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PREVALENCE OF URINARY TRACT INFECTION AMONG PREGNANT WOMEN OF DISTRICT DERA ISMAIL KHAN KPK PAKISTAN

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Abstract

Background: *Urinary tract infection (UTI) is one of the most common bacterial infections affecting pregnant women and is associated with adverse maternal and neonatal outcomes. Pregnancy-related physiological and hormonal changes increase susceptibility to urinary tract infections. This study aimed to determine the prevalence of UTI among pregnant women in District Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan, and to identify the common causative organisms.*

Methods: *A descriptive cross-sectional study was conducted over six months at Tehsil Headquarter Hospital Prova, Biomed Diagnostic Center, and Rehmania Hospital in District Dera Ismail Khan. A total of 230 pregnant women aged 18–45 years were enrolled using simple random sampling. Midstream urine samples were collected aseptically and cultured on CLED agar, Blood agar, and MacConkey agar. Bacterial isolates were identified using standard microbiological and biochemical techniques. Antimicrobial susceptibility testing was performed using the Kirby–Bauer disc diffusion method according to CLSI guidelines.*

Results: *Among the 230 urine samples analyzed, 65 (28.3%) showed significant bacterial growth, indicating an overall UTI prevalence of 28.3%. The majority of participants belonged to the 26–35 years age group (41.7%). Escherichia coli was the predominant pathogen, accounting for 38 (58.5%) isolates, followed by Klebsiella pneumoniae 13 (20.0%), Proteus mirabilis 8 (12.3%), and Pseudomonas aeruginosa 6 (9.2%). Most participants were recruited from Biomed Diagnostic Center (46.5%).*

Conclusion: *Urinary tract infection is a common health problem among pregnant women in District Dera Ismail Khan, with Escherichia coli being the most frequently isolated uropathogen. Routine antenatal screening, early diagnosis, health education regarding personal hygiene, and appropriate*

antimicrobial treatment are essential to reduce the burden of UTI and improve maternal and neonatal health outcomes.

INTRODUCTION

Urinary tract infection (UTI) is one of the most common bacterial infections affecting pregnant women worldwide and represents a major public health concern. It is characterized by the presence and multiplication of pathogenic microorganisms within the urinary tract, including the kidneys, ureters, bladder, and urethra (1). Pregnancy predisposes women to urinary tract infections because of various physiological, anatomical, and hormonal changes that occur during gestation. These changes increase the susceptibility of pregnant women to both symptomatic and asymptomatic urinary tract infections (2). UTIs may involve the lower urinary tract, resulting in cystitis, or the upper urinary tract, leading to pyelonephritis, which can have serious consequences for both the mother and fetus if left untreated. Consequently, early diagnosis and appropriate management of UTIs during pregnancy are essential to prevent adverse maternal and neonatal outcomes (3). The urinary tract undergoes significant changes during pregnancy that favor bacterial colonization and growth. Hormonal influences, particularly increased progesterone levels, cause relaxation of smooth muscles, resulting in ureteral dilatation and decreased ureteral peristalsis (4). In addition, the enlarging uterus exerts pressure on the urinary tract, causing urinary stasis and vesicoureteral reflux. These conditions facilitate the ascent of bacteria from the lower urinary tract to the kidneys. Furthermore, changes in urine composition, including increased glucose and amino acid concentrations, create a favorable environment for microbial growth (5). The physiological immunosuppression associated with pregnancy may also contribute to increased vulnerability to infections. These factors collectively explain why pregnant women are at a higher risk of developing UTIs than non-pregnant women (6).

Urinary tract infections during pregnancy may be either symptomatic or asymptomatic. Asymptomatic bacteriuria, defined as the presence of significant bacterial growth in urine without clinical symptoms, is particularly common among pregnant women (7). Although asymptomatic bacteriuria may initially appear harmless, it can progress to symptomatic infection and pyelonephritis if not identified and treated appropriately (8). Symptomatic UTIs commonly present with dysuria, urinary frequency, urgency, lower abdominal discomfort, hematuria, nausea, vomiting, and fever. The presence of these symptoms can significantly affect the quality of life of pregnant women and may increase the risk of pregnancy-related complications. Therefore, routine screening and timely treatment are important components of antenatal care (9).

Several bacterial species have been implicated in the development of UTIs during pregnancy. Among these, *Escherichia coli* is recognized as the most common causative organism and accounts for the majority of community-acquired urinary tract infections. Other important pathogens include *Klebsiella pneumoniae*, *Proteus mirabilis*, and *Pseudomonas aeruginosa* (10). These microorganisms possess virulence factors that enhance their ability to adhere to the epithelial lining of the urinary tract, evade host defenses, and establish infection. The predominance of these pathogens may vary according to geographical location, population characteristics, and healthcare practices. Identification of the specific causative organism is crucial because it guides the selection of appropriate antimicrobial therapy and improves treatment outcomes (11).

Various risk factors have been associated with the occurrence of UTIs during pregnancy. Women with a previous history of urinary tract infection are at increased risk of recurrence during pregnancy. Other contributing factors include advanced maternal age, poor personal hygiene, low socioeconomic status, illiteracy, inadequate sanitation, urinary catheterization, and limited

access to healthcare services (12). Certain behavioral practices and contraceptive methods have also been reported to influence the risk of infection (13). In developing countries, where awareness regarding maternal health and infection prevention may be limited, these factors contribute substantially to the burden of urinary tract infections among pregnant women. Understanding these risk factors is essential for designing effective preventive and educational interventions (14). The burden of urinary tract infections continues to increase globally. Epidemiological studies have demonstrated a substantial rise in the number of UTI cases over recent decades, reflecting their growing impact on healthcare systems worldwide. UTIs are associated with significant morbidity, healthcare expenditures, and reduced quality of life (15). During pregnancy, the consequences may be even more severe because maternal infections can directly influence fetal development and pregnancy outcomes (16). Untreated UTIs have been linked to preterm labor, premature rupture of membranes, low birth weight, intrauterine growth restriction, and increased perinatal morbidity. Maternal complications such as pyelonephritis, sepsis, anemia, and renal impairment may also occur. These adverse outcomes emphasize the importance of early detection and management of urinary tract infections during pregnancy (17).

In Pakistan, urinary tract infections remain a common health problem among women, particularly during pregnancy. Several local studies have reported a considerable prevalence of UTI among pregnant women, highlighting the need for regular screening and effective preventive measures (18). Despite the availability of healthcare services, many women continue to face barriers to timely diagnosis and treatment because of socioeconomic challenges, limited awareness, and inadequate healthcare infrastructure. Furthermore, regional variations in prevalence and causative organisms necessitate localized studies to provide evidence-based recommendations for clinical practice and public health planning (19).

Given the clinical significance of urinary tract infections during pregnancy and their potential impact on maternal and neonatal health, there is a need to assess their prevalence and associated risk factors in specific populations (20). District Dera Ismail Khan, located in Khyber Pakhtunkhwa, Pakistan, has limited published data regarding the epidemiology of UTIs among pregnant women. Understanding the local burden of disease and identifying the most common causative organisms can help healthcare professionals develop targeted prevention and management strategies. Such information is essential for improving maternal healthcare services and reducing pregnancy-related complications associated with urinary tract infections (21).

Therefore, the present study was conducted to determine the prevalence of urinary tract infection among pregnant women in District Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan, and to identify the associated risk factors and common causative organisms (22). The findings of this study may contribute to the development of effective screening programs, improved clinical management, and evidence-based interventions aimed at reducing the burden of urinary tract infections during pregnancy (23).

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted over a period of six months at Tehsil Headquarter Hospital Prova, Biomed Diagnostic Center, and Rehmania Hospital in District Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan, to determine the prevalence of urinary tract infection (UTI) among pregnant women. The study population comprised pregnant women attending the selected healthcare facilities during the study period. Women aged 18–45 years who consented to participate were included, while non-pregnant women and pregnant women younger than 18 years or older than 45 years were excluded from the study. A sample size of 230 participants was calculated using the Raosoft online sample size calculator with a 95% confidence level and 5% margin of error. Participants were selected using a simple random sampling technique.

Midstream urine specimens were collected

aseptically in sterile containers and transported immediately to the laboratory for microbiological analysis. Urine samples were cultured on Cysteine Lactose Electrolyte Deficient (CLED) agar, Blood agar, and MacConkey agar using standard microbiological procedures. Following incubation, bacterial isolates were identified based on colony morphology, Gram staining characteristics, and biochemical tests including Triple Sugar Iron (TSI), citrate, indole, catalase, and DNase tests.

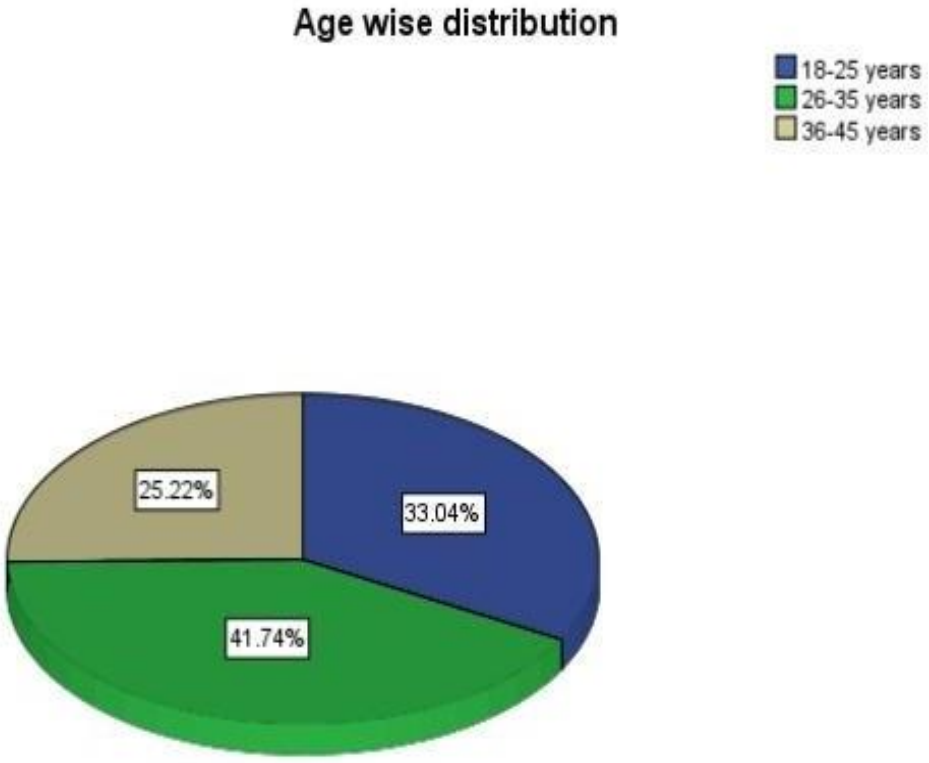
Antimicrobial susceptibility testing was performed using the Kirby–Bauer disc diffusion method on Mueller–Hinton agar in accordance with Clinical and Laboratory Standards Institute (CLSI) guidelines. Antibiotics tested included nitrofurantoin, fosfomycin, amikacin, augmentin, ceftriaxone, co-trimoxazole, ciprofloxacin, imipenem, levofloxacin, moxifloxacin, tazocin, and polymyxin. The diameter of inhibition zones was measured and interpreted as sensitive, intermediate, or resistant according to CLSI criteria. Data obtained from laboratory investigations and participant information were analyzed to determine the prevalence of UTI, associated risk factors, and the distribution of causative bacterial pathogens among pregnant women.

RESULTS

A total of 230 pregnant women participated in the study. The age ranged from 18 to 45 years. The majority of participants belonged to the 26–35 years age group, accounting for 96 (41.7%) women, followed by the 18–25 years age group with 76 (33.0%) participants. The least represented group was 36–45 years, comprising 58 (25.2%) participants. These findings indicate that most pregnant women included in the study were in the age range of 26–35 years (Table 1).

Table 1. Age distribution of study participants

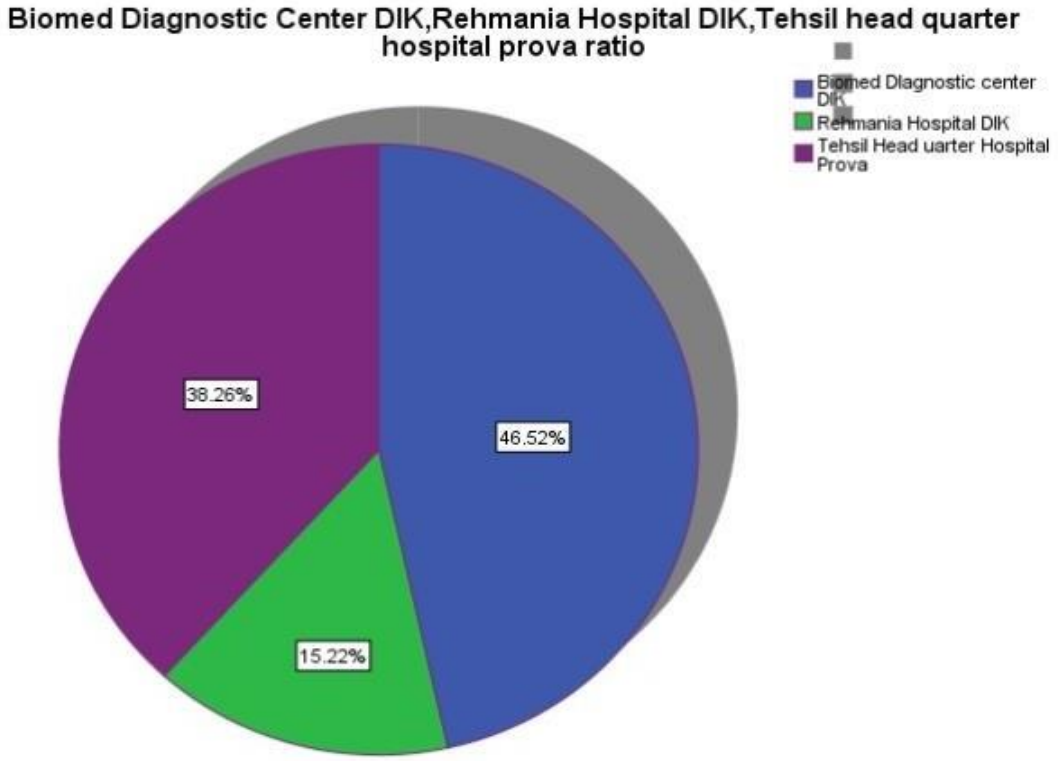
Age Group (Years)	Frequency (n)	Percentage (%)
18–25	76	33.0
26–35	96	41.7
36–45	58	25.2
Total	230	100.0



Among the 230 pregnant women included in the study, the highest number of participants were recruited from Biomed Diagnostic Center, Dera Ismail Khan, accounting for 107 (46.5%) participants. This was followed by Tehsil Headquarter Hospital Prova, which contributed 88 (38.3%) participants. Rehmania Hospital, Dera Ismail Khan, had the lowest representation with 35 (15.2%) participants. The findings indicate that nearly half of the study population was enrolled from Biomed Diagnostic Center (Table 2).

Table 2. Hospital-wise distribution of study participants

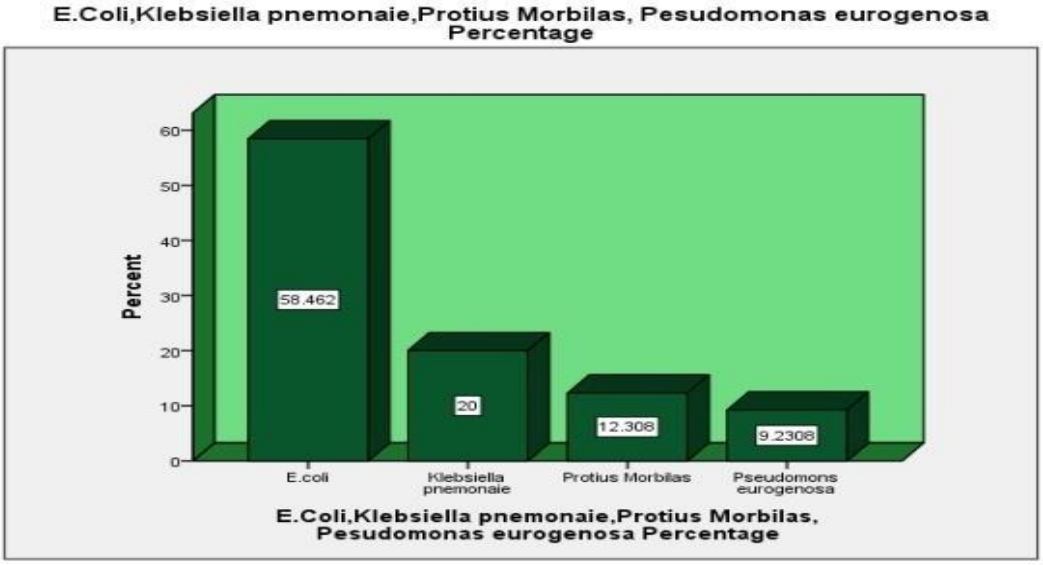
Healthcare Facility	Frequency (n)	Percentage (%)
Biomed Diagnostic Center, DI Khan	107	46.5
Rehmania Hospital, DI Khan	35	15.2
Tehsil Headquarter Hospital Prova	88	38.3
Total	230	100.0



Out of the 230 urine samples analyzed, 65 (28.3%) showed significant bacterial growth, while 165 (71.7%) samples were culture-negative. Among the positive cultures, *Escherichia coli* was the most frequently isolated pathogen, accounting for 38 (58.5%) isolates. This was followed by *Klebsiella pneumoniae* with 13 (20.0%) isolates, *Proteus mirabilis* with 8 (12.3%) isolates, and *Pseudomonas aeruginosa* with 6 (9.2%) isolates. These findings indicate that *E. coli* was the predominant causative agent of urinary tract infection among the pregnant women included in the study (Table 3).

Table 3. Distribution of UTI-causing bacterial isolates

Bacterial Isolate	Frequency (n)	Percentage (%)
Escherichia coli	38	58.5
Klebsiella pneumoniae	13	20.0
Proteus mirabilis	8	12.3
Pseudomonas aeruginosa	6	9.2
Total	65	100.0

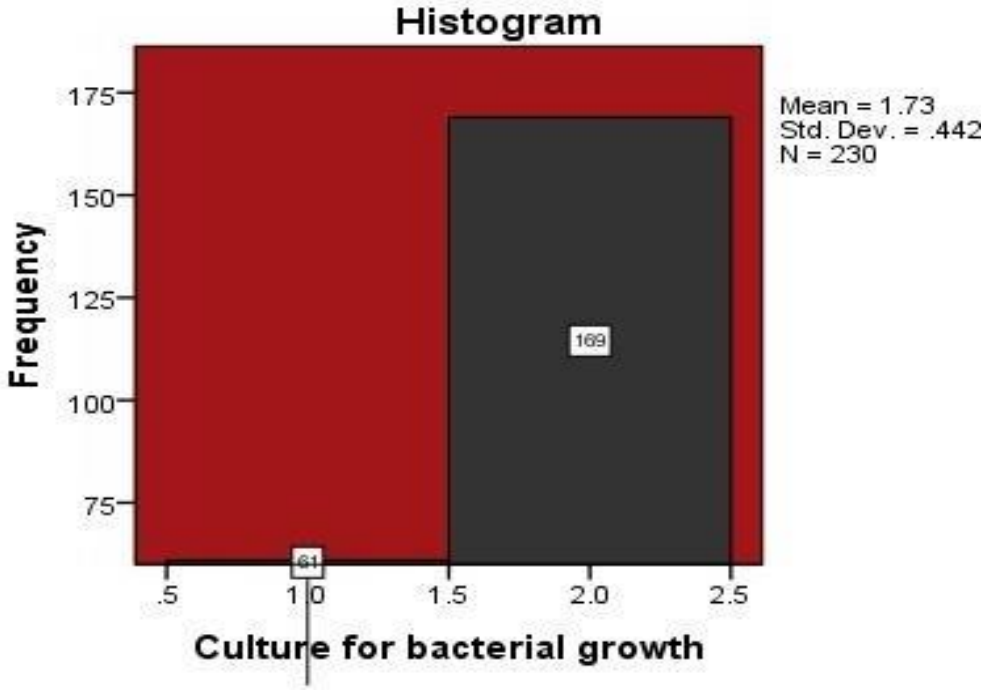


Out of the 230 pregnant women included in the study, 65 (28.3%) were found to have urinary tract infections based on urine culture results, whereas 165 (71.7%) participants showed no evidence of infection. The overall prevalence of UTI among the study population was 28.3%. These findings indicate that approximately one-third of the pregnant women included in the study were affected by urinary tract infection (Table 4).

Table 4. Distribution of urinary tract infection among study participants

UTI Status	Frequency (n)	Percentage (%)
Positive	65	28.3
Negative	165	71.7
Total	230	100.0

Bacterial growth was observed in 65 (28.3%) samples, while no bacterial growth was detected in 165 (71.7%) samples. The culture-positive samples showed visible bacterial colony formation on the culture media and were further subjected to identification and antimicrobial susceptibility testing. The findings indicate that bacterial growth was detected in approximately one-quarter of the study population, whereas the majority of samples showed no growth on culture media (Table 5).



DISCUSSION

Urinary tract infection (UTI) remains one of the most common bacterial infections during pregnancy and is associated with adverse maternal and neonatal outcomes if left untreated. In the present study, the overall prevalence of UTI among pregnant women was 28.3%, with 65 out of 230 urine samples showing significant bacterial growth. This prevalence is comparable to findings reported in several developing countries, highlighting the continued burden of UTIs among pregnant women.

The prevalence observed in our study was higher than that reported by Masinde et al., who found a prevalence of 14.6% among pregnant women in Tanzania, and higher than the 10.5% prevalence of asymptomatic bacteriuria reported in Indonesia. However, our findings were lower than those reported by Muhammad et al. in Nigeria, where 55.0% of pregnant women were diagnosed with UTI. Differences in prevalence rates may be attributed to variations in geographical location, socioeconomic conditions, personal hygiene practices, healthcare accessibility, and diagnostic methods used in different studies.

In the present study, *Escherichia coli* was the predominant uropathogen, accounting for 58.5% of all positive isolates, followed by *Klebsiella pneumoniae* (20.0%), *Proteus mirabilis* (12.3%), and *Pseudomonas aeruginosa* (9.2%). These findings are consistent with previous studies that identified *E. coli* as the leading cause of UTIs during pregnancy. Masinde et al. reported that *E. coli* accounted for 47.2% of bacterial isolates, while Muhammad et al. also identified *E. coli* as the most common etiological agent among pregnant women. The predominance of *E. coli* may be attributed to its ability to adhere to uroepithelial cells and colonize the urinary tract efficiently.

The high frequency of UTIs observed in this study emphasizes the importance of routine screening of pregnant women during antenatal visits. Early detection and appropriate antimicrobial therapy can reduce the risk of complications such as pyelonephritis, preterm labor, low birth weight, and maternal morbidity. Regular urine culture and susceptibility testing should be encouraged to ensure timely diagnosis and effective treatment.

In conclusion, the present study demonstrated that UTI is a common infection among pregnant women in District Dera Ismail Khan, with *E. coli* being the most frequently isolated pathogen. Strengthening antenatal screening programs, promoting awareness regarding personal hygiene, and implementing appropriate treatment strategies may help reduce the burden of UTIs and

improve maternal and neonatal health outcomes.

CONCLUSION

In this study, we focus on urinary tract infection among pregnant women in District Dera Ismail Khan. We collected data from three hospitals, namely Biomed Diagnostic Center, Rehmania Hospital DIK and Tehsil Head Quarter Hospital Prova. We found out that mostly UTIs caused in pregnant women are E.coli, Klebsiella pneumonea, Proteus morbilas and Pseudomonas eurogenosa play a significant role in causing UTI. The pregnant women should be mindful of the potential risk associated with this agent. Hence advised proper hygienic protocol to lower your chance of infection. The Women's, who dry their clothes in closed condition without Sunlight, also having a chance of UTI in pregnant women. There should be a public awareness campaign to educate people about UTI from time to time, so that people are aware of the fact that UTI can also become a source of serious complications.

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