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Etiological Factors of Urinary Tract Infections in Pregnant Women: A Comprehensive Study

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ABSTRACT

Background: Urinary tract infection is becoming very common in pregnant women because many physical and hormonal changes make the urinary system weak and allow germs to grow. These infections can move upward very fast and may cause serious problems like kidney infection, early labor, and low weight of the baby. **Objective:** To determine the frequency of etiological factors leading to urinary tract infection in pregnant women. **Study Design:** Cross sectional study. **Duration and Place of Study:** This study was done from February 2025 to May 2025 in the Department of Obstetrics and Gynecology, Abbas Institute of Medical Sciences, Muzaffarabad. **Methodology:** A total of 170 pregnant women between 15 and 40 years were included. Data were collected about age, education, income, parity, trimester, sexual activity, and history of urinary problems. Urinary tract infection was confirmed by white cell count and culture report. **Results:** The mean age of women was 30.85 years. The most common etiological factor was maternal anemia seen in 27.60% of women. Frequent sexual activity was present in 25.30% cases. Low family income was found in 18.80% women. History of urinary infection was seen in 18.20% women. History of catheter use was recorded in 16.50% women. First trimester pregnancy was found in 16.50%. Multiparity was observed in 12.90%, young maternal age in 8.80%, and illiteracy in 10.60%. **Conclusion:** This study showed that maternal anemia is the main etiological factor for urinary tract infection in pregnant women.

INTRODUCTION

Urinary tract infection in pregnancy becoming very common because many physical and hormonal changes make the urinary system more weak to infection.[1] During pregnancy the bladder tone becoming low, urine stay longer, and the growing uterus press on the bladder which cause incomplete emptying.[2] Because of this situation bacteria get more chance to grow and move upward in urinary tract. Many pregnant women also do not feel early symptoms clearly which make the infection spread fast and sometimes lead to serious issues like pyelonephritis, preterm labor, and low birth weight.[3]

The etiological factors of urinary tract infection in pregnant women mostly come from social, biological and personal condition. Young maternal age is one major factor because younger mothers mostly have less awareness and less self-care habits about hygiene.[4] Illiterate mothers face more difficulty to understand preventive measures so infection occur more.[5] First trimester also show more infection because body immunity drops and hormonal changes are strong.[6] Low family income makes it harder for pregnant women to access clean water, healthy food and proper medical checkup, so they become more expose to bacteria and infection.[7] Multiparity also increase chance because repeated pregnancy brings more physical stress and bladder weakness which allow bacteria to enter and grow easily.[8]

Another important etiological factor is history of urinary tract infection because previous infection shows that the woman already having weak defense and bacteria can come back more easily.[9] History of catheterization increase risk too because catheter help bacteria to enter directly.[10] Frequent intercourse also raise infection because bacteria from outside can move to urinary tract very easily.[11] Anemia is another factor since low hemoglobin reduce body immunity and make pregnant women more weak to infection.[12] All these factors combine together and make urinary tract infection more easy to occur in pregnant women, especially when health awareness and access to care are low.

A study conducted in Ethiopia by Emiru T. et al. reported several key etiological factors associated with

urinary tract infections in pregnant women. The findings indicated that young maternal age accounted for 8.5%, illiteracy among mothers for 10.6%, and being in the first trimester for 16.3%. Low family income contributed to 18.9%, multiparity to 13.1%, a previous history of urinary tract infection to 18.1%, and a history of catheterization to 16.7%. Additionally, frequent sexual intercourse represented 25%, while anemia was the most prevalent factor at 27.6% among the pregnant participants.[13]

There is big need to do this study in Azad Jammu & Kashmir because many pregnant women here not getting proper health awareness and infection control knowledge. The area have limited medical facilities and many mothers come from low income homes, so UTI cases mostly remain unnoticed. Also education level in some rural parts is low, so women not understand early symptoms and they delay treatment. Because of these problems the region need more research to know why UTI happening more and how to reduce it for better maternal health.

METHODOLOGY

The research was conducted at the Department of Obstetrics & Gynae, Institute of Medical Sciences of Abbas, Muzaffarabad. The research was performed from 15th Feb 2025 to 15th May 2025. Cross-sectional type of research was done, and pregnant women who visited the outpatient section of the Institute of Obstetrics & Gynae for routine antenatal visits participated. The total number of patients chosen was 170. Earlier, the number was estimated using the formula of the World Health Organization's sample size, keeping confidence level of 95%, tolerance level of 4.25% and assuming the prevalence of younger maternal age of 8.5%, obtained from a previous study.[13] Approvals had already been obtained from the review committee of the Institute for conducting this investigation, prior to enrolling a single patient. The women's age range was to be 15-40years, the index of singleton pregnancies, & evidence of urinary tract infection according to lab criteria. The patients weren't to be selected, if there was a previous long standing infection or defect related to urinary tract, if recent antibiotics or uncontrolled Diabetes, or Neurological diseases, or previous uro-surgery within 6 months. Once patients had fulfilled the criteria for investigation, voluntary written consent was sought for investigation, & a detailed explanation of the purpose of this study was provided to make the patient feel comfortable about being a participant.

Basic profile information was taken at the first contact, like age in years, gestational age by last menstrual period, parity, duration of urinary tract infection in days, BMI, and details regarding their socioeconomic status and whether they lived in rural or urban area. Each patient went through a short history-taking that focused on possible contributing factors. These included checking if the woman fell in the age band for young maternal age, whether she could read or write, whether pregnancy was in the first trimester, her monthly household income, previous pregnancy history to determine multiparity, any earlier note of urinary tract infection in her medical record, any previous need of catheter insertion, the pattern of sexual activity per week, and her hemoglobin values for anemia. All information was entered by the researcher on a structured form without leaving any portion empty.

Urinary tract infection meant pyuria shown by ≥10 white blood cells per mm^3 or ≥5 white blood cells per HPF together with a culture reporting ≥5 × 10^4 CFU/mL of a single organism. Young maternal age meant the woman fell between 15–24 years. Illiterate mother referred to a woman not able to read or write. First trimester of pregnancy meant gestation of less than 12 weeks by last menstrual period. Low family income meant monthly earning below Rs. 11,000. Multiparity meant history of two or more births, either live or stillborn. History of urinary tract infection meant a documented previous infection in medical record. History of catheterization meant earlier introduction of a sterile catheter either through urethra or abdominal route for bladder drainage. Frequent intercourse meant more than three sexual acts per week. Anemia meant hemoglobin <11 g/dl and hematocrit <33% on blood report.

For handling the data, SPSS version 26 was used. Categorical variables were described by counts and percentages. Numeric variables were expressed as mean with standard deviation or median with IQR, depending on the Shapiro-Wilk normality test.

RESULTS

The mean age of the subjects was 30.85 ± 5.90 years, while mean BMI was 26.70 ± 5.59 kg/m^2. The mean gestational age was 23.28 ± 10.26 weeks, and mean parity was 0.95 ± 1.12. The mean duration of UTI was documented at 3.98 ± 1.99 days. Regarding socioeconomic status, majority of the pregnant population was found to have middle socioeconomic status (93, 54.7%), whereas 32 (18.8%) females had low-level and 45 (26.5%) females had high socioeconomic status. In terms of geographical distribution per residency, equal proportion of pregnant females resided in rural settings (85, 50.0%) and urban settings (85, 50.0%) (as shown in Table-I).

Table I

Patient Demographics

Demographics	Mean ± SD
Age (years)	30.85 ± 5.90
Gestational Age (weeks)	23.28 ± 10.26
Parity	0.95 ± 1.12
Duration of UTI (days)	3.98 ± 1.99
BMI (kg/m^2)	26.70 ± 5.59
Socioeconomic Status	
Low n (%)	32 (18.8%)
Middle n (%)	93 (54.7%)
High n (%)	45 (26.5%)
Residential Status	
Rural n (%)	85 (50.0%)
Urban n (%)	85 (50.0%)

Among the etiological factors leading to urinary tract infection in pregnant women, young maternal age was observed in 15 women (8.80%), while 155 women (91.20%) did not had this factor. Illiterate mother was found in 18 cases (10.60%), whereas 152 cases (89.40%) were not illiterate. First trimester pregnancy was documented in 28 women (16.50%), while 142 women (83.50%) were not in first trimester. Low family income was present in 32 cases (18.80%), while 138 cases (81.20%) did not had low family income. Multiparity was

observed in 22 women (12.90%), whereas 148 women (87.10%) were not multiparous. History of UTI was found in 31 cases (18.20%), while 139 cases (81.80%) did not had previous UTI history. History of catheter use was documented in 28 women (16.50%), whereas 142 women (83.50%) had no such history. Frequent intercourse was reported in 43 cases (25.30%), while 127 cases (74.70%) did not reported frequent intercourse. Maternal anemia was present in 47 women (27.60%), while 123 women (72.40%) did not had maternal anemia (as shown in Table-II).

Table II

Frequency of etiological factors leading to urinary tract infection in pregnant women

Etiological factors	Frequency	%age
Young Maternal Age		
Yes	15	8.80%
No	155	91.20%
Illiterate Mother		
Yes	18	10.60%
No	152	89.40%
First Trimester		
Yes	28	16.50%
No	142	83.50%
Low Family Income		
Yes	32	18.80%
No	138	81.20%
Multiparity		
Yes	22	12.90%
No	148	87.10%
History of UTI		
Yes	31	18.20%
No	139	81.80%
History of Catheter		
Yes	28	16.50%
No	142	83.50%
Frequent Intercourse		
Yes	43	25.30%
No	127	74.70%
Maternal Anemia		
Yes	47	27.60%
No	123	72.40%

DISCUSSION

The objective of current study was to determine the frequency of etiological factors leading to urinary tract infection in pregnant women. The results of present study showed various etiological factors contributing to UTI in pregnancy with different frequencies. Maternal anemia was found to be most common etiological factor with frequency of 27.60% (47 cases). This finding can be explained because anemia causes decreased tissue oxygenation and impaired immune function, which makes pregnant women more susceptible to infections including UTI. The reduced hemoglobin levels compromises the body defense mechanism and allows bacterial colonization in urinary tract more easily. Frequent intercourse was second most common factor with frequency of 25.30% (43 cases). This is because sexual activity can introduce bacteria from perineal area into urethra and bladder, leading to ascending infection. During pregnancy, the increased vascularity and changes in vaginal pH also facilitates bacterial growth after intercourse.

Low family income was present in 18.80% (32 cases) of pregnant women. This association occurs because low socioeconomic status is linked with poor hygiene practices, inadequate nutrition, limited access to healthcare facilities, and overcrowded living conditions which all increases risk of developing UTI. History of previous UTI was documented in 18.20% (31 cases). This is significant because previous UTI indicates underlying anatomical abnormalities or functional problems in urinary tract which predisposes to recurrent infections. Also, incomplete treatment of previous infection can leads to persistence of bacteria and recurrence during pregnancy. History of catheter use was found in 16.50% (28 cases). Catheterization introduces bacteria directly into bladder and also causes trauma to urethral mucosa, which increases susceptibility to infection. Catheter also serves as foreign body where bacteria can form biofilms and multiply.

Maternal anemia was most common factor in current study with frequency of 27.60% (47 cases), which is somewhat lower than reported by Sadiq G *et al.* who found anemia in 54.4% of UTI cases[14] but similar to Mishra PP *et al.* who documented 39.06% cases with anemia [15]. This variation can be attributed to different screening criteria and hemoglobin cutoff values used for defining anemia in different populations. Begum F *et al.* also reported anemia in 31.67% of pregnant women with UTI [16], which is closely comparable to present findings. The reason for anemia being common etiological factor is because it weakens immune system and reduces oxygen delivery to tissues, making urinary tract more vulnerable to bacterial colonization.

Frequent intercourse was found in 25.30% (43 cases) in current study, which is lower than reported by Begum F *et al.* who documented frequent sexual activity in 33.33% cases [16]. This difference may be due to cultural and social factors affecting reporting of sexual history in different populations. Sexual activity introduces bacteria into urethra mechanically and also causes microtrauma to urethral mucosa.

Low family income was present in 18.80% (32 cases) of cases in present study, while Mishra PP *et al.* reported low socioeconomic status in 42.18% of UTI cases [15] and Sadiq G *et al.* found it in 72.15% cases [14]. This considerable variation suggests that socioeconomic status assessment criteria differs across studies and also reflects different population characteristics in various geographical regions. Low socioeconomic status contributes to UTI through poor hygiene practices, inadequate sanitation facilities, and limited healthcare access.

History of previous UTI was documented in 18.20% (31 cases) in current study, which is lower than findings of Mishra PP *et al.* who reported recurrent UTI in 32.81% cases [15], Sadiq G *et al.* who found it in 63.3% [14], and Begum F *et al.* who reported 25% cases with UTI history [16]. This variation may be due to differences in documentation of medical history and recall bias among pregnant women. Previous UTI history indicates persistent predisposing factors or anatomical abnormalities that was not adequately treated.

History of catheter use was found in 16.50% (28 cases) in present study, while Sadiq G *et al.* reported catheterization in 27.8% of UTI cases [14]. This difference can be explained by different indications for catheterization and varying hospital practices in different settings. Catheterization breaks natural defense

mechanisms of urinary tract and introduces bacteria directly into bladder.

Multiparity was observed in only 12.90% (22 cases) in current study, which is considerably lower than reported by Mishra PP *et al.* who found multiparity in 45.31% of UTI cases [15]. This major difference may be because present study population had mean parity of 0.95 ± 1.12, indicating mostly primigravida and low parity women, whereas other studies included predominantly multiparous women. Sadiq G *et al.* also found significantly higher infection rates in multiparous women [14]. Multiparity causes pelvic floor relaxation and urinary stasis which promotes bacterial growth.

The present study had several limitations that should be acknowledged. First, this was single center study conducted at one hospital, so the findings may not be generalizable to other settings or populations. Second, the sample size was relatively small which may have limited the statistical power to detect significant associations. Third, this study relied on self-reported information for some etiological factors like frequent intercourse and history of UTI, which may be subjected to recall bias and underreporting due to social desirability. Fourth, the cross-sectional design of study does not allow to establish causal relationships between etiological factors and UTI occurrence.

CONCLUSION

Based on this study, different causative factors lead to urinary tract infections among pregnant women. The most prominent causative factor among pregnant women was found to be maternal anemia, followed by frequent sexual contacts, low family income, previous experience of UTI, previous experience of catheterization, and finally, being a multiparous woman. These conclusions signified the importance of risk factors to be recognized to avert UTI among pregnant women.

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