

Asymptomatic bacteriuria & urinary tract infections in pregnancy: A study in a tertiary care rural hospital

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Abstract

Introduction: Urinary tract infections (UTI) are one of the common infections during pregnancy. If not treated, these can cause serious complications to both mother and foetus. This study was carried to determine the prevalence of UTI in pregnant women and to identify the common uropathogens causing UTI.

Materials and Methods: Midstream urine specimens were collected from 180 pregnant females. The specimens were examined microscopically and by culture. A colony count of 10⁵ CFU/ml of urine of a single uropathogenic bacterium in culture is considered significant and such patients, either symptomatic or asymptomatic, are considered to have a urinary tract infection.

Results: Urine specimens of 33 females (18.33%), all of whom were asymptomatic, showed significant growth of uropathogenic organisms confirming the diagnosis of UTI. The commonest pathogen isolated was *E. coli* (54.55%), followed by *Klebsiella species* (24.24%), *S. aureus* (12.12%), *Pseudomonas spp.*, *Pseudomonas aeruginosa* and *C. albicans* (3.03% each).

Conclusion: In this study, the prevalence of UTI in pregnancy was found to be 18.33%. As most of these cases present without any symptom, its early detection by screening for it with appropriate laboratory tests is vital. This would help clinicians to start appropriate antibiotic treatment at an early stage which in turn will help to minimize complications associated with UTI.

Keywords: Urinary tract infections, Asymptomatic bacteriuria, Pregnancy, Cystitis, Pyelonephritis.

Introduction

Urinary tract infections (UTI) are very common during pregnancy and may present as cystitis or less frequently as pyelonephritis.¹ About 20% of the pregnant women suffer from symptomatic or asymptomatic UTI during their pregnancy.¹ Women are significantly more likely to be affected by UTI due to anatomical issues, such as proximity of the urethra to the anus.² Pregnant women are even at higher risk for UTI because of physiological changes such as decreased urine concentration because of increased plasma volume which enhances bacterial growth.² Certain anatomical changes such as dilatation of urethra and decreased bladder tone that develops in 90% of pregnant women can lead to urinary stasis and increase the risk of UTI.²

Women developing UTI's in pregnancy may or may not present with symptoms related to it. These two clinical types of UTI's are known as asymptomatic bacteriuria or symptomatic UTI.³ The presence of significant bacteriuria without any symptom suggestive of acute urinary tract infection is known as asymptomatic bacteriuria.³ The diagnostic criteria of significant bacteriuria includes growth of 10⁵ colony forming units (CFUs) of a single uropathogenic bacterium in one ml of a properly collected urine specimens.⁴ In an asymptomatic patient, the presence of more than 10⁵ uropathogenic organisms per ml of urine is considered as a case of UTI.⁵ In patients with symptoms suggestive of UTI, presence of more than 10³ organisms per ml of urine along with presence of > 5 pus cells in wet mount of urine per high power field (HPF) of microscope is considered as a case of UTI.⁵ Anatomically these infections

are divided as those involving the lower urinary tract (cystitis) or the upper urinary tract (pyelonephritis).

Risk of UTI begins in the 6th week and has its peak during the 22-24th weeks.² Sometimes it is required to hospitalize the patient for treatment of UTI. Untreated UTI or asymptomatic bacteriuria during pregnancy may lead to serious consequences for maternal life and fetus, like higher risk of pyelonephritis, sepsis and transient renal failure; and complicated outcomes such as intrauterine growth retardation, hypertension in pregnancy and premature birth.² Therefore, it is important to screen, raise suspicion and know how to recognize this condition, intending to promptly initiate appropriate treatment in order to minimize complications associated with UTI. Keeping this in mind, this study was conducted in a tertiary care rural hospital to find out the incidence of urinary tract infections among pregnant women attending antenatal clinic (ANC) and to identify the isolated uropathogens by using standard microbiological techniques.

Materials and Methods

This study was a prospective study carried out in the Dept. of Microbiology, at a tertiary care rural hospital in western Maharashtra, after approval from the institutional ethics committee. Urine specimens of 180 pregnant women in the age group of 18 to 45 years, attending ANC clinic were examined. Patients having a known renal disease/anomaly of urinary tract and who are on antibiotic therapy for any reason within 72 hours of specimen collection were excluded from the study.

Specimen Collection

The patients were asked to collect midstream urine specimen in a sterile wide mouth container after giving proper instructions to minimize the chances of contamination. The specimen is collected preferably at 1st ante-natal visit as per ACOG (American College of Obstetrics and Gynecology guidelines).⁶ The first portion of urine that flushes out commensal bacteria from anterior urethra is discarded. Next portion of urine (midstream sample) is collected in a sterile wide mouthed container.

Transport and Storage

Urine specimens are transported to the laboratory without delay. In case of delay, these samples are stored in refrigerator at 4°C for up to 4 hours. After 4 hours, a fresh urine specimen in again collected for culture.

Processing of Specimen

Macroscopic Examination: Gross examination of urine is done for cloudy or turbid urine. This is seen in presence of bacteria, proteins, crystals or leucocytes.

Microscopic Examination: following parameters are noted.

1. Pyuria – presence of > 5 pus cells (WBC's) per HPF is indicative of infection.⁵
2. RBCs – Normally not more than 2 or 3 RBCs per HPF are observed.
3. Bacteria – bacilli or cocci are looked for.

Urine Culture

Uncentrifuged urine specimen is cultured on blood agar and MacConkey agar by semi-quantitative method. A standard inoculating loop which holds 0.001 ml of specimen is used and streaked on culture plates without intermittent heating. Culture plates are incubated at 37°C for 24 hours and observed for growth of bacteria on next day.

Identification of the Isolate

These isolates were identified using standard microbiological techniques such as motility, Gram staining, colony characteristics and biochemical reactions.

Interpretation of Results

1. A colony count of 100 CFU per 0.001 ml (which corresponds to 10⁵ CFU per ml of urine) of a single uropathogenic bacterium on each culture plate is considered as significant and such patient is considered to have a urinary tract infection in both asymptomatic and symptomatic cases.
2. In a symptomatic patient with pyuria (> 5 pus cells per HPF in wet mount of urine) low bacterial counts of 10³ CFU/ml of urine or more are also considered significant.⁷
3. The specimens (cultures) showing no growth of bacteria or growth of 10² CFU/ml of urine or less are considered insignificant.⁸ These occur because of contamination by commensal bacteria during voiding.
4. The frequency of intermediate counts 10² – 10³ CFU/ml is only 5% to 10% if the urine collection procedures have been performed properly.⁸ In such a case fresh specimen of urine is collected.
5. Urine specimens showing growth of three or more types of bacterial colonies are considered as contamination by

commensals and a repeat specimen is collected for such patients.⁸

6. In case of less frequent but known urinary pathogens such as *Staphylococcus aureus* and *Pseudomonas aeruginosa*, even low colony counts are also considered as significant.

Results and Observations

Out of 180 urine specimens examined from 180 pregnant women, 33 urine specimens showed significant growth of uropathogenic organisms as per the criteria (10⁵ CFU/ml of urine) as shown in table 1. None of these females complained about any symptom related to UTI, indicating asymptomatic but significant bacteriuria cases.

Table 1

No. of specimens examined	Culture Confirmed cases of UTI
180	33 (18.33%)

Out of 33 urinary pathogens isolated, the most common uropathogen was *E. coli* (18 isolates), followed by *Klebsiella species* (8 isolates). Table 2 shows the number of different urinary pathogens isolated from these cases. Table 3 shows the percentage of different isolated organisms.

Table 2

Organism isolated	No. of isolates
<i>E.coli</i>	18
<i>Klebsiella spp.</i>	8
<i>Staphylococcus aureus</i>	4
<i>Pseudomonas spp</i>	1
<i>Pseudomonas aeruginosa</i>	1
<i>Candida albicans</i>	1
Total	33

The most common organism isolated from cases of UTI in pregnancy in our study was *E. coli*, which comprised of 54.55% of all pathogens followed by *Klebsiella species* (24.24%). Table 3 shows the percentage of different isolated organisms.

Table 3

Organism isolated	% of isolated pathogens
<i>E.coli</i>	54.55
<i>Klebsiella spp.</i>	24.24
<i>Staphylococcus aureus</i>	12.12
<i>Pseudomonas spp</i>	3.03
<i>Pseudomonas aeruginosa</i>	3.03
<i>Candida albicans</i>	3.03

Discussion

Urinary tract infection is a common among men and women but the incidence is quite high among women due to their anatomical and physiological differences. It is a condition which women will certainly encounter during the

span of their life time and the prevalence is higher among women during pregnancy.⁵ Risk of UTI in pregnancy begins from 6th week. Its incidence is maximum during 22nd to 24th week. About 90 percent of pregnant women develop dilatation of their ureters, which persists till childbirth (hydronephrosis of pregnancy). There is an increase in bladder volume, decreased tone of muscles of bladder and ureters, pressure effects from an enlarged uterus all of which contributes to increased urinary retention and vesicoureteral reflux. Moreover, an increase in plasma volume leads to decrease in urinary concentration. Approximately 70 percent of pregnant women have deranged glucose metabolism and glycosuria, which encourages bacterial survival and growth in the urine. Increase in urinary progestins and estrogens hampers local immunity in urinary tract making it liable for infection. All these factors may contribute to the development of UTIs during pregnancy.⁹ If not identified and treated at the right time, these infections can lead to serious maternal and fetal consequences. By screening for and aggressively treating pregnant women with asymptomatic or symptomatic UTI, it is possible to protect both mother and fetus from its future complications.

In this study, out of 180 urine specimens examined from 180 cases, 33 urine specimens showed significant growth of uropathogenic organisms indicating UTI. Thus prevalence of UTI among pregnant females was 18.33%. In a similar study carried out by Parida B. et al,¹⁰ the prevalence of UTIs in pregnant women was found to be 49.4%. In another study carried out by Haider G. et al,¹¹ the prevalence of UTI among pregnant females was only 4.3%. Parveen K. et al¹ reported the incidence of 26% of UTI among pregnant females.

The commonest uropathogen isolated from cases of UTI in pregnancy in our study was *E. coli*, which comprised of 54.55% of all pathogens followed by *Klebsiella species* (24.24%). This finding was consistent with the study conducted by Parveen K. et al,¹ where *E. coli* was the most common urinary pathogen isolated (86.15%) followed by *Klebsiella spp.* (7.69%). Ordaz-Lopez VI et al¹² also reported *E. coli* to be the commonest organism isolated from UTI in pregnant females (81.2%) followed by *Klebsiella* (12.8%). In contrast to this finding, Valentina Y. et al¹³ reported *Enterococcus* to be the most common pathogen in UTI cases among pregnant women.

Conclusion

Urinary tract infection is a very common infection among both men and women but has definitely a higher incidence in females especially in pregnancy not only due to anatomical differences between male and female urinary tracts but also due to physiological and hormonal changes associated with pregnancy. UTI in pregnancy may lead to serious consequences for maternal life and fetus, like higher risk of pyelonephritis, sepsis and transient renal failure; and complicated outcomes such as intrauterine growth retardation, preeclampsia and premature delivery. Therefore, it is important to screen, raise suspicion and know how to recognize this condition, intending to

promptly initiate appropriate treatment in order to minimize complications associated with UTI.

Conflict of Interest: None.

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