

## Prevalence of asymptomatic bacteriuria in pregnancy in rural population

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### Abstract

Urinary Tract Infections (UTIs) commonly occur during pregnancy, the study aimed at to know the prevalence of asymptomatic bacteriuria in pregnancy

Materials and methods

Prospective observational study done in the department of medicine and obstetrics acsr ggh hospital, Nellore for a period of 1year from April 2022,all the pregnant women recruited for study

Results

Durring the study period, a total of 500 cases were included in the study. Of these, there were 46 (9.2%)have ASB. 6.1% of women were in the age group of 20-25 years. 21.7% were in age groups between 26 years to 30 years,2.2% were in the above 30 years . Gram negative bacteria were more frequently (86%) isolated organism than Gram positive bacteria (14%). Most of the isolates in our study are sensitive to drugs like Meropenam (100%), Amikacin (93.5%),Nitrofurantoin(76.1%),cefoxitin(65.2%),Ceftriaxone(54.3%),andpiperacillin+tazobactum(47.8%), ciprofloxacin (47.5%).

Conclusion

ASB is a common bacterial infection, complicating pregnancy with a high prevalence of 9.2%. The prevalence is more common in our area which has a rural background in younger age group of less than 25 years .

**Key words:** Asymptomatic bacteriuria, pregnancy, gram negative bacteriuria.

**Introduction:**

Urinary Tract Infections (UTIs) commonly occur during pregnancy, due to the morphological and physiological changes that take place in the genitourinary tract. UTIs are of two types, symptomatic and

asymptomatic. Asymptomatic Bacteriuria (ASB) is defined as the presence of actively multiplying bacteria, with colony count greater than  $10^5$ /ml of urine in an asymptomatic patient.

Pregnancy enhances the progression from ASB to symptomatic bacteriuria, which could lead to acute pyelonephritis in 20-50% of cases and to adverse obstetric outcomes such as prematurity, anaemia, , and higher fetal mortality rates, if it is left untreated<sup>2,3</sup>.

. Additionally, the physiological increase in plasma volume during pregnancy decreases urine concentration leading to decreased ability of the lower urinary tract to resist invading organisms.<sup>1,2</sup>

Asymptomatic bacteriuria is a diagnosis which is based on the isolation of a specified quantitative count of bacteria in a specimen of urine which is properly collected from a pregnant woman who does not have any signs or symptoms. Thus, urine culture is the gold standard screening technique for ASB which occurs during pregnancy<sup>4,5</sup>. The predominant organism that causes UTIs during pregnancy is *Escherichia coli*, which accounts for 80-90% of infections<sup>6</sup>. The frequencies of isolated pathogens and their antimicrobial resistance patterns can vary in different geographical regions<sup>7</sup>.

Symptomatic bacteriuria poses no problems because of its ease to diagnosis and treatment due to its overt symptoms but asymptomatic bacteriuria is difficult to diagnose and it is more common in pregnant women.<sup>6</sup> Therefore to prevent mother and child from any form of complication that may arise due to infection, it has been suggested to do routine urine analysis screening for all pregnant women attending antenatal clinic even in the absence of symptoms.<sup>12</sup>

The present study is undertaken to study the the prevalence of asymptomatic bacteriuria, its causative agents in pregnant women attending ACSR ggh Hospital, Nellore.

## Materials and methods

### SOURCE OF STUDY:

This is a prospective observational study done in the department of general medicine and obstetrics, acsr ggh hospital, nellore for a period of 1year from April 2022.

- **STUDY PERIOD** :1 year from April 2022.
- **SAMPLE SIZE:**
- 500 pregnant women have been recruited for the study after their consent for participation.

- **STUDY DESIGN:** prospective observational study.

### INCLUSION CRITERIA:

1. All pregnant women who came for the first antenatal 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 during this pregnancy.
  3. Patients with diabetes, chronic hypertension and other preexisting medical disorders.
  4. Patients who had taken antibiotics in last 14 days<sup>18</sup>
  5. All cases of Tuberculosis are excluded

### METHODOLOGY:

Pregnant women (500) attending the department of medicine and obstetrics have been recruited in the study. A detailed history including the demography, complaints (symptoms of UTI), period of gestation is taken. Emphasis on previous obstetric history and medical history is given. Complete general physical examination is carried out along with examination of the cardiovascular system and respiratory system.

Obstetrical examination is carried out. Pregnant females were counseled regarding the method of collection of clean catch midstream urine sample. The samples are immediately transferred and processed within one to two hours of collection in the laboratory. Apart from routine antenatal profile, urine routine and culture is done. Women with ASB is treated and followed up. Two weeks after treatment culture is repeated

### 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 is done for pus cells, red bloodcells, and bacteria. All samples were subjected to culture by the Standard Loop technique on blood agar, nutrient agar and MacConkey agar plates. A colony count of  $10^5$  or more pure isolates have been processed further for identification. The isolates are identified by standard biochemical tests.

The standardized Kirby-Bauer disc diffusion test of the Clinical and Laboratory Standards Institute (formerly NCCLS) is used for antibiotic susceptibility testing and interpretations are carried out accordingly<sup>8</sup>. The isolates from this study have been tested against the antibiotics:

Zone diameter is measured by Clinical Laboratory Standard Institute (CLSI) Sensitivity

### METHOD OF STATISTICAL ANALYSIS:

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.

Calculated by the formula:  $\chi^2 = \frac{(ad-bc)^2}{(a+b)(c+d)(b+d)(a+c)}$

Degrees of freedom= (number of columns - 1) x (number of rows - 1)

With chi square test & degrees of freedom, corresponding probability was calculated.

P value < 0.05 was considered statistically significant.

### Results

A total of 500 pregnant women with varying gestational periods attending to OPD for their first visit were recruited in the study group and screened for ASB.

Out of the total 500 pregnant women participated in this study, 46(9.2%) women had ASB.

In the present study age distribution varied from 18-35 years. 76.1% of women were in the age group of 20-25 years. 21.7% were in age groups between 26 years to 30 years, 2.2% were in the above 30 years .

AGE DISTIRIBUTION AMONG POSITIVE CASES		
AGE	Number of Patients	Percentage
Up to 25	35	76.1
26 to 30	10	21.7
> 30	1	2.2

In our study majority of women (37%) with ASB belong to low socio economic status and 63% belong to middle socioeconomic status.

Socio Economic Status		
SES	Number of Patients	Percentage
Low	17	37
Middle Class	29	63

**ASB - Gestational age**

In our study ASB was more common in second trimester (43.5%) followed by 41.3% and 15.2% in first trimester and third trimesters respectively.

TRIMESTER		
	Number of Patients	Percentage
I	19	41.3
II	20	43.5
III	7	15.2

**Table-: ASB- Gestational age****ASB – gram staining**

In the present study, Gram negative bacteria were more frequently (86%) isolated organism than Gram positive bacteria (14%).

Organism	n/t	%
Gram-negative	42/46	91.34%
Gram positive	4/46	8.6%

**Table : ASB – gram staining****ASB- spectrum of bacterial isolates**

In our study the commonest isolated organism was E.coli in 30 cases (65.2%), followed by Klebsiella sp in 12 cases (26%), (12%), Enterococci in 3 cases (6.5%), Staphylococcus sp in 1(2.1%) cases.

Urine organisms	No. of patients (n=46)	%
Positive	46	100
E-coli	30	65.22
Klebsiella	12	26.08
Enterococcus	3	6.52
Staphylococcus coagulase	1	2.18%

**Table: ASB- Spectrum of bacterial isolates.****ASB- antibiotic sensitivity**

Most of the isolates in our study are sensitive to drugs like Meropenam (100%), Amikacin (93.5%), Nitrofurantoin (76.1%), cefoxitin (65.2%), Ceftriaxone (54.3%), and piperacillin+tazobactam (47.8%), ciprofloxacin (47.5%) .

Antibiotic sensitivity – resistance pattern	Resistance	Sensitive	I
Amoxicillin	33(71.7%)	13(28.3%)	0(0%)
Amikacin	1(2.2%)	43(93.5%)	2(4.3%)
Ampicillin	33(71.7%)	13(28.3%)	0(0%)
Cefuroxime	23(50%)	22(47.8%)	1(2.2%)
Cefoxitin	10(21.7%)	30(65.2%)	6(13%)
Nitrofurantoin	7(15.2%)	35(76.1%)	4(8.7%)
Ceftriaxone	21(45.7%)	25(54.3%)	0(0%)
Ciprofloxacin	25(54.3%)	21(45.7%)	0(0%)
Piperacillin+Tazobactam	24(52.2%)	22(47.8%)	0(0%)
Meropenam	0(0%)	46(100%)	0(0%)

**Table-: ASB- Antibiotic sensitivity**

### Discussion

This is a prospective observational study conducted over a period of 1 years from april 2022- april2023, in ggh hospital. A total of 500 pregnant women were recruited to the study during their first antenatal visit irrespective of their gestational age and parity after fulfilling the eligibility criteria.

The aim of the study was to determine the prevalence of ASB in pregnancy, to evaluate the effects of demographic variables and to find the spectrum of organisms causing ASB and their antibiotic sensitivity patterns.

### PREVALENCE:

ASB is common in pregnancy; its prevalence varies between communities and different ethnicities. The global prevalence of bacteriuria in pregnancy varies from 4% to 23.9% in various studies.<sup>16</sup>

Study	Place	Percentage
Lavanya et al <sup>34</sup> (2002)	Andhrapradesh	8.2%
Girish babu et al <sup>18</sup> (2011)	Karnataka	9%
Gayathri et al <sup>17</sup> (2010)	Karnataka	6.2%
Chandel Lata et al <sup>68</sup> (2011)	Shimla	7.34%
Present study	ggh	9.2%

**Table-: ASB-PREVALENCE**

The prevalence of ASB in the present study is 9.2% which correlates with the studies done by *Girish Babu et al* . This high prevalence is attributed to the low socioeconomic status, lack of personal and environmental hygiene.

### AGE DISTRIBUTION

Study	Age in years	Percentage
Lavanya et al <sup>34</sup> (2002)	< 20 years	71.42%
Girishbabu et al <sup>18</sup> (2011)	26-35 years	60%

Nawal et al <sup>67</sup> (2011)	26-35 years	53%
Chandel Lata et al <sup>68</sup> (2011)	20-30 years	91.2%
Present study	20-25 years	76.1%

**Table-: ASB-AGE DISTIBUTION**

Majority of the women in our study belonged to the age group of 18-25 years (76.1%) which correlates with other studies done by *Chandel Lata et al* (91.2%) and *Lavanya et al* (71.42%). This high incidence of ASB in the young reproductive age group is due to early pregnancy in our country, especially in the rural sector.

**SOCIOECONOMIC STATUS:**

Study	Percentage	SES
Lavanya et al <sup>43</sup> (2002)	66%	Low
Present study	71%	Middle

**Table-: ASB- SOCIOECONOMIC STATUS**

In our study most of the patients belonged to middle socioeconomic status i.e., 71%. But this differs with the study done by *Lavanya et al*. increased prevalence of ASB in middle class pregnant population in our area which has a rural background suggests lack of general hygienic practice.

**GRAVIDITY:**

Study	Gravidity	Percentage
Lavanaya et al <sup>34</sup> (2002)	primigravida	66.6%
Chandel Lata et al <sup>68</sup> (2011)	primigravida	52.9%
Present study	primigravida	56.5%

**Table-: ASB-GRAVIDITY**

In the present study, majority of the women with ASB were primigravidae (56.5%). This was close to study done by *lavanya et al and Chandel Lata et al*. The higher incidence of ASB in the primigravida is due to early marriage.

**GESTATIONAL AGE**

Most pregnant women in our area report to antenatal checkups during 2<sup>nd</sup> and 3<sup>rd</sup> trimester.

Study	Gestational age	Percentage
Sanyogita Jain1 et al <sup>15</sup> (2013)	2 <sup>nd</sup> trimester	54.5%
Sudha et al <sup>66</sup> (2013)	3 <sup>rd</sup> trimester	45%
Lakshmipriya et al <sup>70</sup> (2013)	3 <sup>rd</sup> trimester	53%
Present study	2 <sup>nd</sup> trimester	43.5%

**Table-: ASB-GESTATIONAL AGE**

In the present study, majority of the women with ASB were in second trimester (43.5%). This correlates with the study done by *Sanyogita Jain1 et al* and but it differs with other workers . The incidence of ASB is more pronounced in the second trimester probably because of the anatomical and physiological changes. This leads to stasis of urine and encourage bacterial multiplication<sup>73</sup>

**SPECTRUM OF BACTERIAL ISOLATES:**

*E coli* accounts for 85% of community acquired urinary tract infections and commonest isolate in 70-90% of pregnant women.

Study	Frequent isolate	Percentage
Jeyaseelan et al <sup>15</sup> (2013)	E.coli	69%
Sabharwal et al <sup>72</sup> (2012)	E.coli	63%
Chandel Lata et al <sup>68</sup> (2011)	E.coli	79.5%
Present study	E.coli	65.2%

**Table-: Spectrum of bacterial isolates**

In the present study, the frequently isolated organism was *Escherichia coli* (65.2%) which are correlating with the studies done by *Sabharwal et al* and *Jayaseelan et al*.

*Escherichia coli* possess the attributes required to colonize and infect the urinary tract, hence is a commonly isolated organism in a community acquired infection like ASB.

**ASB- ANTIBIOTIC SENSITIVITY:**

In our study isolates showed 100% sensitivity to Meropenem and among the aminoglycosides, Amikacin demonstrated (93.5%) sensitivity. Nitrofurantoin (76.1%) showed increased sensitivity when compared to Ceftriaxone (54.3%). Ampicillin, Amoxycillin was found to be least sensitive (28-30%). Our Antibiogram pattern correlates with others studies done by *R J Girishbabu et al*<sup>18</sup> and *Sudha Biradar et al*.<sup>66</sup>

The upsurge in antibiotic resistant pattern could be due to antibiotic abuse and self-medication. Also low cost and availability of drugs could be another contributing factor for antibiotic resistance.

**Conclusion**

ASB is a common bacterial infection, complicating pregnancy with a high prevalence of 9.2%. The prevalence is more common in our area which has a rural background in younger age group of less than 25 years

Single urine culture could detect most cases of ASB. Urine culture is the Gold standard test in detecting ASB, significant pyuria (>5 pus cells/HPF) did not play an important role in screening.

If unrecognized and untreated, ASB leads to adverse maternal outcomes like symptomatic UTI, pyelonephritis, anemia, PROM, IUGR, puerperal fever, wound infections and adverse fetal outcomes like prematurity, neonatal infections, abortions, still births, all these complications related to ASB could be reduced by early recognition and prompt antimicrobial treatment in pregnancy.

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.

In our study *E.coli* is the common organism causing ASB and is sensitive to Nitrofurantoin, Amikacin, & Meropenam.

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