



URINARY TRACT INFECTIONS COMPLICATING PREGNANCY AND ITS IMPACT ON GESTATIONAL OUTCOMES – OUR INSTITUTIONAL EXPERIENCE

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ABSTRACT

Objective: To study the impact of urinary tract infections complicating pregnancy and outcomes of gestations Urinary tract infections

Methods: This is a prospective study of 121 pregnant women diagnosed with gestational urinary tract infections during the period of June 2018 – May 2019 (12 months) in the Department of Urology and Department of Obstetrics & Gynecology, Government Kilpauk Medical College, Chennai. Patients were thoroughly evaluated clinically and all relevant investigations including urinalysis, Urine culture and sensitivity, USG KUB were done. Patients with at least two positive culture ($> 100,000$ cfu/ml) were included in this study. Any gestational complications, uropathogens causing UTI that necessitate hospitalization and outcomes of gestational UTIs were analyzed.

Results: In our study, *Escherichia coli* is the most predominant microorganism causing gestational UTIs. In this study the mean gestational week at birth was 36 weeks 6 days (24-40 weeks range). Mean birth weight was 2.6 kg (700 – 3200 gm). 27 cases required hospitalisation for treating UTIs. Cesarean section rate was 57.3%

Conclusions: Preterm labour was noted as the most common and important complication in gestational UTIs. Diagnosing gestational UTIs and better planning with medical management helps to prevent the complications associated with it and results in a better outcome.

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INTRODUCTION

Urinary tract infection (UTI) is a frequently encountered health problem affecting any part of the urinary tract including the kidneys, ureters, bladder or urethra. These are the most common bacterial infection in pregnancy, increasing the risk of maternal and neonatal morbidity and mortality. Diagnosing and managing with appropriate therapy prevents the complications of gestational UTIs and have a better outcome. Urinary tract infections in pregnancy commonly present as asymptomatic bacteriuria, acute cystitis or pyelonephritis. The need for early diagnosis and proper management has been evaluated in this study with respect to the gestational outcome.

MATERIALS AND METHODS

In this prospective analysis 121 patients who were diagnosed with gestational urinary tract infections were included. The study was conducted in the Department of Urology and Department of Obstetrics & Gynecology in Government Kilpauk Medical College. Our study period was 12 months from June 2018 – May 2019. Out of these 27 patients required hospitalization for managing the urinary tract infection. Indications for hospitalization included: urinary tract

symptoms of dysuria, frequency, nausea, vomiting, renal angle tenderness, positive urinalysis and culture, presence of fever and irregular uterine contractions. Patients with at least two positive cultures [$\geq 100,000$ colony forming units per milliliter (cfu/ml)] were hospitalized. Contaminated urine cultures were repeated or excluded from the study.

Antimicrobial susceptibility tests were done in all cases in order to determine antimicrobial resistance profile and to choose the ideal antibiotics for empiric and definitive treatment. Antibiotics tested in the antibiogram included ciprofloxacin, norfloxacin, nitrofurantoin, gentamycin, amikacin, ampicillin, meropenem, amoxicillin clavulanate, piperacillin-tazobactam, cefixime, cefuroxime, cefotaxime, ceftriaxone and trimethoprim-sulfamethoxazole.

RESULTS

A total of 121 patients had a positive culture during the study period, in which 27 patients were hospitalized. Our rate of hospitalization was higher with 22.31%. Among the patients hospitalized, there were 12 primiparous and 15 multiparous women. Mean age was 29 years (range 22-38 years) at the time of diagnosis. Maternal risk factors and coexisting diseases were detected in 9 (33.33%) patients which included diabetes mellitus (5), hypothyroidism (3), preeclampsia (2).

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Nineteen cases were hospitalized before 37th gestational week (1 case was in the first trimester, 3 cases were in the second trimester and 15 cases were in the third trimester), while remaining eight cases were hospitalized at term pregnancy.

In this study the mean gestational week at birth was 34 weeks 6 days (24-40 weeks range). Mean birth weight was 2.6 kg (700 – 3200 gm). Cesarean section rate was 57.3%. Term delivery (\geq 37th gestational week) rate was 43.7%. Preterm delivery rate was 56.3%. There were 2 extremely preterm cases that died after birth. For the remaining liveborn neonates, mean APGAR score was 8.8 and 9.4 at 1st and 5th minute, respectively. Preeclampsia and preterm premature rupture of membranes were noted in 6 patient and should especially be the concern of the obstetricians in the presence of UTIs

Among the microorganisms, *E. coli* was the predominant organism isolated followed by *Klebsiella pneumoniae*, *Enterococcus faecalis*, *Pseudomonas aeruginosa*. Mixed infections with more than one organism is noted in 4 patients. Antimicrobial susceptibility was tested in all patients and appropriate full course antibiotics were administered.

DISCUSSION

UTIs may be the cause of various gestational complications which can be prevented by appropriate treatment protocols. Untreated UTIs has been reported to be associated with complications like pre-eclampsia, preterm birth, intrauterine growth restriction and low birth weight.

In pregnancy, many hormonal and anatomical changes favor a UTI (Hannan *et al.* 2013). Early in a pregnancy at around seven weeks, the ureters begin to dilate due to smooth muscle relaxation induced by progesterone. Later, with a peak at 22–26 weeks, mechanical compression from the enlarging gravid uterus further aggravates the phenomenon of hydronephrosis of pregnancy (Jeyabalan and Lain 2007). Moreover, an increased plasma volume during pregnancy leads to decrease urine concentration and increased bladder volume. All these factors promote urinary stasis and uretero-vesical reflux. Additionally, differences in urine pH and osmolality, as well as pregnancy-induced glycosuria and aminoaciduria further facilitate bacterial growth and UTI (Ipe *et al.* 2016).

Urinary tract infections in pregnancy are classified as either asymptomatic or symptomatic.

Asymptomatic bacteriuria is defined as the isolation of bacteria in at least 1×10^5 colony forming units per mL of cultured urine, in the absence of signs or symptoms of a UTI.

Symptomatic UTIs are divided into lower tract (acute cystitis) or upper tract (acute pyelonephritis) infections (Bahadi *et al.* 2010).

Asymptomatic bacteriuria occurs in 2–15% of pregnant women and is a major risk factor for developing symptomatic UTIs during pregnancy (Ipe *et al.* 2013). The prevalence of symptomatic urine infection during pregnancy is less common, complicating about 1–2% of all pregnancies

Knowing the uropathogens of each obstetric population is particularly important in the management of UTIs. Various studies related to the most frequently observed microorganisms in UTIs during pregnancy reported *Escherichia coli* as the most critical microorganisms. In this study also *E. coli* is the most common microorganism

responsible from the UTI. Other microorganisms commonly isolated in our study include *Klebsiella pneumoniae*, *Enterococcus faecalis*, *Pseudomonas aeruginosa*.

Maternal risk factors such as diabetes, hypertension, hypothyroidism, autoimmune disorders, urinary tract abnormalities, chronic inflammatory conditions, renal diseases (nephrotic syndrome, glomerular diseases etc) increase the incidence of gestational UTIs. In our study, 33.33 % of cases were with such risk factors (diabetes mellitus (5), hypothyroidism (3), preeclampsia (2)).

Urine culture remains the gold standard for diagnosis. The presence of a urinary culture composed of greater than 100,000 colony-forming units of a single organism in a symptomatic pregnant woman confirms the diagnosis of UTI.

Urinalysis to look for protein, white blood cells (WBCs) and red blood cells, as well as urine dipstick for nitrites and leukocyte esterase also provide complementary data in diagnosis. However, these tests have poor predictive values and increased false negatives results (Loh and Sivalingam 2007).

Positive nitrites suggest the presence of gram-negative bacteria, such as *Escherichia coli*, *Klebsiella*, *Proteus* and *Enterobacter*, as these organisms convert urinary nitrates to nitrites, however, this test will be negative in the presence of gram-positive species such as *Staphylococcus* or *Streptococcus*.

The detection of leukocyte esterase reflects an increased number of WBCs in the urine, such as in pyuria, however, in the initial phase of an infection and until a certain threshold has been reached, the test can be negative (Mignini *et al.* 2009).

Urine microscopy can also be helpful in detecting bacteria. If a significant number of squamous epithelia cells (>15 – 20 per high-power field) are present, then the sample is likely to be contaminated and a new sample should be collected (Bachman *et al.* 1993).

Antibiotic susceptibility tests are very important in order to have successful therapy and low-cost management. The choice of treatment should be guided by antimicrobial susceptibility testing in UTIs.

Limited sample size, single institutional study and no multivariate analysis were the main limitations in our study.

CONCLUSION

Urinary tract infection is a common, but preventable cause of pregnancy complications. If asymptomatic bacteriuria is untreated, up to 30% of mothers develop acute pyelonephritis, with an increased risk of multiple maternal and neonatal complications, such as preeclampsia, preterm birth, intrauterine growth restriction and low birth weight. Early diagnosis and prompt management of UTIs in pregnancy has a positive impact on both maternal and neonatal health.

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