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Original Research Paper

Bacteriological Profile of Asymptomatic Bacteriuria among Antenatal women in a tertiary care centre in Central Kerala

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ABSTRACT:
Usually asymptomatic bacteriuria during pregnancy is detected during routine antenatal checkups. IF IT IS NOT DETECTED and treated with appropriate antibiotics during early pregnancy it will lead to ascending infections such as acute pyelonephritis which is very serious condition which may lead to maternal and foetal complications. A cross-sectional study was conducted in the Department of Microbiology, Government Medical College Ernakulam to find out the proportion and bacteriological profile of asymptomatic bacteriuria in antenatal women who attended outpatient department of Obstetrics and Gynecology for antenatal checkups during a one year from January 2020 to December 2020.After proper collection and transport of midstream urine samples of these patients, the samples were cultured in the microbiology laboratory. Out of the 460 samples received only 27 isolates were obtained. Culture positivity was 5.86% only. The most common isolate in this study was E.coli (48.14%) followed by *Klebsiella* (33.33%) , Enterobacter species (7.4%), Stapylococcus aureus (3.7%), Stapylococcus saphropyticus (3.7%) and Enterococcus fecalis (3.7%). Antibiotic susceptibility testing of bacteria was done on Mueller Hinton agar by Kirby Bauer disc diffusion method and interpreted according to CLSI guidelines.

Keywords: ASB, E.coli , Antibiotic sensitivity testing.

INTRODUCTION:

Urinary tract infection (UTI) is a common painful illness which rapidly responds to the modern antibiotic therapy. It affects all age groups, particularly in females than in males. The short urethra in females predisposes to infection by ascending route. UTI is the second most common bacterial infection seen during pregnancy. The urinary tract will endure an intense physiological and anatomical changes during pregnancy that facilitates the development of both symptomatic and asymptomatic bacteriuria. Although different microorganisms can cause UTI, including fungi and viruses, bacteria are the major causative organisms and are responsible for more than 95% of UTI cases (1). The presence of bacteria in urine is called bacteriuria. It is usually regarded as significant when the urine contains 10^5 organisms or more per ml in pure culture (3). Significant bacteriuria is defined as the presence of more than $>10^5$ bacteria per ml in a suitably collected, well transported midstream sample of urine (4). Asymptomatic bacteriuria (ASB) is defined as persistently, actively multiplying bacteria in significant number. i.e. more than 10^5 bacteria of same species per ml of urine within the urinary tract without any obvious symptoms (2). ASB is one of the major risk factors for the development of UTI during pregnancy. It was estimated that about 5 % of antenatal women have ASB during pregnancy. A midstream urine sample for microscopy, culture and sensitivity should be routinely collected early in pregnancy and if infection is detected, appropriate antibiotics are necessary. If no antibiotic therapy is given to these patients, 20-30% of them will develop acute pyelonephritis (4). The role of the Microbiology laboratory in the management of UTI is to support the obstetricians through early detection and accurate diagnosis of ASB by doing urine culture and antimicrobial sensitivity testing. Several tests are available for the diagnosis of asymptomatic bacteriuria. Urine culture is the gold standard diagnostic test.

Common organisms causing UTI are the enteric Gram negative bacilli. E.coli is the predominant one. If ASB is detected, most of the obstetricians used to treat the

patients with Ampicillin, Cephalosporins, or Nitrofurantoin for 7 days. Urine culture is repeated 2 weeks after treatment to ensure no bacteriuria.

Only few studies are available in Kerala regarding asymptomatic bacteriuria. Hence this study has been taken up to find out the proportion and bacteriological profile of ASB among antenatal women attending Government Medical College Ernakulam, which is a tertiary care centre.

OBJECTIVES:

1. To estimate the proportion of asymptomatic bacteriuria among antenatal women attending outpatient department of Obstetrics and Gynecology at GMC Ernakulam from January 2020 to December 2020.
2. To identify the common bacteria causing asymptomatic bacteriuria and antibiotic sensitivity pattern of the isolates.

METHODOLOGY:

The study was conducted to find out the proportion and bacteriological profile of asymptomatic bacteriuria among antenatal women.

Study design: Cross sectional study.

Study setting: Department of Microbiology and Department of Obstetrics and Gynecology of Government Medical College Ernakulam.

Study period: One year (January 2020 to December 2020)

Study population: Antenatal women attending Obstetrics and Gynecology outpatient department.

Inclusion Criteria:

- Antenatal women without symptoms of UTI attending OBG OPD.
- Those who are willing to participate in the study.

Exclusion criteria:

- Antenatal women with signs and symptoms of UTI.
- Any history of diabetes mellitus, anemia, immunocompromised conditions.
- Those patients who took antibiotics in past one week.

Sample size = 460

Calculated using formula, n = (Za)2x P x Q /d2

where, Za = 1.96

P = prevalence taken from previous study 5

Q = 100-P

d = 20% of P = 2

SPECIMEN COLLECTION:

The urine sample was collected in a sterile plastic disposable 10 ml volume wide mouth container. The container was labelled with minimum informations like patient name, age. The procedure of collection of midstream urine was clearly explained to the patient to avoid contamination of urine sample.

About 5ml of midstream urine sample was collected by the clean catch method. The patient was advised to clean the periurethral space and perineum. The labia should be held apart during voiding and discard the first few drops of urine and then collect the midstream urine in a wide mouthed sterile leak proof container (universal container). From the collection point the sample was immediately transported to the bacteriology lab. The patient was advised to give the urine sample to the collection point along with properly filled culture request forms.

SAMPLE PROCESSING:

When the freshly collected urine sample was received in the bacteriology lab, it was processed immediately.

A. Macroscopic appearance:

The sample was visualised through the transparent container to note whether the sample is clear or turbid. Colour of the urine was noted and recorded.

B. Microscopy:

Wet film examination

A loopful of uncentrifuged urine sample was placed in the middle of the microscopic slide. A coverslip was placed over it and examined under low power field for the presence of pus cells, RBC, epithelial cells, casts, crystals and yeast and motile bacteria if any.

Gram staining:

Examine the Gram stain smear of urine sample first with the low power objective to see the distribution of material, and then with the oil immersion objective. Look for bacteria, pus cells, epithelial cells etc.

The presence of atleast one bacterium per oil immersion field (100X) in a midstream, clean catch, uncentrifuged, Gram stained, urine correlates with 10^5 bacteria per ml of urine or more. Only after examining at least 20 oil immersion fields smear is considered as negative (10) (5).

CULTURE:

1. **MacConkey agar**:

A calibrated wire of 0.01ml capacity inoculating loop was flamed and allowed to cool without touching any surface. Then insert the loop into the urine to allow urine to adhere to it. The loopful of urine was spread without flaming or re-entering urine. Inoculation is accomplished by first touching the surface of agar in one small area. Once primary inoculum is made, using loop wire spread the entire material by streaking. After overnight incubation observe the type of colonies.

- Lactose fermenting colonies – produce pink coloured colonies.
- Non lactose fermenting colonies – produce colourless colonies.

2. **CLED agar**:

Semiquantitative culture of urine was done by standard loop technique on CLED agar. A calibrated wire of 0.01ml capacity inoculating loop was used. The loopful of urine was drawn across the entire plate under sterile precautions. Then the plate was incubated at 37 °C overnight. Colonies were counted on each plate. The number of CFUs was multiplied by 1000 (if a 0.001-mL loop was used) or by 100 (if a 0.01-mL loop was used) to determine the number of microorganisms per millilitre in the original specimen (16).

Interpretation of bacterial counts:

- If no growth was present - no bacteriuria.
- If the colony count was $< 10^5$ colony forming units/ml No significant bacteriuria.
- If the colony count was $>10^5$ colony forming units /ml of a particular organism significant bacteriuria.
- A pure culture of Gram positive cocci is considered to be significant regardless of the number of CFUs, and antimicrobial susceptibility tests are performed.

3. **HiCrome UTI agar:**

Media was prepared as per manufacture's instructions. Sample was inoculated and incubated at 37 degree C overnight. Different bacteria was identified by different colour they produced.

Organism	Colour of colony
Escherichia coli	pink purple
Klebsiella pneumonia	blue to purple mucoid
Enterococcus faecalis	blue, small
Staphylococcus aureus	golden yellow.
CoNS	White
Enterobacter	Blue green

Table 1: Colour of colony in HiChrome UTI agar.

Pathogens were identified using standardized biochemical tests from 24hrs pure culture colonies.

Antibiotic Susceptibility Testing:

Antibiotic susceptibility testing was performed in Mueller Hinton Agar (MHA) by Kirby Bauer disk diffusion method and interpreted according to CLSI guidelines.

Extended Spectrum Beta Lactamase:

Beta lactamase enzymes are capable of hydrolyzing beta lactam rings of beta lactam antibiotics, thereby deactivating their antibacterial properties. They can be produced by both Gram positive and Gram negative organisms. Broad spectrum β-lactamase producing organisms are growing worldwide problem. It was first observed in 1983 in isolates of *Klebsiella pneumoniae* (9).

The term ESBLs encompasses a group of plasmid coded enzymes capable of hydrolysing all beta lactam agents except carbapenems and cephamycins. Most members are susceptible to inhibition by beta lactamase inhibitors like clavulanic acid and tazobactam which forms the basis for their identification.

Detection of ESBL by Combination Disc Method:

ESBLs were detected by CLSI method using Cefotaxime (30µg) and Cetazidime (30µg), along with Cefotaxime -Clavulanic acid(30,10µg) and Ceftazidime -Clavulanic acid (30,10µg) combination discs respectively.

ESBL production was inferred if the inhibition zone increased by 5mm towards the combination disc in comparison to third generation Cephalosporin disc alone (27)).

DATA MANAGEMENT AND ANALYSIS:

Data were entered in Microsoft excel and analysed using SPSS. Qualitative data will be expressed as frequency and percentage. Quantitative data expressed as mean and standard deviation.

RESULTS:

The study was conducted at the department of Microbiology, Government Medical College, Ernakulam for a period of one year from January 2020 to December 2020. A total of 460 urine samples were collected from the antenatal women attending OPD of Obstetrics and Gynecology were collected by clean

catch method and processed in the bacteriology laboratory immediately after collection.

Out of 460 samples processed for culture 27 were isolates (5.8%), 239 samples (51.95%) with no bacteriuria, 103 samples (22.39%) with no significant bacteriuria and 91 samples (19.78%) with mixed bacterial growth were obtained. The most common isolate in this study was E.coli (48.14%) followed by *Klebsiella* (33.33%), Enterobacter species (7.4%), Stapylococcus aureus (3.7%), Stapylococcus saphropyticus (3.7%) and Enterococcus fecalis (3.7%). The predominant isolates are Gram negative bacilli (88.88%).

All the isolates of E.coli were 100% sensitive to Imipenam, Meropenem and Amikacin. 90% of the Klebsiella isolates were sensitive to Imepenem, Meropenem, Amikacin and 90% resistant to Gentamicin. Both isolates of Enterobacter were sensitive to Cotrimoxazole, Cefepime, Piperacillin Tazobactam, Amikacin, Meropenem, Imipenem, Ceftazidime, Nitrofurantoin, Gentamicin and Cefoperazone Sulbactam (100%). Antibiotic sensitivty pattern of Staphylococcus aureus (n=1) showed sensitivity to all antibiotics except Penicillin, Ampicillin, Erythromycin and Clindamycin. Whereas Staphylococcus saphropyticus (n=1) is sensitive to Clindamycin, Gentamicin, Linezolid, Amikacin and resistant to Penicillin, Erythromycin, Cloxacillin and Novobiocin. About the antibiotic sensitivity pattern of Enterococcus fecalis (n=1), it is sensitive for most of the antibiotics like Penicillin, Linezolid, Ampicillin.

Among the 13 E.coli isolates, 7 were ESBL producers and 6 ESBL non producers. Among 9 of the Klebsiella isolates, 4 were ESBL producers and 5 ESBL non producers. Both the Enterobacter species were ESBL nonproducers.

In this study most of the isolates obtained in 3RD trimester and in 37-40 weeks of gestation – 9 isolates (33.33%). There is significant association between trimester and asymptomatic bacteriuria as the p value obtained is <0.035, which is less than 0.05.

The minimum age of the patient included in this study is 18 and maximum age is 40. The age group 26-30 have the higher prevalence of ASB (48.14%) followed by age group 21-25 (33.33%). As the P value is 0.264, which is greater than 0.05, there is no association between age and asymptomatic bacteriuria.

In this study out of 460 studied cases ASB was present in 27 patients (5.86%).Out of the patients having ASB, 14 (51.85) were multigravida while 13 (48.14) were primigravida. The P value is 0.898, which is greater than 0.05. So there is no significant association between gravida and asymptomatic bacteriuria.

SAMPLE DISTRIBUTION:

Total no of samples	Total no of isolates	No bacteriuria	No significant bacteriuria	Mixed bacterial growth
460	27 (5.8%)	239(51.95%)	103 (22.39%)	91(19.78%)

Table 2: Sample Distribution

NO OF CASES VS GESTATIONAL PERIOD:

Weeks of gestation	Total samples collected	No of isolates	Percentage % (n=27)
5-8	3	0	0
9-12	61	2	7.4
13-16	198	4	14.81
17-20	7	1	3.7
21-24	10	0	0
25-28	28	2	7.4
29-32	29	1	3.7
33-36	58	5	18.51
37-40	66	9	33.33

Table 3: Cases vs Gestational Period

TRIMESTER WISE DISTRIBUTION OF ISOLATES:

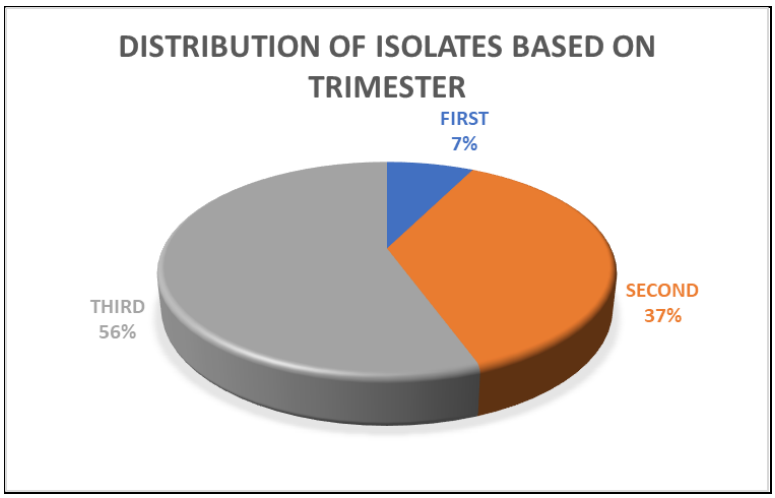


Figure 1: Pie diagram showing distribution of isolates based on trimester.

DISTRIBUTION OF BACTERIAL ISOLATES FROM PATIENTS WITH ASB:

Sl No	Organisms	Total No	Percentage % (n=27)
1	*E.coli*	13	48.14
2	*Klebsiella species*	9	33.33
3	*Enterobacter species*	2	7.40
4	*Staphylococcus aureus*	1	3.70
5	*Staphylococcus saprophyticus*	1	3.70
6	*Enterococcus fecalis*	1	3.70
	Total	27	100

Table 4: Distribution of Bacterial Isolates from Patients with ASB

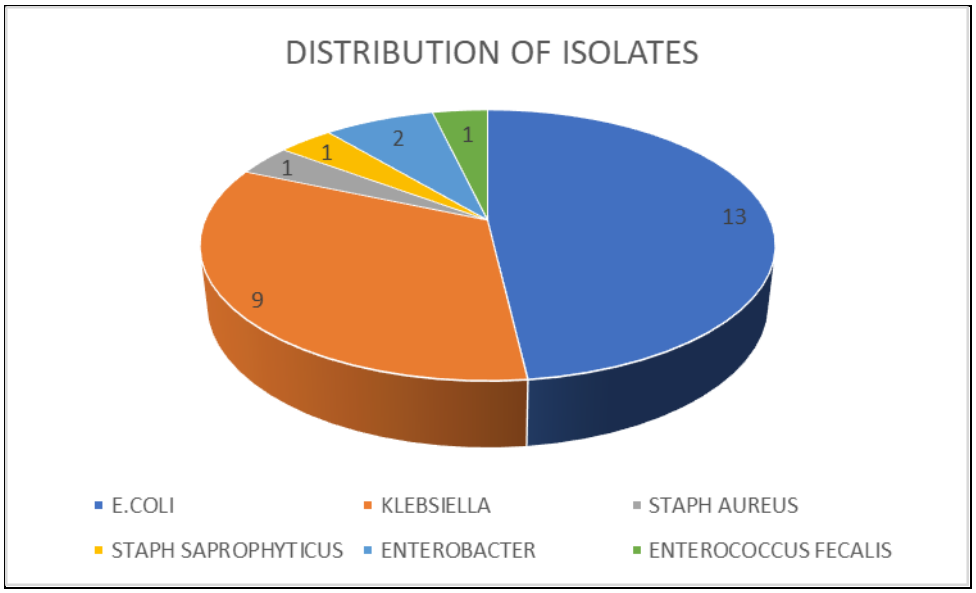


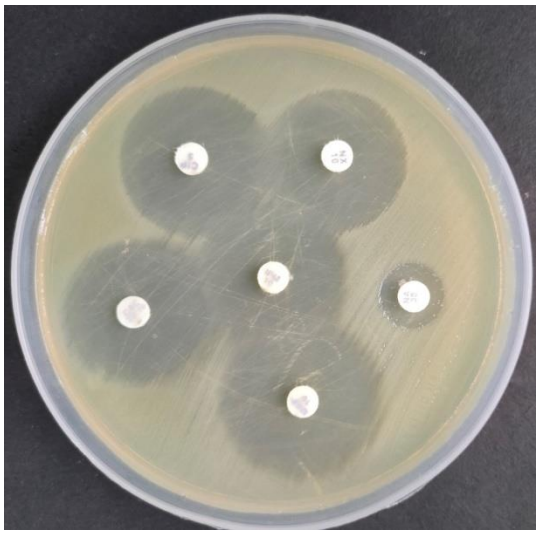
Figure 2: Pie diagram showing distribution of isolates.

Antibiotic Sensitivity Pattern of E.Coli (n=13):

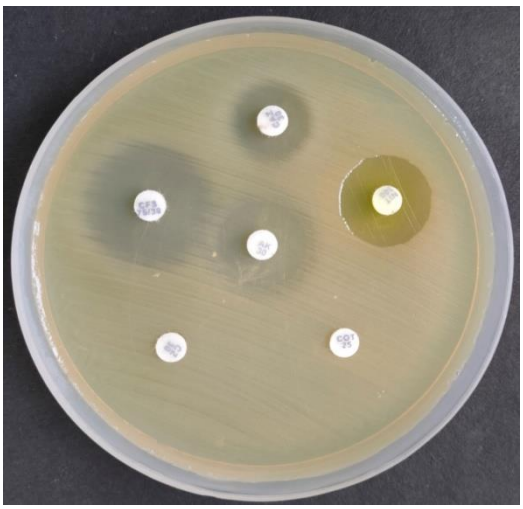
Antibiotic Disc With Concentration	Sensitive		Resistant	
	Number	%	Number	%
Ampicillin (25 µg)	2	15.38%	11	84.61%
Cephalothin (30µg)	3	23.07%	10	76.92%
Gentamicin (10µg)	10	76.92	3	23.07
Cotrimoxazole(1.25/23.75µg)	10	76.92	3	23.07
Ciprofloxacin (5µg)	5	38.46	8	61.53
Ceftriaxone (30µg)	3	23.07	10	76.92
Cefotaxime(30µg	3	23.07	10	76.92
Amoxicillin clavulanic acid(20/10µg)	4	30.76	9	69.23
Cefipime (30µg)	3	23.07	10	76.92
Piperacillin tazobactam (100/10µg)	11	84.61	2	15.38
Amikacin (30µg)	13	100	0	0
Meropenem(10µg)	13	100	0	0
Imepenam (10µg)	13	100)	0	0
Ceftazidime (30µg)	7	53.84	6	46.15
Cefaperazone sulbactum	9	69.23	4	30.76
Norfloxacin (10µg)	6	46.15	7	53.84
Nitrofurantoin	10	76.92	3	23.07
Nalidixic acid (30µg)	6	46.15	7	53.84

Table 5: ABST Pattern of the E.coli

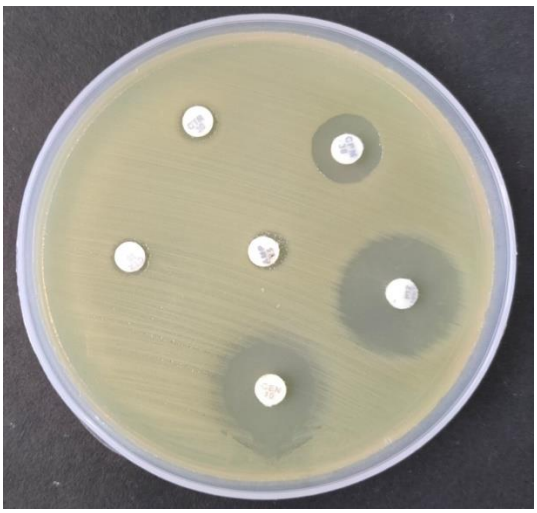
E.coli in MA



ABST OF E.coli -Plate 1



ABST of E.coli -plate 2



ABST of E.coli -plate 3

DISCUSSION:

A total number of 460 midstream urine samples collected from the antenatal women were transported and processed immediately after they were received in the bacterioloy lab. Out of 460 samples processed 27 isolates were obtained from culture. The prevalence rate in our study is 5.86%.

Lavanya et.al conducted a study in Vishakapattanam India in 1999, in which they have processed 500 urine samples and the culture positivity was 8.4% (5). Fidelis Agwu Onu et al in Nigeria, reported prevalence rate of ASB was 24.7% in a cross sectional study conducted during 2012(6). Prevalence rate of 4.68%was reported from a study conducted by Boss et al from Kerala (10). Radha et al reported a prevalence rate of 8.25% in their study in 2017 in Kerala (13). In the same year Patnaik et al in Orissa, have reported a prevalence rate of 25.3% in their study. (21)

Difference in prevalence rate of ASB in studies across the world and in different places in the same country may be due to difference in geographical locations, social behaviour, ethinicity, hygienic practices, level of education, study population and sample size of participants (18)(26).

Bacterial isolates:

Gram negative bacteria were the predominant bacteria isolated from the patients with ASB (88.88%) in the present study. Among 27 isolates only 3 isolates were Gram positive bacteria. This agrees with the study report by Edae et al from Eastern Ethiopia in 2019(23). This finding is supported by the fact that Gram negative bacteria have a unique structure which helps in attachment to the uroepithelium and prevents pathogens from being washed away by urine and the same characteristics allow for growth and tissue invasion which results in invasive infection and pyelonephritis in pregnancy (23).Usually the causative organisms of UTI are from the Enterobacteriaceae family. In a recent study conducted by Karikari et al in Northern Ghana in 2020, Gram positive organisms were the predominant bacteria isolated. (14)

In our study *E.coli* was the most common isolate (48.14%) obtained among the total no of 27 isolates. Radha et al from Kerala (57.14%)(13), Madhu et al from Vishakapattanam in 2019(12%) (17) have also reported *E.coli* was the most common isolate in their studies.

E.coli is a common microorganism in the perineum (15).During pregnancy the women may have difficulty to maintain personal hygiene due to functional and anatomical changes. This can increase the chance of *E.coli* infection during pregnancy.(8)

A A Abdullah et al in 2002 in Sharjah reported that the main *E.coli* serotype among the samples with asymptomatic bacteriuria was O112ac (25%of samples) while in symptomatic community acquired bacteriuria the main serotype was O86a (31.3% of samples) (19).

Patnaik et al from Orissa in 2017(45%) (21) reported *Klebsiella* species was the most common organism isolated in their studies.

Staphylococus aureus bacteriuria (SABU) is rare (0.8-4.3%) and can be associated with asymptomatic colonization (20). Fidelis et al from Nigeria (82.60%) have reported *Staphylococcus aureus* as the predominant isolate in ASB (14). *Staphylococcus* has high prevalence due to poor genital hygiene practices (25).

Age wise analysis:

In our study the urine samples were collected from antenatal women belong to the age group between 18 to 40yrs. The mean age is 26. Maximum number of isolates were obtained in the age group between 26 and 30(48.14%).Similar findings were obtained in the study conducted by Bose et al in 2014 from Kottayam (10) and Kasinathan et al from Pondicherry

(59.1%)(11). According to Patnaik M et al prevalence of ASB also increases with advanced maternal age (21).

Gravida vs ASB:
In our study maximum no of cases with ASB were obtained in the antenatal women with multigravida (51.85%). Similar findings was reported by Patnaik et al in Odisha, India.(21)
In 2017 Nida Abbas et al reported highest frequency of ASB (9.73%) among multigravida. The association between ASB and age/gravidity/ trimester of pregnancy were not found to be statically significant according to their study (18).
In contrast to this Chetana et al in 2018 from Nanded India reported higher prevalence of ASB in primigravida (29). Goyal et al from Amritsar, India in 2019 reported that occurance of ASB was equal both in primigravida (50%) and multigravidas (50%) in their study.(28)

Trimester of pregnancy vs ASB:
In our study the highest no of isolates were obtained in 3rd trimester (55.55%). Gayathree et al from India also reported higher prevalence of ASB in 3rd trimester (61.77%) (22).
In contrast to this Rohini NS et al from Karnataka in 2015 have reported higher percentage of isolates during second trimester (43.86%) (12) and Hemalatha et al, from Chennai reported higher prevalence in first trimester (7).

Antibiotic susceptibility pattern:
Among the 13 strains of E coli isolated in this study, only 15.38% of *E.coli* strains were sensitive to Ampicillin and 84.6% were resistant to Ampicillin. 23.07% were sensitive to Cephalothin and 76.92% were sensitive to Nitrofurantoin and Cotrimoxazole. All the isolates were sensitive to Imipenem and Meropenem (100%). Ampicillin was the least sensitive drug.11 out of 13 *E.coli* isolates were resistant to ampicillin (84.61%). These findings were similar to study conducted by Bose et al from Kerala in 2014.(10)The study conducted by Edae et al in Eastern Ethiopia also reported that 80% of *E.coli* strains were resistant to Ampicillin. (23)
Among the 9 Klebsiella isolates, 44.44% of Klebsiella strains were sensitive to Cephalothin, 33.33% were sensitive to Cefipime, 55.55% sensitive to Piperacillin tazobactam, 66.66% were sensitive to Nitrofurantoin.
In the present study antibacterial sensitivity of Nitrofurantoin against *E.coli* was documented to be 76.92%, for *Klebsiella* 66.66% and for *Enterobacter* 50%.
Only 3 Gram positive cocci were isolated in this study. All the Gram positive isolates were sensitive to Linezolid and Cotrimoxazole (100%). This is similar to the results of study conducted by Patnaik M et al (21).*Staphylococcus aureus* is sensitive to all antibiotics other than Erythromycin ,Clindamycin and Penicillin. All isolates were resistant to Erythromycin (100%).The overuse and misuse of antibiotics leads to the development of increased antibiotic resistance. Low costs and easy availability of drugs are the factors influencing misuse of antibiotics.
The drug resistance seen among uropathogens against the commonly used antibiotics are a major issue, which limits the drug of choice for the treatment of UTI.

ESBL producers:
In our study, 24 Gram negative isolates were tested for ESBL production by the phenotypic combined disc method. Among the 13 *E.coli* strains tested, 7 were ESBL producers (53.84%) and 6 were ESBL nonproducers (46.15%). Among K*lebsiella* isolates 4 were ESBL producers (44.44%) and 5 were ESBL non producers (55.55%). ESBL producers were more among *E.coli* than *Klebsiella.*
In 2009, Umadevi et al from Pondichery have reported the highest prevalence of ESBL producing GNB. In their study the prevalence rate of ESBL producing *E.coli* was 81% and *Klebsiella pneumonia* was 74% .(24)
The increasing prevalence of UTI by antibiotic resistant Enterobacteriacea makes empirical treatment of their infections difficult. The major mechanism of drug resistance among uropathogens is the production of ESBL. The higher prevalence of ESBL producers observed among *E.coli* and *Klebsiella species* in many of the study centres in India .ESBL producing strains of Enterobactericia have emerged as a challenge in the treatment of patients with UTI.

Antibiotic therapy:
Most of the patients with ASB were treated with safer drugs such as Nitrofurantoin, Cephalothin, Ampicillin and Cotrimoxazole. Nitrofurantoin is the commonly used drug, followed by first generation cephalosporins. Ampicillin was given to a few patients in whom the isolates were sensitive to the drug detected by invitro ABST.
Asymptomatic bacteriuria is common in pregnancy but regular screening is not being carried out in many of the healthcare setups. If ASB is not detected and treated earlier during pregnancy it may lead to foetal and maternal complications.

CONCLUSION:

- All the 470 urine samples after preliminary tests ,were subjected to culture. 27 samples yielded bacterial isolates. The prevalence rate in our study is 5.86%.
- Most of the isolates are Gram negative bacteria (88.88%).
- *E.coli* is the predominant isolate obtained in this study(48.14%).Other bacteria isolated are *Klebsiella species* (33.33%), *Enterobacter species* (7.4%), *Staphylococcocus aureus*(3.7%), *Staphylococcus*

saphrophyticus (3.7%) and *Enterococcus fecalis* (3.7%).

- Most of the isolates are obtained during 3rd trimester of pregnancy (55.55%).There is significant association between ASB and trimester of pregnancy.
- Most of the patients with ASB are multigravida (51.85%).There was no statistically significant association seen between ASB and gravida / age.
- ABST of the bacterial isolates were performed by Kirby Bauer disc diffusion method and interpreted according to CLSI guidelines. Among the *E.coli* (13 strains) tested, 76.92% were sensitive to Nitrofurantoin , 23.07% were sensitive to Cephalothin ,15.38% were sensitive to Ampicillin . All the isolates were sensitive to Meropenem and Imipenem.
- Among the 9 isolates of *Klebsiella species* tested 66.66% sensitive to Nitrofurantoin and 44.44% were sensitive to Cephalothin.
- All the Gram negative bacteria (24 no's) isolated were tested for ESBL production by the phenotypic Combined disk method. Among them, 11 were ESBL producers (45.83%) and 13 were ESBL nonproducers (54.16%).
- The patients with ASB were treated with Nitrofurantoin, Cephalothin and Ampicillin based on the ABST pattern.
- Only 2 out of the 27 patients (7.4%) with ASB had preterm delivery inspite of antibiotic therapy.
- The present study concludes that screening of urine samples is mandatory for early detection of ASB during pregnancy to initiate treatment with appropriate antibiotic therapy at the earliest to reduce maternal and foetal complications.

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