

## FETO Maternal Outcome in Patients with Urinary Tract Infection During Pregnancy

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### Abstract

*Introduction:* Asymptomatic bacteriuria has been reported to be associated with adverse pregnancy outcome. This study sought to determine the fetomaternal outcome in patients with urinary tract infection during pregnancy in a tertiary level teaching hospital in Southern part of Rajasthan, India.

*Material & Methods:* The study was a hospital based prospective study involving 126 eligible antenatal attendees coming or referred to Department of Obstetrics and Gynecology at a tertiary level teaching hospital in Southern Rajasthan. Urine culture was conducted for each participant and the fetomaternal outcome between symptomatic and asymptomatic bacteriuria was observed.

*Results:* Regarding pregnancy complications in UTI cases of pregnant women, anemia was found in 35.71%, Preterm labour in 18.25%, PPRM in 14.29%, IUGR in 13.49% and only 4.76% had preeclampsia and 3.18 had suffered from Pyelonephritis. Regarding fetal outcome in UTI cases of pregnant women, NICU admission was maximum i.e. 36 (28.57%), followed by low birth weight (19.84%), low APGAR score (n=24; 19.05%) and preterm delivery (17.46%).

*Conclusion:* UTI in pregnancy is associated with significant morbidity for both mother and baby. All pregnant mothers should be screened for UTI.

**Keywords:** Urinary tract infection; Asymptomatic bacteriuria; fetomaternal outcome.

### Introduction

Urinary tract infection (UTI) during pregnancy is the most common health problem, especially in developing countries and requires medical treatment.

Infection of urinary tract in pregnancy due to morphological and physiological changes that take place in the genitourinary tract in pregnancy. It may be of two types:

1. Symptomatic and
2. Asymptomatic bacteriuria (ASB)

ASB is defined as the presence of actively multiplying bacteria within the urinary tract excluding the distal urethra at the time when patient has no urinary tract infection [1-3].

Asymptomatic bacteriuria is a major risk factor for the development of Urinary Tract Infections (UTIs) during pregnancy results in adverse fetomaternal outcome. Bacterial products initiate a complex immunological, endocrinological and biochemical processes, culminating in adverse maternofetal outcome [4].

Pregnant women with asymptomatic bacteriuria are more likely to develop acute pyelonephritis in the later stages of pregnancy, preterm labor, post

partum UTI, hypertensive heart disease, anaemia, chronic renal failure, prematurity, low birth weight babies and prenatal death if untreated. Incidence of these can be decreased by treating asymptomatic bacteriuria during pregnancy promptly [1-3,5,6].

*Escherichia coli* is the most common bacterial pathogen causing UTI in pregnancy. Other organisms being *Klebsiella*, *Staphylococcus*, *Enterococcus*, *Pseudomonas* etc.

Screening of asymptomatic subjects for bacteriuria is appropriate as bacteriuria has adverse outcomes that can be prevented by antimicrobial therapy. Apart from that, even the progression of the asymptomatic bacteriuria to the symptomatic UTI in the later life can be prevented, which emphasizes the fact that, "Prevention is better than cure" as is believed from the time immemorial, which mandates early detection and treatment of asymptomatic bacteriuria, in pregnant women [7].

Despite association of asymptomatic bacteriuria with these adverse pregnancy outcomes, screening and treatment is not pursued with much vigor as is done for frank urinary tract infection. Therefore, the present study was conducted with an objective to study the effects of ante partum urinary tract infections on maternal and fetal outcome in pregnant women coming to Department of Obstetrics and Gynecology of tertiary care teaching hospital in Southern Rajasthan, India.

## Materials and Methods

### *Study design, settings and participants*

It was a hospital based prospective study conducted over a period of one and half year from January 2017 to June 2018 in Department of Obstetrics and Gynecology of tertiary care teaching hospital in Southern Rajasthan, India. All ante-natal patients with symptomatic urinary tract infections, asymptomatic urinary tract infections, and completely healthy patients with no predisposing pathology of the urinary tract or any chronic disease constituted the study population. At 95% confidence interval and 10% margin of error, taking the prevalence of Urinary tract Infection as 20% sample size was calculated as 126. So, total 126 pregnant women with urinary tract Infection coming to or referred by other departments to the Department of Obstetrics and Gynecology at a tertiary care teaching hospital, Southern Rajasthan were enrolled for study.

### *Data collection*

Pregnant women fulfilling the inclusion criteria were included after informed consent. At 1<sup>st</sup> visit, their midstream urine routine along with routine blood investigations, USG W/A and fetal well-being was done.  $>10^5$ /ml single organism or asymptomatic bacteriuria with  $>6$  pus cells in urine microscopy was considered as UTI which was confirmed by urine culture and sensitivity and treated accordingly. Patients were followed up till delivery by doing blood investigation and USG fetal well-being. Thus, frequency, nature and UTI and it's effect on fetal and Maternal outcome was studied.

### *Study tools*

A semi-structured interview schedule was designed, pretested and used for data collection to study socio-demographic profile and antenatal details. Information regarding a) socio-demographic profile of study subjects i.e. age, educational status, area of residence, socio-economic status, occupation b) Antenatal details i.e. gravida, presentation on trimester were collected from caregivers.

### *Statistical analysis*

Data were analyzed and statistically evaluated using SPSS software, version 17 (Chicago II, USA) [9]. Quantitative data was expressed in mean, standard deviation while qualitative data were expressed in percentage. Difference between proportions were tested by Chi-square test or Fisher exact test. 'P' value less than 0.05 was considered statistically significant.

### *Ethical issues*

All participants were explained about the purpose of the study. Confidentiality was assured to them along with informed written consent. The study was approved by the Institutional Ethical Committee.

## Results

Out of pregnant women with urinary Tract Infection more than half (n=66; 58.93%) were between the age group of 21-30 years while only 5 (3.97%) were more than 40 years old.

The majority (n=71; 56.4%) of the study subjects

were living in rural areas, and more than half were working (n = 76; 60.3%). Nearly two-fifth (n=52, 41.3%) of the study subjects belonged to low socio-economic status and more than half (n=74; 58.7%) were uneducated. Table 1 shows the socio-demographic characteristics of women with UTI and revealed that most women with AB were Primigravida (n=87; 69.1%) and in more than half (n=66; 52.4%) of women vaginal delivery was conducted.

Out of total cases of UTI, 76 (60.32%) had symptoms of UTI whereas 50 (39.68%) had asymptomatic bacteriuria, recurrence of UTI was seen in 9 (7.14%) subjects.

Table 2 Shows pregnancy complications between affected and unaffected women and revealed no significant difference in complications between women with symptomatic and those with asymptomatic bacteriuria. Regarding pregnancy complications in UTI cases of pregnant women, anemia was found in 35.71%, Preterm labor in 18.25%, PPROM in 14.29%, IUGR in 13.49% and only 4.76% had preeclampsia and 3.18 had suffered from Pyelonephritis.

Table 3 shows the feto-maternal outcome between affected and unaffected women with no significant difference between both groups. Regarding fetal outcome in UTI cases of pregnant women, NICU admission was maximum i.e. 36 (28.57%), followed by low birth weight (19.84%), low APGAR score (n=24; 19.05%) and preterm delivery (17.46%). Neonatal infection was observed in 8.73% and perinatal mortality in 5 (3.97%) cases. Significant association was observed between NICU admission and type of UTI i.e. either symptomatic or ASB. (p < 0.05). In other feto-maternal outcomes no significant difference was seen between symptomatic and ASB.

Regarding puerperal complications in UTI cases of Pregnant women within 48 days of delivery, fever was found in 17 (51.51%) mothers, UTI in 10 (30.31%) and Wound infection in 6 (18.18%) mothers.

**Table 1:** Sociodemographic characteristic of women with UTI

Sociodemographic characteristic	Number of cases	%
<i>Age (years)</i>		
≤ 20	10	7.94
21-25	36	28.57
26-30	30	23.81
31-35	34	25.98
36-40	11	8.73

> 40	5	3.97
<i>Area of living</i>		
Rural	71	56.35
Urban	55	43.65
<i>Education status</i>		
Educated	74	58.73
Uneducated	52	41.27
<i>Socio-economic status</i>		
Low	52	41.27
Medium	38	30.16
High	36	28.57
<i>Gravida</i>		
Primi gravida	87	69.05
Multi gravid	39	30.95

**Table 2:** Distribution of pregnancy complications in UTI cases of pregnant women

Pregnancy complications	Number of cases		Total (n=126)	%	P-value
	Symptomatic N = 76	ASB N = 50			
Anaemia	24	21	45	35.71	0.32
PPROM	10	8	18	14.29	0.85
Preterm labour	10	13	23	18.25	0.11
IUGR	9	8	17	13.49	0.69
Preeclampsia	2	4	6	4.76	0.34
Pyelonephritis	2	2	4	3.18	0.96

**Table 3:** Distribution of Feto-maternal outcomes in UTI cases of pregnant women

Feto-maternal outcomes	Number of cases		Total N = 126	%	p-value
	Symptomatic N = 76	ASB N = 50			
Low birth weight	14	11	25	19.84	0.79
Preterm delivery	10	12	22	17.46	0.54
Low APGAR	13	11	24	19.05	0.65
Neonatal infection	5	6	11	8.73	0.46
NICU Admission	16	20	36	28.57	0.04*
Perinatal mortality	2	3	5	3.97	0.63

### Discussion

The present study was a hospital based prospective study conducted to assess feto-maternal outcome in 126 patients with urinary tract infection during pregnancy, coming to or referred by other departments to the Department of Obstetrics and Gynecology at a tertiary care teaching hospital, Southern Rajasthan.

In present study, majority of UTI cases in pregnancy were in the age group of 21-30 years (58.93%) followed by in age group of 31-35 years (25.98%) which correlates with other studies done by Nawal *et al.* [8] (53%) and Kerure SB *et al.* [9] (52%). In Hail province, the prevalence of UTI was found to be higher in the age group 15-24 years and least in 35-45 years [10].

In our study, majority of patients were from rural area, 60.32% were working and 58.53% were uneducated. Regarding socioeconomic status majority i.e. 52 (41.27%) were of low socioeconomic status followed by Medium (30.16%) and High socioeconomic status (28.57%). This correlates to the study done by Lavanya *et al.* [5] This increased prevalence of ASB in women with low socioeconomic status is due to poor sanitation, lack of general hygienic practice and failure to attend antenatal clinic.

In our study, 87 (69.05%) women were primigravida and 39 (30.95%) were multi gravida. This was in contrast to study done by Okonko *et al.* [11]. The higher incidence of ASB in the multigravida is due to increased colonization of urinary tract by pathogens due to repeated exposure to urinary stasis or previous infections.

In Egypt found that UTI was commonest among those of first and third trimesters, unlike our women who had maximum occurrence of UTI during the second i.e. 29.37% and third trimester i.e. 48.41% [12]. Also, this study revealed that UTI was higher in multi gravida women, whereas in our study, UTI was higher in primi gravida women. This high incidence of ASB in the young reproductive age group is due to early pregnancy and multi parity in our country, especially in the rural sector. Many studies show advancing age as a risk factor for acquiring ASB in pregnancy. There is decrease in glycogen deposition and reduction in the lactobacillus as a part of ageing process which enhances bacterial adherence and invasion by pathogens and make them more susceptible. This correlates with the study done by Jeyaseelan *et al.* [13].

Another study was carried out in Makkah by Faidah H *et al.* revealed that 20% of the pregnant women were positive for UTI with symptomatic UTI cases more than asymptomatic ones [14]. So this prevalence was also higher than our study. Also, the number of symptomatic UTI in our study (60.32%) is more than asymptomatic cases (39.68%) which are a similar finding to this study.

An earlier report of no association with parity and increased prevalence with lower maternal age by Hazhir was not corroborated by this study [15]. The exact link between parity, maternal age and AB is yet to be established.

### **Maternal complications**

Regarding maternal complications in UTI cases of pregnant women, anaemia was found in 35.71%,

Preterm labour in 18.25%, PPRM in 14.29%, IUGR in 13.49% and only 4.76% had preeclampsia and 3.18 had suffered from Pyelonephritis. Anaemia was present in 44.8% of the women with UTI. Maternal anaemia has been reported in 25% to 66% of antepartum patients with pyelonephritis. The most probable cause of this haematological change is haemolysis secondary to endotoxin [16].

Overall insignificant association was observed between any Anemia and type of UTI i.e. either symptomatic or ASB. ( $p > 0.05$ ) correlating to Ansari *et al.* study [17]. This proved an indirect relation of anemia with asymptomatic bacteriuria. This correlates in our study which correlates with other studies by Jain *et al.* [6]. and Sheiner *et al.* [18] Similar figures have been reported in women with PROM [19–21].

This study did not demonstrate any statistically significant difference in pregnancy complications in women with AB when compared to women without AB. Other reports have associated asymptomatic bacteriuria with adverse pregnancy outcomes like preeclampsia, preterm labour, intrauterine growth restriction and prelabour rupture of fetal membranes [22–23]. Most of these reports in literature were not based on prospective comparative cohort studies of this nature. However, findings in this study are in support of findings from a multicenter prospective cohort study, which reported no significant adverse pregnancy outcome with AB [24].

Regarding puerperal complications in UTI cases of Pregnant women within 48 days of delivery, fever was found in 17 (51.51%) mothers, UTI in 10 (30.31%) and Wound infection in 6 (18.18%) mothers. With regard to preterm deliveries, the result of this study (31.6%) is consistent with the finding of previous studies [25].

### **Fetomaternal Outcome**

Regarding fetal outcome in UTI cases of pregnant women, NICU admission was maximum i.e. 28.57%, followed by around 19.8% with low birth weight, low APGAR score (19.1%) and preterm delivery (17.46%). Neonatal infection was observed in 8.73% and perinatal mortality in 5 (3.97%) cases. Significant association was observed between NICU admission and type of UTI i.e. either symptomatic or ASB ( $p < 0.05$ ).

We found that women who acquire urinary tract infections during pregnancy are at increased risk of delivering low-birth weight, premature and preterm low-birth weight infants. This again is at

variance with widely held view of low birth weight and preterm labour associated with AB [23].

Assuming that the association between urinary tract infection and prematurity is real, the mechanism by which the former might exert such an effect is not well established. Several investigators have demonstrated a high incidence (up to 50%) of pyelographic abnormalities, indicative of chronic pyelonephritis, in bacteriuric women [26].

It is plausible, then, that the effect of urinary tract infection on premature birth could be indirectly mediated by occult renal abnormalities that result in antepartum maternal complications such as hypertension/preeclampsia or anemia. It has been previously suggested that bacterial infection of the amniotic fluid is a risk factor for premature delivery [27,28]. One hypothesis contends that bacterial enzymes such as collagenase may weaken the fetal membranes and predispose them to rupture, which subsequently triggers the onset of labor [29]. A wider randomised control study and meta-analysis will help to resolve these conflicting reports in pregnancy outcome of AB.

### Conclusion

It can be concluded that UTI in pregnancy is associated with significant morbidity for both mother and baby. All pregnant mothers should be screened for UTI. Untreated UTI will lead to pre-term premature rupture of membrane, maternal chorioamnionitis, intrauterine growth retardation and low birth weight baby. Early treatment with antibiotics has significantly reduced the above complications. Urine culture and sensitivity remain the gold standard in diagnosing UTI. If patient's condition is not improving despite adequate and appropriate use of antimicrobials, further investigations for underlying predisposing factors are necessary. Prophylactic antibiotic is indicated for recurrent UTI.

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