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Original Research Article

Study of incidence of urinary tract infection during pregnancy and its effect on maternal and perinatal outcome

Suman Mahor^{1*}, Ritika Malviya¹, Ritu Goyal²

¹Department of Obstetrics and Gynecology SZH, GMC Bhopal, Madhya Pradesh, India

²Department of Obstetrics and Gynecology, DDU Hospital, Harinagar, New Delhi, India

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***Correspondence:**

Dr. Suman Mahor,

E-mail: sumanmahor@gmail.com

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ABSTRACT

Background: Urinary tract infection is the commonest bacterial infection in pregnancy, especially in developing countries like India. It has several adverse outcomes not only in the mother but also in the fetus. This study aims to determine the incidence of UTI during pregnancy, the commonest micro-organism causing UTI, and to find out the impact of such infection on maternal and fetal outcomes.

Methods: This observational study was carried out in the department of obstetrics and gynaecology Deen Dayal Upadhyay Hospital, New Delhi over a period of 10 months. A total of 196 pregnant women attending the outdoor hospital for ANC check-up without any medical disorder or previous adverse pregnancy outcomes were included in this study. Urine routine microscopy was done as a screening test for UTI. They were followed through their pregnancy and puerperium due to any pregnancy complication and perinatal outcome.

Results: Incidence of urinary tract infection was 12.2%, of which 8.2% were asymptomatic and 4.08% were symptomatic. It was found that the incidence of UTI was highest in the age group of 18 to 25 years and also found that UTI was more common in the second (16.7%) and third (16.7%) trimester and lowest in the first trimester (5.7%). Women who had anaemia, pregnancy-induced hypertension, preterm labour, chorioamnionitis, perinatal mortality, and puerperal pyrexia had a high incidence of UTI than those who had not.

Conclusions: From this study, we concluded that screening for UTI should be a part of routine antenatal care, and also there is a need to initiate an awareness program to educate women about UTI and their adverse fetomaternal outcome so that prompt and effective treatment can be done.

Keywords: FGR, LBW, PPROM, UTI

INTRODUCTION

UTI is the commonest bacterial infection in pregnancy, it occurs more frequently in developing countries, prevalence rate of UTI in pregnant women in America to be 2.5-8.7%, whereas the prevalence of UTI in pregnant women to be 12-40% in developing countries, this was due to difference in the socio-economic levels and standards of living.¹⁻³ UTI is the infection of the urogenital system, which can involve urethra, bladder and kidney. UTI during pregnancy is classified as either

asymptomatic or symptomatic.⁴ Although asymptomatic bacteriuria is the most common, this refers to persistent, actively multiplying bacteria, within the urinary tract in asymptomatic women. If asymptomatic bacteriuria is not treated, approximately 25% of infected women will develop symptomatic infection during pregnancy.⁴ Symptomatic and asymptomatic bacteriuria have been reported among 17.9% and 13% pregnant women respectively.⁵ UTI was said to be 4-10 times more common in pregnant women than in the nonpregnant women.⁶ This was because, during pregnancy, there is a

change in urine chemical composition with an increase in glucose and amino acids, which facilitate bacterial growth in urine.⁷

The organisms that cause UTI during pregnancy are same as those found in nonpregnant patients.⁸

Antepartum UTI has been implicated as a risk factor for adverse maternal and fetal outcome like- abortion, recurrent UTI, Anaemia, pregnancy-induced hypertension, PPROM, Chorioamnionitis, FGR, LBW, Preterm birth, Perinatal death and Puerperal pyrexia.^{9,10}

Thus screening for UTI should be a part of routine antenatal care.

METHODS

Study area

Department of Obstetrics and Gynaecology Deen Dayal Upadhyay Hospital, New Delhi.

Study design

Prospective observational study.

Study population

The study population comprised all pregnant women attending the Department of Obstetrics and Gynaecology, Deen Dayal Upadhyay Hospital, New Delhi.

Study period

July 2017 to June 2018.

Inclusion criteria

All antenatal women of age between 18-35 years with no medical disorders (Haemorrhagic disorders, Hypertension, Diabetes and Renal disorders). No previous adverse pregnancy outcome (abortion, perinatal deaths, prematurity or low birth weight).

Exclusion criteria

All immunocompromised patients.

Sampling method

The informed consent, detailed history, physical examination, relevant lab investigations, were done and the master chart was prepared

Sample size

196 pregnant women attending outdoor hospital were taken.

This sample size is based on previous study Mazor-Dray et al, "Maternal urinary tract infection: is it independently associated with adverse pregnancy outcome"

The sample size was calculated using the following formula (Charan and Biswas, 2013):

$n=4 \times pq/d^2$ the required sample size is 196 subjects.

Methodology

The pregnant women attending the department of obstetrics and gynaecology of DDU Hospital for an antenatal checkup, who fulfil the required criteria were included in this study. After proper counselling, written informed consent was taken from all the selected patients.

A detailed history, thorough clinical examination and routine investigations, was carried out in all cases. The biochemical investigation included haemoglobin estimation and serum urea and creatinine. Routine examination of urine and urine culture was done during 1st antenatal checkup and were repeated in 2nd and 3rd trimester.

The women who had a positive screening test of urine defined as >5 pus cell/HPF on routine examination of urine were subjected to urine culture and sensitivity. All the above information were recorded on predesigned proforma.

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 urinary tract infection. The women who didn't have such symptoms were classified as having asymptomatic urinary tract infection.

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.

Outcome of study

Maternal: Outcomes were measured in terms of; Anaemia, Pregnancy-induced hypertension, Premature rupture of membrane, Chorioamnionitis, Puerperal pyrexia.

Perinatal: Perinatal outcome is measured in terms of FGR, Preterm birth and Perinatal mortality.

Statistical methods

The results are presented in frequencies, percentages and mean \pm SD. The Chi-square test was used for comparisons. The p-value <0.05 was considered significant. All the

analysis was carried out on the SPSS 16.0 version (Chicago, Inc., USA).

RESULTS

Out of 196 pregnant women incidence of UTI was found to be 12.2% of which 8.2% were asymptomatic and 4.08% were symptomatic.

Table 1: Distribution of patients according to the incidence of UTI.

Incidence of UTI	No. (n=196)	%
Present	24	12.2
Absent	172	87.8

Table 1 shows the distribution of patients according to the incidence of UTI.

Table 2: Incidence of asymptomatic and symptomatic urinary tract infection during pregnancy.

	Number	% of total pregnant women with UTI	% of total pregnant Women
Asymptomatic UTI	16	66.7%	8.16%
Symptomatic UTI	8	33.3%	4.08%
Total No of Pregnant women with UTI	24	100%	12.2%

Table 3: Association of Incidence of UTI with age.

Age in years	No. of patients	Incidence of UTI				p-value ¹
		Present		Absent		
		No.	%	No.	%	
18-25	107	16	15.0	91	85.0	0.18
26-30	45	2	4.4	43	95.6	
>30	44	6	13.6	38	86.4	

Chi-square test.

Table 4: Association of incidence of UTI with gravida.

Gravida	No. of patients	Incidence of UTI				p-value ¹
		Present		Absent		
		No.	%	No.	%	
One	124	16	12.9	108	87.1	0.93
Two	53	6	11.3	47	88.7	
≥Three	19	2	10.5	17	89.5	

Chi-square test.

Table 2 shows the Incidence of asymptomatic and Symptomatic urinary tract infection during pregnancy. Among patient with UTI, about 66.7% were asymptomatic and 33.3% were symptomatic. Incidence of asymptomatic UTI among pregnant women was 8.16% while that of symptomatic UTI was 4.08%.

Figure 1 shows the association of the incidence of UTI with trimester. The incidence of UTI was higher among the patients in whom trimester was 2nd (16.7%) than 3rd (11.3%) and 1st (5.7%) years, however, the association was statistically insignificant (p>0.05).

Table 3 shows the association of the incidence of UTI with age. The incidence of UTI was higher among the patients aged 18-25 years (15%) than >30 (13.6%) and 26-30 (4.4%) years, however, the association was statistically insignificant (p>0.05).

Table 4 shows the association of the incidence of UTI with gravida. The incidence of UTI was higher among the

patients in whom gravida was one (12.9%) than two (11.3%) and ≥Three (10.5%) years, however, the association was statistically insignificant (p>0.05).

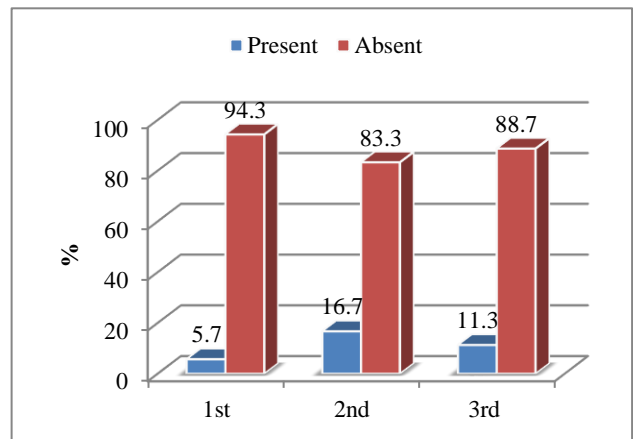


Figure 1: Association of incidence of UTI with trimester.

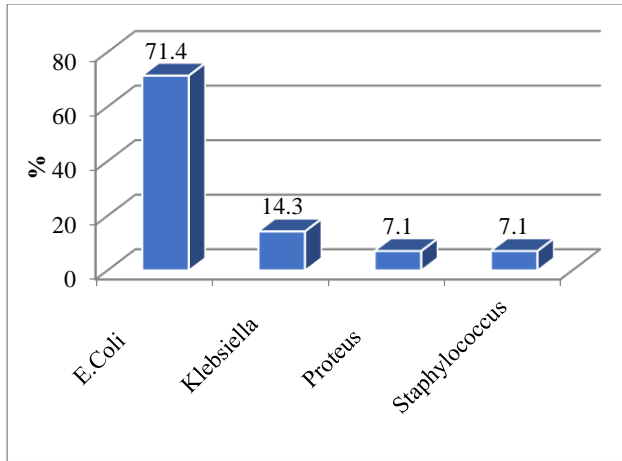


Figure 2: Distribution of organism.

Figure 2 shows the distribution of the organism. E.coli was found to be the most common organism (71.4%) followed by Klebsiella (14.3%) and Proteus and Staphylococcus (7.1%).

Table 5 shows the association of the incidence of UTI with anaemia. The incidence of UTI was higher among the patients in whom anaemia was present (21.6%) than absent (9%), the association was statistically significant (p=0.01).

Table 6 shows the association of the incidence of UTI with preterm delivery. The incidence of UTI was higher among the patients in whom delivery was preterm (24.44%) than the term (11.3%), the association was statistically significant (p<0.05).

Table 5: Association of incidence of UTI with anaemia.

Anaemia	No. of patients	Incidence of UTI				p-value ¹
		Present		Absent		
		No.	%	No.	%	
Yes	51	11	21.6	40	78.4	0.01*
No	145	13	9.0	132	91.0	

Chi-square test, *Significant

Table 6: Association of incidence of UTI with preterm.

Preterm	No. of patients	Incidence of UTI				p-value ¹
		Present		Absent		
		No.	%	No.	%	
Yes	45	11	24.44	34	75.6	0.02*
No	151	17	11.3	134	88.7	

Chi-square test-significant*

DISCUSSION

Incidence

Table 1 and Table 2 shows the overall incidence of UTI and incidence of asymptomatic and symptomatic UTI during pregnancy respectively. Incidence of UTI in our study was about 12.2 %. Out of this, about 33.3% of the pregnant women with UTI were found to be symptomatic while about 66.7% were asymptomatic UTI. Incidence of UTI as found by different authors have varied widely like Mazor dray E et al from France had found the incidence of UTI to be 2.3%.¹¹ Marahatta R et al from Nepal placed the incidence at 9.8%,while Francoisde de paul from South Africa at 5%.^{12,13}

On contrary, Anjana Verma et al from Udaipur, Rajasthan found the incidence of UTI to be 12.27%.¹⁴ Prabhavathi et al from Nothern Andhra Pradesh found the incidence of UTI to be 11.33%.¹⁵ Researchers of developed countries have found a lower incidence of UTI than their counterparts in developing countries.¹ The

difference in incidences may be explained by the differences in socioeconomic status and standards of hygiene in which the women live. This could also be due to a difference in criteria and technique adopted by different researchers.¹⁶ In most of the studies incidence of asymptomatic UTI in pregnancy is much more common than symptomatic UTI.^{17,18} So the results of the current study match with those of the earlier studies available.¹⁴

Demography

Age

Table 3 shows the association of incidence of UTI with age. In our study more than half of the patients (54.6%) were between 18 to 25 yrs followed by 26 to 30 yrs (23%) and > 30 yrs (22.4%). The highest incidence was seen in 18-25 years age group in whom the incidence was about 15% followed by 13.6% in the age group of more than 30 years and lowest was seen in 26-30 year age group in whom the incidence was 4.4%.

Parity

Table 4 shows the association of incidence of UTI with gravida. In our study, most of the patients were primigravida (12.9%), followed by second gravida (11.3%) and in three or more than three gravida incidence was lower (10.5%). Hence in our study parity was not found to be a significant factor influencing the incidence of UTI.

Trimester

Figure 1 shows the association of the incidence of UTI with trimester. In our study, most of the cases (16.7%) of UTI were detected during the second trimester, followed by 11.3% in the third trimester and the lowest incidence was found in the first trimester (5.7%). 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.¹⁹ Most of the studies found that the incidence of UTI was highest in the second trimester.^{20,21}

The causative organism of UTI

Figure 2 shows the distribution of organisms. In our study, E.coli was the commonest offending organism found in 10 pregnant women out of 14, (71.4%). This was followed by klebsiella which was seen in 2 cases out of 14 (14.3%), and Staphylococcus and Proteus were seen in 2 cases out of 14 (7.1% each). Most of the studies have identified E.coli as the commonest organism causing urinary tract infection.^{14,22}

Maternal outcome

In our study, the incidence of UTI was higher among the pregnant women in whom anaemia (21.6%), PIH (21.7%), Chorioamnionitis (18.2%) and Puerperal pyrexia (23.5%) was present than in whom it was absent.

Table 7: Maternal outcome.

Maternal outcome	UTI present	UTI absent
Anemia	21.6%	9%
PIH	21.7%	11%
Chorioamnionitis	18.2%	11.9%
Puerperal pyrexia	23.5%	11.2%

But except for anaemia (statistically significant, $p=0.01$), in all other maternal outcomes, the association was statistically insignificant ($p>0.05$).

Fetal outcome

In our study the incidence of UTI was higher among the patients in whom preterm birth (24.4%) and perinatal mortality (16.7%) was present than in whom it was

absent. However, in our study association of the incidence of UTI with FGR was not found.

Table 8: Fetal outcome.

Fetal outcome	UTI present	UTI absent
Preterm birth	24.44%	11.3%
FGR	13%	12.1%
Perinatal mortality	16.7%	12.2%

CONCLUSION

UTI in pregnancy leads to adverse maternal and fetal effects due to anatomical changes occurring in pregnancy, short urethra in females, easy contamination of urinary tract with faecal flora, immunodeficiency of pregnancy and various other reasons. The highest incidence of UTI is found maximum in the second trimester, maybe due to the physiological changes occurring mostly in the second trimester. UTI affects premature labour directly through development of amnionitis. Bacterial enzymes such as collagenase may weaken the fetal membrane. Pregnant women with UTI are at an increased risk for adverse maternal and fetal outcomes which could be prevented by antimicrobial treatment. Hence pregnant women should be screened for bacteriuria and treated if results are positive. Public educational programmes on the importance of personal hygiene and good environmental sanitation habits mostly during pregnancy should be carried out as a part of routine antenatal care.

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