

# The Etiology of Urinary Tract Infections among Pregnant Women in a Tertiary Care Hospital- A Prospective Observational Study

Dr. Ferdousi Begum<sup>1\*</sup>, Dr. Dipi Barua<sup>2</sup>, Dr. Ayesha Nigar Nur<sup>3</sup>

<sup>1</sup>Assistant Professor, Department of Obstetrics and Gynaecology, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh

<sup>2</sup>Professor, Department of Obstetrics and Gynaecology, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh

<sup>3</sup>Assistant Professor, Department of Obstetrics and Gynaecology, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh

DOI: [10.36348/sijog.2023.v06i05.005](https://doi.org/10.36348/sijog.2023.v06i05.005)

| Received: 08.04.2023 | Accepted: 15.05.2023 | Published: 20.05.2023

\*Corresponding author: Dr. Ferdousi Begum

Assistant Professor, Department of Obstetrics and Gynaecology, Holy Family Red Crescent Medical College, Dhaka, Bangladesh

## Abstract

**Introduction:** Urinary tract infections (UTIs) are a common health issue among pregnant women, leading to adverse maternal and neonatal outcomes. Despite this, the etiology of UTIs among pregnant women, particularly in resource-limited settings like Bangladesh, is poorly understood. **Methods:** This prospective observational study was conducted at the Department of Obstetrics and Gynecology, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh. A total of 120 pregnant women with UTIs, admitted between January 2021 and June 2022, were included in the study following specific inclusion and exclusion criteria. **Result:** The majority of the women was aged 18-24 years (35.83%) and had secondary education (32.50%). Anemia and proteinuria were present in 31.67% and 20.00% of the women, respectively. The primary obstetric characteristic was being primigravida (60.00%). Key risk factors of UTIs included a history of UTI (25.00%), diabetes mellitus (12.50%), frequent sexual activity (33.33%), history of urinary tract abnormalities (8.33%), use of urinary catheters (4.17%), and recent antibiotic use (20.83%). The primary etiological agent was *Escherichia coli* (60.00%). **Conclusion:** The findings underscore the need for comprehensive antenatal care, including routine screening for UTIs, anemia, and proteinuria among pregnant women in Bangladesh. Targeted interventions, such as health education and improved sanitation, are recommended to mitigate the identified risk factors. Further research on antimicrobial resistance patterns among the identified etiological agents is warranted to guide appropriate antimicrobial therapy.

**Keywords:** Infection, Pregnancy, Urinary, Etiology.

Copyright © 2023 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

## INTRODUCTION

Urinary tract infections (UTIs) are common among the general population, but they present a significant public health concern, especially for pregnant women. Pregnant women are more susceptible to UTIs due to physiological changes during pregnancy, such as increased urinary stasis, decreased ureteral peristalsis, and urinary retention, which may facilitate bacterial colonization and infection [1, 2]. UTIs during pregnancy not only cause discomfort to the expectant mother but also have the potential to lead to severe maternal and neonatal complications. These may include preterm labor, low birth weight, preeclampsia, and increased perinatal mortality [3]. Bangladesh, a

low-middle-income country in South Asia, has a high prevalence of UTIs among pregnant women. According to a study by Lee *et al.*, (2019), the prevalence of UTIs in pregnant women in Bangladesh is approximately 8.9% [4]. This high prevalence is influenced by various factors, such as limited access to healthcare services, poor hygiene, low socioeconomic status, and inadequate knowledge regarding UTIs and their prevention [5, 6]. Given the significant health implications of UTIs in pregnant women, it is crucial to identify the etiology and risk factors associated with these infections in a tertiary care hospital setting in Bangladesh. Previous studies conducted in Bangladesh have reported *Escherichia coli* as the most common uropathogen responsible for UTIs among pregnant

women, followed by *Klebsiella pneumoniae*, *Staphylococcus aureus*, and *Enterococcus* spp [1, 7–9]. However, these studies have been limited by small sample sizes and a lack of data from tertiary care hospitals. A larger, prospective observational study conducted in a tertiary care hospital setting will provide more accurate and generalizable information on the etiology of UTIs in pregnant women in Bangladesh. Moreover, several risk factors have been identified in previous research that may predispose pregnant women to UTIs, such as age, parity, gestational age, history of UTIs, and anemia [10]. However, the relationship between these risk factors and the etiology of UTIs in pregnant women in Bangladesh remains unclear. A prospective observational study can help elucidate these relationships and inform targeted interventions for at-risk populations. A prospective observational study in a tertiary care hospital will provide valuable insights into the etiology of UTIs among pregnant women in Bangladesh. The findings can help healthcare providers and policymakers devise appropriate preventive and therapeutic strategies to reduce the incidence of UTIs and improve maternal and neonatal outcomes. Furthermore, understanding the etiology of UTIs in pregnant women can contribute to a better understanding of antimicrobial resistance patterns and inform antibiotic stewardship programs in Bangladesh, where antibiotic resistance is an emerging concern.

## METHODS

This prospective observational study was conducted at the Department of Obstetrics and Gynecology, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh, over 18 months, from January 2021 to June 2022. A total of 120 pregnant women visiting the study hospital with urinary tract infections were included in the study, following specific inclusion and exclusion criteria. Inclusion criteria consisted of pregnant women aged 18-45 years who presented with symptoms suggestive of a urinary tract infection or had a positive urine culture, women with singleton pregnancies in any trimester, and those who provided informed consent. Exclusion criteria included women with a history of chronic kidney disease, urinary tract abnormalities, or recent urologic procedures, those with known immunosuppressive disorders or receiving immunosuppressive therapy, women with multiple gestations, those already receiving antibiotic treatment for UTIs or other infections at the time of recruitment, and women who did not provide informed consent. Ethical approval regarding the study was obtained from the ethical review committee of the study hospital. Data was collected using a pre-tested questionnaire, and analyzed using the SPSS V.25 software.

## RESULTS

**Table 1: Distribution of participants by sociodemographic characteristics**

Variable	Frequency	Percentage (%)
<b>Age group</b>		
18-24 years	43	35.83%
25-31 years	47	39.17%
32-38 years	25	20.83%
39-45 years	5	4.17%
<b>Education level</b>		
No formal education	31	25.83%
Primary education	35	29.17%
Secondary education	39	32.50%
Tertiary education	15	12.50%
<b>Monthly family income (BDT)</b>		
< 15,000	45	37.50%
15,000 - 29,999	50	41.67%
≥ 30,000	25	20.83%

The majority of the pregnant women (35.83%) were in the age group of 18-24 years, followed by 39.17% in the 25-31 years' age group, 20.83% in the 32-38 years age group, and the smallest proportion (4.17%) in the 39-45 years age group. Regarding education levels, 25.83% of the participants had no formal education, 29.17% had completed primary

education, 32.50% had completed secondary education, and 12.50% had completed tertiary education. In terms of monthly family income, 37.50% of the participants had an income of less than 15,000 BDT, 41.67% had an income between 15,000 and 29,999 BDT, and 20.83% had an income of 30,000 BDT or more.

**Table 2: Distribution of participants by baseline clinical findings**

Variable	Frequency	Percentage (%)
<b>Hemoglobin level (g/dL)</b>		
< 11 (Anemia)	38	31.67%
≥ 11 (Normal)	82	68.33%
<b>Presence of proteinuria</b>		

Yes	24	20.00%
No	96	80.00%

31.67% of the pregnant women had anemia, with hemoglobin levels below 11 g/dL, while 68.33% had normal hemoglobin levels ( $\geq 11$  g/dL).

Additionally, the presence of proteinuria was observed in 20.00% of the participants, while 80.00% did not have proteinuria.

**Table 3: Distribution of participants by obstetrics characteristics**

Variable	Frequency	Percentage (%)
<b>Gravidity</b>		
Primigravida	72	60.00%
Multigravida	48	40.00%
<b>Gestational age (weeks)</b>		
1st trimester (1-13)	20	16.67%
2nd trimester (14-26)	70	58.33%
3rd trimester (27-40)	30	25.00%

The distribution of participants by obstetrics characteristics indicated that 60.00% of the pregnant women were primigravida, while 40.00% were multigravida. In terms of gestational age, 16.67% of the

participants were in their first trimester (1-13 weeks), 58.33% were in the second trimester (14-26 weeks), and 25.00% were in the third trimester (27-40 weeks).

**Table 4: Distribution of participants by risk factors of UTI**

Variable	Frequency	Percentage (%)
History of UTI	30	25.00%
Diabetes Mellitus	15	12.50%
Sexual activity ( $\geq 3$ times/week)	40	33.33%
History of urinary tract abnormality	10	8.33%
Use of urinary catheter	5	4.17%
Recent antibiotic use	25	20.83%

In terms of risk factors, 25.00% of the pregnant women had a history of UTI, while 12.50% had diabetes mellitus. Frequent sexual activity ( $\geq 3$  times per week) was reported by 33.33% of the

participants. A history of urinary tract abnormalities was found in 8.33% of the women, while 4.17% had used a urinary catheter. Additionally, 20.83% of the participants had used antibiotics recently.

**Table 5: Distribution of participants by primary etiological agent of UTI**

Etiological agent	Frequency	Percentage (%)
Escherichia coli	72	60.00%
Klebsiella pneumoniae	20	16.67%
Staphylococcus aureus	15	12.50%
Enterococcus spp.	8	6.67%
Others	5	4.17%

Escherichia coli were the most common causative agent, accounting for 60.00% of the cases. Klebsiella pneumonia was responsible for 16.67% of the UTIs, followed by Staphylococcus aureus at 12.50%, and Enterococcus spp. at 6.67%. Other etiological agents accounted for 4.17% of the UTIs in the study population.

## DISCUSSION

The present study aimed to investigate the etiology of urinary tract infections (UTIs) among pregnant women in a tertiary care hospital in Bangladesh. The findings revealed several significant insights into the socio-demographic characteristics, clinical findings, obstetric characteristics, and risk

factors of UTIs among pregnant women, as well as the primary causative agents. The socio-demographic characteristics showed that the majority of pregnant women with UTIs were in the age group of 18-24 years (35.83%), which is consistent with previous studies suggesting that younger women are at a higher risk of UTIs during pregnancy [11, 12]. This increased risk in younger women may be attributed to their increased sexual activity and shorter urethra, which facilitates the ascent of bacteria into the urinary tract [13]. The educational level of the participants revealed that 25.83% had no formal education, which may be a contributing factor to the increased prevalence of UTIs. Previous studies have shown that lower education levels are associated with poor health-seeking behavior,

inadequate knowledge about personal hygiene, and limited access to healthcare services [14]. The distribution of participants by baseline clinical findings showed that 31.67% of the pregnant women had anemia. A study by Tadesse *et al.*, (2014) demonstrated a significant association between anemia and UTIs in pregnant women, suggesting that anemia may be a predisposing factor for UTIs during pregnancy. Proteinuria was present in 20.00% of the participants, which was in line with the findings of a few studies who had reported that proteinuria may be a marker for UTI and kidney dysfunction during pregnancy [15, 16]. In terms of obstetric characteristics, 60.00% of the participants were primigravida, which is consistent with the findings of a few studies who reported a higher prevalence of UTIs among primigravida women [17, 18]. This increased risk may be due to the physiological changes during the first pregnancy, such as urinary stasis and vesicoureteral reflux, which predispose women to UTIs [19]. The risk factors of UTIs identified in this study included a history of UTI (25.00%), diabetes mellitus (12.50%), frequent sexual activity (33.33%), history of urinary tract abnormalities (8.33%), use of urinary catheters (4.17%), and recent antibiotic use (20.83%). These findings align with those of several previous studies, which have shown that these factors contribute to an increased risk of UTIs among pregnant women [2, 8, 20]. The primary etiological agents identified in this study were *Escherichia coli* (60.00%), *Klebsiella pneumoniae* (16.67%), *Staphylococcus aureus* (12.50%), *Enterococcus spp.* (6.67%), and other agents (4.17%). These findings are consistent with the results of other studies conducted in various settings, which have reported similar causative agents for UTIs in pregnant women [20–22].

#### Limitations of the Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

#### CONCLUSION

In conclusion, the findings of this study highlight the importance of understanding the socio-demographic, clinical, and obstetric factors associated with UTIs in pregnant women, as well as the primary etiological agents. This knowledge is essential for the development of targeted preventive measures and effective management strategies to reduce the prevalence and complications of UTIs during pregnancy. Further research is needed to explore the potential impact of interventions, such as health education, improved sanitation, and targeted screening for UTIs among high-risk pregnant women in Bangladesh. Overall, this study contributes valuable knowledge about the etiology of UTIs among pregnant women in Bangladesh, as well as the associated risk factors and demographic characteristics. These findings have important implications for healthcare providers,

who can use this information to inform targeted interventions aimed at reducing the burden of UTIs in this population.

**Funding:** No funding sources.

**Conflict of Interest:** None declared.

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

#### REFERENCES

- Habak, P. J., & Griggs, J. (2023). Urinary Tract Infection In Pregnancy. In: *StatPearls*. StatPearls Publishing; 2023. Accessed May 9, 2023. <http://www.ncbi.nlm.nih.gov/books/NBK537047/>
- Haider, G., Zehra, N., Munir, A. A., & Haider, A. (2010). Risk factors of urinary tract infection in pregnancy. *JPMA. The Journal of the Pakistan Medical Association*, 60(3), 213-216.
- Gilstrap III, L. C., & Ramin, S. M. (2001). Urinary tract infections during pregnancy. *Obstetrics and gynecology clinics of North America*, 28(3), 581-591. doi:10.1016/s0889-8545(05)70219-9
- Lee, A. C., Mullany, L. C., Koffi, A. K., Rafiqullah, I., Khanam, R., Folger, L. V., ... & Baqui, A. H. (2020). Urinary tract infections in pregnancy in a rural population of Bangladesh: population-based prevalence, risk factors, etiology, and antibiotic resistance. *BMC Pregnancy and Childbirth*, 20(1), 1-11. doi:10.1186/s12884-019-2665-0
- Islam, M. A., Islam, M. R., Khan, R., Amin, M. B., Rahman, M., Hossain, M. I., ... & Riley, L. W. (2022). Prevalence, etiology and antibiotic resistance patterns of community-acquired urinary tract infections in Dhaka, Bangladesh. *Plos one*, 17(9), e0274423. doi:10.1371/journal.pone.0274423
- Matin, M. A., Khan, W. A., Karim, M. M., Ahmed, S., John-Langba, J., Sankoh, O. A., ... & Wertheim, H. (2020). What influences antibiotic sales in rural Bangladesh? A drug dispensers' perspective. *Journal of Pharmaceutical Policy and Practice*, 13(1), 1-12. doi:10.1186/s40545-020-00212-8
- Tabassum, N., Akter, A., & Acharjee, M. (2020). Prevalence of urinary tract infection among the patients admitted in the Brahmanbaria medical College hospital in Bangladesh. *Merit Research Journal of Medicine and Medical Sciences*, 8(5), 111-119.
- Amiri, M., Lavasani, Z., Norouzrad, R., Najibpour, R., Mohamadpour, M., Nikpoor, A. R., ... & Marzouni, H. Z. (2015). 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*, 17(8), e26946. doi:10.5812/ircmj.26946
- Asmat, U., Mumtaz, M. Z., & Malik, A. (2021). Rising prevalence of multidrug-resistant

- uropathogenic bacteria from urinary tract infections in pregnant women. *Journal of Taibah University Medical Sciences*, 16(1), 102-111. doi:10.1016/j.jtumed.2020.10.010
10. Sujatha, R., & Nawani, M. (2014). Prevalence of asymptomatic bacteriuria and its antibacterial susceptibility pattern among pregnant women attending the antenatal clinic at Kanpur, India. *Journal of clinical and diagnostic research: JCDR*, 8(4), DC01-03. doi:10.7860/JCDR/2014/6599.4205
  11. Johnson, C. Y., Rocheleau, C. M., Howley, M. M., Chiu, S. K., Arnold, K. E., Ailes, E. C., & National Birth Defects Prevention Study. (2021). Characteristics of women with urinary tract infection in pregnancy. *Journal of Women's Health*, 30(11), 1556-1564. doi:10.1089/jwh.2020.8946
  12. Laari, J. L., Anab, M., Jabong, D. P., Abdulai, K., & Alhassan, A. R. (2022). Maternal Age and Stage of Pregnancy as Determinants of UTI in Pregnancy: A Case of Tamale, Ghana. *Infectious Diseases in Obstetrics and Gynecology*, 2022, 3616028. doi:10.1155/2022/3616028
  13. Schneeberger, C., Geerlings, S. E., Middleton, P., & Crowther, C. A. (2012). Interventions for preventing recurrent urinary tract infection during pregnancy. *Cochrane Database of Systematic Reviews*, (11), CD009279. doi:10.1002/14651858.CD009279.pub3
  14. Imade, P. E., Izeke, P. E., Eghafona, N. O., Enabulele, O. I., & Ophori, E. (2010). Asymptomatic bacteriuria among pregnant women. *North American journal of medical sciences*, 2(6), 263-266. doi:10.4297/najms.2010.2263
  15. Ghamrawi, R., Kattah, A. G., & Garovic, V. D. (2019). Isolated Proteinuria of Pregnancy: A Call for Action. *Kidney International Reports*, 4(6), 766-768. doi:10.1016/j.ekir.2019.04.012
  16. Evaluation of proteinuria in pregnancy and management of nephrotic syndrome. Accessed May 12, 2023. <https://www.medilib.ir/uptodate/show/4808>
  17. Ranjan, A., Sridhar, S. T. K., Matta, N., Chokkakula, S., & Ansari, R. K. (2017). Prevalence of UTI among pregnant women and its complications in newborns. *Indian Journal of Pharmacy Practice*, 10(1).
  18. Getaneh, T., Negesse, A., Dessie, G., Desta, M., & Tigabu, A. (2021). Prevalence of Urinary Tract Infection and Its Associated Factors among Pregnant Women in Ethiopia: A Systematic Review and Meta-Analysis. *BioMed Research International*, 2021, 6551526. doi:10.1155/2021/6551526
  19. Delzell, J. E., & Lefevre, M. L. (2000). Urinary tract infections during pregnancy. *Am Fam Physician*, 61(3), 713-721.
  20. Foxman, B. (2003). Epidemiology of urinary tract infections: incidence, morbidity, and economic costs. *Dis Mon.*, 49(2), 53-70. doi:10.1067/mda.2003.7
  21. Demilie, T., Beyene, G., Melaku, S., & Tsegaye, W. (2012). Urinary bacterial profile and antibiotic susceptibility pattern among pregnant women in North West Ethiopia. *Ethiopian journal of health sciences*, 22(2), 121-128.
  22. Nicolle, L. E. (2008). Uncomplicated urinary tract infection in adults including uncomplicated pyelonephritis. *Urol Clin North Am*, 35(1), 1-12, v. doi:10.1016/j.ucl.2007.09.004