

# Urinary Tract Infection during Pregnancy

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## **ABSTRACT**

*Urinary tract infections (UTIs) are common in pregnant women and pose a great therapeutic challenge, since the risk of serious complications in both the mother and her child is high. Pregnancy is a state associated with physiological, structural and functional urinary tract changes which promote ascending infections from the urethra. Unlike the general population, all pregnant women should be screened for bacteriuria with urine culture, and asymptomatic bacteriuria must be treated in every case that is diagnosed, as it is an important risk factor for pyelonephritis in this population. The antibiotic chosen should have a good maternal and fetal safety profile. In this paper, current principles of diagnosis and management of UTI in pregnancy are reviewed, and the main problems and controversies are identified and discussed. Urinary Tract Infections (UTI) are mainly caused by the presence and growth of microorganisms in the urinary tract, which are the single commonest bacterial infections of all age groups and especially in pregnancy. UTI was diagnosed based on urinalysis reports. With the help of data collection form demographic data were collected. The commonest causative organism was found to be E.coli (50%). The weight of newborn infants of mothers afflicted with UTI were significantly not lowered compared to newborns of healthy women. The prevalence rate of urinary tract infection (UTI) during pregnancy is high. So it is important to do routine screening of all pregnant women for significant bacteriuria to reduce the complications on both maternal and fetal health.*

**Key words:** *Urinary Tract Infection, Complications in Pregnant women, Newborns, and treatment of UTI in pregnancy*

**Goal:** *to describe Complications and treatment of Urinary Tract Infection during pregnancy*

## **Introduction**

The prevalence of bacteriuria in women has previously been reported as 3–20 % in various studies [1]. Untreated urinary tract infections (UTIs) during pregnancy is associated with an increased risk of multiple maternal and neonatal complications, such as preeclampsia, preterm birth, intrauterine growth restriction and low birth weight [2–5]. Gestational UTIs are complicated when the infection is accompanied by risk factors such as urolithiasis, recurrent UTI, urinary tract abnormalities, chronic inflammatory diseases, autoimmune disorders, renal parenchyma diseases, and diabetes mellitus [6–10]. Therefore, time is of the essence in treating gestational UTIs [9, 11, 12]. Furthermore, identifying the uropathogens in the obstetric populations is important in order to optimize the antibiotic regimens used for the empiric treatment [13–16]. In this study, we have demonstrated the uropathogens and the pregnancy outcomes of the UTIs that necessitate hospitalization within the framework of our antenatal care program.

According to the International Classification of Diseases (ICD-10), urinary tract infections are infections affecting structures participating in the secretion and elimination of urine: the kidneys, ureters, urinary bladder and urethra. In pregnancy, these infections can lead to serious adverse maternal and neonatal outcomes. Recurrent urinary tract infection is defined as more than one UTI before or during pregnancy. Bacteriologic persistence is continued bacteriuria with the same organism 48 hours after initiation of treatment. A “relapse” is a recurrent urinary tract infection where the organism that was previously treated persists in the urinary tract two weeks after completing treatment. A “reinfection” is a ‘true’ recurrence. It is a urinary tract infection occurring after sterilization of the urine, with an organism originating from outside of the urinary tract, either a new bacterial strain or a strain previously isolated that has persisted in the colonizing flora of the gut or vagina, more than two weeks after treatment.

**Classification of urinary tract infections:** Severity is graded on a scale of 1-6 as follows (and also includes an anatomical component):

- Grade 1: cystitis, low severity
- Grade 2: pyelonephritis with moderate symptoms
- Grade 3: established pyelonephritis with severe symptoms
- Grade 4: urosepsis with systemic inflammatory response syndrome (SIRS)
- Grade 5: urosepsis with organ dysfunction
- Grade 6: urosepsis with organ failure

This distinction is based on presence of the classical symptoms of dysuria, frequency of urination, urgency, polyuria and suprapubic tenderness, hematuria or costovertebral angle tenderness [2,4].

**Diagnosis:** In a symptomatic patient, the diagnosis is made based on typical symptoms of a lower or upper urinary tract infection backed by evidence of bacteriuria [5,2]. Asymptomatic bacteriuria is marked by an absence of symptoms, and a culture from a single midstream voided urine specimen yields the same bacterial strain in any trimester in quantitative counts of more than 100,000 colony-forming units/ml [5,6]. Urinalysis and dipstick testing, Microscopic urinalysis (Microscopic examination of a centrifuged urine sediment gives invaluable information) [8].

Squamous epithelial cells most commonly indicate a contaminated urine sample, while casts help to localize the pathology, and in this case, leukocyte casts are associated with the kidney as the foci, as in pyelonephritis [5,6,7]. Triple phosphate crystals which are colorless with a characteristic “coffin lid” appearance, may be a normal finding but are often associated with alkaline urine and UTI (typically associated with *Proteus* species) [1,2]. Bacteria may also be evident under the microscope through gram staining, and this is significant if there are more than 5 bacterial cells/high power field, which correlates with 100,000 CFU/ml on culture indicative of UTI, in asymptomatic patients [9,10]. Though the gram stain gives immediate results, advising empiric therapy, it is insensitive and hence may not detect bacteriuria in the 10<sup>2</sup>-10<sup>3</sup> range. Its use is therefore ideal in patients with acute pyelonephritis, invasive UTI, or where immediate information on the etiology is needed

**Urine culture:** Urine culture with two urine specimens is regarded as the gold standard, with a 95% probability that the woman has bacteriuria if positive, compared to 80% probability if only one urine sample is collected and cultured [11]. However, culture of two separate specimens is only necessary for outpatients being evaluated for recurrent UTIs, treatment failures, or who have complicated UTIs, or for inpatients who develop UTIs [8,9]. It is unnecessary for the evaluation of outpatients with uncomplicated UTIs [5]. A culture is positive if a single bacterial species is isolated in a concentration greater than 100,000 colony forming units per milliliter of urine, from the clean-catch midstream collection of two. Consecutive urine specimens. For urine collected via bladder catheterization, the threshold is 100 colony forming units of a single species per milliliter [6].

**Complete blood count, procalcitonin, c-reactive protein and ESR:** A complete blood count may only generally indicate the presence of infection on account of elevated white blood cells, but does not localize the infection. Its routine use for uncomplicated UTI is therefore not recommended. In the patient with a complicated UTI, it may be necessary to evaluate for severe infection such as sepsis [14].

Of all these markers of infection, many studies have shown the importance of Procalcitonin in better predicting acute pyelonephritis in UTI than white blood cell counts or C-reactive protein [12]. Though most of these studies have been extensively conducted in children, one small study in pregnant women revealed that procalcitonin was significantly higher in pregnant women with asymptomatic bacteriuria.

**Epidemiology of urinary tract infections in pregnancy:** Causative agents *E. Coli* accounts for the majority of urinary tract infections, as high as 80%. *Klebsiella*, *Enterobacter*, and *Proteus* species, and enterococci infrequently cause uncomplicated cystitis and pyelonephritis. *Candida* species are an important cause of fungal UTIs especially in immunosuppressed patients and in those with in-dwelling catheters (Minardi 2011). Group B *Streptococcus* and the genital mycoplasma *Ureaplasma urealyticum* are rare causes of UTI and are of significance particularly in pregnancy because of their association with chorioamnionitis (Tita 2010) Cram LF, Zapata MI, Toy EC, Baker B 3rd: Genitourinary infections and their association with preterm labor.

**TREATMENT:** Asymptomatic bacteriuria should be treated with antimicrobials even though the mother has no clinical symptoms [14]. Various studies have proven that early treatment of asymptomatic bacteriuria in pregnancy reduces the incidence of acute pyelonephritis and decreases the incidence of pre-term delivery and low birth weight infants [1,2,8] Early recognition and treatment of asymptomatic bacteriuria can reduce up to 70% of acute symptomatic UTIs.[3] Amoxicillin is a safe choice but in recent years *E. coli* has become increasingly resistant to amoxicillin. Alternative drugs are now used as first line treatment [15]. Cephalosporins and nitrofurantoin are safe for pregnant mothers; as both have high urinary concentration and are effective against *E. coli*. There is insufficient data to recommend any specific type of treatment regime in symptomatic UTI in pregnancy [10]. Common antibiotics such as nitrofurantoin and cefuroxime are effective and complications are rare.[4] Nitrofurantoin has the advantage of sparing the disruption of normal vaginal flora but should be avoided at third trimester because a potential risk of hemolysis if the fetus is G6PD-deficient.[5] Sulphonamides can be used in first and second trimester but it is best avoided in third trimester because it competes for bilirubin-binding sites on albumin in the foetus and causes severe jaundice and kernicterus especially in preterm babies.[1,3] Quinolones and tetracyclines have possible toxic effects on the fetus and these medications are contraindicated in pregnancy.[1,5,6] A 7 to 10-day course of oral antibiotic treatment is usually adequate in a majority of the cases of asymptomatic bacteriuria and acute cystitis.[1,3] Patients should be

advised to come for a repeat urine culture 1-2 weeks after completing antibiotics. Mothers who are treated for shorter period of time are more likely to have higher recurrence rate and this may lead to serious consequences [13].

### Discussion

Untreated UTIs has been reported to be associated with multiple pregnancy complications like preeclampsia, preterm birth, intrauterine growth restriction and low birth weight [2–6]. In our cohort, preterm delivery rate was 56.3%. UTIs may also be the cause of various obstetrical complications which can be prevented by appropriate treatment protocols [13,15]. Preeclampsia and preterm premature rupture of membranes should especially be the concern of the obstetricians in the presence of UTIs [10,12]. Maternal problems such as urolithiasis, chronic recurrent urinary infections, urinary tract abnormalities, chronic inflammatory diseases, autoimmune disorders, renal diseases (nephrotic syndrome, glomerular diseases etc) and diabetes mellitus were the risk factors for UTI in pregnancies [6–9]. Knowing the uropathogens of each obstetric population is particularly important in the management of UTIs. There are various studies related to the most frequently observed microorganisms in UTIs during pregnancy. *Escherichia coli* is reported to be the most critical microorganisms which should be kept in mind [2,3]. *pneumoniae* is a common cause of UTIs during pregnancy. It has been reported from a study that *K. pneumoniae* was isolated in 21.5% of the urine samples in pregnancies with asymptomatic bacteriuria [15] together with significant clinical symptoms is also an important uropathogen causing obstetrical complications [2,7]. *S. mitis* has been considered a relatively benign oral streptococcus and a member of the oral commensally flora. Nevertheless, it can cause infection especially in immune-compromised patients [2,8]. Infection of the urinary tract due to *C. albicans* is uncommon. Prolonged use of antibiotics and diabetes mellitus may be associated with fungal UTIs [2,9].

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. Recently, increasing numbers of urinary pathogens are developing resistance to antibiotics [3, 6].

### Conclusions

Urinary tract infection is the most common problem throughout the world, particularly in developing countries. In addition, emergence of bacterial strains resistant to commonly used antibiotic agents is widespread phenomenon all over the world. From the results of a study, concluded that, UTI is prevalent in the study area and the most frequently isolated uropathogen was *E. coli* followed by *Staphylococcus* spp. In addition, *Leuconostoc* species, *Raoultella terrigena* (*Klebsiella* spp), *Salmonella typhimurium*, *Demacoccus nishinomiyaeyiensis*, *Citrobacter freundii* and *Issatchenkia orientalis* were isolated. Female sex, poor hygienic practice of the rural residents, improper urine storage, frequent sex and lack of genital hygiene, were the major risk factors for the high prevalence of UTI. Gentamycin was the most effective antibiotic for the area followed by chloramphenicol and nitrofurantoin. In contrast, amoxicillin, vancomycin and cephalexin were the drugs to which the isolates developed resistance. Generally, as there was no previous study and published information on UTI in the study area, this study has provided baseline data on the prevalence, drug sensitivity, and some potential risk factors of UTI and is, therefore, of clinical and epidemiological significance.

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