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Original Article

Asymptomatic bacteriuria in pregnancy

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ABSTRACT

Background: Asymptomatic Bacteriuria is a common problem in pregnancy and is associated with risk of preterm birth and pyelonephritis if untreated. The diagnosis is based on urine culture. The incidence of antibiotic resistance has been steadily increasing over the past few years resulting in limitation of therapeutic options. **Aims & Objectives:** This study was carried out to determine the prevalence of asymptomatic bacteriuria in pregnant women and also to isolate, identify and establish antimicrobial susceptibility pattern of the pathogens responsible for Asymptomatic Bacteriuria. **Methods & Materials:** The study includes 1000 pregnant women with asymptomatic bacteriuria. Isolates were identified by conventional methods and their antibiotic susceptibility pattern was established. **Results:** A total of 100 (10%) were positive for significant bacteriuria. *Escherichia coli* was the most predominant organism followed by *Klebsiella pneumoniae*. *Piperacillin-Tazobactam*, amikacin and nitrofurantoin were found to be the most effective antibiotics against the urinary isolates.

Conclusion: Asymptomatic bacteriuria is not uncommon among antenatal patients in the population studied. Routine urine cultural test should be carried out on all antenatal patients in order to identify any unsuspecting infection. This measure will go a long way in reducing maternal and obstetric complications associated with pregnancy.

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1. Introduction

Urinary tract infections (UTI) affects all age groups, but women particularly pregnant women are more susceptible than men, due to short urethra, pregnancy, easy contamination of urinary tract with fecal flora and various other reasons. [1]

UTI are a common problem in pregnancy due to the morphological and physiological changes that takes place in the genitourinary tract during pregnancy. It is of two types, symptomatic or asymptomatic. Asymptomatic bacteriuria (ASB) is defined as the "presence of actively multiplying bacteria within the urinary tract excluding the distal urethra", at a time when the patient has no urinary symptoms. [2]

Asymptomatic bacteriuria are found in 2 to 10% of pregnant women and are likely to develop acute pyelonephritis, postpartum UTI, hypertensive disease, anemia, prematurity, low birth weight babies and prenatal death if untreated. [2,3]

Asymptomatic bacteriuria is a microbial diagnosis based on the isolation of a specified quantitative count of bacteria in a properly collected specimen of urine from pregnant women without signs or symptoms of UTI. Thus urine culture is the gold standard screening technique for asymptomatic bacteriuria during pregnancy. [4, 5]

The most common infecting organism is *Escherichia coli*, which is responsible for 75-90% of bacteriuria during pregnancy. 40% of the asymptomatic bacteriuria cases develop into acute symptomatic UTI. Hence early detection and treatment is of considerable importance not only to forestall acute pyelonephritis and chronic renal failure in the mother, but also to reduce prematurity and fetal mortality in the offspring. [4]

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2. Materials and Methods

This study on asymptomatic bacteriuria in pregnancy was carried out in the Department of Microbiology, Sri Siddhartha Medical College, Tumkur. A total of 1000 pregnant women with asymptomatic bacteriuria attending various out-patient departments and admitted in wards at Sri Siddhartha Medical College Hospital, Tumkur, were taken for the study. The study and data collection were carried out with approval from the Institutional Ethical Committee. Informed consent was taken from all the patients.

Exclusion Criteria included

- 1) History of UTI symptoms (dysuria, frequency and urgency, etc).
- 2) Pregnancy induced Diabetes Mellitus/ Hypertension.
- 3) History of antibiotic therapy in the previous two weeks.
- 4) Pyrexia.
- 5) Known congenital anomalies of the urinary tract.

Urine samples were collected by standard mid-stream "clean catch" method from all the pregnant women, in a sterile, wide-mouthed container that can be covered with a tightly fitted lid. Microscopic examination of a wet film of uncentrifuged urine was carried out to detect the presence of pus cells, erythrocytes, microorganisms, casts etc. The samples were processed using standard microbiological procedures. The specimens were cultured on dried plates of MacConkey's agar, Sheep Blood agar with 5-10% CO₂ atmosphere and Cystine Lactose Electrolyte Deficient agar, by standard loop method and incubated at 37°C overnight. Culture results were interpreted as being significant and insignificant, according to the standard criteria. The organism was identified by routine methods from the samples showing significant bacteriuria. [6,7]

The standardized Kirby-Bauer disc diffusion test of the Clinical and Laboratory Standards Institute (formerly NCCLS) was used for Antibiotic susceptibility testing and accordingly interpretations were carried out. The antibiotics tested were: imipenem, piperacillin-tazobactam, amikacin, nitrofurantion, ceftazidime, cefotaxime, co-trimoxazole, amoxicillin-clavulanic acid, norfloxacin, ciprofloxacin, erythromycin, and ampicillin. [8] The results were analyzed using mean, median and Chi-square (χ^2) test. P (predictive) value of <0.05 were considered as a significant association between the variables tested.

3. Results

The study shows highest number of culture positive cases among pregnant women in the age group 26-35 years (60%). This was closely followed by 18-25 (20%) and 36-45 (20%) respectively. [Table 1] The young among the case studied was 18 yrs old and oldest was 45 yrs old. In our study culture positive cases with respect to trimester are as follows, first trimester (20%), second trimester (40%) and third trimester (40%) respectively. [Table 2].

Of the total 1000 samples processed, Significant growth was found in 100 (10%) samples, while 900 (90%) samples showed no growth. The commonest isolated organism being *Escherichia coli* 30 (30%), followed by *Klebsiella pneumoniae* 30 (30%), *Proteus mirabilis* 15 (15%), *Citrobacter koseri* 8 (8%), *Pseudomonas aeruginosa* 7 (7%), *Staphylococcus aureus* 4 (4%),

Staphylococcus saprophyticus 3(3%) and *Enterococcus faecalis* 3(3%). [Table 3]

In our study organisms showed following sensitivity pattern, imipenem (100%), piperacillin-tazobactam (100%), amikacin (85%), nitrofurantion (68%), ceftazidime (62%), cefotaxime (62%), co-trimoxazole (50%) amoxicillin-clavulanic acid (50%), norfloxacin (49%), ciprofloxacin (48%), erythromycin (41%), and ampicillin (11%).

Table 1. Age distribution of the culture –positive cases

Age Group in years	Total no. of Culture Positive Cases	Percentage
18-25	20	20
26-35	60	60
36-45	20	20
Total	100	100

Table 2. Distribution of Culture Positive Cases with respect to trimester.

Trimester	Total no. of Culture Positive Cases	Percentage
First	20	20
Second	40	40
Third	40	40
Total (%)	100	100

Table 3. Distribution of Culture Positive Cases According to Spectrum of Bacterial Isolates.

Trimester	Total no. of Culture Positive Cases	Percentage
<i>Escherichia coli</i>	30	30
<i>Klebsiella pneumoniae</i>	30	30
<i>Proteus mirabilis</i>	15	15
<i>Citrobacter koseri</i>	8	8
<i>Pseudomonas aeruginosa</i>	7	7
<i>Staphylococcus aureus</i>	4	4
<i>Staphylococcus saprophyticus</i>	3	3
<i>Enterococcus faecalis</i>	3	3
Total	100	100

4. Discussion

Asymptomatic bacteriuria is common during pregnancy. It gives a clear predisposition to the development of symptomatic UTI, which in turn pose risk to mother and fetus. In the present study, it is observed that pregnant women in the age group 26-35 years had highest percentage of infection (60%). This results correlates with Imade et al [9]. Advanced maternal age was reported as risk factor for asymptomatic bacteriuria in pregnancy and also could be due to the fact that many women within this age bracket are likely to have had many children before the present pregnancy and it has been reported that multiparity is a risk factor for acquiring asymptomatic bacteriuria in pregnancy. [10, 11]

Most cases of asymptomatic bacteriuria were found during 3rd trimester (40%) of pregnancy. This results correlates with other studies [12].

In our study significant growth was found in (10%) cases and (90%) samples were sterile. These results were consistent with reports of the recent studies. [1, 4, 9, 13, 14]. The presence of significant bacteriuria indicates the significance of microbiological culture to clinch the diagnosis of urinary tract infection.

Bacterial isolates have been changing from time to time from place to place. In our study organisms isolated, correlated with various others studies [1, 4, 9, 13, 14]. This pattern could be due to the fact that urinary stasis is common in pregnancy and since most *Escherichia coli* strains prefer that environment, they cause UTI. Another reason could be as a result of poor genital hygiene practices by pregnant women who may find it difficult to clean their anus properly after defecating or clean their genital after passing urine. [9]

The antimicrobial sensitivity and resistance pattern varies from community to community and from hospital to hospital. This is because of emergence of resistant strains as a result of indiscriminate use of antibiotics. In our study isolates showed 100% sensitivity to imipenem and piperacillin-tazobactam. Among the aminoglycosides, amikacin demonstrated (85%) sensitivity. Nitrofurantoin (68%) showed increased sensitivity when compared to ceftazidime (62%) and cefotaxime (62%). Ampicillin was found to be least sensitive (11%). Our Antibiogram pattern correlates with others studies. [1, 9, 13,] 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.

5. Conclusion

Special attention to the pregnant women is one of the most important points in health care system. Pregnancy enhances the progression from asymptomatic to symptomatic bacteriuria, which could lead to hypertension, preeclampsia, septicemia, maternal death pyelonephritis and adverse obstetric outcomes such as prematurity, low birth weight, and higher foetal mortality rates.

The adverse effects of undiagnosed asymptomatic bacteriuria on mother and child have made us to suggest routine urine culture screening for all pregnant women attending antenatal clinic in order to prevent mother and child from any form of complication that may arise due to infection.

Asymptomatic bacteriuria can be ascertained on the basis of microscopy and microbial culture. Thus urine culture is the gold standard screening technique for asymptomatic bacteriuria during pregnancy.

Gram negative organisms were the commonest organisms isolated; among which *Escherichia coli* was the principal urinary pathogen. The isolates were most sensitive to imipenem, followed by piperacillin-tazobactam, amikacin, nitrofurantoin, ceftazidime, cefotaxime and co-trimoxazole. In all the isolates

ampicillin was found to be least sensitive antibiotic. *Escherichia coli* and *Klebsiella pneumoniae* have the ability to produce ESBL in large quantities resulting in limitation of therapeutic option. Among ESBL producing isolates imipenem remains the drug of choice for empiric treatment of UTI. Amikacin and nitrofurantoin are found to be alternatives at low cost.

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