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Original Article

Clinical Presentation and Culture Yield of Urinary Tract Infection Among Symptomatic Pregnant Women: A Tertiary Hospital Experience

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Abstract

Background: Urinary tract infection is a significant issue during pregnancy. Clinical symptoms can overlap with normal pregnancy-related changes. Therefore, lab confirmation is crucial. Aim of the study: This study aimed to assess the clinical presentation and urine culture results of UTI among symptomatic pregnant women. It also aimed to describe dipstick findings, isolated organisms, and patterns of antimicrobial susceptibility.

Material and Methods: This cross-sectional descriptive study included 105 symptomatic pregnant women who visited the Department of Obstetrics and Gynecology at Shaheed Ziaur Rahman Medical College Hospital from January 2024 to December 2024. Researchers collected clinical and obstetric data. Urine samples underwent dipstick testing, culture, identification of organisms, and antimicrobial susceptibility testing. Data analysis utilized SPSS version 15.0. Fisher's exact test assessed the association between dipstick and culture findings.

Results: Of the 105 symptomatic pregnant women, 87.6% were under 25 years old, and the average gestational age was 24.67 ± 4.79 weeks. The most common symptoms were urinary frequency (98.1%) and burning sensation during urination (71.4%). Urine culture was positive in 6.7% of participants, with Escherichia coli found in all culture-positive cases. Dipstick positivity showed a significant association with culture-confirmed UTI ($p<0.001$). All E. coli isolates were sensitive to nitrofurantoin, 71.4% were sensitive to cephalexin, and only 14.3% were sensitive to amoxicillin.

Conclusion: While urinary symptoms were common, only 6.7% of pregnant women had culture-confirmed UTI. Escherichia coli was the only isolated organism, showing the highest sensitivity to nitrofurantoin and considerable resistance to amoxicillin. Urine culture and susceptibility testing are vital for accurate diagnosis and appropriate treatment.

Keywords: Urinary tract infection, Pregnancy, Escherichia coli, Urine culture, Dipstick test, Antimicrobial susceptibility.

Introduction

Urinary tract infection (UTI) is an important bacterial infection in pregnancy due to physiological and anatomical factors which promote ascending infection: dilatation of the ureters, reduced tone of the ureters, urinary stasis and incomplete bladder emptying. Infection can be either silent or symptomatic, and severe symptomatic infections usually have signs of dysuria (difficulty voiding), urinary frequency and urgency, suprapubic discomfort, fever, loin pain, nausea, or vomiting. Several of these manifestations may mimic normal pregnancy symptoms, so clinical evaluation alone may not be enough to establish the diagnosis and laboratory evaluation is especially crucial.[1-4] UTIs are a significant public-health problem worldwide, with an estimated 404.6 million cases in the general population in 2019, and pregnancy-specific prevalence rates are highly variable depending on the population, definition of UTI and setting in which the healthcare is provided.[5] In Latin America, a systematic review of the literature found that the prevalence of asymptomatic bacteriuria was 18.39%, the prevalence of lower UTI was 7.54%, and the prevalence of

pyelonephritis was 2.34% in more than 111,000 pregnant women.[1] The situation is also highly variable geographically within developing nations of Africa and Asia, with aggregated evidence suggesting some particularly high burdens in several low and middle income countries.[6] A meta-analysis also showed significant heterogeneity for both symptomatic UTI and asymptomatic bacteriuria within Iran, as the local epidemiology is still essential.[7] In South Asia, the burden is clinically relevant because limitations in microbiological facilities, empirical antibiotic use, and increasing antimicrobial resistance may complicate diagnosis and treatment. In rural Bangladesh, a population-based study of 4,242 pregnant women reported an overall UTI prevalence of 8.9%, comprising 4.4% symptomatic UTI and 4.5% asymptomatic bacteriuria.[8] In neighbouring Pakistan, multidrug-resistant uropathogens have been documented among pregnant women, while studies from Ethiopia and Cameroon have reported substantial culture-confirmed infection rates, illustrating pronounced setting-specific variation.[1-4,9,10]

Clinically, failure to identify and appropriately treat bacteriuria during pregnancy may allow progression to cystitis or pyelonephritis and has been associated with adverse obstetric outcomes. In a recent systematic review and meta-analysis, UTI during pregnancy was associated with almost twice the odds of preterm birth, with a pooled odds ratio of 1.92.[11] Accordingly, evidence synthesized in systematic reviews suggests that antimicrobial treatment of bacteriuria reduces maternal pyelonephritis and may also lower the risks of preterm delivery and low birth weight, although the certainty of some outcome estimates remains limited [12.] Therefore, timely confirmation of infection has implications for both maternal and fetal health.For diagnosis, urine culture remains the reference standard, yet cost, laboratory availability, and reporting delays may restrict routine use in resource-constrained settings.[4,8] Although dipstick detection of leukocyte esterase and nitrite provides a rapid alternative, recent pregnancy-specific evidence has shown imperfect diagnostic performance, indicating that dipstick findings should be interpreted cautiously against culture results.[4,13] Meanwhile, Escherichia coli is consistently the most common uropathogen, with different susceptibility patterns across regions. Significantly, resistance to common antibiotics is reported in many cases.[1-4,10] Against this background, locally generated evidence from symptomatic pregnant women in tertiary-care hospitals in Bangladesh remains important, particularly evidence integrating clinical presentation, dipstick findings, urine culture yield, causative organisms, and antimicrobial susceptibility. Therefore, the present study aimed to assess the clinical presentation and culture yield of UTI among symptomatic pregnant women, while also describing isolated organisms, dipstick findings, and antibiotic susceptibility patterns.

Materials and Methods

This cross-sectional descriptivestudy was conducted in the Department of Obstetrics and Gynecology, Shaheed Ziaur Rahman Medical College Hospital, Bogura, Bangladesh, from January 2024 to December 2024. During the study period, pregnant women attending the department with clinical features suggestive of urinary tract infection (UTI) were considered for enrollment. Using a non-probability purposive sampling approach, eligible participants were enrolled consecutively according to their availability. A total of 105 symptomatic pregnant women were included.

For eligibility, pregnant women presenting with one or more urinary or associated symptoms, including dysuria or burning sensation during urination, increased frequency of micturition, loin pain, fever, nausea, vomiting, or non-specific lower abdominal pain, were included. Pregnant women without urinary symptoms, those experiencing vaginal bleeding or spontaneous rupture of membranes because of the possibility of urine-sample contamination, catheterized patients, and those receiving antibiotics at the time of assessment were excluded.

For each participant, information was collected using a

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structured data-collection sheet. After explaining the study purpose and procedures, informed written consent was obtained before enrollment. Through face-to-face interviews, clinical examination, observation, review of medical and obstetric history, and relevant laboratory investigations, demographic, obstetric, clinical, and medical-history data were recorded. Urine specimens were collected from the selected participants and evaluated using relevant urinary investigations, including dipstick testing and urine culture. For culture-positive specimens, the isolated organisms were identified, and antimicrobial susceptibility testing was performed against the selected antibiotics.

After collecting the data, we checked it for completeness and consistency, edited it, coded it, and entered it into a computer for analysis. We used Statistical Package for the Social Sciences (SPSS), version 15.0 (SPSS Inc., Chicago, IL, USA), to perform descriptive and inferential statistical analyses. We summarized categorical variables as frequencies and percentages, while we expressed continuous variables as mean ± standard deviation and range, when applicable. To assess the link between dipstick findings and urine culture results, we applied Fisher's exact test, with a p-value <0.05 considered statistically significant. Before starting, the study protocol received institutional approval. Throughout the study, we maintained confidentiality, ensured voluntary participation, and respected participants' right to withdraw.

Results

Among the 105 symptomatic pregnant women included in the study, 92 (87.6%) were younger than 25 years, whereas 13 (12.4%) were older than 25 years. Regarding obstetric characteristics, the mean gravidity was 1.64 ± 0.85, with a range of 1–3, while the mean gestational age was 24.67 ± 4.79 weeks, ranging from 16 to 35 weeks.

Table I. Demographic and obstetric characteristics of the study participants (N=105)

Variables	Categories/ measurements	Total
Age	<25 years	92 (87.6)
	>25 years	13 (12.4)
Gravidity	Mean ± SD	1.64 ± 0.85
	Range	1–3
Gestational age (weeks)	Mean ± SD	24.67 ± 4.79
	Range	16–35

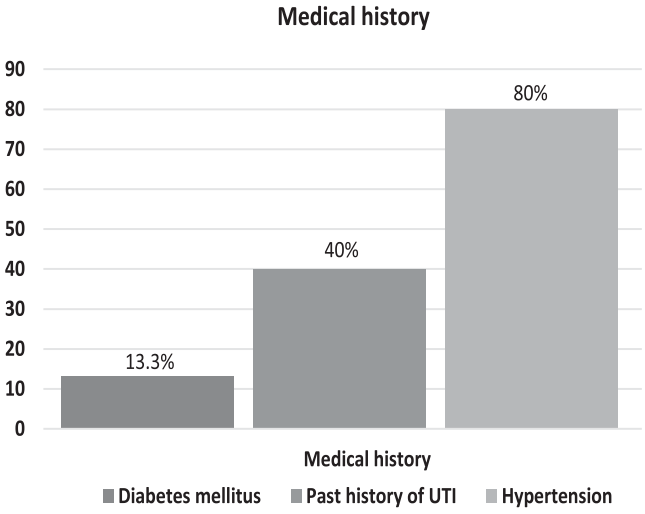

Figure 1. Distribution of the respondents by medical history

Regarding previous medical conditions, among the 15 women with a recorded medical history, hypertension was reported in 12 (80.0%), a previous history of UTI in 6 (40.0%), and diabetes mellitus in 2 (13.3%).

With respect to clinical presentation, frequency of urination was the most frequently reported symptom, occurring in 103 (98.1%) participants, followed by nausea in 101 (96.2%), burning sensation during urination in 75 (71.4%), and vomiting in 72 (68.6%). Lower abdominal pain was reported by 39 (37.1%) women. Fever and loin pain were comparatively uncommon, occurring in 8 (7.6%) and 2 (1.9%) participants, respectively.

Table II. Clinical presentation of symptomatic pregnant women with suspected UTI (N=105)

Presenting complaints	n (%)
Frequency of urination	103 (98.1)
Nausea	101 (96.2)
Burning sensation	75 (71.4)
Vomiting	72 (68.6)
Pain in lower abdomen	39 (37.1)
Fever	8 (7.6)
Loin pain	2 (1.9)

Among the 55 participants reported to have individual dipstick findings, leukocyte esterase positivity was observed in 37 (67.2%), while protein was detected in 36 (65.5%). Blood was detected in 15 (27.3%) samples, whereas nitrite positivity was identified in 8 (14.5%). Concurrent positivity for both nitrite and leukocyte esterase was found in 8 (14.5%) samples.

Table III. Urine dipstick findings among the study participants (n=55)

Dipstick findings	Positive, n (%)
Leukocyte esterase	37 (67.2)
Protein	36 (65.5)
Blood	15 (27.3)
Nitrite	8 (14.5)
Both nitrite and leukocyte esterase	8 (14.5)

On urine culture, bacterial growth was detected in 7 of the 105 participants, giving an overall culture yield of 6.7%, while 98 (93.3%) specimens showed no growth. Among all seven culture-positive specimens, Escherichia coli was isolated, accounting for 100% of the culture- confirmed infections.

Table IV. Urine culture yield and isolated organisms among symptomatic pregnant women (N=105)

Variables	Categories	n (%)
Urine culture result	Growth	7 (6.7)
	No growth	98 (93.3)
Organism isolated among culture-positive cases (n=7)	Escherichia coli	7 (100.0)

When dipstick results were compared with urine culture, 6 of the 7 culture-positive participants had a positive dipstick result, whereas only 2 of the 98 culture-negative participants were dipstick positive. Conversely, one culture-positive participant had a negative dipstick result. A statistically significant association was identified between dipstick positivity and culture-confirmed UTI (Fisher's exact test, $p<0.001$).

Table V. Association between dipstick result and urine culture findings (N=105)

Dipstick result	Culture positive	Culture negative	Total	p-value
	n (%)	n (%)	n (%)	
Positive	6 (85.7)	2 (2.0)	8 (7.6)	<0.001
Negative	1 (14.3)	96 (98.0)	97 (92.4)	
Total	7 (100.0)	98 (100.0)	105 (100.0)	

Regarding antimicrobial susceptibility among the seven E. coli isolates, all 7 (100.0%) were sensitive to nitrofurantoin. Sensitivity to cephalexin was observed in 5 (71.4%) isolates, while 2 (28.6%) were resistant. In contrast, only 1 (14.3%) isolate was sensitive to amoxicillin, while 4 (57.1%) were resistant and 2 (28.6%) showed intermediate sensitivity.

Table VI. Antibiotic susceptibility pattern of culture-positive Escherichia coli isolates (n=7)

Antibiotic	Sensitive	Resistant	Moderately sensitive
	n (%)	n (%)	n (%)
Amoxicillin	1 (14.3)	4 (57.1)	2 (28.6)
Cephalexin	5 (71.4)	2 (28.6)	0 (0.0)
Nitrofurantoin	7 (100.0)	0 (0.0)	0 (0.0)

Discussion

In this study of 105 symptomatic pregnant women, the principal findings were a relatively low urine-culture positivity of 6.7%, universal isolation of Escherichia coli among culture-positive cases, a strong association between dipstick positivity and culture-confirmed infection, and marked differences in antimicrobial

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susceptibility. While 98.1% complained of urinary frequency and 71.4% about burning during urination, only seven women were found to have a UTI, which suggests that symptoms alone are not very specific in pregnancy. This discordance could be biologically possible as urinary frequency, lower abdominal discomfort, nausea and vomiting can also be physiological symptoms of pregnancy. In terms of culture positivity, this was 6.7% compared to 8.9% of 4034 pregnant women in rural Bangladesh who were culture positive.[8] Much more have been reported in other parts of the world. Culture-confirmed UTI was found to be 18.7% of pregnant women in Ambo, 26.0% among pregnant women in Goba and Sinana and 14.1% of pregnant women at public facilities in Harar in Ethiopia.[3,10,14] Asymptomatic bacteriuria has also been found to be high and varies considerably from one geographical area to another, such as 19.9% in Harar, 17.4% in India and 13.5% in an Indian meta-analysis.[15-17] The lower culture yield in this cohort may be the result of selection of cases, differences in bacterial-count thresholds, specimen handling, documented prior antimicrobial exposure, population differences or the high proportion of pregnancy-related symptoms that mimic UTI.

Concerning clinical manifestations, urinary frequency was reported by 98.1%, burning sensation by 71.4%, lower abdominal pain by 37.1%, fever by 7.6%, and loin pain by only 1.9%. In contrast, Dube et al. reported lower abdominal pain in 85%, dysuria in 48%, and fever in 48% among symptomatic women, while only 6.7% of women with lower abdominal pain and urinary frequency had culture-positive infection. [18] This supports the present observation that common urinary complaints cannot reliably establish bacterial UTI. Accordingly, careful laboratory confirmation is particularly relevant in pregnancy, when unnecessary antimicrobial exposure should be avoided.

With respect to dipstick findings, leukocyte esterase was positive in 67.2% of the 55 individually assessed samples, while nitrite positivity was much lower at 14.5%. More importantly, 85.7% of culture-positive women had a positive overall dipstick result, compared with only 2.0% of culture-negative women, producing a significant association, $p<0.001$. Recent evidence nevertheless cautions against replacing culture with dipstick testing. In a pregnancy-specific cohort, Werter et al. demonstrated imperfect diagnostic accuracy of leukocyte esterase and nitrite and emphasized the risk of both overdiagnosis and missed infection.[13] Therefore, the strong association observed here supports dipsticks as useful rapid screening tools, but not as substitutes for urine culture where microbiological facilities are available.

Regarding bacterial etiology, E. coli accounted for 100% of the seven isolates. Although this proportion is higher than most reports, the predominance of E. coli is highly consistent with existing evidence. Among Bangladeshi pregnant women, Lee et al. identified E. coli in 38% of isolates, while rates of 46.4% were reported in Ambo and 27.3% in southeastern Ethiopia.[3,8,14] Furthermore, a meta-analysis from Iran estimated E. coli in 61.6% of pregnancy-associated UTIs, whereas studies from Addis Ababa and eastern Ethiopia also identified Gram-negative enteric organisms as major uropathogens.[7,19,20] The 100% proportion here should nevertheless be interpreted cautiously because only seven cultures were positive.

Regarding antimicrobial susceptibility, nitrofurantoin showed 100% activity against the E. coli isolates, compared with 71.4% sensitivity to cephalexin and only 14.3% to amoxicillin. This pattern closely resembles Bangladeshi evidence showing generally high nitrofurantoin activity but substantially poorer susceptibility to older β-lactams.[8] Likewise, high resistance to amoxicillin or ampicillin has been reported in Ethiopia, Pakistan, and across developing countries in a systematic review.[6,9,10,15] Current international guideline reviews also identify nitrofurantoin as an important treatment option for lower UTI during pregnancy, while emphasizing culture-guided selection whenever possible.[21]

Clinically, these findings support obtaining urine culture in symptomatic pregnant women rather than

relying solely on nonspecific symptoms. Empirical amoxicillin may be unreliable where resistance resembles that observed here, whereas nitrofurantoin appears microbiologically promising for appropriate lower UTIs, subject to gestational age, clinical condition, contraindications, and contemporary susceptibility data. This is important because pregnancy-associated UTI is not benign; a 2024 meta-analysis found that maternal UTI was associated with an approximately 1.92-fold higher odds of preterm birth.11 Given the small number of isolates and the historical study period, however, the susceptibility findings should not be interpreted as current prescribing guidance. Rather, they demonstrate the continuing need for local antimicrobial surveillance, culture-based diagnosis, and periodically updated treatment protocols for pregnant women in Bangladesh.

Conclusion

Urinary symptoms were extremely common among pregnant women who were suspected of having a UTI, but only 6.7% of these women actually had a culture-positive UTI, suggesting that urinary symptoms do not always indicate a UTI. E. coli was the only uropathogen isolated and dipstick positivity was highly associated with culture confirmed UTI. Among all drugs, nitrofurantoin was the most sensitive to microbial activity and amoxicillin had a significant degree of resistance. The results of the study agree with using urine culture and sensitivity test for proper diagnosis and selection of appropriate antibiotics in the treatment of symptomatic pregnant women to prevent unnecessary treatment and overuse of antibiotics, thus reducing the chances of developing antimicrobial resistance.

Recommendations

Culture and antimicrobial sensitivity testing of urine should be recommended in symptomatic pregnant women to help determine an accurate diagnosis and a proper antibiotic choice. Rapid screening can be carried out using dipsticks, and empirical use of antibiotics should take local resistance patterns into account. Frequent antimicrobial surveillance and more multi-centre studies are suggested.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of Shaheed Ziaur Rahman Medical College, Bogura.

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