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Original Research Article

A study of urinary tract infection in pregnancy and its effect on maternal and perinatal outcome

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ABSTRACT

Background: Urinary tract infection (UTI) during pregnancy is very common in developing countries like India. UTI is caused by the growth of micro-organisms in the urinary tract. This study aims to determine the incidence of UTI in whole pregnancy and its adverse effects on mother and fetus.
Methods: This is a prospective study conducted in outpatient department of ESIC medical college for one year from January 2017 to December 2017. A total of 182 pregnant women attending OBG OPD for ANC check-up without any medical disorders or previous adverse pregnancy outcomes of 18-35 years of age were included in the study. Urine routine and urine culture sensitivity were done for all.
Results: Out of 182 pregnant women tested for UTI, the incidence of UTI in pregnancy was found to be 19%. Asymptomatic UTI was noted in 65% patients with UTI. Primigravida were commonly affected (56%). Highest cases were in 18 to 25 years (63%) age group. 56% cases showed 6-10 pus cells/HPF. Prevalence of UTI was more common in winter seasons. Commonest causative organism was *E. coli* in 38% cases. Maternal complications like anaemia (26%) and puerperal pyrexia (23%) were observed. Adverse fetal outcomes like preterm birth (35%) and fetal growth restriction (15%) were observed.
Conclusions: In this study, the prevalence rate of UTI during pregnancy is high (19%). The physiological changes of pregnancy predispose the women to UTI so does the other factors such as age, sexual activity, hygiene, multiparty, previous history of UTI and socio-economic conditions. 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 retested 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.[1,2] UTI are mainly caused by the presence and growth of microorganisms in the urinary tract, especially the lower urinary tract and the urinary bladder.[3,4] There is an increased risk for UTI, beginning from 6th week and the peak levels were observed from 22nd to 24th weeks.[3] It is the second most common bacterial infection seen during pregnancy which could be symptomatic or asymptomatic.[5]

The asymptomatic urinary tract infection is a persistent, actively multiplying bacteria within the urinary tract

without any symptoms of infection. The prevalence of UTI in pregnancy depends on parity, race, and socioeconomic status, individual hygiene and anaemia. Prevalence of UTI in pregnant women in America is 2.5-8.7%, whereas the prevalence of UTI in pregnant women in developing countries is around 12-40%. This is due to difference in the socio-economic levels and standards of living.[6-9] If asymptomatic bacteriuria is not treated, approximately 25% of women will subsequently develop acute symptoms of an infection during pregnancy.[1]

Symptomatic and asymptomatic bacteriuria have been reported among 17.9% and 13% pregnant women respectively.[10]

UTI is 4-10 times more common in pregnant women than in non-pregnant women.[11] This is because, during pregnancy, pressure of gravid uterus on ureter causes stasis of urine flow, also, there is a change in urine chemical composition with increase in glucose and amino acids, which facilitates bacterial growth in urine.[3,12]

UTIs are more frequently caused by gram-negative organisms than gram-positive organisms. Gram-negative organisms include *E. coli* (60-70%), *Klebsiella* (10%), *Proteus* (5-10%) and *Pseudomonas* (2-5%), and gram-positive organisms include *Streptococcus* species, *Staphylococcus* species and *Enterococcus* species.[13,14]

Asymptomatic bacteriuria is a risk factor for the serious fetal and maternal outcomes. It can cause maternal anaemia, acute pyelonephritis, abortions, recurrent UTI, preterm labour, septicemia, pregnancy induced hypertension, PPROM, chorioamnionitis, and the puerperal pyrexia. In the fetus, it can cause intra uterine growth restriction, prematurity and low birth weight and the perinatal death.[6]

Thus, screening for UTI should be a part of routine antenatal care, so that early detection and treatment of asymptomatic bacteriuria prevents the maternal and fetal complications.

METHODS

Study area

Department of obstetrics and gynaecology. ESIC medical college, Kalaburagi, Karnataka.

Study design

Prospective observational study design used.

Study population

All pregnant women attending the department of obstetrics and gynaecology, ESIC medical college, Kalaburagi. Karnataka.

Study period

Study carried out for one year study from January 2017 to December 2017.

Inclusion criteria

All antenatal women between the ages of 18-35 years with no medical disorders (Haemorrhagic disorders, hypertension, diabetes and renal disorders) and no previous adverse pregnancy outcomes (abortion, perinatal deaths, prematurity or low birth weight).

Exclusion criteria

All immunocompromised patients were excluded from the study.

Sampling method

After taking informed consent, a detailed history, physical examination was done. Relevant lab investigations were done and the master chart was prepared.

Sample size

The 182 pregnant women attending OPD of hospital were taken.

Pregnant women attending outpatient department of obstetrics and gynaecology. ESIC medical college. Kalaburagi, who fulfil the inclusion criteria were included in this study. A detailed history, thorough clinical examination and routine investigations were carried out in all cases. The biochemical investigation included haemoglobin estimation and serum urea and creatinine. They were instructed about giving mid stream urine sample by clean catch method for urine routine microscopy and urine culture sensitivity.

Routine examination of urine was done during the first antenatal checkup. The women who had a positive screening test of urine was defined as >5 pus cells/HPF on routine examination of urine. They were subjected to urine culture and sensitivity. All the above information were noted down in prescribed formats.

If the women with a positive urine examination complained of urinary symptoms like frequency of micturition, burning sensation during micturition, loin pain, fever, lower abdominal pain they were classified as having symptomatic UTI. Women who didn't have such symptoms were classified as having asymptomatic UTI.

Depending upon findings, patients were divided into two groups: those with UTI (both asymptomatic and symptomatic UTI) and those without UTI. All the patients of both groups were followed up throughout the pregnancy and puerperium. Maternal and perinatal outcome were noted. Results documented in frequencies and percentages.

RESULTS

Out of 182 pregnant women tested for UTI, Table 1 shows that incidence of urinary tract infection in pregnancy was found to be 19%, that is 34 patients had UTI.

Out of 34 patients of UTI in pregnancy, table 2 shows that asymptomatic UTI was observed in 22 patients (65%) and urinary symptoms (symptomatic UTI) were noted in 12 patients (35%).

Table 3 shows that UTI in pregnancy was more common in 18-25 years age group in 21 patients (63%), followed by in 26-30 years age patients (29%).

Table 4 shows that UTI in pregnancy is more common in primigravida patients (19 patients=56%), followed by second gravida patients (9 patients=26%) and 6 cases in multigravida patients (18%).

Table 5 shows that 20 pregnant cases (60%) of UTI were observed highest in second trimester of pregnancy, followed by third trimester in 10 patients (31%).

Table 6 shows the distribution of cases according to urine microscopy pus cells. The women who had a positive screening test of urine was defined as >5 pus cells/HPF on routine examination. Highest incidence was seen in 19 patients (56%) who had 6-10 pus cells/ HPF, followed by 15 patients (44%) whose urine microscopy showed 11-20 pus cells/HPF.

Table 7 shows that UTI in pregnancy is more common in winter seasons (59%), followed by in summer seasons (29%) and monsoon seasons (12%).

Table 8 shows commonest microorganisms causing UTI in pregnancy. *E coli* was most commonly observed organism in 13 patients (38%), followed by *Klebsiella* in 8 patients (24%). *Proteus organism* was noted in 6 cases (17%), *Pseudomonas aeruginosa* was noted in 4 cases (12%), and *Staphylococcus aureus* was seen in 3 cases (9%).

Most common susceptible antibiotic was found to be with nitrofurantoin (83%) and with norfloxacin (77%). Most resistant antibiotic was found to be ampicillin (10%).

Table 9 shows the maternal outcome of UTI in pregnancy. 12% patients had abortions, 26% patients had anaemia, 23% patients developed puerperal pyrexia. 12% patients developed abortions and PIH, 9% patients developed chorioamnionitis and 6% patients developed PPROM, recurrent UTI and preterm labour each.

Table 10 shows the effect of UTI in pregnancy on fetal outcome. Preterm births were noted in 35% patients, 15% babies showed fetal growth restriction and perinatal mortality was noted in 12% cases.

Table 1: Distribution of cases according to incidence of UTI in pregnant women, (n=182).

Incidence	N	Percentage (%)
UTI present	34	19
UTI absent	148	81

Table 2: Distribution of cases according to asymptomatic and symptomatic UTI during pregnancy, (n=34).

Variables	N	Percentage of pregnant women with UTI (%)
Asymptomatic UTI	22	65
Symptomatic UTI	12	35
Total no. of pregnant women with UTI	34	100

Table 3: Age wise distribution of cases of UTI in pregnant women, (n=182).

Age (In years)	N	No. positive	Percentage (%)
18-25	114	21	63
26-30	53	10	29
>30	15	3	8
Total	182	34	100

Table 4: Distribution of cases in relation to gravidity.

Gravidity	No. examined	No. positive	Percentage (%)
Primigravida	118	19	56
Second gravida	36	9	26
Multigravida (≥3)	28	6	18
Total	182	34	100

Table 5: Distribution of cases according to trimesters.

Trimesters	No. positive	Percentage (%)
First trimester	4	9
Second trimester	20	60
Third trimester	10	31
Total	34	100

Table 6: Distribution of cases in relation to pus cells on microscopy.

Pus cells/ hpf	No. examined	No. positive	Percentage (%)
0-5	109	0	0
6-10	48	19	56
11- 20	25	15	44
Total	182	34	100

Table 7: Prevalence of UTI in pregnant women in relation to seasons.

Seasons	No. examined	No. positive	Percentage (%)
Winter	64	20	59
Summer	58	10	29
Monsoon	60	4	12
Total	182	34	100

Table 8: Distribution of organisms causing UTI.

Causative organism	Positive cases	Percentage (%)
E. coli	13	38
Klebsiella	8	24
Proteus	6	17
Pseudomonas aeruginosa	4	12
Staphylococcus aureus	3	9
Total	34	100

Table 9: Distribution of cases according to maternal outcome, (n=34).

Maternal outcome	N	Percentage (%)
Abortions	4	12
Anaemia	9	26
Hypertension	4	12
Puerperal pyrexia	8	23
Chorioamnionitis	3	9
PPROM	2	6
Recurrent UTI	2	6
Preterm labour	2	6

Table 10: Effect of UTI on fetal outcome.

Fetal outcome	Percentage of UTI present cases (%)
Preterm birth	35
Fetal growth restriction	15
Perinatal mortality	12

DISCUSSION

In this study, out of 182 patients examined, 34 cases (19%) were positive for UTI in pregnancy. Delzell et al in 1999 stated that high incidence of UTI may be due to hormonal effects produced during pregnancy which reduces the tone of uterine musculature aided by mechanical pressure from the gravid uterus resulting in urinary stasis thus encouraging bacterial proliferation in urine. This high incidence highlights the size of the problem which necessitates a rapid interference in pregnancy.[1,18]

Incidence of UTI in our study was 19%, which is comparable to Verma et al study of 12.27%.[15] Out of 34 cases, 22 cases (65%) had asymptomatic UTI and 12 cases (35%) had symptomatic UTI. Incidence of UTI have varied widely like Esha study of 9.8% study and Prabhavati et al study of 11.33%.[1,16]

In most of the studies, incidence of asymptomatic UTI in pregnancy is much more common than symptomatic UTI.[17] So, the results of the current study match with those of the earlier studies available.

In our study, UTI in pregnancy was high in 18-25 years age group in 21 patients (63%), followed by in 26-30 years age patients (29%). This is similar to Esha et al study and Mahor et al study.[1,6] This is probably because, most of the patients had their pregnancy and marriages during this age group. Also, highest prevalence in this age group could be due to the fact that many are sexually active in this age group.

Most of the patients with UTI in the present study belonged to the middle socio-economic group as is true with most of the other studies and most cases of UTI were found with unsound personal hygiene.

In our study, UTI in pregnancy is more common in primigravida patients (19 patients=56%), followed by second gravida patients (9 patients=26%) and 6 cases in multigravida patients (18%), this is similar to Amit et al study which showed 60% of primigravida having UTI in pregnancy and Mahor et al study.[3,6]

In our study, highest cases (60%) of UTI were observed in second trimester of pregnancy, followed by in third trimester in 10 patients (31%), and the lowest incidence was found in the first trimester (9%), which is similar to Mahor et al study.[6] This difference may be as a result of either change in urinary stasis and vesicoureteral reflux or decrease in urinary progesterone and estrogens in the various trimester of pregnancy.[18] Most of the studies found that the incidence of UTI was highest in second trimester.[19]

Women with higher number of pus cells in urine specimen had significantly higher asymptomatic bacteriuria. Present study showed 56% patients had pus cells of 6-10/HPF and 11-20/HPF in 44% of cases. This result is significant ($p<0.05$). This is similar to Amit et al study.[3]

According to the results of this study, highest incidence of UTI among pregnant women is in winter (59%), followed by summer (29%) and monsoon (11%), and the result is significant ($p<0.05$). Similar results were observed in Amit et al study.[3] Unconventional climate such as cold and dry weather in autumn and warm and dry weather in spring is associated with obvious changes in the number of UTIs.

The gold standard for detecting bacteriuria in pregnancy is urine culture. Table 8 shows the frequency of various isolated pathogens. 148 cases were negative and had no growth, 34 cases were positive for urinary pathogens. Among 34 cases the significant isolates are-*E. coli* (38%)

of the cases and *Klebsiella* in 24% cases, *Proteus* organism was noted in 6 cases (17%), *Pseudomonas aeruginosa* was noted in 4 cases (12%), and *Staphylococcus aureus* was seen in 3 cases (9%). This is similar to results in studies of Amit et al and Verma et al study.[3,15]

In our study, most common susceptible antibiotic was found to be with nitrofurantoin (83%) and with norfloxacin (77%). Most resistant antibiotic was found to be ampicillin (10%).

In this study, maternal outcome of UTI in pregnancy showed 4 patients (12%) had abortions, 9 patients (26%) had anaemia, 8 patients (23%) developed puerperal pyrexia, 4 patients (12%) developed PIH, 3 patients (9%) developed chorioamnionitis and 2 patients (6%) each developed PPROM, recurrent UTI and preterm labour each. These maternal complication rates are similar to Mahor et al study and Amit et al study.[3,6]

In our study, preterm births were noted in 35% patients, 15% babies showed fetal growth restriction and perinatal mortality was noted in 12% cases. Similar results were observed in Esha et al study and Mahor et al study. This study showed that UTI was one of the main factors contributing to occurrence of preterm labour and FGR.[1,6]

CONCLUSION

The prevalence rate of UTI during pregnancy is high (19%). The physiological changes of pregnancy predispose the women to UTI so does the other factors such as age, sexual activity, hygiene, multiparity, previous history of UTI and socio-economic conditions. 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 retested 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. Steps of prevention of UTI in pregnancy should be advised like good hygiene practices, to stay hydrated, and to urinate before and after intercourse. Caffeine and chocolate should be avoided. Advise to drink cranberry juice- cranberries can prevent *E. coli* from adhering to the bladder. Frequent voiding of urine and prolonged journeys to be avoided.

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