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Impact of Urinary Tract Infection (UTI) on Maternal and Fetal Outcomes During Pregnancy; A Tertiary Care Hospital Experience

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Abstract

Background: Urinary tract infection (UTI) is one of the most prevalent bacterial infections during pregnancy, associated with significant maternal and fetal morbidity if left untreated. The physiological changes of pregnancy, such as urinary stasis and altered urine composition, increase the risk of both symptomatic and asymptomatic UTIs. Early identification and management are therefore crucial. ***Aim of the study:*** To evaluate the incidence of urinary tract infections during pregnancy and assess the associated maternal and fetal outcomes in a tertiary care setting. ***Methods:*** This prospective study was conducted over two years in the Department of obstetrics and Gynecology, Rangpur Community Medical College Hospital, Rangpur, Bangladesh. A total of 220 pregnant women aged 18–40 years were enrolled, of whom 41 were diagnosed with UTI based on clinical presentation, urine microscopy, and culture sensitivity. Patients were classified as having symptomatic or asymptomatic UTI and were followed throughout pregnancy and postpartum for adverse outcomes. Statistical analysis was performed using SPSS version 26. ***Result:*** Among the 41 UTI-positive cases, the highest incidence (60.98%) was observed in women aged 18–25 years and in primigravida patients (56.10%). The majority (58.54%) of infections occurred during the second trimester. Asymptomatic UTI accounted for 65.25% of cases. The most common pathogen was Escherichia coli (36.59%), followed by Klebsiella (24.39%). Adverse maternal outcomes included anemia (26.83%), puerperal pyrexia (24.39%), and abortion (12.20%). Fetal complications included preterm birth (36.59%), fetal growth restriction (14.63%), and perinatal mortality (12.20%). ***Conclusion:*** UTI during pregnancy is a frequent and often silent infection, with significant implications for both maternal and fetal health. Routine screening and prompt treatment are essential, especially during the second trimester, to minimize complications such as preterm labor, intrauterine growth restriction, and perinatal mortality.

Keywords: Urinary tract infection, pregnancy, asymptomatic bacteriuria, maternal outcomes, fetal outcomes, preterm birth, perinatal mortality.

INTRODUCTION

UTI is identified when there is an excessive presence of bacteria in the urinary tract (≥105 counts/mL of urine), regardless of whether clinical symptoms are present [1]. UTIs are commonly attributed to gram-negative bacteria rather than gram-positive bacteria. Gram-negative organisms such as E. coli (60-70%), Klebsiella (10%), Proteus (5-10%), and Pseudomonas (2-5%) are frequently responsible, while gram-positive organisms like Streptococcus species, Staphylococcus species, and Enterococcus species also play a role [2,3]. It is a significant public health concern, impacting over 150 million individuals, with an annual global financial burden of approximately $6 billion [4,5]. It ranks as one of the most prevalent infectious diseases, following closely behind upper respiratory tract infections in terms of frequency [6]. More than 50% of all women and at least 12% of men experience UTI in their lifetime [7]. Information on the prevalence of UTIs in children and pregnant women is widely accessible due to their increased vulnerability to secondary complications [8]. During pregnancy, it ranks as the second most frequent bacterial infection, affecting roughly 20% of pregnant women [9,10]. The risk of UTI begins to elevate around

the 6th week of pregnancy, reaching its peak levels between the 22nd and 24th weeks [11]. UTI is 4-10 times more common in pregnant women than in non-pregnant women [12]. This occurs because, during pregnancy, the pressure of the gravid uterus on the ureter leads to a stagnation of urine flow. Additionally, there are alterations in the chemical composition of urine, including increased levels of glucose and amino acids, which promote bacterial growth in the urine [11,13]. Symptomatic UTI is characterized by a positive urine culture accompanied by fever (> 38°C) and at least one urinary symptom (such as dysuria, urgency, frequency, or suprapubic pain or tenderness). Asymptomatic bacteriuria is diagnosed when there are no apparent signs or symptoms related to the urinary tract despite the presence of bacteria in the urine [14]. Asymptomatic bacteriuria poses a risk for both serious fetal and maternal complications. In mothers, it can lead to conditions such as maternal anemia, acute pyelonephritis, abortions, recurrent UTIs, preterm labor, septicemia, pregnancy-induced hypertension, preterm premature rupture of membranes (PPROM), chorioamnionitis, and puerperal pyrexia. For the fetus, it can result in intrauterine growth restriction, prematurity, low birth weight, and perinatal death [15]. Screening asymptomatic individuals for bacteriuria is justified due to the potential adverse outcomes that can be avoided with antimicrobial therapy. Moreover, preventing the progression of asymptomatic bacteriuria to symptomatic UTI later in life underscores the importance of early detection and treatment. This aligns with the age-old adage "prevention is better than cure." Hence, early identification and proper antibiotic treatment have been shown to reduce the risk by 80% in pregnant women [16]. Our study aims to investigating the frequency of UTIs during pregnancy and examining the maternal and fetal consequences linked to UTIs.

METHODOLOGY & MATERIALS

This is a prospective study, conducted at the Department of obstetrics and Gynecology, Rangpur Community Medical College Hospital, Rangpur, Bangladesh. Over two years, 220 pregnant patients were enrolled in the study, spanning from July 2022 to June 2024. Among these participants, 41 were diagnosed with urinary tract infections (UTIs). Prior to participation, patients provided informed consent. Comprehensive assessments were conducted for all participants, including detailed medical histories and physical examinations. Additionally, relevant laboratory investigations were documented in a master chart. Biochemical analyses encompassed haemoglobin estimation and serum urea and creatinine levels. Patients were also instructed to provide mid-stream urine samples for routine microscopy and urine culture sensitivity testing.

Inclusion criteria:

- All antenatal women between the ages of 18-40 years.

Exclusion criteria:

- Immunocompromised patients.
- Patients with medical disorders (Haemorrhagic disorders, hypertension, diabetes and renal disorders)
- Patients with previous adverse pregnancy outcomes (abortion, perinatal deaths, prematurity or low birth weight).

During the initial prenatal examination, a standard urine analysis was conducted. Positive results were determined by the presence of more than five pus cells per high power field (HPF) on routine urine examination. These individuals underwent further assessment through urine culture and sensitivity tests. All pertinent data were meticulously recorded following prescribed protocols. If a woman with a positive urine test exhibited symptoms such as frequent urination, burning sensation during urination, loin pain, fever, or lower abdominal pain, she was categorized as having symptomatic urinary tract infection (UTI). Conversely, those without such symptoms were classified as having asymptomatic UTIs. Based on these distinctions, patients were divided into two groups: those with UTI (comprising both asymptomatic and symptomatic cases) and those without UTI.

All patients from both groups were closely monitored throughout pregnancy and the postpartum period. Maternal and perinatal outcomes were meticulously documented, with results presented in frequencies and percentages. Data were organized into tables and graphs as appropriate, with detailed descriptions provided to ensure clarity of interpretation. Statistical analysis was conducted using the Statistical Package for Social Science (SPSS) program (version 26) on the Windows platform, ensuring the robustness and reliability of the findings.

RESULT

Among the studied population of 41 pregnant women, the majority were in the younger age group of 18-25 years, constituting 60.98% of the total cases. In contrast, a smaller proportion of UTI cases were observed among women aged 26-30 years, accounting for 29.27% of the total cases. Furthermore, only 9.76% of UTI cases were reported among pregnant women aged over 30 years (Table 1). The majority were found in primigravida individuals, accounting for 56.10% of the total cases. In comparison, a smaller proportion of UTI cases were observed in second gravida individuals, representing 24.39%. Additionally, 19.51% of UTI cases were reported in multigravida individuals (≥3 pregnancies) (Table 2). Table 3 shows that 24 pregnant cases (58.54%) of UTI were observed highest in second trimester of pregnancy, followed by third trimester in 13 patients (31.71%). Out of 41 patients of UTI in pregnancy, Figure 1 shows that asymptomatic UTI was observed in 65.25% of patients and urinary symptoms

(symptomatic UTI) were noted in 34.15% of patients. Table 4 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 23 patients (56.10%) who had 6-10 pus cells/ HPF, followed by 18 patients (46.90%) whose urine microscopy showed 11-20 pus cells/HPF. Table 5 shows commonest microorganisms causing UTI in pregnancy. E coli was most commonly observed organism in 15 patients (36.59%), followed by Klebsiella in 10 patients (24%). Proteus organism was noted in 7 cases (17.07%), Pseudomonas aeruginosa was noted in 5 cases (12.20%), and Staphylococcus aureus was seen in 4 cases (9.76%). Table 6 shows the maternal outcome of UTI in pregnancy. 12.20% patients had abortions, 26.83% patients had anaemia, 24.39% patients developed puerperal pyrexia. 9.76% patients developed chorioamnionitis and 4.88% patients developed PPROM, recurrent UTI and preterm labour each. Table 7 shows the effect of UTI in pregnancy on fetal outcome. Preterm births were noted in 36.59% patients, 14.63% babies showed fetal growth restriction and perinatal mortality was noted in 12.20% cases.

Table 1: Age wise distribution of cases of UTI in pregnant women, (n=41)

Age group (in years)	Frequency (n)	Percentage (%)
18-25	25	60.98
26-30	12	29.27
>30	4	9.76
Total	41	100

Table 2: Distribution of cases in relation to gravidity

Gravidity	Frequency (n)	Percentage (%)
Primigravida	23	56.10
Second gravida	10	24.39
Multigravida (≥3)	8	19.51
Total	41	100.00

Table 3: Distribution of cases according to trimesters

Trimesters	Frequency (n)	Percentage (%)
First trimester	4	9.76
Second trimester	24	58.54
Third trimester	13	31.71
Total	41	100.00

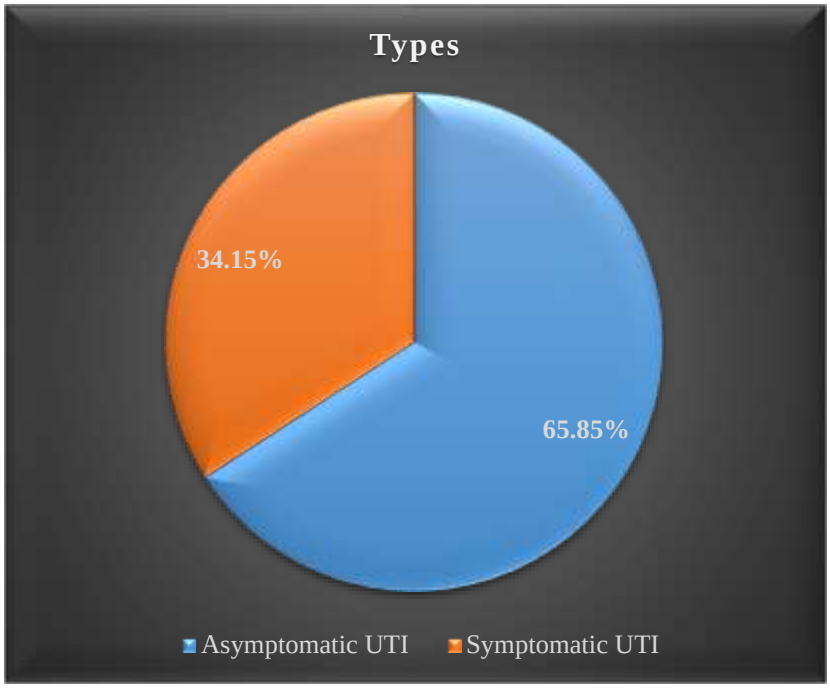

Figure 1: Distribution of cases according to asymptomatic and symptomatic UTI during pregnancy, (n=41)

Table 4: Distribution of cases in relation to pus cells on microscopy

Pus cells/hpf	Frequency (n)	Percentage (%)
0-5	0	0
6-10	23	56.10
11-20	18	43.90
Total	41	100.00

Table 5: Distribution of organisms causing UTI

Causative organism	Frequency (n)	Percentage (%)
E. coli	15	36.59
Klebsiella	10	24.39
Proteus	7	17.07
Pseudomonas aeruginosa	5	12.20
Staphylococcus aureus	4	9.76
Total	41	100.00

Table 6: Distribution of cases according to maternal outcome, (n=41)

Maternal outcome	Frequency (n)	Percentage (%)
Abortions	5	12.20
Anaemia	11	26.83
Hypertension	5	12.20
Puerperal pyrexia	10	24.39
Chorioamnionitis	4	9.76
PPROM	2	4.88
Recurrent UTI	2	4.88
Preterm labour	2	4.88
Total	41	100.00

Table 7: Effect of UTI on fetal outcome

Fetal outcome	Frequency (n)	Percentage (%)
Preterm birth	15	36.59
Fetal growth restriction	6	14.63
Perinatal mortality	5	12.20
Total	26	63.41

DISCUSSION

In this study, out of 220 patients examined, 41 cases were positive for UTI in pregnancy. This 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 [17,18]. In our study, UTI in pregnancy was high in 18-25 years age group in 25 patients (60.98%), followed by in 26-30 years age patients (29.27%). This is similar to Michael et al study and Mahor et al study [15,17]. Ouslander et al. in 2001 also observed highest prevalence in this age group, the reason could be due to the fact that many are sexually active in this stage group. Also, this is probably because, most of the patients had their pregnancy and marriages during this age group [19]. In our study, UTI in pregnancy is more common in primigravida patients (56.10%), followed by second gravida patients (24.39%) and 8 cases in multigravida patients (19.51%), this is similar to Ranjan et al study which showed 60% of primigravida having UTI in pregnancy and Mahor et al study [11,15]. According to our study, highest cases (58.54%) of UTI were observed in second trimester of pregnancy, followed by in third trimester in 13 patients (31.71%), and the lowest incidence was found in the first trimester (9.76%), which is similar to Mahor et al study [15]. 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 [17]. Out of 41 cases, 27 cases (65.85%) had asymptomatic UTI and 14 cases (34.15%) had symptomatic UTI. Incidence of UTI have varied widely like Michael study of 9.8% study and Prabhavati et al study of 11.33% [17,20]. In most of the studies, incidence of asymptomatic UTI in pregnancy is much more common than symptomatic UTI [21]. So, the results of the current study match with those of the earlier studies available. Women with higher number of pus cells in urine specimen had significantly higher asymptomatic bacteriuria. Present study showed 56.10% patients had pus cells of 6-10/HPF and 11-20/HPF in 43.90% of cases. This is similar to Ranjan et al study

[11]. The gold standard for detecting bacteriuria in pregnancy is urine culture. Table 8 shows the frequency of various isolated pathogens. 179 cases were negative and had no growth, 41 cases were positive for urinary pathogens. Among 41 cases the significant isolates are- E. coli (36.59%) of the cases and Klebsiella in 24.39% cases, Proteus organism was noted in 7 cases (17.07%), Pseudomonas aeruginosa was noted in 5 cases (12.20%), and Staphylococcus aureus was seen in 4 cases (9.76%). This is similar to results in studies of Ranjan et al and Verma et al study [11,22]. In this study, maternal outcome of UTI in pregnancy showed 5 patients (12.20%) had abortions, 11 patients (26.83%) had anaemia, 10 patients (24.39%) developed puerperal pyrexia, 4 patients (9.76%) developed chorioamnionitis and 2 patients (4.88%) each developed PPROM, recurrent UTI and preterm labour each. These maternal complication rates are similar to Mahor et al study and Ranjan et al study [11,15]. In our study, preterm births were noted in 36.59% patients, 14.63% babies showed fetal growth restriction and perinatal mortality was noted in 12.20% cases. Similar results were observed in Michael 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 [15,17].

Limitations of the study:

Every hospital-based study has some limitations and the present study undertaken is no exception to this fact. The limitations of the present study are mentioned. Therefore, the results of the present study may not be representative of the whole of the country or the world at large. The number of patients included in the present study was less in comparison to other studies. Because the trial was short, it was difficult to remark on complications and mortality.

CONCLUSION AND RECOMMENDATIONS

This study highlights the significant impact of urinary tract infections (UTIs) on both maternal and fetal outcomes during pregnancy. A notably high prevalence of asymptomatic bacteriuria was observed, particularly among primigravida women in the second trimester. Escherichia coli emerged as the most frequent pathogen. Maternal complications included anemia, puerperal pyrexia, and abortion, while fetal consequences such as preterm birth, fetal growth restriction, and perinatal mortality were documented. These findings reinforce the importance of routine screening and early intervention for UTIs during antenatal care. Timely diagnosis and appropriate antibiotic therapy can significantly reduce adverse outcomes, underscoring the need for integrating UTI management into standard prenatal protocols to safeguard maternal-fetal health.

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Ethical approval: *The study was approved by the Institutional Ethics Committee.*

REFERENCES

1. Taghavi Zahedkalaei A, Kazemi M, Zolfaghari P, Rashidan M, Sohrabi MB. Association between urinary tract infection in the first trimester and risk of preeclampsia: A case–control study. International Journal of Women's Health. 2020 Jul 10:521-6.
2. Amiri M, Lavasani Z, Norouzirad R, Najibpour R, Mohamadpour M, Nikpoor AR, Raeisi M, Marzouni HZ. Prevalence of urinary tract infection among pregnant women and its complications in their newborns during the birth in the hospitals of Dezful city, Iran, 2012-2013. Iranian Red Crescent Medical Journal. 2015 Aug;17(8).
3. Obiora CC, Dim CC, Ezegwui HU, Nwogu-Ikojo EE, Okeudo C. Asymptomatic bacteriuria among pregnant women with sickle cell trait in Enugu, South Eastern Nigeria. Nigerian journal of clinical practice. 2014;17(1):95-9.
4. Stamm, W.E. and Norrby, S.R., 2001. Urinary tract infections: disease panorama and challenges. The Journal of infectious diseases, 183(Supplement_1), pp.S1-S4.
5. Mann, R., Mediati, D.G., Duggin, I.G., Harry, E.J. and Bottomley, A.L., 2017. Metabolic adaptations of uropathogenic E. coli in the urinary tract. Frontiers in cellular and infection microbiology, 7, p.241.
6. Klumpp DJ, Rycyk MT, Chen MC, Thumbikat P, Sengupta S, Schaeffer AJ. Uropathogenic Escherichia coli induces extrinsic and intrinsic cascades to initiate urothelial apoptosis. Infection and immunity. 2006 Sep;74(9):5106-13.
7. Brumbaugh AR, Smith SN, Mobley HL. Immunization with the yersiniabactin receptor, FyuA, protects against pyelonephritis in a murine model of urinary tract infection. Infection and immunity. 2013 Sep;81(9):3309-16.
8. Sangeda RZ, Paul F, Mtweve DM. Prevalence of urinary tract infections and antibiogram of uropathogens isolated from children under five attending Bagamoyo District Hospital in Tanzania: A cross-sectional study. F1000Research. 2021 Jun 7;10:449.
9. Mikhail MS, Anyaegbunam A. Lower urinary tract dysfunction in pregnancy: a review. Obstetrical & gynecological survey. 1995 Sep 1;50(9):675-83.
10. Yan L, Jin Y, Hang H, Yan B. The association between urinary tract infection during pregnancy and preeclampsia: A meta-analysis. Medicine. 2018 Sep;97(36).
11. Ranjan A, Sridhar ST, Matta N, Chokkakula S, Ansari RK. Prevalence of UTI among pregnant women and its complications in newborns. Indian Journal of Pharmacy Practice. 2017;10(1).
12. Schulman A, Herlinger H. Urinary tract dilatation in pregnancy. The British journal of radiology. 1975 Aug;48(572):638-45.

13. Murtaza ME. Urinary tract infection in pregnancy. A survey in women attending antenatal clinic in Kenyatta national hospital by Murtaza muzaffer Essajee-2002. M. Med (obs/gyn) Thesis University of Nairobi. 2002.
14. KASS EH. Pregnancy, pyelonephritis and prematurity. Clinical obstetrics and gynecology. 1970 Jun 1;13(2):239-54.
15. Mahor S, Malviya R, Goyal R. Study of incidence of urinary tract infection during pregnancy and its effect on maternal and perinatal outcome. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2021 Apr 1;10(4):1497-503.
16. Nicolle LE. Management of asymptomatic bacteriuria in pregnant women. The Lancet Infectious Diseases. 2015 Nov 1;15(11):1252-4.
17. Michael E, Wadhwani R, Resident S. Urinary tract infection and its effect on outcome of pregnancy. Indian J Obstet Gynecol Res. 2017;4(2):108-1.
18. Kavitha V, Reddy AN, Nagireddy N, Pasha MM, Anvesh D, Kiran MS. Prevalence of urinary tract infection in pregnant women in the region of Warangal. IJPBS. 2015;5(3):136-44.
19. Ouslander JG, Greendale GA, Uman G, Lee C, Paul W, Schnelle J. Effects of oral estrogen and progestin on the lower urinary tract among female nursing home residents. Journal of the American Geriatrics Society. 2001 Jun;49(6):803-7.
20. Prabhavathi V, Krishnamma B, Krishna GM, Prasad DK. Prevalence of asymptomatic bacteriuria among antenatal women and its effects on maternal and perinatal outcome in northern Andhra Pradesh population. Int J Adv Med. 2018 Jan 18;5(1):179-85.
21. Kant S, Lohiya A, Kapil A, Gupta SK. Urinary tract infection among pregnant women at a secondary level hospital in Northern India. Indian journal of public health. 2017 Apr 1;61(2):118-23.
22. Verma A, Baheti S, Sharma M. Asymptomatic bacteriuria in pregnancy and its relation to perinatal outcome. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2016 Dec 1;5(12):4390-7.

