

ORIGINAL ARTICLE

Prevalence of Asymptomatic Bacteriuria in Pregnant Women in a Tertiary Care Hospital at Akola

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Abstract

Introduction: Females in reproductive age group are at an increased risk of Urinary tract infection (UTI). Physiological changes during pregnancy leads to increase in frequency of UTI in pregnant women. This study is carried out to rule out pregnant women with asymptomatic bacteriuria who are at high risk for foetal and maternal complications. **Materials and Methods:** A total 300 women attending the antenatal clinic at Govt. Medical College & hospital, Akola were evaluated for asymptomatic bacteriuria over a period of 6 months. Wet mount examination, gram staining of uncentrifuged urine, and then culture and sensitivity testing to detect significant bacteriuria was carried out. **Results:** Out of 300, 23 women (7.6%) showed significant bacteriuria. Maximum incidence was found to be in the age group of <25 years (56.51%). Prevalence was found to be higher in multi gravida (47.82%) and in second trimester of pregnancy (73.91%). Gram stain was found to be more sensitive (78.26%) and specific (94.90%) than wet mount examination. *Eschrechia coli* was found to be the predominant isolate (56.53%) followed by *Klebsiella pneumonia* (17.39%) & *Proteus mirabilis* (17.39%) **Conclusions:** As asymptomatic bacteriuria causes various serious maternal and foetal complications, every patient attending ANC OPD should be screened for asymptomatic bacteriuria. By screening and early detection of asymptomatic bacteriuria, we can minimize these complications.

Keywords: Asymptomatic bacteriuria, significant bacteriuria, Pregnant women, *Eschrechia coli*

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Introduction

Asymptomatic bacteriuria is a condition in which urine culture of the patient reveals a significant growth of pathogens that is greater than 10^5 bacteria/ml, but without showing symptoms of urinary tract infection (UTI).⁽¹⁾ Pregnant women are more prone for UTI because of the maternal physiologic and anatomical factors which predispose to ascending infection. Such factors include urinary retention caused by the weight of the enlarging uterus and urinary stasis due to progesterone-induced vesicourethral reflux.⁽²⁾ The apparent reduction in immunity of pregnant women appears to encourage the

growth of both commensal and non-commensal microorganisms.⁽³⁾ The physiological increase in plasma volume during pregnancy decrease urine concentration and up to 70% pregnant women develop glucosurea, which encourages bacterial growth in the urine.^(4,5) These changes, along with an already short urethra (approximately 3-4 cm in females) and difficulty with maintenance of hygiene due to a distended pregnant belly, increase the frequency of urinary tract infections (UTIs) in pregnant women.⁽²⁾ Infections result from ascending colonization of the urinary tract, primarily by existing vaginal, perineal, and faecal flora. Prevalence of UTI increases from 1-5% in non-pregnant females to 1-9.9% in

pregnancy. As per IDSA (Infectious Disease Society of America) global range of prevalence of asymptomatic bacteriuria ranges between 0-9.9%.⁽⁶⁾

Pregnant women with asymptomatic bacteriuria are at high risk for foetal and maternal complications. The foetus is at high risk for prematurity, low birth weight, IUGR and perinatal mortality. Maternal complications include overt UTI in (30-40%), acute cystitis (40%) and pyelonephritis (25-30%).⁽²⁾ In many hospitals in developing countries, routine urine culture test is not carried out for antenatal patients. It is so probably due to cost implication and time factor for culture result (usually 48 hours period). But true picture of such urine specimen cannot be fully assessed by any presumptive diagnostic test for UTI. None of the presumptive diagnostic test can either quantify the extent of infection in such a patient or provide antimicrobial therapy which is usually seen in the case of culture test. Keeping all these points in mind, the present study was carried out to determine the prevalence of asymptomatic bacteriuria in pregnant women attending the antenatal clinic at Govt. Medical College, Akola.

Materials and Methods

After obtaining approval from the ethical committee of the institute, the present study was carried out in the Department of Microbiology, Govt. Medical College, Akola. This is hospital based cross sectional study carried out over a period of 6 months from Jan 2016- Jun 2016. Informed consent and a detailed history of all the antenatal women was taken regarding age, any presenting symptoms they had, earlier pregnancies, and period of gestation. Pregnant women having no urinary complaints & no any other medical problem like severe anaemia, hypertension, gestational diabetes, etc were included in study. Symptomatic, catheterized and diabetic women were excluded from the study.² They were instructed to take clean catch midstream urine samples in a sterile wide mouthed container. Second urine sample was asked to those who showed significant bacteriuria on first culture report.

Wet mount examination of uncentrifuged urine was done. Pus cells > 10/hpf was considered as significant.⁽⁷⁾

A loopful of well mixed urine was placed on a grease free slide and it was air dried. Then, the smear was stained by Gram's stain and was observed under oil immersion. The presence of ≥ 1 bacteria/Oil immersion field in 20 fields correlated with the diagnosis of significant bacteriuria of $\geq 10^5$ CFU/ml of urine.⁽⁸⁾

Urine was then cultured on Cystein Lactose Electrolyte Deficient (CLED) agar by semi-quantitative method using a calibrated loop of 4 mm diameter.⁹ Inoculated plates then kept for incubation at 37°C for 24 hours. As per Kass concept of significant bacteriuria, if colony counts equals to bacterial counts equal or more than 10^5 per ml, it was taken as positive for significant bacteriuria.⁽⁹⁾ Second urine sample was asked to those who showed significant bacteriuria on first culture report & processed similarly. Cultures were either reported as significant bacteriuria, insignificant bacteriuria, sterile or polymicrobial flora grown. The isolates from significant bacteriuria were identified by colony morphology, biochemical reactions and gram stain. The Antibiotic Susceptibility Testing (AST) was performed as per CLSI guidelines 2016. The data was then analyzed statistically.

Results

Out of the 300 antenatal women screened, only 23 (7.6%) showed significant bacteriuria and the rest 277 were found to be either insignificant bacteriuria (107), sterile (27) or with polymicrobial flora (43). Maximum incidence of ABU was found to be in the age group of <25 years (56.52%). Culture positivity was found to be higher in second trimester of pregnancy 17 (73.91%) while in 1st trimester it was 2 (8.69%) and in 3rd trimester 4 (17.39%). Culture positivity was found to be more in multigravida women 11 (47.82%), it was 6 (26.09%) each in primi and in second. Sensitivity and specificity of wet mount was 76.67% and 88.50%. However sensitivity and specificity of gram stain was found to be 82.14% and 95.19% respectively which was

higher than total of wet mount. Positive predictive value (PPV) and Negative predictive value (NPV) of wet mount examination was found to be 38.98 and 97.54 respectively. Whereas PPV and NPV of gram staining was 62.16 and 98.23 respectively which was higher than that of wet mount examination. Maximum isolates were found to be *E coli* 13 (56.52%) followed by *Klebsiella pneumonia* & *Proteus mirabilis* 4 (17.39% each). Isolates of Coagulase

negative *Staphylococcus* were found to be only 2 (8.69%).

Sensitivity was seen maximum to Nitrofurantoin (100%), Gentamicin (85.71), Cefotaxim (85.71%), Ciprofloxacin (82.60%), Imipenam (80.95%), Linezolid (100%). Organisms were seem to be less sensitive to Piperacillin-Tazobactum (76.19%), Ampicillin (78.26%). Most are resistant to Amoxyclav(61.90%), Cotrimaxozole (60.86%), Tetracyclin (56.52%), Teicoplanin (50%), Cefoxitin (0%) table-1.

Table 1- Organism wise Sensitivity of antibiotics in percentage

Antibiotic	<i>E. coli</i>	<i>K. pneumonia</i>	<i>P. mirabilis</i>	Coagulase negative <i>Staphylococcus</i>	Total
Nitrofurantoin	100%	100%	100%	100%	100%
Gentamicin	92.30%	75%	75%	NA	85.71%
Cefotaxim	92.30%	75%	75%	NA	85.71%
Imipenam	92.30%	50%	75%	NA	80.95%
Piperacillin-Tazobactum	84.61%	75%	50%	NA	76.19%
Amoxyclav	76.92%	25%	50%	NA	61.90%
Ciprofloxacin	84.61%	75%	75%	100%	82.60%
Ampicillin	84.61%	75%	50%	100%	78.26%
Cotrimaxozole	76.92%	50%	50%	0%	60.86%
Tetracyclin	61.53%	50%	50%	50%	56.52%
Linezolid	NA	NA	NA	100%	100%
Teicoplanin	NA	NA	NA	50%	50%
Cefoxitin	NA	NA	NA	0%	0%

Discussion

UTIs during pregnancy known to cause various serious maternal and foetal morbidity. With appropriate screening and treatment, this morbidity can be limited.⁽¹⁰⁾ Hence in the present study all the women attending the antenatal clinics of our tertiary care hospital were screened for asymptomatic bacteriuria. 300 antenatal cases were evaluated of which 23 (7.67%) cases showed significant bacteriuria. Our findings fall within the global prevalence of 0-9.9% as per Infectious Disease Society of America (IDSA).⁽⁶⁾ Similar results were found in studies of Siddhiqui et al (8.7%)⁽²⁾, Jayalaxmi et al (7.4%)⁽¹¹⁾, Lavanya et al (8.4%)⁽¹²⁾. While higher prevalence was seen in study by Sentinath et al (13%)⁽¹³⁾. Much higher result was seen in study in Nigeria where prevalence of asymptomatic bacteriuria in ANC patient was found to be 43.7%.⁽¹⁾

When the age group of these women was analyzed, it was found that age group of <25 years of women had the maximum prevalence of asymptomatic bacteriuria (56.52%). This may be due to highest number of women attending ANC OPD belong to this age group. Similar findings were observed by Lavanya et al⁽¹²⁾. Girishbabu et al have reported a higher prevalence in the 26-30 age group (60%).⁽¹⁴⁾

As per our study, multigravida females and those in the second trimester have reported a higher prevalence of 47.82% and 73.91% respectively. Similar findings found in Siddhiqui et al⁽²⁾ study. But studies by Pegu et al⁽¹⁵⁾ and Girishbabu et al⁽¹⁴⁾ stated that highest prevalence was seen in 3rd trimester of pregnancy and in multigravida women. Sentinath et al study⁽¹³⁾ Stated that there is no significant association of trimester and gravid status of pregnancy with asymptomatic bacteriuria. Such results ere may be due to starting of various anatomical major changes were seen on uterus and there is also pressure

on urinary bladder which leads to stagnancy of urine and lead to UTI.

Considering culture as gold standard, This study signifies that sensitivity and specificity of Gram staining is higher than that of wet mount. Sensitivity and specificity of gram staining is 78.28% & 94.90% whereas sensitivity & specificity of wet mount 69.56% & 87.32%. These findings also correspond with studies by Mundada et al⁽¹⁶⁾, Siddhiqui et al⁽²⁾, Gayathree et al.⁽¹⁷⁾

In our study, predominant isolate was noted as *E coli* (56.67%). This may be due to infections resulting from ascending colonization of the urinary tract, primarily by existing vaginal, perineal, and faecal flora which mainly comprises of *E coli*. Uropathogenic *E. coli* have virulence factors like fimbrias or *pilli* which are adherence proteins (adhesins) expressed on the bacterial wall surface that promote binding to the epithelium of the vagina and urethra, thus increasing *E.coli* ability to cause UTIs.⁽¹⁸⁾

Similar findings were seen in studies of Sentinath et al,⁽¹³⁾ Mundada et al,⁽¹⁶⁾ Girishbabu et al,⁽¹⁴⁾ Siddhiqui et al.⁽²⁾ While Rajaratnam et al⁽¹⁹⁾ study found *K. pneumonia* (50%) as the commonest organism among asymptomatic bacteriuria In our study, *E. coli* is followed by *K. pneumoniae* (17.39%) which is similar with Enayat et al study⁽²⁰⁾ (13.73%) but much more higher than Pegu et al⁽¹⁵⁾(10.23%), Mundada et al⁽¹⁶⁾(10.96%) & Siddhiqui et al⁽²⁾(5.5%). In this study, we found CONS causing UTI in only 8.69% patient. But studies of Siddhiqui et al⁽²⁾ (33.33%), Enayat et al⁽²⁰⁾, Sentinath et al⁽¹³⁾ reported CONS causing UTI in higher percentage.

Sensitivity was seen maximum to Nitrofurantoin (100%), Gentamicin (85.71), Cefotaxim(85.71%), Ciprofloxacin (82.60%), Imipenam (80.95%), Linezolid (100%). Organisms were seem to be less sensitive to Piperacillin-Tazobactum (76.19%), Ampicillin (78.26%). Most are resistant to Amoxyclav (61.90%), Cotrimaxazole (60.86%), Tetracyclin (56.52%), Teicoplanin (50%), Cefoxitin (0%).

Out of these Gentamicin, Ciprofloxacin, Linezolid, Cotrimaxazole, Tetracyclin are not prescribed during pregnancy due to their

teratogenic effects. Drugs like Imipenam, Piperacillin-Tazobactum, Teicoplanin should be prescribed to ANC women only if benefits outweighs the risks. So Nitrofurantoin, Cephalosporins and Beta-Lactamases are drug of choice for treating asymptomatic bacteriuria in ANC patients. Pegu et al⁽¹⁵⁾ & Siddhiqui et al⁽²⁾ have also observed maximum sensitivity to nitrofurantoin.

Conclusion

As asymptomatic bacteriuria causes various serious maternal and foetal complications, every patient attending ANC OPD should be screened for asymptomatic bacteriuria. By early detection, we can minimize these complications. Early diagnosis and proper antibiotic therapy will help to reduce prevalence and complications of asymptomatic bacteriuria.

Conflict of Interest: None declared

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