

Risk Factors of UTI in Pregnant Women and the Maternal and Perinatal Outcome

Dr. Parul Akhter^{1*}, Dr. Zinat Habiba², Dr. Salma Akhtar Walida³, Dr. Mst. Shabrin Akhter⁴, Dr. Sharmin Sultana⁵, Dr. Masuda Sultana⁶

¹Associate Professor, Obs and Gynae, Faridpur Medical College, Faridpur, Bangladesh

²Medical Officer, National Institute of Cancer Research and Hospital, Mohakhali, Dhaka, Bangladesh

³Associate Professor, Gynaecological Oncology, National Institute of Cancer Research and Hospital, Dhaka, Bangladesh

⁴Resident Surgeon (Gynae), Faridpur Medical College, Faridpur, Bangladesh

⁵Assistant Professor, Gynae, Faridpur Medical College, Faridpur, Bangladesh

⁶Assistant Professor (CC) (Fetomaternal Medicine), Fetomaternal Medicine Unit, Dept. of Gynae & Obs, Dhaka Medical College, Dhaka, Bangladesh

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*Corresponding Author: Dr. Parul Akhter

Associate Professor, Obs and Gynae, Faridpur Medical College, Faridpur, Bangladesh

Abstract

Background: Urinary tract infections (UTIs) are one of the most common bacterial infections during pregnancy, posing significant risks to maternal and perinatal health. Pregnant women are more susceptible to UTIs due to anatomical and physiological changes, including ureteral dilation and urinary stasis. Inadequate management can lead to complications such as pyelonephritis, preterm labor, and low birth weight. Understanding the risk factors and outcomes of UTIs is crucial for improving maternal and neonatal health, particularly in resource-limited settings like Bangladesh. **Objective:** To identify the risk factors of UTIs among pregnant women and assess their maternal and perinatal outcomes. **Methodology:** A case-control study was conducted at a tertiary medical college and hospital in Bangladesh from January 2022 to January 2023. Pregnant women aged 13–26 weeks with culture-positive UTIs were included as cases, and age-matched women with negative urine cultures served as controls. A total of 250 participants were enrolled. Data on socio-demographic variables, clinical symptoms, and pregnancy outcomes were collected using structured questionnaires. Statistical analyses were performed to explore associations between risk factors and UTI occurrence. **Results:** The prevalence of mid-trimester UTIs was 12.30%. The majority of cases (40.5%) were in the 20–30 age group. *Escherichia coli* (E. coli) was the most common causative organism, followed by *Pseudomonas* and *Klebsiella*. Risk factors included a history of UTI during the current pregnancy (22%) and increased sexual activity during early pregnancy (34.7%). Asymptomatic bacteriuria was the most frequent condition observed (32.3%). Maternal outcomes included a higher rate of caesarean delivery and preterm labor, while perinatal outcomes showed significantly lower birth weights in infants born to mothers with UTIs. **Conclusion:** UTIs in pregnancy are associated with significant maternal and perinatal risks, including preterm labor and low birth weight. Routine screening and early intervention can reduce complications. Efforts to improve awareness, prenatal care, and access to healthcare are essential for addressing UTIs in pregnant women, particularly in resource-limited settings.

Keywords: Urinary tract infections, pregnancy, maternal outcomes, perinatal outcomes.

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INTRODUCTION

Urinary tract infections (UTIs) are among the most common bacterial infections during pregnancy, posing significant risks to both maternal and perinatal health. The physiological and anatomical changes that occur during pregnancy, including ureteral dilation, urinary stasis, and hormonal alterations, create a conducive environment for bacterial growth, increasing the vulnerability of pregnant women to UTIs [1-4].

These infections, if left untreated or inadequately managed, can escalate into severe complications, including pyelonephritis, preterm labor, and neonatal sepsis. Understanding the risk factors associated with UTIs during pregnancy is crucial for developing effective preventive and management strategies [5-7].

In Bangladesh, where maternal healthcare challenges persist, the prevalence of UTIs among

pregnant women is a significant public health concern. Contributing factors such as low socioeconomic status, inadequate prenatal care, poor hygiene practices, and limited access to healthcare exacerbate the risks [8-11]. Nutritional deficiencies and a lack of awareness about UTI symptoms further compound the problem, making early detection and treatment less likely. Identifying these risk factors is essential for reducing the burden of UTIs and their associated complications in pregnant women.

The maternal outcomes of UTIs can range from mild discomfort to severe complications such as anemia, preeclampsia, and even maternal mortality in extreme cases. Additionally, infections can impact fetal health, leading to adverse perinatal outcomes such as low birth weight, intrauterine growth restriction (IUGR), and preterm birth. In resource-limited settings like Bangladesh, these outcomes are more pronounced due to gaps in healthcare infrastructure and maternal health services [12-13].

Despite advancements in global maternal health, disparities in the management of UTIs remain a challenge in low- and middle-income countries (LMICs) like Bangladesh. Cultural taboos, financial constraints, and gender disparities often prevent women from seeking timely medical care. This highlights the urgent need for targeted interventions, including community education programs and accessible healthcare facilities, to mitigate the impact of UTIs during pregnancy.

OBJECTIVE

This study aims to explore the risk factors contributing to UTIs among pregnant women in Bangladesh and examine their maternal and perinatal outcomes. By understanding these dimensions, healthcare providers and policymakers can better design and implement strategies to reduce the prevalence and severity of UTIs, ultimately improving maternal and neonatal health outcomes.

METHODOLOGY

This case-control study was conducted at a tertiary medical college and hospital from January 2022 to January 2023. The study aimed to explore the risk factors and outcomes of urinary tract infections (UTIs) in pregnant women during their second trimester, specifically between the 13th and 26th weeks of gestation. Pregnant women with positive urine cultures were included in the case group, while age-matched pregnant women with negative urine cultures formed the control group.

The study population comprised pregnant women attending the hospital within the specified gestational period. The case group included women with confirmed culture-positive UTIs, while the control group consisted of women without bacterial growth in their

urine cultures. A purposive sampling technique was used to recruit participants, ensuring a focused selection based on the study criteria. Socio-demographic characteristics, including age, occupation, parity, and gestational duration, were collected using structured questionnaires administered during patient interviews.

Participants were selected based on gestational age (13th–26th weeks) and their willingness to participate, as indicated by verbal informed consent. The exclusion criteria eliminated potential confounding factors by excluding pregnant women with diabetes, those on immunosuppressive therapy, those with renal diseases, and those who had taken antibiotics within 72 hours prior to urine sample collection.

Over the course of the study, 250 urine samples were collected and analyzed. Among these, 62 samples demonstrated significant bacterial growth and were included in the case group. The control group consisted of women with negative urine cultures, matched by age to the cases. Urine samples were processed using standard microbiological techniques to ensure reliable and valid results. Data on socio-demographic variables and clinical features were collected and kept confidential throughout the study to maintain ethical standards.

The data were analyzed using the Statistical Package for Social Sciences (SPSS), version 15.0. Descriptive statistics were employed to summarize socio-demographic and clinical features. Quantitative variables were expressed as mean \pm standard deviation (SD), while qualitative data were presented as frequencies and percentages. Comparative statistical analyses were performed to identify associations between risk factors and UTI occurrence in pregnancy.

Ethical principles guided the study design and implementation. Verbal informed consent was obtained from all participants after providing them with adequate information about the study's purpose and procedures. Confidentiality of all patient data was strictly maintained. The study's findings aim to contribute to the understanding and management of UTIs in pregnancy, addressing a critical maternal health issue in Bangladesh.

RESULTS

The age distribution of the participants revealed a significant difference between the case and control groups. Among the case group, 40.5% of women were aged 20–30 years, compared to only 9.5% in the control group. Similarly, 38.8% of the case group were over 30 years of age, whereas only 10.2% of the control group fell into this age bracket. This indicates a higher prevalence of urinary tract infections among women aged 20 years and above, highlighting age as a potential risk factor for UTIs during pregnancy.

Table 1: Age distribution of the patients

Age groups	Case, %	Control, %
20-30 years	40.5	9.5
>30 years	38.8	10.2

In figure-1 shows parity distribution of the study group where UTI was more prevalent among birth order second and third irrespective of previous obstetric history and it was almost equal in both case and control

(28 % and 29.2%). In primi patient it was 16.1%. From three and more birth order UTI showed reduced preponderance. The following figure is given below in detail:

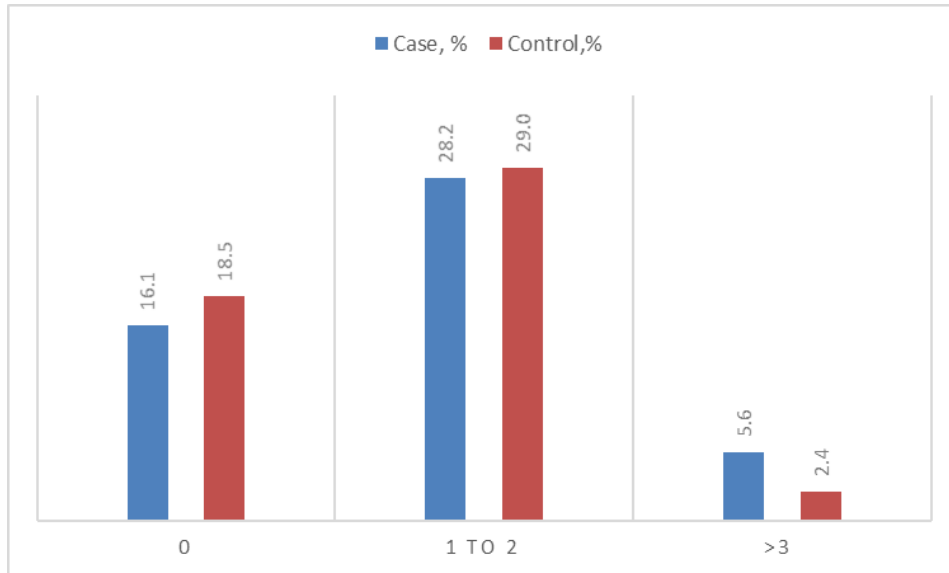


Figure 1: Parity distribution of the study group

Figure 2 illustrates the organisms responsible for UTIs in the study, with *E. coli* identified as the most common causative agent, followed by *Pseudomonas* and *Klebsiella*. Asymptomatic

bacteriuria was the most frequently observed condition among the cases. The detailed distribution of these organisms is presented in the figure below.

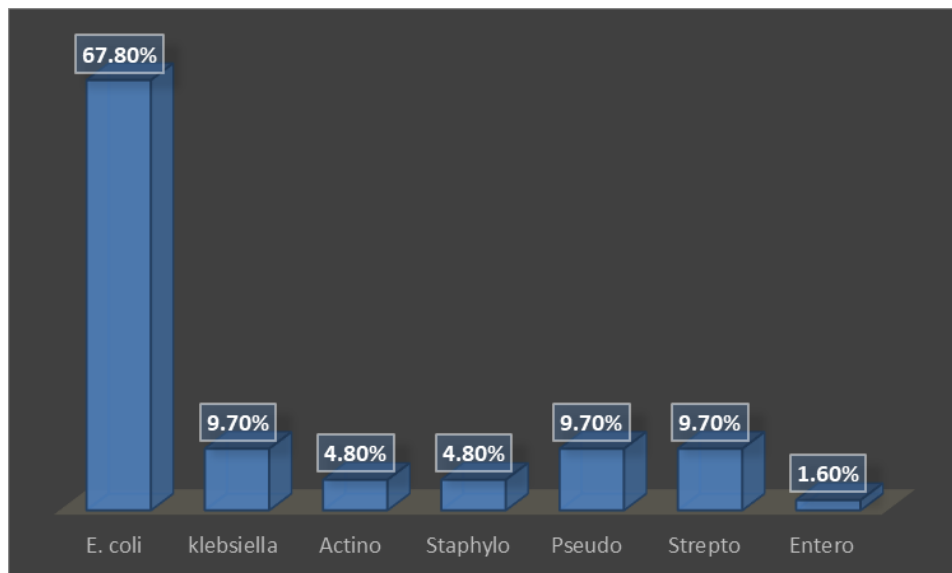


Figure 2: Organisms responsible for UTI

In figure-3 shows mode of delivery. Caesarean section was higher in women with UTI than without

caused mostly due to prematurity and fetal distress. The following is given below in detail:

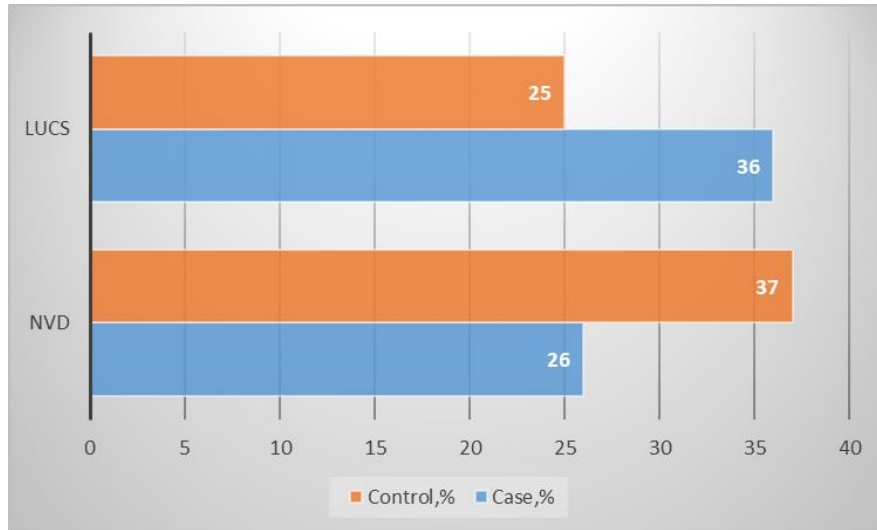


Figure 3: Mode of delivery

Table 2 highlights the etiological factors associated with UTIs. A past history of UTI before pregnancy was not identified as a significant risk factor. However, a previous history of UTI during the current pregnancy was notably higher in the case group,

accounting for 22%. Additionally, sexual activity in early pregnancy emerged as a significant contributor to the development of UTIs. The detailed data is presented in the table below.

Table 2: Causes of UTI

Parameters	Case (%)	Control (%)	X ² Test
Past H/O UTI			
Present	(30.6)	(30.6)	0.574
Absent	(19.4)	(19.4)	
Previous H/O UTI in current Pregnancy			
Present	(17.7)	-	<0.001
Absent	(32.3)	(50)	
Sexual activity			
Present	(34.7)	(16.1)	<0.001
Absent	(15.3)	(33.1)	

In figure-4 shows Symptoms of UTI. Where most of the cases UTI was asymptomatic, 32.3%. the following figure is given below in detail:

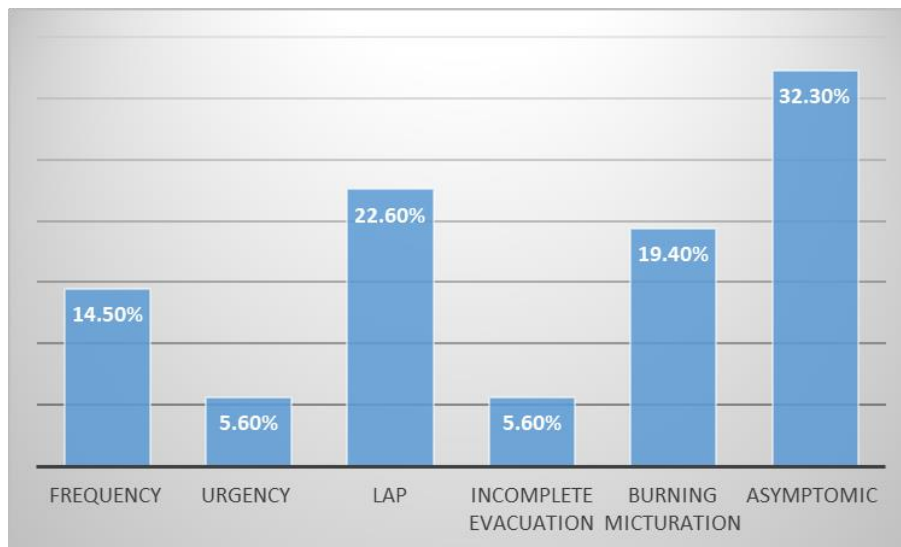


Figure 4: Symptoms of UTI

Table-3 shows fetal outcome where preterm labour was comparatively high in case group. Birth weight of babies born to UTI mother was significant

lower than their counterpart. The following table is given below in detail:

Table 3: Fetal outcome

Complications	Case, %	Control, %	X ² test
Preterm labour	8.9	4.0	0.090
Low birth weight	15.3	0.8	<0.001
PROM	11.3	4.8	0.043
Fetal distress	28	17.7	0.019
Admission in NICU	16.3	14.52	0.697

DISCUSSION

The prevalence of mid-trimester UTIs in this study was 12.30%, which is lower than the reported prevalence during the third trimester of pregnancy, as documented in a 2011 study at Dhaka National Medical College [13]. This variation may be attributed to the progressive anatomical and physiological changes in the genitourinary tract during pregnancy, which become more pronounced in later trimesters.

Previous research has established a correlation between UTIs and adverse maternal and perinatal outcomes, such as low birth weight, preterm delivery, hypertension/preeclampsia, intrauterine growth restriction (IUGR), caesarean delivery, and even maternal and neonatal mortality [13]. However, not all studies have reported consistent findings. Discrepancies may arise from factors such as sampling bias, environmental differences, inadequate control of confounding variables, and whether the study population was hospital-based or community-based [14].

In our study, preterm labor was found to be significantly higher in the case group compared to controls. Additionally, the birth weight of babies born to mothers with UTIs was markedly lower than that of babies born to mothers without UTIs. These findings align with existing evidence suggesting that UTIs contribute to adverse pregnancy outcomes.

The increased incidence of preterm labor and UTI-related complications is likely driven by inflammatory responses triggered by uro-pathogens. These pathogens produce cytokines and prostaglandin mediators that stimulate uterine contractions. Specifically, they secrete collagenase and phospholipases A and C, which act as precursors to pro-contractile prostaglandins E2 and F2a, thereby increasing the risk of preterm delivery [15].

The predominance of *Escherichia coli* (*E. coli*) as the primary causative agent of UTIs in this study, followed by *Pseudomonas* and *Klebsiella*, aligns with global trends. However, the emergence of multidrug-resistant strains of *E. coli* is a significant concern that warrants immediate attention to mitigate adverse maternal and neonatal outcomes [16]. In our study,

asymptomatic bacteriuria was the most common clinical condition associated with UTIs, followed by symptoms like lower abdominal pain (22.6%) and headache (19.5%).

These findings underscore the need for early detection and management of UTIs during pregnancy to prevent complications. Strengthening antenatal care and raising awareness about the risks associated with asymptomatic infections could help improve maternal and neonatal health outcomes.

CONCLUSION

Our study indicates that UTIs in mothers are a significant contributor to lower birth weights in infants. Routine urine screening during pregnancy is crucial for early diagnosis and timely intervention. Further research is needed to enhance understanding and improve outcomes.

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