	4	45	5	35	12	45	37	43	29	46
<i>Klebsiella pneumonia</i>	15	1	14	0	10	3	10	11	10	8	15
CONS & <i>Staphylococcus aureus</i>	10	8	6	8	4	7	5	6	4	9	9
<i>Enterococci</i>	3	3	1	2	2	1	2	2	1	2	3
<i>Pseudomonas</i>	1	0	0	0	0	0	0	1	0	1	1
<i>Streptococcus sp</i>	1	1	0	1	1	1	1	1	1	1	1
<i>Proteus mirabilis</i>	1	0	1	0	0	0	1	1	1	1	1
<i>Acinetobacter</i>	1	0	1	1	0	1	1	1	1	0	1

**Figure.1** Prevalence of asymptomatic bacteriuria



**Figure.2** Distribution of age

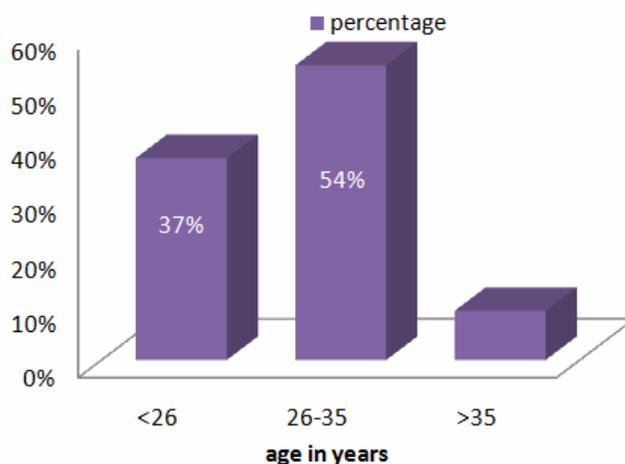


Figure.3 Socio economic status

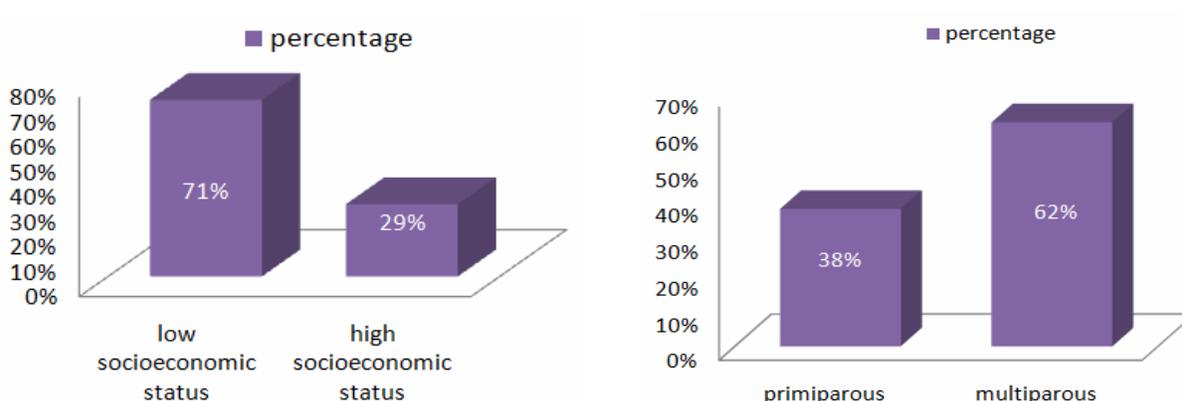
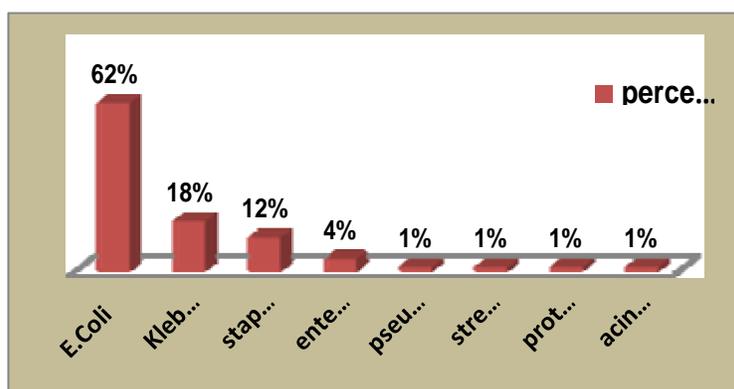


Figure.4 Bacterial isolate- drug sensitivity



In our study most of the patients belonged to low socioeconomic status i.e. 71%. This correlates to the study done by *Lavanya et al.*<sup>9</sup> This increased prevalence of ASB in those belonging to low socio economic status is due to poor sanitation, lack of general hygienic practice and failure to attend antenatal clinic.

In the present study, majority of the women with ASB were multigravidae (62%). This was close to study done by *Okonko et al*<sup>12</sup>. The higher incidence of ASB in the multigravida is due to increased colonization of urinary tract by pathogens due to repeated exposure to urinary stasis or previous infections. Most pregnant women in our area report to antenatal checkups during 2<sup>nd</sup> and

3<sup>rd</sup> trimester. In the present study, majority of the women with ASB were in 3<sup>rd</sup> trimester (49%). This correlates with the study done by *Jeyaseelan et al*<sup>7</sup> and others. The incidence of ASB is more pronounced in the third trimester probably because of the anatomical and physiological changes related to advancing gestational age. This leads to stasis of urine and encourage bacterial multiplication.

In the present study, when the cut off for pyuria was considered as > 5 pus cells/HPF, 90% of ASB patients had pyuria while only 21% patients without ASB had pyuria. Thus high sensitivity of pyuria to detect ASB is useful for screening pregnant women. Positive predictive value of 81% defines a

probability of ASB among patients with pyuria and negative predictive value of 89% defines probability of no ASB among patients without pyuria.

*E. coli* accounts for 85% of community acquired urinary tract infections and commonest isolate in 70-90% of pregnant women. In the present study of ASB, the frequently isolated organism was *Escherichia coli* (62%) which are correlating with the studies done by Sabharwal *et al*<sup>14</sup> and Jayaseelan *et al*.<sup>7</sup> *Escherichia coli* possess ability to colonize and infect the urinary tract, hence it is a commonly isolated organism in the community acquired infections.

In our study isolates showed 90% sensitivity to Meropenem and in aminoglycosides, Amikasin demonstrated 80% sensitivity, Nitofuranton 76%, Ceftriaxone 71 % sensitivity. Ampicillin and Amoxicillin were found to be least sensitive i. e. 17%. Our antibiogram pattern correlates with other studies done RJ Girish Babu *et al*<sup>15</sup> and Sudha Biradaur *et al*.<sup>11</sup> The upsurge in the antibiotic resistant pattern could be due to antibiotic abuse and self medication.

ASB is a common bacterial infection complicating pregnancy with high Prevalence. Hence atleast one urine culture is needed as a part of antenatal care to rule out ASB. By knowing the isolates & its sensitivity we can eradicate ASB effectively, hence reducing serious untoward maternal and fetal complications.

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