

Bacterial isolates in urinary tract infection among pregnant women

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Abstract

Background: To assess bacterial isolates in urinary tract infection among pregnant women. **Methodology:** One hundred ten antenatal women between 12-16 weeks of gestation were selected. A clean catch mid-stream urine specimen was collected. Colony count of 100 or more equals to ≥ 105 CFU/ml & considered as significant bacteriuria. **Results:** Age group 18- 22 years comprised of 55 patients, 22- 26 years had 35, 26- 30 years had 20 and 30- 34 years had 5 patients. The difference was significant ($P < 0.05$). Asymptomatic bacteriuria (ABU) was seen in 30 and asymptomatic bacteriuria (ABU) in 42 patients. The prevalence found to be 65.4%. The difference was significant ($P < 0.05$). In ABU and in patients with symptomatic bacteriuria, bacteria isolates were streptococcus Spp. in 20% and 25%, Pseudomonas Spp. in 14% and 5%, Acinetobacter Spp. in 6% and 2%, Staph. Aureus in 28% and 33% and E. coli in 32% and 35% respectively. The difference was significant ($P < 0.05$). **Conclusion:** Common isolates seen in pregnant women were E. coli, staph. aureus, Streptococcus spp., pseudomonas spp., candida spp. and acinobacter spp.

Keywords: E. coli, Urinary tract infection, staph. aureus.

INTRODUCTION

The urinary tract infections (UTI) are the commonly associated with pregnancy.^[1] Asymptomatic UTI develops in 2-12% of pregnancy and it's a major predisposition to the development of pyelonephritis associated with complications like preterm labour and low birth weight baby.^[2] In asymptomatic bacteriuria (ASB) there is presence of minimum 105 colony forming units (CFU) per ml of urine, of a single uro-pathogen in a midstream urine without symptoms and signs such as dysuria, frequency of micturition, fever, loin pains, renal angle tenderness, suprapubic pain and tenderness.^[3]

Asymptomatic bacteriuria (ABU) is a condition characterized by presence of bacteria in two consecutive clear-voided urine specimens both yielding positive cultures (≥ 105 CFU/ml) of the same uropathogen, in a patient without classical symptoms.^[4] E. coli is the major etiologic agent in causing UTI, which accounts for up to 90% of cases. The risk factors for UTI in pregnant women are varied.^[5] A variety of factors is associated with UTI, which include age, parity, gravidity, pregnancy, and association of illnesses enhancing the situation of the infection. Illiteracy, history of sexual activity, low socioeconomic monthly income, multiparity, and past history of UTI are also reported as significant risk factors for UTI during pregnancy. Pregnancy is an exception and it is recommended that women take 7 days of antibiotics.^[6]

If not treated it causes up to 30% of mothers to develop pyelonephritis and increases risk of low birth weight and preterm birth. Some also support treatment of those with diabetes mellitus and treatment before urinary tract procedures which will likely cause bleeding.^[7] This study was performed to assess bacterial isolates in urinary tract infection among pregnant women.

METHODS

In this prospective, observational study one hundred ten antenatal women between 12-16 weeks of gestation were selected. All were informed regarding the study and written consent was obtained. Ethical clearance certificate was obtained from institutional ethical committee.

Baseline characteristics such as name, age etc. was recorded. A clean catch mid-stream urine specimen was collected. Each of the specimens was subjected to culture by the semi-quantitative standard loop technique on Blood agar & MacConkey agar using 4 mm internal diameter loop. Culture plates were incubated aerobically at 37°C for 24 hours. Culture plates without visible growth were further incubated for additional 24 hours before being discarded. Colony count of 100 or more equals to ≥ 105 CFU/ml & considered as significant bacteriuria. The results were compiled and subjected for statistical analysis using chi-square test. P value less than 0.05 was set significant.

RESULTS

Table 1: Distribution based on age group.

Age group (years)	Number	P value
18-22	55	

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22-26	35	0.04
26-30	20	
30-34	5	

Age group 18- 22 years comprised of 55 patients, 22- 26 years had 35, 26- 30 years had 20 and 30- 34 years had 5 patients. The difference was significant ($P < 0.05$) [Table 1].

Table 2: Distribution based on age group.

Type	Number	P value
Asymptomatic bacteriuria (ABU)	30	0.03
Symptomatic bacteriuria	42	

Asymptomatic bacteriuria (ABU) was seen in 30 and asymptomatic bacteriuria (ABU) in 42 patients. The prevalence found to be 65.4%. The difference was significant ($P < 0.05$) [Table 2].

Table 3: Pathogenic organisms isolated from patients.

Bacteria isolates	ABU	Symptomatic bacteriuria	P value
Streptococcus Spp.	20%	25%	0.04
Pseudomonas Spp.	14%	5%	
Acinetobactor Spp.	6%	2%	
Staph. aureus	28%	33%	
E. coli	32%	35%	

In ABU and in patients with symptomatic bacteriuria, bacteria isolates were streptococcus Spp. in 20% and 25%, Pseudomonas Spp. in 14% and 5%, Acinetobactor Spp. in 6% and 2%, Staph. Aureus in 28% and 33% and E. coli in 32% and 35% respectively. The difference was significant ($P < 0.05$) [Table 3].

DISCUSSION

Urinary tract infection (UTI) is an infection caused by the presence and growth of microorganisms anywhere in the urinary tract.^[8] It is usually due to bacteria from the digestive tract which climb the opening of the urethra and begin to multiply to cause infection.^[9] As compared to men, women are more susceptible to UTI, and this is mainly due to short urethra, absence of prostatic secretion, pregnancy and easy contamination of the urinary tract with faecal flora. Urinary tract infection in pregnancy is associated with significant morbidity for both mother and baby.^[10] The combination of mechanical, hormonal and physiologic changes during pregnancy contributes to significant changes in the urinary tract, which has a profound impact on the acquisition and natural history of bacteriuria during pregnancy. Those who have bacteria in the urine but no symptoms should not generally be treated with antibiotics.^[11] This includes those who are old, those with spinal cord injuries, and those who have urinary catheters. *P. mirabilis*, *Klebsiella* species, *P.*

aeruginosa and *Enterobacter* species are less frequent offenders. Less commonly, Enterococci, *G. vaginalis* and *U. urealyticum* are also known agents in UTIs. Gram-positive organisms are even less common in which Group B Streptococcus, *S. aureus*, *S. saprophyticus* and *S. haemolyticus* are recognized organisms.^[12] This study was performed to assess bacterial isolates in urinary tract infection among pregnant women.

Our results showed that age group 18- 22 years comprised of 55 patients, 22- 26 years had 35, 26- 30 years had 20 and 30- 34 years had 5 patients. Demilie et al.^[13] evaluated the bacterial profile and antibiotic resistance pattern of the urinary pathogens isolated from pregnant women. Out of 367 pregnant women, 37 were symptomatic and the rest 330 asymptomatic. Bacteriological screening of urine samples revealed growth of bacteria in 8.5% (7/37) and 18.9% (28/330) for symptomatic and asymptomatic pregnant women respectively with overall prevalence of 9.5%. The most common isolates detected were *E. coli* (45.7%) followed by coagulase negative Staphylococcus (17.1%) and *S. aureus* (8.6%). Gram-negative bacteria showed resistance rates in the range of 56.5% –82.6 % against trimethoprim/sulfamethoxazole, tetracycline, amoxicillin & ampicillin. Gram positive isolates showed resistant rate ranging from 50–100% against tetracycline, trimethoprim-sulphamethoxazole, amoxicillin and penicillin-G. Both Gram positive and gram- negative bacteria showed high sensitivity against Nitrofurantoin with a rate of 82.3% and 87%, respectively. All isolated Gram positive bacterial uropathogens were sensitive for Amoxicillin-clauvianic acid.

We found that Asymptomatic bacteriuria (ABU) was seen in 30 and asymptomatic bacteriuria (ABU) in 42 patients. The prevalence found to be 65.4%. Taher et al.^[14] included 587 pregnant women with no symptoms and signs of urinary tract infection were recruited. Out of the 587 pregnant women, 22 (3.75%) tested positive for asymptomatic bacteriuria. Women aged 20–24 years were less likely to have ASBP when compared to women aged less than 20 years. The most common isolates in descending order were *E. coli* ($n = 13$, 46.4%) and *S. aureus* ($n = 9$, 32.1%). Among the gram-negative isolates, the highest sensitivity was to gentamycin (82.4%) and imipenem (82.4%). The gram- positive isolates were sensitive to gentamycin (90.9%) followed by imipenem (81.8%). All the isolates were resistant to sulphamethoxazole with trimethoprim (100%). Multidrug resistance was 82.4% among gram negative isolates and 72.4% among the gram-positive isolates.

We observed that in ABU and in patients with symptomatic bacteriuria, bacteria isolates were streptococcus Spp. in 20% and 25%, Pseudomonas Spp. in 14% and 5%, Acinetobactor Spp. in 6% and 2%, Staph. Aureus in 28% and 33% and *E. coli* in 32% and 35% respectively. Moyo et al.^[15] identified the etiologic agents of UTI and determined the patterns of antimicrobial drug susceptibility among pregnant women. Significant bacteriuria (> 105 colony forming units/mL of urine) was found in 42/200 (21%) specimens. Of the 42 isolates, the most commonly isolated bacteria were *Escherichia coli* 14 (33.3%), *Klebsiella* spp. 9 (21.4%) coagulase negative Staphylococcus 7 (16.7%),

Staphylococcus aureus 6 (14.3%), *Proteus* species 3 (7.1%) and *Enterococcus* species 3 (7.1%). Low rate to moderately high rate of antimicrobial drug resistance was observed against first line drugs namely, nitrofurantoin 18.7 % (n=16), co-trimoxazole 38.5 % (n=13) and ampicillin 57.7% (n=26). Relatively low rate of resistance was seen against second line drugs: ciprofloxacin 13.6 % (n=22) and amikacin 5 % (n=20). High rate of resistance was observed in third generation cephalosporin cefotaxime 31.2 % (n=16). Of the Gram-positive organisms tested against vancomycin and methicillin, resistance was found in 25 % (n=13) and 25 % (n=4), respectively. In conclusion, *E. coli* was found to be the common cause of UTI among the pregnant women. Low to moderately high level of resistance was found in first line drugs while high level of resistance was found in third generation cephalosporin. It is recommended to monitor the levels of resistance for nitrofurantoin, fluoroquinolone and cefotaxime and to screen for Extended Spectrum Beta Lactamase production among cefotaxime resistant *E. coli* and *Klebsiella* spp.

CONCLUSION

Common isolates seen in pregnant women were *E. coli*, *staph. aureus*, *Streptococcus* spp., *pseudomonas* spp., *candida* spp. and *acinobacter* spp.

REFERENCES

1. A. Assefa, D. Asrat, W. Yimtubezinash, G. Yirgu, A. Ahmed, and M. Tadelle. Bacterial profile and drug susceptibility pattern of UTI in pregnant women at Tikur Anbessa Specialized Hospital. *Ethiopian Medical Journal* 2008; vol. 46, no. 3, pp. 227–235.
2. A.A. Abdullah and M.I. Al-Moslih. Prevalence of asymptomatic bacteriuria in pregnant women in Sharjah, United Arab Emirates. *Eastern Mediterranean Health Journal*. 2005; 2-12.
3. D. Wolday and W. Erge. Increased incidence of resistance to antimicrobials by urinary Pathogens isolated at Tikur Anbessa Hospital. *Ethiopian Medical Journal* 1997; vol. 35, no. 2, pp. 127–135.
4. P. S. Shazia, S. V. Reddy, M. V. Rama Rao, and R. R. Janardhan. Uropathogens and their drug susceptibility patterns among pregnant women in a teaching hospital. *Annals of Biological Research* 2011; vol. 2, no. 5, pp. 516–521.
5. M. Anayet Ullah, A. Barman, M.A. Siddique and A.K.M.E. Haque. Prevalence of asymptomatic bacteriuria and its consequences in pregnancy in a rural community of Bangladesh. *Bangladesh Med Res Counc Bull* 2007; 33:60-64.
6. Endale Tadesse, Million Teshome, Yared Merid, Belayhun Kibret and Techalew Shimelis. Asymptomatic urinary tract infection among pregnant women attending the antenatal clinic of Hawassa Referral Hospital, Southern Ethiopia. *BMC Research Notes* 2011; 7:155.
7. Farkash E, Weintraub AY, Sergienko R, Wiznitzer A, Zlotnik A, Sheiner E. Acute antepartum pyelonephritis in pregnancy: a critical analysis of risk factors and outcomes. *European journal of obstetrics, gynecology, and reproductive biology*. 2012; May;162(1):24–7.
8. Oli AN, Okafor CI, Ibezim EC, Akujiobi CN, Onwunzo MC. The prevalence and bacteriology of asymptomatic bacteriuria among antenatal patients in Nnamdi Azikiwe University Teaching Hospital Nnewi; South Eastern Nigeria. *Nigerian journal of clinical practice*. 2010;13(4):409–12.
9. Tadesse A, Negash M, Ketema LS. Asymptomatic bacteriuria in pregnancy: assessment of prevalence, microbial agents and the antimicrobial sensitivity pattern in Gondar Teaching Hospital, North West Ethiopia. *Ethiopian Medical Journal*. 2007; 45(2):143-149.
10. Bjorn Blomberg, Bjorg Evjen Olsen. Antimicrobial resistance in urinary bacterial isolates from pregnant women in rural Tanzania: Implications for public health. *Scandinavian Journal of Infectious Diseases* 2005; 4: 1-12.
11. M. A. Sheikh, M. S. Khan, A. Khatoon, and G. M. Arain. Incidence of urinary tract infection during pregnancy. *Eastern Mediterranean Health Journal* 2000; vol. 6, no. 2-3, pp. 265–271.
12. M. A. Ullah, A. Barman, M. A. Siddique, and A. K. Haque. Prevalence of asymptomatic bacteriuria and its consequences in pregnancy in the rural community of Bangladesh. *Bangladesh Medical Research Council Bull* 2007; vol. 33, no. 2, pp. 60–64.
13. Demilie T, Beyene G, Melaku S, Tsegaye W. Urinary bacterial profile and antibiotic susceptibility pattern among pregnant women in North West Ethiopia. *Ethiopian journal of health sciences*. 2012;22(2).
14. Taher Aseel M, Mohamed Al-Meer F, Ghaith Al-Kuwari M, Ismail MF. Prevalence and Predictors of Asymptomatic Bacteriuria among Pregnant Women Attending Primary Health Care in Qatar. *Middle East J Fam Med*. 2009;7:10–13.
15. Moyo SJ, Aboud S, Kasubi M, Maselle SY. Bacterial isolates and drug susceptibility patterns of urinary tract infection among pregnant women at Muhimbili National Hospital in Tanzania. *Tanzania Journal of Health Research*. 2010 Sep 15;12(4):233-6.