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Bacteria Isolated from Pregnant Women with UTIs: Susceptibility to Commonly Used Antibiotics and Related Risk Factors

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Running Title: **Uropathogens and Antibiotic Resistance in Pregnancy**

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Abstract

Background: Urinary tract infection (UTI) is a common bacterial infection during pregnancy. This study aimed to identify prevalent uropathogens, evaluate their susceptibility to common antibiotics, and record multidrug resistance (MDR) rates. **Methods:** Three hundred urine samples from pregnant women diagnosed with UTIs were collected. Samples underwent general urine examination and culture on *MacConkey* and blood agar. Isolated bacteria were identified using Gram staining, colony morphology, and biochemical tests. Antibiotic susceptibility testing was conducted using standard methods. **Results:** Bacterial cultures were positive in 218 of 300 samples, with Gram-negative bacteria accounting for 71.10%. *Escherichia coli* was the most frequent pathogen (44.95%), followed by *Klebsiella pneumoniae* (17.89%), *Staphylococcus aureus* (18.81%), *Staphylococcus haemolyticus* (10.09%), *Pseudomonas aeruginosa* (5.05%), and *Proteus mirabilis* (3.21%). Uropathogens showed the highest resistance to Augmentin (90.37%), Ceftazidime (89.45%), and Amoxicillin (87.80%). Fosfomycin demonstrated the highest efficacy, with an overall resistance rate of only 6.42%. Multidrug resistance was detected in 64.22% (140/218) of all isolates, with *P. aeruginosa* (100%), *K. pneumoniae* (76.92%), and *E. coli* (68.37%) having the highest rates. **Conclusions:** *Escherichia coli* is the leading cause of UTIs in pregnant women in Ramadi City, exhibiting high resistance to Augmentin, Ceftazidime, and Fluoroquinolones. Despite Fosfomycin's high in vitro susceptibility, pregnancy safety, local regulations, and the possibility of resistance development must all be considered while prescribing the medication. Getting cultures prior to treatment and ensuring the proper administration of antibiotics remain critical.

Keywords: UTI, Antibiotics Resistance, Pregnant Women, Fosfomycin, Uropathogens, Public Health.

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Introduction

UTI during pregnancy poses a significant clinical problem (1). Although bacteriuria is only slightly more common than in non-pregnant women, the consequences for both the mother and the fetus are more severe (2). Increased risk factors include pyelonephritis, low neonatal birth weight, pre-eclampsia, and premature delivery (3). Pregnancy-related changes to the urinary system, like ureteral dilatation, hydronephrosis (likely caused by progesterone), and uterine compression that results in reflux and stasis, are ideal conditions for bacterial development (4). An additional risk factor for infection is changing urine biochemistry during gestation (5). Due to variations in socioeconomic circumstances, availability of prenatal care, personal hygiene habits, and fundamental population health factors, the frequency of UTIs in pregnant women ranges significantly among geographical areas and healthcare facilities. Recent epidemiological investigations from various settings show significant variance in UTI incidence within pregnant women. The prevalence rates in Africa vary from 3.5% in Ethiopia (6) to 14.3% in Nigeria (7). Rates of prevalence from South Asian studies range from11.5% in Iran (8) to 17.0% in Yemen (9). According to studies, ampicillin resistance ratios range from 50 to 90%, making this once-reliable antibiotic less useful for empirical treatment. According to a recent study, UTIs affected 10–18% of pregnancies in the United States (10). The incidence of urinary tract infections during pregnancy in European countries generally ranges between 2% and 15% (11).

The occurrence of severe and recurrent infections has been demonstrated to be significantly impacted by the development of resistance to commonly used antimicrobial drugs (12). A concern to public health is the emergence of antibiotic resistance, which is being driven by non-prescription use and low cost (13). Additionally, differences in resistance rates to antibiotics were observed across regional and geographic borders (14,15). Globally, resistance to ampicillin and amoxicillin, historically regarded as first-line treatments for UTIs during pregnancy, has reached alarming proportions (16). According to studies, ampicillin resistance ratios range from 50 to 90%, making this once-reliable antibiotic less useful for empirical treatment (8,17,18). To avoid resistance and provide appropriate therapeutic care, it is essential to track pathogen frequency and resistance patterns (10). Since the burden of illness is so high for both people and society as a whole, accurate diagnosis and effective treatment of UTIs are crucial (5).

There are still a lot of unanswered questions about antibiotic resistance, despite its rising recognition as a serious threat to the health of mothers and children. The lack of systematic monitoring information on resistance patterns within pregnancy-related uropathogens in many regions hinders evidence-based therapy recommendations. The current study overcomes these important information gaps by methodically describing the bacterial etiology and patterns of antibiotic resistance of UTIs in pregnant women in a particular context. By identifying the most prevalent uropathogens, assessing their susceptibility to widely used antibiotics, and recording the prevalence of MDR, this study will provide crucial information to guide evidence-based treatment recommendations and antimicrobial stewardship initiatives. The results will encourage efforts to improve maternal and fetal outcomes in the face of this expanding public health concern and add to the body of information on antibiotic resistance in pregnancy-associated UTIs worldwide.

Materials and methods

Study Design

This hospital-based cross-sectional study was carried out between November 2025 and August 2026 at the laboratory departments of Al-Ramadi Teaching Hospital and Al-Ramadi Maternity and Child Teaching Hospital. Following ethical and scientific review board approval, the study was conducted with informed consent from all of the

women. A sample size of 300 pregnant women (aged 17–45) presenting with clinical UTI symptoms or positive urinalysis was calculated using the single-proportion formula ($n = Z^2 P(1-P)/d^2$) with an expected regional UTI prevalence of ~25%, a 95% CI, and a 5% margin of error. All 300 participants initially presented with clinical symptoms suggestive of a UTI (e.g., dysuria, frequency, urgency) and/or positive urinalysis (pus cells/leukocyte esterase). They were categorized as suspected UTIs prior to culture. Following microbiological culture, 218/300 were categorized as culture-confirmed UTIs ($\geq 10^3$ CFU/mL with single pathogen species), while 82/300 were classified as culture-negative symptomatic cases (which may be attributed to non-bacterial urethritis, aseptic pyuria, prior unreported antimicrobial intake, or fastidious organisms). Patients who have a history of chronic renal and vascular illness, vaginal bleeding, smoking, or use of antibiotics or non-steroidal anti-inflammatory medicines were excluded.

Microscopy

Using a conventional sterile procedure, midstream (clean-catch) urine specimens were taken from every patient during the prenatal care checkup. Urine samples were centrifuged at 3000 rpm for five minutes in aliquots. To investigate the deposits, x10 and x40 objectives were used (19).

Culture Technique

Clean-catch midstream urine samples were inoculated on blood and MacConkey agar plates using a loop calibrated to deliver roughly 0.001 mL each. Every day for two days, all plates were checked for growth while being incubated at 37 °C. One urinary tract pathogen growing at $\geq 10^3$ CFU/mL was considered a positive outcome (in line with updated IDSA/EAU guidelines) (20). Samples with mixed bacterial growth (≥ 2 distinct colony types) or less than 10^3 CFU/mL of common skin flora were judged contaminated/negative. For Gram-positive organisms, substantial growth required single-organism pure culture growth of $\geq 10^4$ CFU/mL accompanied by pyuria (≥ 5 WBCs/HPF) in urinalysis. Repeat fresh clean-catch samples were sought whenever mixed growth or skin contaminant flora were anticipated.

Diagnostic Identification

Following observing the characteristics of bacterial colonies, bacteria were routinely identified based on Gram stain reactions and biochemical tests such as coagulase and catalase tests for Staphylococcus species, while lactose utilization, IMVC tests, urease, hydrogen sulphide gas production tests, starch hydrolysis, and motility for Enterobacteriaceae.

Susceptibility testing

The Kirby-Bauer disk diffusion method was used and interpreted in accordance with CLSI M100 criteria. Bacterial inoculum was lawn-streaked onto Mueller-Hinton agar (MHA) after being prepared in sterile saline to match a 0.5 McFarland turbidity standard (1.5×10^8 CFU/mL). Plates were incubated for 16–18 hours at 37°C. The antimicrobial disc dosages tested were Amoxicillin (10µg), Augmentin (20µg), Cephalexin (30µg), Ceftazidime (30µg), Ciprofloxacin (5µg), Levofloxacin (5µg), Amikacin (30µg), Trimethoprim (5µg), Doxycycline (30µg), Fosfomycin (200µg with 50µg G6P), and Nitrofurantoin (300µg). Quality control was ensured by parallel testing of the reference strains *E. coli* ATCC 25922, *P. aeruginosa* ATCC 27853, and *S. aureus* ATCC 25923, which yielded inhibitory zone sizes within acceptable CLSI reference ranges.

Statistical Analysis

SPSS version 26.0 was used for statistical analysis. Participants' baseline characteristics were summarized using frequencies, means with standard deviations (SD), and medians (IQR) for continuous variables. Initially, relationships with urine culture positivity were assessed using bivariable analyzes (chi-square or Fisher's exact tests). Each type of bacteria that was isolated and identified was measured as a proportion of all isolated bacteria. Frequencies and percentages were used to illustrate the patterns of antibiotic resistance in isolated

bacteria. A multivariable binary logistic regression model was then used to include variables that showed $p < 0.20$ in univariable screening, such as age, gravidity, painful micturition, presence of pus cells, and orientation of genital hygiene washing (front-to-back vs. back-to-front). The odds ratio (OR) and 95% CI were used to calculate the strength of the association between UTI and related factors. A p-value of ≤ 0.05 was considered statistically significant.

Results

Over the course of nine months, 300 samples were taken from pregnant women who had been diagnosed with a UTI based on symptoms and a thorough urine analysis. The proportion of positive urine culture was 72.67% (218/300). In this investigation, six distinct bacteria were identified, with 71.1% (155/218) of the isolates being Gram negative. The most often isolated pathogen was *Escherichia coli* (44.95%), which was followed by *Klebsiella pneumoniae* (17.89%), *Pseudomonas aeruginosa* (5.05%) and *Proteus mirabilis* (3.21%). Out of all the isolated bacteria, *Staphylococcus aureus* (18.81%) and *Staphylococcus haemolyticus* (10.09%) made up 28.9% (63/218) of Gram-positive bacteria (**Table 1**).

Participants were 28.37 (±5.77) years old on average. The number of conceptions (gravity), number of pus cells, and cleaning of genitalia manner were significantly correlated with UTI-positive culture (P values of 0.00073, 0.00021, and 0.00066, respectively). None of the other factors showed statistically significant differences (**Table 2**).

Antimicrobial susceptibility testing demonstrated that Augmentin (90.37%), ceftazidime (89.45%), and amoxicillin (87.80%) had the highest overall resistance rates, followed by nitrofurantoin (61.93%), doxycycline (57.80%), levofloxacin (55.05%), and ciprofloxacin (55.05%). Trimethoprim (36.70%) and amikacin (28.44%) had resistance rates of less than 50%. Regarding specific microbial patterns, *Pseudomonas aeruginosa* showed 100% resistance to ceftazidime, trimethoprim, and nitrofurantoin; *Proteus mirabilis* showed 100% resistance to Augmentin and trimethoprim; and *Staphylococcus aureus* and *Staphylococcus haemolyticus* both showed 100% resistance to ceftazidime. In contrast, *S. aureus* was completely susceptible to ciprofloxacin.

Meanwhile, fosfomycin had the lowest overall resistance rate in laboratory tests, at 6.42% (14 of 218). K. pneumoniae showed a resistance rate of 25.6%, and Escherichia coli showed 4.1%. Other microorganisms such as P. mirabilis, P. aeruginosa, S. aureus, and S. haemolyticus showed a resistance rate of 0% (**Table 3, Figure 1**).

Multidrug resistance bacteria were detected in 64.22% (140/218) of all pathogens isolated from the urinary tract, as shown in **Table 4**. *P. aeruginosa* showed the greatest rate of multidrug resistance among the Gram-negative isolates (100%, 11/11), followed by *K. pneumoniae* (76.92%, 30/39), *P. mirabilis* (71.43%, 5/7), and *E. coli* (68.37%, 67/98). In terms of Gram-positive isolates, multidrug resistance was found in 36.36% of *S. haemolyticus* isolates and 46.34% of *S. aureus* isolates.

Table 1: Bacterial type frequencies and percentages isolated from pregnant women with UTIs.

Test	Result	Frequency (n)	Percent (%)
Growth	Significant growth	218	72.67
	No significant growth	82	27.33
Gram stain (N=218)	Gram positive	63	28.90
	Gram negative	155	71.10
Microorganisms (N = 218)	*E. coli*	98	44.95
	Klebsiella pneumoniae	39	17.89
	Pseudomonas aeruginosa	11	5.05
	Proteus mirabilis	7	3.21
	Staphylococcus aureus	41	18.81
	Staphylococcus haemolyticus	22	10.09

Table 2: Risk factors related to culture-confirmed UTIs in pregnant women were analyzed using bivariable and multivariable logistic. Negative Culture (N=82), Positive Culture (N=218), and Total (N=300). Characteristics n/N (%) with p-value.

Characteristic		**Overall (N = 300)**	**Positive Culture (N = 218)**	**Negative Culture (N = 82)**	**Adjusted P value**	**Adjusted OR (95% CI)**
Age mean (±SD)		28.37 (±5.77)	28.60 (±4.34)	27.87 (±6.67)	0.215	1.04 (0.98–1.11)
Trimesters	1st	97 (32.33)	69 (28.44)	28 (34.15)	—	1.00
	2nd	85 (28.33)	62 (72.94)	23 (28.05)	0.792	1.09 (0.57–2.09)
	3rd	118 (39.33)	87 (39.91)	31 (37.80)	0.668	1.14 (0.63–2.06)
Gravidity	Prime-gravid	62 (20.67)	34 (15.60)	28 (34.15)	—	1.00
	Multi-gravid	238 (79.33)	184 (84.40)	54 (65.85)	0.004	2.45 (1.32–4.55)
Frequency of coitus per week, median		2	3	2	0.188	0.188
Painful micturition	Continuous	186 (62)	144 (66.06}	42 (51.22)	0.055	2.32 (0.98–5.49)
	Urgency of passing	67 (22.33)	46 (21.10)	21 (25.61)	0.291	1.48 (0.71–3.12)
	No pain	47 (15.67)	28 (12.84)	19 (23.17)	—	1.00
Vaginal discharge		72 (24)	49 (22.48)	23 (28.05)	—	—
Pus cells	(WBCs> 5)	181 (60.33)	167 76.61)	14 (17.07)	< 0.001	14.82 (7.41–29.63)
	(WBCs< 5)	119 (39.67)	51 (23.39)	68(82.93)	—	1.00
Cleaning of genitalia	Back to front	204 (68)	161 (73.85)	43 (52.44)	0.003	2.38 (1.35–4.21)
	Front to back	96 (32)	57 (26.15)	39 (47.56)	—	1.00
Previously diagnosed with a UTI during pregnancy		82 (27.33)	64 (29.36)	18 (21.95)	—	—
Chronic conditions present	Diabetes	7 (2.33)	5 (2.29)	2 (2.44)	—	—
	Hypertension	6 (2.0)	3 (1.38)	3 (3.66)	—	—
	Other illness	4 (1.33)	3 (1.38)	1 (1.22)	—	—

Table 3: Antibiotic resistance rate of bacteria isolated from pregnant women with UTIs

Antibiotics	Isolated bacteria and resistance rate N (%)					
	E. coli **(N=98)**	***K. pneumoniae*** **(N=39)**	***P. aeruginosa*** **(N=11)**	***P. mirabilis*** **(N=7)**	***S. aureus*** **(N=41)**	***S. hemolyticus*** **(N=22)**
Augmentin	91 (92.9)	33 (84.6)	10 (90.9)	7 (100)	37 (90.2)	19 (86.4)
Amoxicillin	82 (83.7)	36 (92.3)	10 (90.9)	6 (85.7)	36 (87.8)	19 (86.4)
Cephalexin	68 (69.4)	29 (74.4)	11 (100)	4 (57.1)	32 (80.5)	20 (90.9)
Ceftazidime	87 (88.8)	31 (79.5)	11 (100)	3 (42.9)	41 (100)	22 (100)
Amikacin	19 (19.4)	12 (30.8)	5 (45.5)	1 (14.3)	17 (41.5)	8 (36.4)
Trimethoprim	10 (10.2)	4 (10.3)	11 (100)	7 (100)	39 (95.1)	12 (54.54)
Levofloxacin	71 (72.4)	31 (79.5)	7 (63.6)	6 (85.7)	3 (7.3)	2 (9.1)
Ciprofloxacin	69 (70.4)	34 (87.2)	6 (54.5)	7 (100)	0 (0)	4 (18.2)
Doxycycline	80 (81.6)	19 (48.7)	4 (36.4)	5 (71.4)	11 (26.8)	7 (31.8)
Fosfomycin	4 (4.1)	10 (25.6)	0 (0)	0 (0)	0 (0)	0 (0)
Nitrofurantoin	75 (76.5)	31 (79.5)	11 (100)	1 (14.3)	13 (31.7)	4 (18.2)

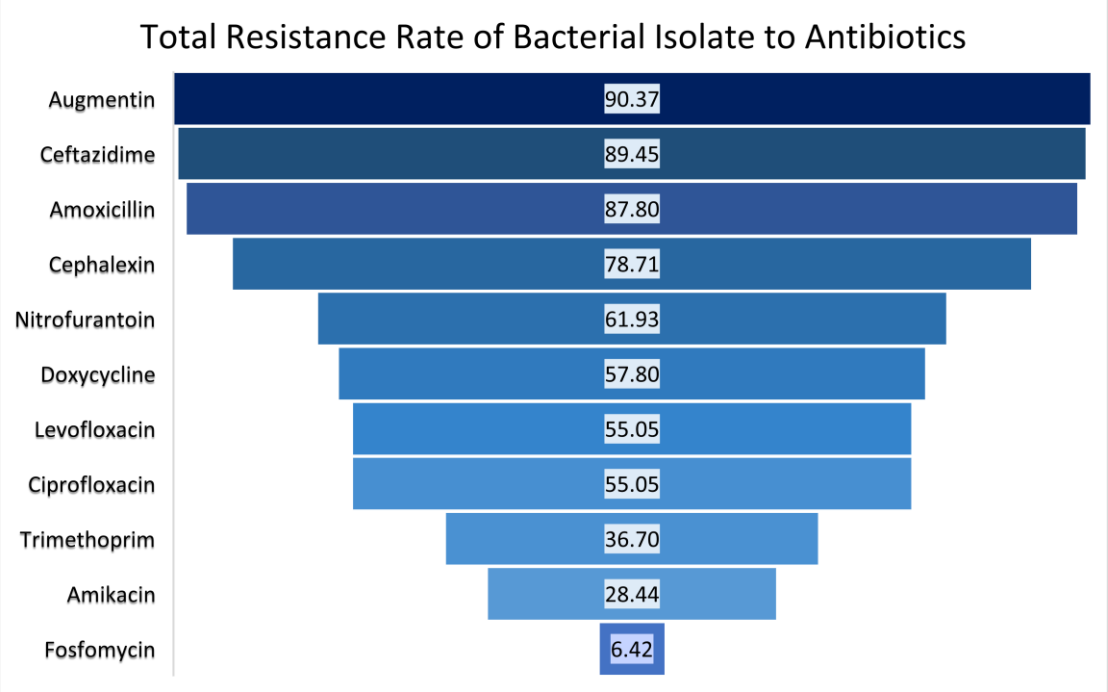


Figure 1: The overall percentage rate of bacterial resistance isolated from UTI-infected pregnant women.

Table 4: Patterns of multidrug resistance in bacteria isolated from pregnant women with UTIs (N=218).

Bacterial Species	Total Isolates (n)	Non-MDR Isolates, n (%)	MDR Isolates, n (%)	Common Resistance Profiles (Antibiotic Classes ≥3)
E. coli	98	31 (31.63%)	**67 (68.37%)**	Pen, Cep, Flu, Nit, Tet
K. pneumoniae	39	9 (23.08%)	**30 (76.92%)**	Pen, Cep, Flu, Nit
P. aeruginosa	11	0 (0.00%)	**11 (100.00%)**	Pen, Cep, Fol, Nit, Flu
P. mirabilis	7	2 (28.57%)	**5 (71.43%)**	Pen, Fol, Flu
S. aureus	41	22 (53.66%)	**19 (46.34%)**	Pen, Cep, Fol
S. haemolyticus	22	14 (63.64%)	**8 (36.36%)**	Pen, Cep, Fol
Total	**218**	**78 (35.78%)**	**140 (64.22%)**	—

Note: MDR is described as resistance to at least one agent in ≥ 3 separate antimicrobial categories. Antibiotic class abbreviations: Pen=Penicillins (Augmentin, Amoxicillin); Cep=Cephalosporins (Ceftazidime, Cephalexin); Flu=Fluoroquinolones (Ciprofloxacin, Levofloxacin); Nit=Nitrofurans (Nitrofurantoin); Tet=Tetracyclines (Doxycycline); Fol=Folate pathway inhibitors (Trimethoprim).

Discussion

Urinary tract infections are among the most prevalent bacterial infections encountered during pregnancy, influencing mother and fetal health globally(7,21). According to this investigation, six different kinds of bacteria were identified in 82% of urine samples from pregnant women who were diagnosed with UTIs. The genitalia anatomy of women associated with contributing factors includes changes in flora, frequent intercourse, family history, and hygiene, which are increased risk factors (22,23). Pregnant women are more susceptible to UTIs because of the physiological changes associated with pregnancy, particularly those linked to elevated progesterone levels (11). A high progesterone level promotes physiological "hydronephrosis" and urine stasis by relaxing smooth muscles, which lowers ureteric peristalsis and increases bladder capacity. These risks are exacerbated by elevated renal function and the gravid uterus compressing the ureters (4). Despite symptoms, urine cultures may seem negative, either as a result of culture limitations or undetected pathogens (24). The diagnosis ought to consider the patient's symptoms, hazards, and additional medical conditions such as STIs or interstitial cystitis (25).

Bacterial Etiology of UTI-Infected Pregnant Women

The results of this study showed that Gram-negative organisms account for 71.10% of the bacterial spectrum that causes UTIs in pregnant women, with *Escherichia coli* being the most common isolated pathogen (44.95%). This finding is supported by several studies that identified *E. coli* as a main cause of UTIs (9,18,21,26). The dominance of these bacteria is due to their virulence factors, including toxins, adhesins, and iron-acquisition mechanisms that promote colonization of the epithelium of the urinary system and form biofilms, making them more resistant to antibiotics (27). *Klebsiella*

pneumoniae has emerged as the second most prevalent Gram-negative uropathogens, making up 17.89% of isolates. *K. pneumoniae* is well-known for its mechanisms of multidrug resistance and its ability to cause serious infections, especially in people with compromised immune systems (28). Other Gram-negative isolated bacteria included *Pseudomonas aeruginosa* (5.05%) and *Proteus mirabilis.* (3.21%), which constitute a smaller fraction of the isolates. *P. aeruginosa* is an opportunistic bacterium that is frequently isolated in UTIs and usually exhibits higher levels of drug resistance compared to *E. coli,* the most common causative pathogen of UTIs (29). However, a previous study mentioned that *P. mirabilis* accounts for 5% of nosocomial UTI infections among hospitalized women and 1% to 2% of UTI cases among healthy adult women (30). Gram-positive bacteria, however less prevalent (28.90%), are a significant uropathogenic spectrum isolated from pregnant UTIs. *Staphylococcus aureus* was isolated in (18.81%) of cases and *Staphylococcus haemolyticus* in (10.09%) of cases. *S. aureus* is the causative agent of complicated UTIs, especially in individuals who are admitted to hospitals (31).

S. haemolyticus is an opportunistic microbe that is part of the normal flora of the skin. However, it is widely known that *S. haemolyticus* colonizes female urethras and periurethral areas, which might result in genitourinary infections (32).

Antibiotic susceptibility of UTI Pathogens

This study draws attention to the concerning problem of antibiotic resistance in bacteria that cause UTIs. The results of this study indicated that Fosfomycin is the most widely effective antibiotic in this group since it is the only one to which every tested bacterium is susceptible. However, because the interpretive criteria for the disk diffusion test (according to CLSI) are only officially established for Escherichia coli, which showed a resistance rate of 4.1%, these results necessitate careful interpretation that takes into account the specific characteristics of each microbe. According to earlier research, Fosfomycin should be regarded as a promising oral therapy option for UTIs, as it has been demonstrated to be more efficient than other tested antibiotics against the bacteria that cause UTIs (18,33). Because of their safety during all trimesters of pregnancy, beta-lactam antibiotics, notably amoxicillin and Augmentin, are commonly used as empirical treatments for UTIs (34). Results of the current study showed high resistance to beta-lactam antibiotics (Ceftazidime, Augmentin, amoxicillin, and Cephalexin), indicating the existence of bacteria that produce extended-spectrum beta-lactamases (ESBLs), which makes treatment a challenge (35). In accordance with several previous studies, *E. coli* and *K. pneumoniae* in particular showed significant rates of resistance to routinely administered antibiotics (Augmentin, Ceftazidime, Levofloxacin, Ciprofloxacin, Doxycycline, Amoxicillin, Cephalexin and Nitrofurantoin) (36). *P. aeruginosa* showed resistance to all antibiotics except Fosfomycin and Doxycycline. Both *S. aureus* and *S. haemolyticus* exhibited susceptibility to most tested antibiotics except Augmentin, Ceftazidime, and Trimethoprim. Antibiotic resistance varies among UTI bacterial isolates, according to numerous studies (37,38). In order to combat antibiotics, bacteria employ a variety of strategies, such as altering or inactivating enzymes, remodeling the porins of the outer membrane, increasing the efflux pump's activity, and changing the antibiotic's target sites (39). Selecting the appropriate antibiotic depends on the local epidemiology of multidrug-resistant bacteria (40). Drug resistance in Iraq is influenced by lifestyle, economic, social, and geographic variables, especially when it comes to UTIs (41).

In this investigation, urine pathogens isolated from pregnant women showed an alarming proportion of multidrug resistance of 64.22% (140/218). Gram-negative isolates demonstrated the most elevated levels of MDR, with *P. aeruginosa* displaying complete resistance at 100%, followed by *K.*

pneumoniae at 76.92%, *P. mirabilis* at 71.43%, and *E. coli* at 68.37%. MDR was detected in 36.36% of *S. haemolyticus* isolates and 46.34% of *S. aureus* isolates. The elevated levels of multidrug resistance correspond with recent research conducted in low- and middle-income nations, where the accessibility of over-the-counter antibiotics, rampant empirical prescribing, and incomplete treatment courses markedly intensify the selective pressure for resistant strains (42,43). The spectrum of safe and effective oral empirical therapy options during pregnancy is severely limited by the observed co-resistance to beta-lactams, fluoroquinolones, and folic acid pathway inhibitors. As a result, these findings highlight the critical necessity for routine pre-treatment urine culture and antibiotic susceptibility testing in antenatal care facilities, as well as comprehensive antibiotic stewardship programs, to avoid treatment failure and negative mother and fetal outcomes.

Conclusion

UTIs are the most common bacterial infection in pregnancy. The investigation of bacterial susceptibility in pregnancy-related UTIs provides important information about the efficacy of widely used antibiotics. The results show that uropathogenic bacteria have grown more resistant, which is worrying because it makes treatment options more difficult and may result in longer-lasting infections. A significant obstacle in pregnancy care is the high frequency of multidrug-resistant uropathogens (64.22%), which calls for stringent antibiotic stewardship. Regular monitoring of antibiotic susceptibility patterns is crucial for directing empirical therapy in an appropriate manner and reducing the chance of resistance development. In addition, in order to properly manage UTIs in the future, it is imperative to promote responsible antibiotic usage and investigate alternative therapeutic approaches.

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Conflict of interest

The authors declare that they have no conflict of interest.

Ethical approval

Ethical approval for this study was obtained from the Ethical Approval Committee, University of Anbar, Iraq (Ref. No. 265 on December 26, 2024).

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