

A Study On Urinary Tract Infections Among Pregnant Women Attending Antenatal Clinic Of A Tertiary Care Center Of Bihar

Arunima¹, Chandan Kumar^{2*}, Poonam Kumari³, Ranjit Kumar⁴

¹Tutor, Department of Microbiology, SKMCH, Muzaffarpur, Bihar, India

²Tutor, Department of Microbiology, SKMCH, Muzaffarpur, Bihar, India

³Assistant Professor, Department of Microbiology, SKMCH, Muzaffarpur, Bihar, India

⁴Associate Professor, Department of Microbiology, SKMCH, Muzaffarpur, Bihar, India

Received: 25-11-2021 / Revised: 11-12-2021 / Accepted: 02-01-2022

Abstract

Introduction: UTI has been reported among 20% of the pregnant women and it is the most common cause of admission in obstetrical wards. Urinary tract infection in pregnancy is associated with significant morbidity for both mother and baby. 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. **Methodology:** This study was carried out in the Dept. of Microbiology, Shri Krishna Medical College & Hospital, Muzaffarpur, Bihar. Prior ethical approval was obtained from the Institutional Ethics Committee. The urinary pathogens and their antibiotic susceptibility patterns from December 2020 to November 2021 were recorded for this study. Clean catch midstream urine sample was collected in sterile container from pregnant women from the antenatal clinic. Bacterial identification was done by colony morphology, Gram staining and standard biochemical tests. Antibiotic susceptibility testing was done by Kirby Bauer disk diffusion method as per CLSI guidelines. Descriptive statistics was used to analyze the data and results expressed as percentages. **Results:** A total of 240 urine samples were received from pregnant women and processed in Microbiology laboratory during the study period. Among 240 samples, 95 (39.6%) samples yielded significant bacterial growth. E.coli was isolated as predominant pathogen followed by Staphylococcus aureus. Only 29 (10.1%) isolates of E.coli were sensitive to ampicillin and 14 (73.7 %) were sensitive to nitrofurantoin. **Conclusion:** All pregnant women should be screened for UTI with a urine culture and treated with antibiotics if the culture is positive. The early diagnosis and treatment of UTI during pregnancy can prevent complications to the mother and the fetus.

Keywords: Urinary Tract Infections, Pregnant Women

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Introduction

Urinary tract includes organs that collect, store and release urine from the body which include: kidneys, ureters, bladder, urethra and accessory structures. Urine formed in the kidney is a sterile fluid that serves as a good culture medium for proliferation of bacteria[1]. Urinary tract infections (UTI), which are caused by the presence and growth of microorganisms in the urinary tract, are perhaps the single commonest bacterial infections of mankind[2] and in pregnancy, it may involve the lower urinary tract or the bladder[3].

UTI has been reported among 20% of the pregnant women and it is the most common cause of admission in obstetrical wards[4]. Urinary tract infection in pregnancy is associated with significant morbidity for both mother and baby. 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[5]. At around 6th week of pregnancy, due to the physiological changes of pregnancy the ureters begin to dilate. This is also known as "hydronephrosis of pregnancy", which peaks at 22-26 weeks and continues to persist until delivery. Both progesterone and estrogens levels increase during pregnancy and these will lead to decreased ureteral and bladder tone. Increased plasma volume during pregnancy leads to decrease urine concentration and increased bladder volume.

The combination of all these factors lead to urinary stasis and ureterovesical reflux[6]. Additionally, the apparent reduction in immunity of pregnant women appears to encourage the growth of both commensal and non-commensal microorganisms[7]. The physiological increase in plasma volume during pregnancy decreases urine concentration and up to 70% pregnant women develop glucosuria, which encourages bacterial growth in the urine[8]. Among the pregnant women approximately 4% to 10% will have asymptomatic bacteriuria (ASB), and 1% to 4% will develop acute cystitis and 1% to 2% may develop severe acute pyelonephritis during the second half of pregnancy[9]. The organisms causing UTIs during pregnancy are the same as those found in non-pregnant patients. E. coli accounts for 80% - 90% infections[10], about 85% of community acquired UTIs, 50% of nosocomial UTIs and more than 80% of uncomplicated pyelonephritis[11]. These E. coli may be endogenous flora of the colon, first colonize the periurethral area and vaginal introitus, then ascend to the bladder and from the bladder to the renal pelvis by receptor mediated ascending process. The process involves both host and bacterial factors, namely tissue receptors and expression of bacterial attachment factors[12]. Increase in concentration of amino acids and lactose during pregnancy also encourages the growth of E. coli[13]. To ensure appropriate therapy, current knowledge of the organisms that cause UTIs and their antibiotic susceptibility pattern is essential. This study aimed to assess bacterial profile of urinary tract infection and their antimicrobial susceptibility pattern among pregnant women attending antenatal clinic at Shri Krishna Medical College & Hospital, Muzaffarpur, Bihar.

Methodology

This study was carried out in the Dept. of Microbiology, Shri Krishna Medical College & Hospital, Muzaffarpur, Bihar. Prior ethical

*Correspondence

Dr. Chandan Kumar

Tutor, Department of Microbiology, SKMCH, Muzaffarpur, Bihar, India

E-mail: drchandan1710@gmail.com

approval was obtained from the Institutional Ethics Committee. The urinary pathogens and their antibiotic susceptibility patterns from December 2020 to November 2021 were recorded for this study. Clean catch midstream urine sample was collected in sterile container from pregnant women from the antenatal clinic. Microscopy was done and each sample was processed on blood agar and mac conkey agar. Culture positive result was given if the number of bacterial colony grown on culture media exceeded 105 colony forming units (CFU) per ml of urine in case of clean catch midstream urine but based on type of urine sample (straight catheterisation) submitted and clinical history (acute urethral syndrome, antibiotic therapy) of the patient, lower colony counts (103 CFU/ml) were also considered significant in some cases. Bacterial identification was done by colony morphology, Gram staining and standard biochemical tests[14]. Antibiotic susceptibility testing was done by Kirby Bauer disk diffusion method

as per CLSI guidelines[15]. Descriptive statistics was used to analyze the data and results expressed as percentages.

Results

A total of 240 urine samples were received from pregnant women and processed in Microbiology laboratory during the study period. Among 240 samples, 95 (39.6%) samples yielded significant bacterial growth. E.coli was isolated as predominant pathogen followed by Staphylococcus aureus. (Figure 1) Gram negative bacteria (58, 61.2%) were predominantly isolated compared to Gram positive bacteria (37, 38.8%). Only 29 (10.1%) isolates of E.coli were sensitive to ampicillin and 14 (73.7 %) were sensitive to nitrofurantoin. The antibiotic sensitivity patterns of the bacteria are shown in Table 1 & 2.

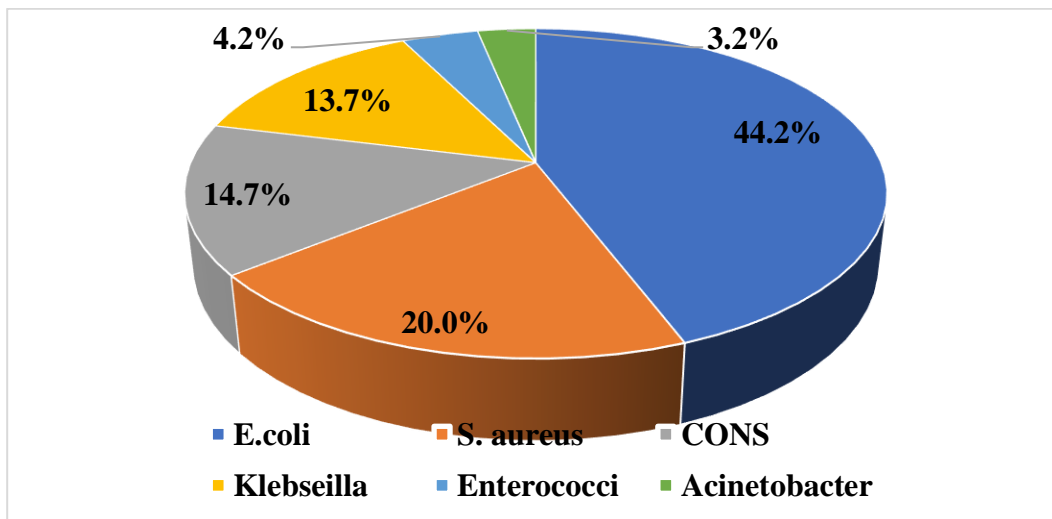


Figure 1: Pie distribution of bacterial isolates from urine samples of the pregnant women

Table 1: Table showing antibiotic sensitivity of various Gram negative bacteria

Antibiotic	Gram-negative bacteria		
	E.coli (42)	Klebseilla (13)	Acinetobacter (3)
Ampicillin	2	0	0
Amoxiclav	12	2	1
Cefotaxime	23	5	1
Ceftriaxone	19	6	2
Ciprofloxacin	26	4	2
Gentamycin	18	8	2
Amikacin	24	9	2
Nitrofurantoin	32	7	1
Tetracycline	14	7	1
Norfloxacin	22	10	2
Imipenam	42	13	3

Table 2: Table showing antibiotic sensitivity of various Gram positive bacteria

Antibiotic	Gram-positive bacteria		
	S. aureus (19)	CONS (14)	Enterococci (4)
Ampicillin	6	3	0
Amoxiclav	9	7	0
Cefotaxime	9	6	0
Ceftriaxone	10	8	0
Ciprofloxacin	15	6	1
Gentamycin	7	5	1
Chloramphenicol	9	10	0
Norfloxacin	11	4	0
Cotrimoxazole	14	12	2
Tertacycline	10	9	0
Linezolid	19	14	4

Discussion

Bacteriuria, either symptomatic or asymptomatic, is common in pregnancy. If left untreated; 20% - 30% of asymptomatic bacteriuria will lead to acute pyelonephritis. This may result in low birth weight of infants, premature delivery cases and occasionally, stillbirth, so it is a serious threat for the mother and fetus[16]. The overall prevalence of urinary tract infection in this study was 39.6%. Akinloye et al[17], reported a prevalence of 21.7 %. Onuh et al[18] reported 32.7% and Ajayi et al[19], reported 40%, which is comparable to this study. However Onyemelukwe et al[20] reported a prevalence of 12.7% and Leigh[21], Brook et al[22] reported a prevalence of 1-10%. This difference may be due to the inclusion of both symptomatic and asymptomatic pregnant woman in this study. The bacterial pathogens isolated were predominantly *E. coli*, followed by *S. aureus*, coagulase-negative staphylococci, *Klebsiella* spp, Enterococci and *Acinetobacter*. This finding is similar to other reports which indicate that Gram-negative bacteria, particularly *E. coli* is the most implicating pathogen isolated in patients with UTIs[23,24]. The major contributing factor for isolating higher rate of *E. coli* is due to urine stasis in pregnancy which favors for *E. coli* strain colonization[25]. Another reason could be due to poor genital hygienic practices by pregnant women who may find it difficult to clean their anus properly after defecating or clean their genital after passing urine during their pregnancy[26]. All the Gram negative bacteria in our study were sensitive to Imipenem and all Gram positive bacteria were sensitive to Linezolid both of which are not safe drugs in pregnancy. Antibiotic resistance has been recognized as the consequence of antibiotic use and abuse[27]. This might be due to inappropriate and incorrect administration of antimicrobial agents in empiric therapies and lack of appropriate infection control strategies, which can increase resistant organisms.

Conclusion

This study showed that a little more than one-third of the pregnant women had UTI. It was also observed that *E. coli* was the most frequently isolated bacteria. Due to rising antibiotic resistance among uropathogens, it is necessary to have local hospital based knowledge of the uropathogens and their antibiotic sensitivity patterns. All pregnant women should be screened for UTI with a urine culture and treated with antibiotics if the culture is positive. The early diagnosis and treatment of UTI during pregnancy can prevent complications to the mother and the fetus.

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Conflict of Interest: Nil Source of support: Nil