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Prevalence of Asymptomatic Bacteriurea and Importance of Antibiotic with Its Resistant Pattern in Pregnant Females Attending OPD in Tertiary Care Hospital

Abstract

Background: An observational study was done on asymptomatic bacteriurea (ASB) in pregnant females attending OPD'S in Era's Lucknow Medical College & Hospital, Lucknow (ELMC&H) from December 2013 to November 2014.

Objective: This study was to investigate the prevalence of asymptomatic bacteriurea (ASB) in pregnant females, to determine the uropathogens responsible for ASB and to know the importance of antibiotic and its resistant pattern for safe motherhood and newborn health.

Materials and Methods: Urine samples were collected from pregnant women at 16th week of gestation (Group A, n=150) and between 32 and 34 week (Group B, n=150). Cultures were performed using standard microbiological technique. ASB was determined as presence of $>10^5$ cfu/mL in culture of urine sample.

Results: The prevalence of ASB among pregnant females was 15.33% at 16th week of gestation and 8% in women between 32 to 34th week of gestation, thus the occurrence of ASB was 7.2%. The most common bacterial isolate was *Escherichia coli* (42.85%).

Conclusion: The study shows necessity of regular urine culture to detect asymptomatic bacteriurea in all the three trimesters to avoid the complications and treated, if positive.

Keywords: Asymptomatic bacteriurea, Pregnancy, Uropathogens, *Escherichia coli*.

Introduction

Asymptomatic bacteriurea is defined as isolation of a specified quantitative count of bacteria in an appropriately collected urine specimen from an individual without symptoms or signs of urinary tract infection (UTI). Urine is normally sterile but can be a good growth medium for bacteria that enter the bladder and are not eliminated.

Asymptomatic bacteriurea is common, with varying prevalence by age, sex and the presence of genitourinary abnormalities. *Escherichia coli* are the most common organism isolated from patients with asymptomatic bacteriuria in pregnant women. Infecting organisms are diverse and include family Enterobacteriaceae, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Enterococcus* species, group B streptococcus. Screening and treatment of asymptomatic bacteriurea in pregnant women are beneficial.¹ 2 to 7% of pregnant women have bacteriuria in the first trimester. Pregnant women with a prior history of urinary infection or of lower socioeconomic status are more likely to have bacteriurea. If untreated, 20 to 30% of bacteriuric women develop acute pyelonephritis later in pregnancy, usually at the end of the second trimester or pregnancy is associated with prematurity, intrauterine growth retardation and neonatal death.²

Some authors have suggested that urine should be cultured in each trimester of pregnancy to improve the detection of asymptomatic bacteriurea, as up to half of the cases may be missed with just a single culture. At least one urine culture should be performed at the end of the first trimester; two consecutive cultures are preferable because 1-2% of women with a negative initial urine culture develop ASB and experience acute pyelonephritis later in pregnancy.^{3,4} Treatment of ASB led to approximately a 75% reduction in the incidence of pyelonephritis and also reduces the rate of subsequent symptomatic UTI by 80-90%.^{5,6}

Materials and Methods

This observational study was conducted in the Department of Microbiology, Era's Lucknow Medical College and Hospital, Lucknow, among outdoor patients for a period of one year. Urine samples of patients attending the OPDs between 9 a.m. and 12 p.m. from Monday to Friday were randomly selected. Pregnant women at 16th week of gestation (Group A, n=150) and between 32 and 34 week (Group B, n=150) having no urinary complaints were enrolled for this study after obtaining informed written consent. Demographic data was obtained at enrollment using a standardized questionnaire. Mid-stream urine sample with cleansing of the perineum and urethra collected from 300 pregnant females attending OPD for routine checkup were sent for screening tests, culture and sensitivity. Screening tests, viz., Gram's staining of uncentrifuged urine and pus cell counts were done before culture. Culture of microorganisms in urine was done on CLED (cysteine lactose electrolyte deficient) medium, MacConkey agar and blood agar using standard loop (Semiquantative method). The plates were read after 24 h of aerobic incubation at 37 °C. They were incubated for another 24 h before a negative report was issued. A sample with single organism obtained in counts >10⁵ colony-forming units (cfu/mL) was taken as positive.⁷ The standardized Kirby-Bauer disc diffusion test of the Clinical and Laboratory Standards Institute (formerly NCCLS) was used for antibiotic susceptibility testing and interpretations were carried out accordingly.⁸ The antibiotics safe in pregnancy were tested namely ampicillin (10 mcg), amoxycylav (20/10 mcg), ceftriaxone (30 mcg), nitrofurantoin (300), cotrimoxazole (25 mcg), erythromycin (15 mcg), imipenem (10 mcg). The company which manufactured all these drugs was HiMedia (Mumbai, India). Both the groups diagnosed of having ASB were treated as per the antibiotic sensitivity for seven days. Clearance of bacteriurea was documented after the therapy was completed. The follow-up culture was done one week after completion

of therapy. All women in whom infection persisted were given a repeat course of antibiotics as per sensitivity report and clearance of infection was documented. Pregnant females were followed till delivery for obstetric outcome. Foetal outcomes like low birth weight (birth weight <2500 g), neonatal septicaemia (hypothermia or fever, poor cry, refusal to suck, hypotonia, absent neonatal reflexes, bradycardia/tachycardia, respiratory distress, and positive blood culture) were also noted.

Results

Twenty-three females in group A (15.33%) and 12 in group B (8%) were found to be culture-positive. Thus the occurrence of ASB was 7.2%. The most common bacterial isolate was *Escherichia coli*, 39.1% in group A females and 50% in group B followed by *Staphylococcus aureus*, Enterococcus, Proteus, Klebsiella, Coagulase negative staphylococcus, Pseudomonas. Isolates of pregnant females of both groups were tested for antibiotic-resistant pattern. Nitrofurantoin, amoxicillin-clavulanic acid and ceftriaxone were the most effective antimicrobials in the majority of isolates. Isolates showed high resistance to erythromycin, cotrimoxazole and ampicillin. One woman in early detected group and two in late-detected group required a repeat antibiotic therapy. Overall, one woman in early detected group developed symptomatic UTI.

Table 1. Bacterial isolates in Pregnant Women at 16th Week of Gestation

Isolates	Numbers	Percentage (%)
<i>E. coli</i>	9	39.13
<i>S. aureus</i>	4	17.39
Enterococcus	4	17.39
Proteus	2	8.69
Klebsiella	2	8.69
CONS	1	4.34
Pseudomonas	1	4.34
Total	23	15.33

E. coli-*Escherichia coli*, *S. aureus*-*Staphylococcus aureus*, CONS-coagulase negative staphylococcus

Table 2. Bacterial isolates in Pregnant Women between 32nd and 34th Week of Gestation

Isolates	Numbers	Percentage (%)
<i>E. coli</i>	6	50
<i>S. aureus</i>	2	16.66
Enterococcus	-	-
Proteus	1	8.33
CONS	1	8.33
Klebsiella	1	8.33
Pseudomonas	1	8.33
Total	12	8

Table 3. Resistant Pattern of Bacterial Isolates in Pregnant Women (n=35)

Isolates	Amp	Ery	Cot	Nitro	AMC	Cef	Imp
<i>E. coli</i> (15)	13	11	5	3	3	2	-
<i>S. aureus</i> (6)	3	4	2	-	1	-	ND
Enterococcus (4)	2	3	2	1	-	-	ND
Proteus (3)	2	2	1	1	-	-	-
Klebsiella (3)	1	2	1	1	1	1	-
CONS (2)	2	1	-	-	-	-	ND
Pseudomonas (2)	2	2	1	-	-	-	-

Amp-Ampicillin, Ery-Erythromycin, Cot-Co-trimoxazole, Nitro-Nitrofurantoin, AMC-Amoxycylav, CTR-Ceftriaxone, Imp-Imipenem, ND-Not done

Discussion

The prevalence of asymptomatic bacteriurea in pregnant women in this study was 15.33% at 16th week of gestation and 8% in women between 32nd to 34th week of gestation, thus the occurrence of ASB was 7.2%, which was similar to a study of Jayalaxmi et al. with a prevalence of 7.4%⁹ and of Gayathree et al. showing prevalence of 6.8%¹⁰. 7.3% was reported in Ghana.¹¹

The most prevalent organism observed in this study was *Escherichia coli* in both the trimesters (42.8%), which was also reported by Gayathree et al. (51.61%)⁹ and various other studies done by Imade et al.¹², and Chandel et al.¹³

The same predominant trend in *E. coli* infection pattern could be due to stasis produced by gravid uterus, and since most *E. 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 to clean their genitals after passing urine.^{12,14}

The prevalence of *S. aureus* was also high (24.4%) in this study and was the second most common isolate. Different studies done by Cheesebrough⁴, Imade et al.¹¹, and Chandel et al.¹² have also shown similar results. Other organisms isolated included Klebsiella species, Proteus species, Enterococcus species, CONS species and Pseudomonas aeruginosa. This study revealed that Ceftriaxone, Augmentin and Nitrofurantoin were very effective against most of the urinary isolates. Ampicillin, Cotrimoxazole and Erythromycin were highly resistant to the isolates. Most commonly prescribed antibiotics were ceftriaxone. In our study, only one woman in early detected group developed symptomatic UTI even though urine culture was sterile after second course of antibiotics. One of the isolates of Klebsiella species was multi-drug-resistant but was Imepenem-sensitive. Choice of antibiotics for the treatment should be guided by antimicrobial susceptibility whenever possible.³

Conclusion

This study revealed 7.2% prevalence of asymptomatic bacteriurea among pregnant women. This is worrisome because UTI in pregnancy may have serious consequences for both the mother and the child. We would like to recommend a routine screening for asymptomatic bacteriurea in all the three trimesters of pregnancy as an important measure, in order to avoid complications of asymptomatic bacteriurea.

The upsurge in antibiotic-resistant pattern seen in this study could be due to antibiotic abuse and self-medication being practiced in many developing countries. Also low cost and availability of these drugs could be another contributing factor for antibiotic resistance. All the sequelae of ASB during pregnancy could be reduced by antimicrobial treatment early in pregnancy. Hence, screening and treatment of ASB need to be incorporated as routine antenatal care for an integrated approach to safe motherhood and newborn health.

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Conflict of Interest: None

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