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UTI in Pregnancy and It's Maternal and Perinatal Outcome

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Abstract

Urinary tract infection is one of the most common bacterial infections in pregnancy in most of developing countries like India. The total incidence is 5-10% in pregnancy. It is the second most common bacterial infection seen during pregnancy which could be symptomatic or asymptomatic. This study aims to find out the incidence of urinary tract infection in pregnancy, maternal complications and its perinatal outcome.

This is a prospective study conducted at Navodaya medical college, Raichur for a period of one year. Pregnant women attending outpatient department irrespective of the trimester, with or without symptoms of UTI and without any known renal diseases were enrolled. Urine routine and urine culture was done as screening test in all pregnant women. If pus cells ≥3- 4 present in mid-stream urine routine and colony count yielding bacterial growth of more than or equal to 10^5/ml was taken as significant. The pregnant women were followed up till delivery to find out maternal and fetal outcomes.

In this present study, out of 100 women, 16% had significant bacteriuria. Out of 16% women with UTI, 9% were symptomatic and 7% were asymptomatic. UTI was highest in the late pregnancy (16.66%) and early pregnancy (28.57%). Most common organism isolated was E. coli (43.75%).

The present study showed that preterm labour, preterm premature rupture of membranes, fetal growth restriction and low birth weight had a significant higher rate in women with urinary infection compared to those without infection. All pregnant women should be screened for UTI with a urine routine and urine culture, treated with antibiotics if the culture is positive and then re-tested for cure. Awareness has to be created about good hygienic practices and adequate hydration among pregnant women.

Keywords: UTI, Pregnancy, E-coli.

Introduction

Urinary tract infection is one of the most common bacterial infections in pregnancy in most of developing countries like India. The total incidence is 5-10% in pregnancy. There is an increased risk for UTI, beginning from 6th week and the peak levels were observed from 22nd to 24th weeks. [1]

UTI is 4-10 times more common in pregnant women than in non-pregnant women. This is because during pregnancy, pressure of gravid uterus causes stasis of urine flow, also there is change in urine chemical composition with increase in glucose and amino acids, which facilitates bacterial growth. [2]

UTIs are more frequently caused by gram-negative bacteria, with Escherichia coli accounting for 60-70% of cases, followed by Klebsiella (10%), Proteus (5-10%), and Pseudomonas (2-5%). Gram-positive organisms, such as Streptococcus, Staphylococcus, and Enterococcus species, also contribute to UTIs, albeit to a lesser extent. [3]

Untreated asymptomatic bacteriuria can lead to severe maternal and fetal complications, including maternal refractory anemia, abortions, acute pyelonephritis, recurrent UTIs, septicemia, preterm labor, pregnancy-induced hypertension, chorioamnionitis, intrauterine growth restriction, prematurity, low birth weight, and an increased risk of perinatal mortality.[3]

Diagnosis is primarily based on clinical presentation, such as urinary frequency, dysuria, and fever, and is confirmed through urine culture and antimicrobial susceptibility testing, which remains the gold standard.[4]

Management of UTI in pregnancy requires careful antibiotic selection. Empiric use of ampicillin or amoxicillin should be avoided due to high resistance rates of *E. coli*. Instead, nitrofurantoin, cephalexin, amoxicillin-clavulanate, or fosfomycin are preferred agents, with treatment lasting 5–7 day. For pyelonephritis, inpatient management with intravenous antibiotics is advised, followed by a total course of 14 days. Women with recurrent UTIs or post-pyelonephritis may benefit from daily prophylaxis, such as nitrofurantoin 100 mg or cephalexin 250–500 mg, until delivery and for 4–6 weeks postpartum.[5]

Objective

To find out the incidence of urinary tract infection in pregnancy, maternal complications and its perinatal outcome.

Ethical Clearence

Ethical clearance was obtained from the Institutional Ethics Committee at Navodaya Medical College,

Raichur, Karnataka before the commencement of the study. Participation was voluntary, and informed consent was obtained from all respondents. Confidentiality was maintained throughout the study.

Statistical Analysis

Data were summarized using descriptive statistics such as frequencies and percentages. Associations between urinary tract infection and maternal or perinatal outcomes were analyzed using the Chi-square test, and Fisher's Exact Test was applied wherever cell counts were small. A p-value of <0.05 was considered statistically significant.

Chi-square test

$\chi 2=\sum(O-E)^2 / E$

here

- O = observed frequency
- E= expected frequency

Materials & Methods

This is a prospective study. Pregnant women attending outpatient department, with or without symptoms of UTI and without any known renal diseases were enrolled. Urine routine was done as screening test in all pregnant women. If pus cells ≥3- 4 present in mid-stream urine routine and colony count yielding bacterial growth of more than or equal to 10^5/ml was taken as significant. The pregnant women were followed up till delivery to find the maternal and fetal outcome.

Source of data

All pregnant women attending the department of Obstetrics and Gynecology, Navodaya Medical College Hospital and Research Centre, Raichur during the study period.

Methods of collection of data

Study site: Navodaya Medical College Hospital and Research Centre, Raichur

Study design: Prospective study

Study period: 1 year

Sample size: 100 samples

Inclusion criteria

- Women who are pregnant irrespective of trimester.
- Women between the ages of 18-39 years.
- Women with no medical disorders
- Pregnant women who had at least one positive urine routine / culture during the study period.
- Patients willing to participate in the study

Exclusion criteria

- Women with medical disorders (Haemorrhagic disorders, hypertension, diabetes and renal disorders).
- Women with previous adverse pregnancy outcomes (abortion, perinatal deaths, prematurity or low birth weight).
- Immunocompromised patients
- Women who did not give consent

Results

A total of 100 antenatal women were screened, 16 out of the 100 women had significant bacteriuria which constitutes 16%. Out of 16 women with UTI, 9% (9) women were symptomatic and 7% (7) women were asymptomatic, 84% (84) women had no growth in culture. All 100 patients were followed up till term and had delivery at Navodaya hospital.

Table 1: Distribution of cases by growth in culture

Significant Bacteriuria			Total
Yes (16) –16%		No growth	
Symptomatic	Asymptomatic		
9(9%)	7 (7%)	84(84%)	100

Graph 1:

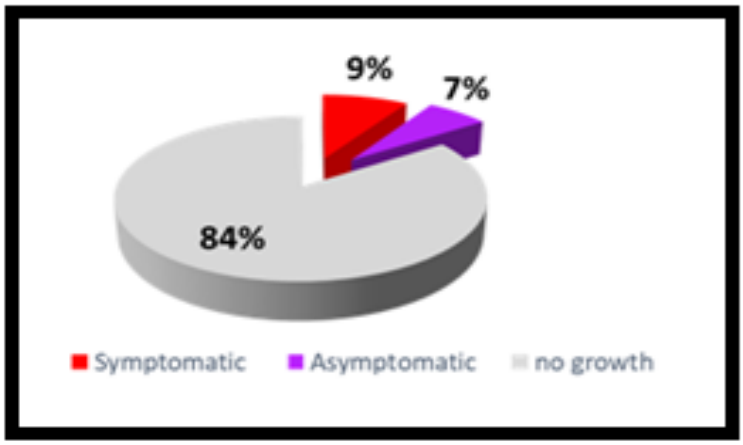
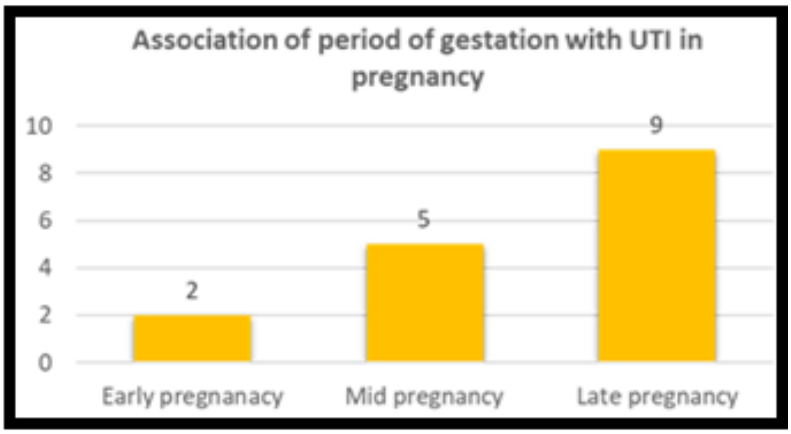


Table 2: Association of period of gestation with UTI in pregnancy

Period of gestation	Total(100)	With UTI(16)	Percentage	P-value
Early pregnancy	7	2	28.57	0.0692
Mid pregnancy	39	5	12.82	
Late pregnancy	54	9	16.66	

Graph 2:

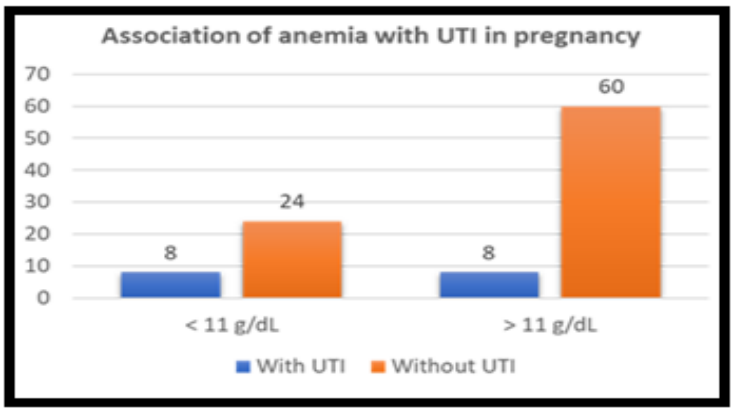


Early up to 16 weeks; Mid: 16 weeks- 28 weeks; Late: More than 28 weeks. It is evident that majority of the women seeking antenatal care in the hospital is in the third trimester) However, the data suggests that UTI is not significantly associated with period of gestation. (0.0692).

Table 3: Association of anemia with UTI in pregnancy

Hemoglobin Level	Total (100)	With UTI (16)	Percentage	P value
< 11 g/dl	32	8	25	< 0.0001
≥ 11 g/dl	68	8	11.76	

Graph 3:



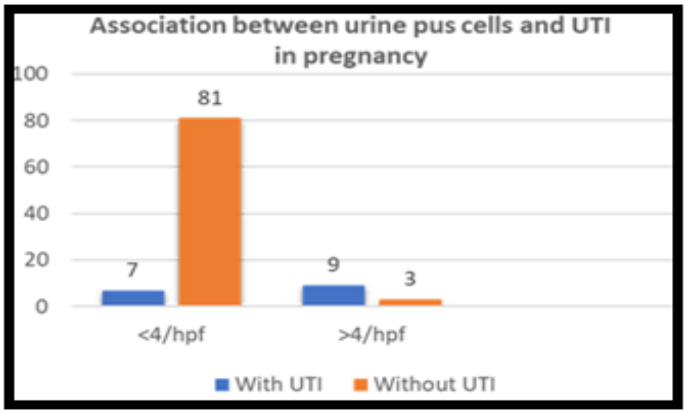
Out of 32 cases of anaemia, 25% (8) women had UTI while out of 68 women without anaemia, 11.76% (8) women had UTI. It is evident from the table that UTI and anaemia are significantly associated. (p = <0.0001). The high prevalence in anaemia among UTI positive cases may be due to the fact that majority of the women take their initial antenatal care at the peripheral centers and

come to tertiary hospital in their late pregnancy with complications like anemia.

Table 4: Association between urine pus cells and UTI in pregnancy

Urine Pus cells	Total(100)	Significant growth	Percentage	P- value
≤ 4/ hpf	88	7	7.95	<0.0001
> 4/ hpf	12	9	75	

Graph 4:

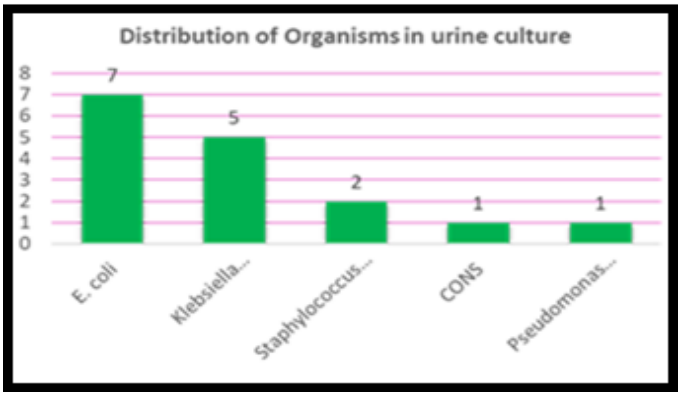


Out of the 88 women with urine pus cells ≤4/hpf, 7.95% (7) women had UTI while 9 (75%) out of 12 women with urine pus cells >4/hpf showed significant growth (<0.0001). UTI is significantly associated with presence of urine pus cells >4/hpf.

Table 5: Distribution of Organisms in urine culture

Organism	Number of organisms	Percentage (%)
E. coli	7	43.75
Klebsiella pneumoniae	5	31.25
Staphylococcus aureus	2	12.5
CONS	1	6.25
Pseudomonas Aeruginosa	1	6.25
Total	16	

Graph 5:

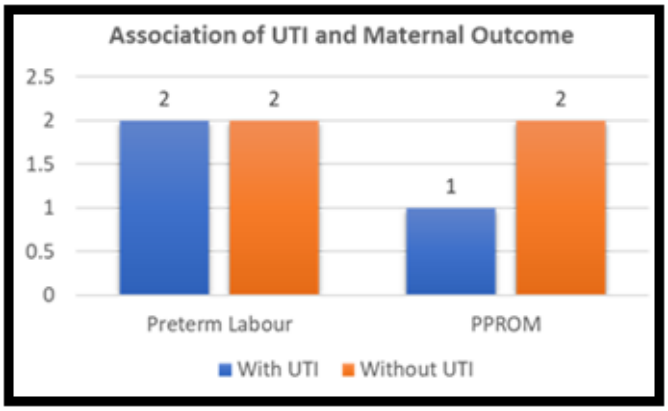


Escherichia coli is frequently present among UTI cases followed by Klebsiella pneumoniae, Staphylococcus -aureus, CONS, Pseudomonas Aeruginosa.

Table 6: Association of UTI and Maternal Outcome

	Total (100)	With UTI (16)	Without UTI (84)	P- value
Preterm Labour	4	2 (50 %)	2 (50 %)	0.0001
PPROM	3	1 (33.33%)	2 (66.66 %)	0.5307

Graph 6:

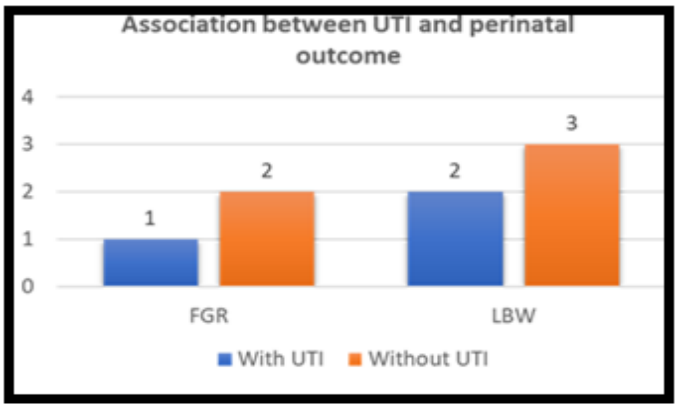


Even though the distribution of preterm labour cases is equal in both UTI & non- UTI groups, the p-value of 0.0001 suggests strong association between preterm labour and UTI. A p-value of 0.5307 is much higher than 0.05, indicating no statistically significant association between PPROM and UTI.

Table 7: Association between UTI and perinatal outcome

	With UTI (16)	Without UTI (84)	Total (100)	P- value
FGR	1 (33.33 %)	2 (66.66 %)	3	0.0155
LBW	2 (40%)	3 (60 %)	5	0.1253
IUD	0	0	0	-

Graph 7:



The proportion of FGR and LBW in women with UTI was not significantly more than those without UTI. Hence FGR (Fetal Growth Restriction), the p-value is 0.0155, which is below the common significance threshold of 0.05. This suggests a statistically significant association between UTI & FGR.

LBW (Low Birth Weight), the p-value is 0.1253, which is greater than 0.05. This means the association between UTI and LBW is not statistically significant.

Discussion

In the present study, there is a significant association of anemia (25%). It is evident from the table that maternal anemia is more prone to get urinary infection. Emiru T et al study showed 27.6 % association of anemia with UTI.[6] Al-Haddad et al. who observed higher rates of UTI in anemic pregnant women.[7] In Ethiopia, Haider et al. also showed a significant correlation between maternal anemia and higher incidence of asymptomatic bacteriuria during pregnancy[8]

Bacterial isolates have been changing from time to time and from place to place. In present study, E. coli organism (43.75%) was most frequently present among UTI positive cases followed by Klebsiella species (31.25%), and Staphylococcus aureus (12.5%), CONS (6.22%), Pseudomonas Aeruginosa (6.25%). These findings are in agreement with Delzell and Lefevre, who reported *E. coli* as the predominant organism in 70–90% of pregnancy-associated UTIs, with *Klebsiella* and *Proteus* as less common isolates. [9] Tadesse et al**.** reported *E. coli* (41.2%) and *Klebsiella* (22.7%) as the most common isolates among pregnant women with UTIs[10]

In this present study, out of 100 women, 16 had significant bacteriuria which constitutes 16%. Out of 16 women with UTI, 9% (9) women were symptomatic and 7% (7) women were asymptomatic.

In a study conducted by Karuna et al out of 13.8% women with UTI 4.5% women were symptomatic and 9.3% were asymptomatic.

In the present study, we have observed that the prevalence of urinary tract infection was highest in the late pregnancy (16.66%) and early pregnancy (28.57%) followed by mid pregnancy (12.82). According to Praveen et al incidence of UTI was more in late (29.48%) and early pregnancy (20%) followed by mid pregnancy (17%).[11]

The present study showed that preterm labour occurred in 50% of women with UTI compared to 2% without UTI ($p = 0.0001$), indicating a strong association. Preterm premature rupture of membranes (PPROM) was observed in 33.3% with UTI vs 66.6% without UTI ($p = 0.53$), which was not statistically significant. Fetal growth restriction (FGR) was present in 33.3% with UTI vs 66.6% without UTI ($p = 0.0155$), showing a significant correlation, while low birth weight (LBW) was seen in 40% with UTI vs 60% without UTI ($p = 0.1253$), which was not statistically significant. These findings are consistent with those of Sheiner et al. who reported that women with UTI had significantly higher rates of preterm delivery, LBW, and perinatal morbidity compared to controls.[12] Similarly, Gilstrap and Ramin highlighted that untreated bacteriuria in pregnancy is associated with increased risk of preterm labour, IUGR, and LBW, underscoring the importance of screening and treatment. [13]

The prevalence of complications in the present study are comparatively lower than the other studies. The lower prevalence of complications in this hospital may be because the patients who were diagnosed with UTI during the study period might have been treated with prophylactic antibiotics a management strategy supported by Cochrane systematic review, which confirmed that

treating asymptomatic bacteriuria reduces risk of pyelonephritis.[14]

Conclusion

The prevalence of UTI is high among pregnant women. Therefore, we recommend screening of urinary tract infection (by urine microscopy and culture) in all trimester, as early as possible to diagnose and treat accordingly in order to detect both asymptomatic and symptomatic cases which can be treated easily if left untreated it will lead to serious maternal complications like cystitis, pyelonephritis, anemia, recurrent pregnancy loss, pre-eclampsia, preterm labour and fetal complications like IUGR, low birth weight and Intra-uterine deaths . When a urine routine examination reveals more than 3-4 pus cells, a urine culture is necessary to identify the specific bacteria and determine its antibiotic sensitivity. In cases of asymptomatic bacteriuria during pregnancy, low-dose antibiotic treatment should be administered continuously throughout the pregnancy to prevent potential complications**.**

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