

## **Prevalence of Urinary Tract Infection and Its Associated Risk Factors In Pregnant Women**

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#### **Abstract:**

Urinary tract infections (UTI) are the most common bacterial infections during pregnancy. Untreated UTI can be associated with serious obstetric complications. This cross-sectional study was carried out to determine the prevalence of UTI among pregnant women. UTI was diagnosed using mid stream urine (MSU) culture. Using  $>10^5$  colony forming unit per millilitre as a significant level of bacteriuria, the prevalence was found to be. There was a high incidence of infection in 21-25 years age group (43.75%). There was also a high incidence of infection in the third trimester of pregnancy (51.56%) compared to first (17.18%) and second trimester (31.25%). Multiparity is associated with increased urinary tract infections in pregnancy. Regarding education 10% were literate and 90 % were illiterate. Prevalence of bacteriuria was 94% in women who had past history of urinary tract infection.80% were sexually active. E.coli was the most frequently isolated pathogen. These findings underscores the importance of screening all pregnant women for significant bacteriuria, so that positive cases should be treated subsequently with antibiotics in order to reduce the adverse effects on both maternal and fetal health.

#### **Keywords:**

Urinary tract infection, pregnancy, bacteriuria

#### **Introduction:**

Urinary tract infections (UTI), which are caused by the presence of growth of microorganisms in the urinary tract, and perhaps the single commonest bacterial infections of mankind and in pregnancy, it may involve the lower urinary tract or the bladder. Incidence of UTI has been reported among 24-25% of the pregnant women(1) and it is the most common cause of admission in obstetrical wards.

Anatomically UTI can be classified into lower urinary tract infection involving the bladder and urethra and upper urinary tract infection involving the kidney, pelvis, and ureter. The majority of the UTI occur due to ascending infection. Three common clinical manifesta-

tions of UTIs in pregnancy are: asymptomatic bacteriuria, acute cystitis and acute pyelonephritis.

UTI is defined as the presence of at least 100,000 organisms per milliliter of urine in an asymptomatic patient, or as more than 100 organisms/mL of urine with accompanying pyuria (>10 WBCs/mL) in a symptomatic patient.(2) Particularly in asymptomatic patients, a diagnosis of UTI should be supported by a positive culture for a uropathogen. Untreated asymptomatic bacteriuria is a risk factor for acute cystitis and pyelonephritis in pregnancy. These cases account for 70% of all cases of symptomatic UTI among unscreened pregnant women. Asymptomatic bacteriuria have been reported among 45% pregnant women.(3) This risk is reduced by 70 to 80 percent if bacteriuria is eradicated. Pregnancy increases the risk of UTI. At around 6<sup>th</sup> week of pregnancy, due to the physiological changes of pregnancy the ureters begin to dilate. This is also known as “hydronephrosis of pregnancy”(4), 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 uretero-vesical reflux. Additionally, the apparent reduction in immunity of pregnant women appears to encourage the growth of both commensal and non-commensal microorganisms. The physiological increase in plasma volume during decreases urine concentration and upto 70% pregnant women develop glucosurea, which encourages bacterial growth in the urine.(5)

Female gender itself is a risk factor because of short urethra, its proximity to vagina and anus and inability of women to empty their bladder completely. High incidence is seen in lower socioeconomic group. Sexual activity and certain contraceptive methods are also said to increase the risk. The anatomical relationship of females urethra and the vagina makes it liable to trauma during sexual intercourse as well as bacteria been massaged up the urethra into the bladder during pregnancy/ child birth. Abnormalities of urinary tract or stones, diabetes mellitus, immunosuppression and past history of UTI tend to increase the risk.

Urinary tract infection during pregnancy contributes significantly to maternal and perinatal morbidity. Abortion, small birth size, maternal anemia, hypertension, preterm labour, phlebitis, thrombosis and chronic pyelonephritis are related to urinary tract infection during pregnancy.(6)

Approximately the common pathogenic causes of urinary tract infections are “*Escherichia coli*, *Staphylococcus* spp., *Streptococcus* spp., *Proteus* spp., *Klebsiella* spp., *Corynebacterium*, *Neisseria* and *Pseudomonas* spp.” The severity of a urinary tract infection is influenced by the malevolence of the bacteria and the susceptibility of the host.

### **Aim:**

This study aimed to assess the urinary tract infection among pregnant women and its associated risk factors.

### **Objectives:**

1. To study the risk factors associated with urinary tract infection in pregnant women.
2. To study the prevalence of most frequently isolated bacteria .

**Materials and methods:**

This cross sectional study was conducted in Symbiosis University Hospital and Research Centre, Lavale, Pune between January 2022 to March 2022. Consecutive booked antenatal women who presented at the antenatal department of the mentioned hospital during the study period were randomly selected for the study upon informed consent, either had any of the symptoms suggestive of urinary tract infections or without any symptoms.

A consecutive 104 pregnant women with or without symptoms of UTI were included in this study. Pregnant women having renal disease or on antibiotic therapy within 72 hours to the study days were excluded due to the fact that the antibiotic must have inhibited or destroyed the pathogens.

Verbal informed consent was obtained from each women before the commencement of research. Socio-demographic data such as age, occupation, parity duration of gestation were collected from the pregnant women using standard questionnaires and kept confidential during research.

Early morning clean-catch midstream urine was collected from each pregnant women into a wide mouthed sterile screw capped container. With a calibrated micro loop 0.001 ml of urine was cultured on to a Blood agar and a MacConkey agar plate. After overnight incubation at 37°C for 24 hours, colony counts yielding bacterial growth of more than  $10^5$ /ml was taken as being significant in both symptomatic and asymptomatic pregnant women. Centrifuged urine deposit was examined microscopically at high magnification for pus cells. Pus cells  $>5$ /HPF were also considered significant for infection.

**Results:**

One hundred and four(104) urine samples were collected and analysed during the study period. Sixty four (64) samples showed significant growth, which amounted to a prevalence of 26%.

Table 1: The prevalence of infection in relation to age

Age groups (years)	Number examined	Number positive	% positive
16-20	10	4	6.25%
21-25	40	28	43.75%
26-30	29	25	39.06%
31-35	25	7	10.93%

The prevalence of infection in relation to age are also shown in table 1, individuals of the age group 21-25 years had the highest incidence of infection (43.75%). Followed by age group 26-30 years (39.06%), 31-35 years (10.93%) and 16-20 years (6.25%).

Table 2: prevalence of urinary tract infection in pregnant women in relation to gestational age.

Gestational age (weeks)	Number examined	Number positive	% positive
1-12	28	11	17.18%
13-25	32	20	31.25%
26-40	44	33	51.56%
Total	104	64	100.00%

In this table there was higher rate of infection in the third trimester ( 51.56%) compared to second trimester ( 31.25%) and first trimester (17.18%).

Table 3: prevalence of Urinary Tract Infection in pregnant women in relation to Parity.

Parity	Number examined	Number infected	% positive
0-1	40	18	28%
1-2	30	20	31.25%
>4	34	26	40.62%
Total	104	64	100.00%

There was a high frequency of infection occurring in those having >4 children (40.62%). Followed by those having 2-3 children (31.25%) while the lowest frequency of infection is occurred in those with 0-1 children (28.00%) as shown in table 3.

Table 4: frequency of other UTI related significant factors.

Factors		% of Bacteriuria
1. Status	Well	25
	Poor	75
2. Education	Educated	10
	Illiterate	90
3. Past history of UTI	Present	94
	Absent	6
4. Sexual activity	Active	80
	Not active	20

Prevalence of other UTI related significant factors is shown in table 4. Prevalence of bacteriuria in well status women is found to be 25%. The significance of education has been evidenced by the fact that only 10% of the patients suffering from bacteriuria are educated while 90% are illiterate. Assessing the risk of recurrence, past history of urinary tract infection was important risk factor as 60 women (94%) among 64 cases had past history of urinary tract infection.

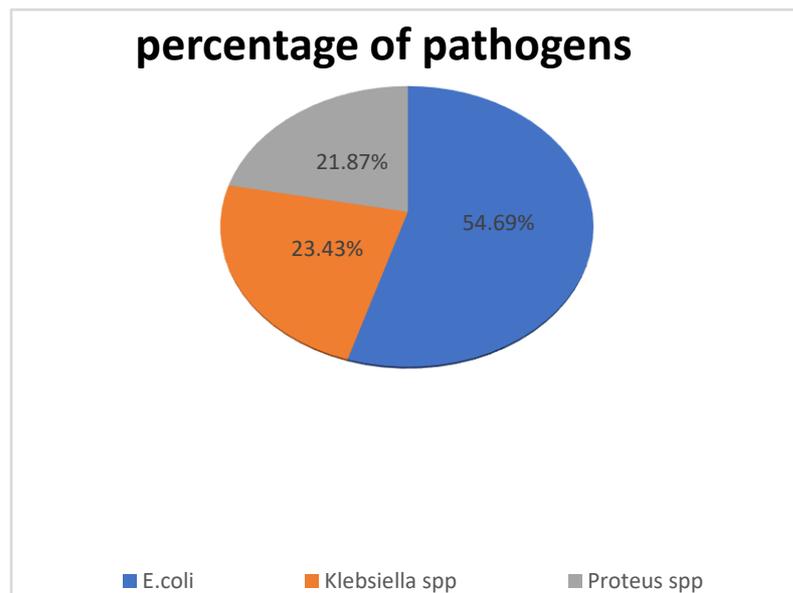
Sexual activity as a risk factor of bacteriuria was also significant in this study as (80%) women were sexually active and (20%) were not.

Table 5: Percentage of isolation of various significant pathogens in urine of pregnant women.

Pathogens	Number isolated	Percentage (%)
E.coli	35	54.68%
Klebsiella spp.	15	23.43%
Proteus spp.	14	21.87%
Total	64	100.00%

The gold standard for detecting bacteriuria in pregnancy is urine culture. Table 5 showed the frequency of various isolated pathogens. 40 samples had no growth 64 samples were positive for urinary pathogens. Among the significant isolates, E.coli has the highest percentage of isolation (54.68%), while the lowest was Proteus species (21.87%).

Following pie chart showing the percentage of various significant pathogens in urine of pregnant women.



### Discussion:

Maternal age was not found to be a significant risk factor in this study. In literature only a significant increasing risk of 1 to 2% is reported per decade of age, which did not become evident in this study, probably due to small sample size. The highest incidence is 20-25 years followed by 26-30 years. The aforementioned age groups are having the highest was also observed in previous studies. The reason could be due to the fact that many women within this age group are likely to have had many children before the present pregnancy and it has been reported that multiparity is a risk factor for acquiring bacteriuria in pregnancy. Sexual activity and certain contraceptive methods are also said to increase the risk and women are mostly sexually active at this age.

Multiparity has an increased risk factor at developing bacteriuria among pregnant women. Leigh and Sharma J.B. et al (7,8) had similar observation regarding the risk of urinary incontinence and other urinary problem which according to them increases by 37% with parity of >3 as compared to 18.75% in nulliparous but disagreement was evident with the findings of Onuh et al(9), who reported that there was no relationship to parity. These findings differences may be a result of the different locations in which these studies were being carried out.

In this study the frequency of urinary tract infection was higher in third trimester compared to first and second trimester. This is in agreement with Leigh, who reported and increased frequency of urinary tract infection in third trimester compared to the first and second trimester or pregnancy. However this report does not agree with Onuh et al(9), who re-

ported a higher prevalence of urinary tract infection in the second trimester as compared to first and third.

In this study the past history of UTI was the significant risk factor. In our study 94% women had past history of UTI. Most of the other studies acknowledge the significance of past episodes of UTI in causing recurrence in pregnancy.

In this study sexual activity was also a significant risk factor. About 80% women were sexually active during pregnancy and most of them around 91% were between age group of 21-35 years. The anatomical relationship of females urethra and the vagina makes it liable to trauma during sexual intercourse as well as bacteria been massaged up the urethra into the bladder during pregnancy or child birth(10).

Other factors like low socio economic status, less knowledge about UTI have been observed as risk factors for UTI during pregnancy.

### **Conclusion:**

The physiological changes of pregnancy predispose women to UTI so does other factors such as age, sexual activity, multiparity, previous history of UTI and socio economic conditions. UTI has significant impact on material & fatal health. So all pregnant women should be screened for UTI with a urine culture, treated with antibiotics if culture is positive and then rested for cure. The goal of early diagnosis and treatment of UTI during pregnancy is to prevent complications with all the added benefits to the mother and the fetus.

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