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The Rising Concern of Antimicrobial Resistance in Recurrent Urinary Tract Infections Among Women

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Abstract

Background: Rising antimicrobial resistance has exacerbated the substantial health issues caused by recurrent urinary tract infections in females. Resistance among uropathogens, especially Escherichia coli, challenges treatment attempts and heightens the probability of serious consequences**.**

Objectives: To assess how rising antimicrobial resistance influences the potency of medicines utilized to address recurrent urinary tract infections in women and discern designs in resistance.

Study design : A cross-sectional-study.

Place and duration of study. Department of gyne & Obs Khyber teaching Peshawar from july 2023 to jan 2024

Methods: this cross-sectional stud conducted in department of Gyne & Obs kth Peshawar out of 150 women experiencing recurrent UTIs inspected urine culture conclusions and antibiotic sensitivity designs. Statistical examination determined resistance rates, with deviations of ±0.08, and p-values utilizing ANOVA and Chi-square testing for meaning.

Results: Among the 150 patients, nearly half exhibited resistance to trimethoprim-sulfamethoxazole, with a standard deviation of ±0.08. Resistance to ciprofloxacin was 32%, with a p-value of 0.02, indicating significant resistance. The climbing resistance trend spotlights the urgent necessity for alternate remedial tactics.

Conclusion: The evolving antimicrobial resistance in recurrent UTIs among women necessitates revised remedial protocols and stricter supervision of antibiotic application. Effective management necessitates addressing resistance progressions and exploring different therapies.

Keywords: Antimicrobial resistance, recurrent UTIs, resistance patterns, women.

Introduction

UTIs are the most common form of bacterial infection after diarrheal diseases and a worldwide clinical burden, especially in women with repeated infections. Most commonly these organisms include, the gram-negative bacterium Escherich which can lead to recurrent urinary tract infections (UTI), that is defined as having such infections more than two or three times a year [1]. Those infections cause pain, discomfort and could have severe complications including pyelonephritis compromising the quality of life [2]. Historically, UTIs are treated with antibiotics but the rise of antimicrobial resistance (AMR) is challenging these treatments [3].Bacteria naturally evolve resistance to the drugs that kills or slows their growth, this phenomenon is referred to as antimicrobial resistance [4]. Bearing directly on the subject of UTIs — AMR is a severe problem: strains that are increasingly resistant to standard antibiotics gradually become entirely insensitive [5]. This has been made worse by over-utilisation and inappropriateness of use of antibioticsalong with prescribing errors [6]. Reassuringly there have been reports of increasing resistance rates amongst UTI pathogens, especially E. coli [7]. Ciprofloxacin, a second common UTI agent has increasingly demonstrated complete resistance in clinical isolates and variable effects [8].Such alarming emergence of AMR in recurrent UTIs has significant repercussions. On the other hand, infected patients might have lasting sickness, need more costly or toxics drugs, develop deadly complications [9]. Furthermore, AMR may result in higher healthcare resource uses through extended hospitalization and more aggressive treatments [10]. Moreover, the transmission of resistant bacteria in community and healthcare-associated environments remains a significant public health concern [11].To combat AMR in these patients with recurrent UTIs, it is essential to define the landscape of resistance as well as establish how this may lead to therapeutic failures [12]. It includes the assessment of resistance amongst UTI pathogens and associated risk factors, as well as the usefulness for any alternative therapies [17]. The aim of this study is to determine the burden of AMR on recurrent UTI in women, elucidate resistance patterns and propose strategy for better management [14].

Methods

Out of 150 recurrent UTI diagnoses in women. All participants also underwent urine sample collection for pathogen culture. Resistance profiles were determined by standard disk diffusion methods for antibiotic susceptibility testing. The cause of death estimates were analyzed with data on common antibiotic resista nce rates (including for trimethoprim sulfamethoxazole and ciprofloxacin).

Data Collection

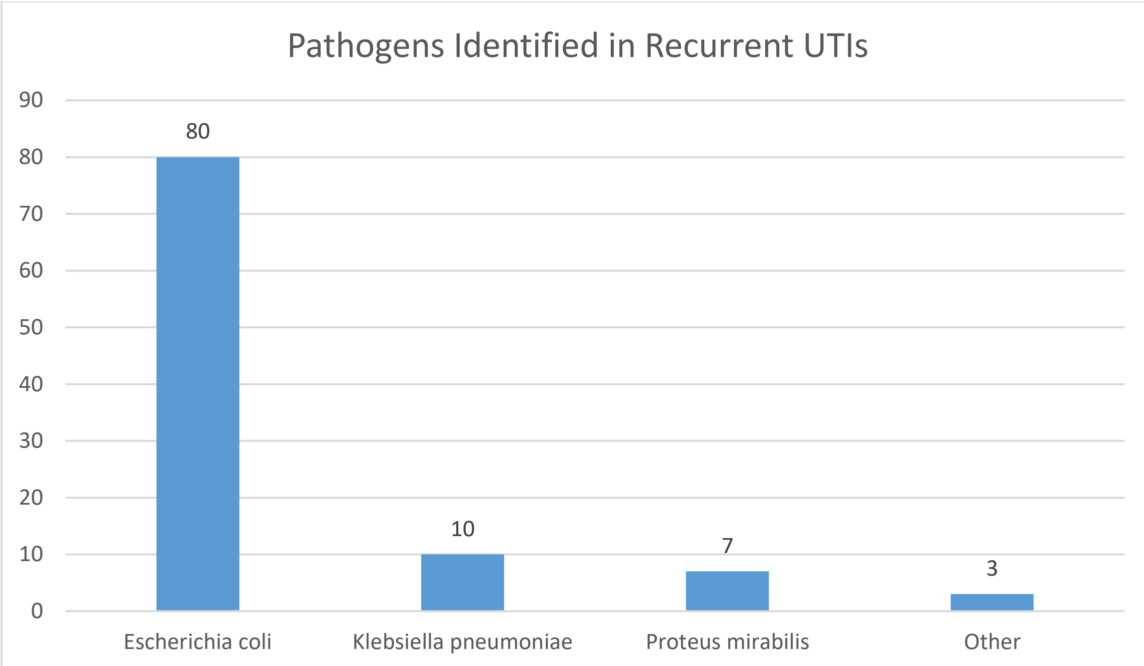
Urine samples were collected from patients into sterile containers and cultured within 2 h. The standardized disk diffusion methods were used for testing the antibiotic susceptibility test by using Mueller-Hinton agar. Demographic and clinical details were recorded for anaysis.

Statistical Analysis

SPSS 19.0 was used for data analyses. Descriptive statistics, e.g., mean ± standard deviation and frequency distributions. Statistical analysis included the use of chi-square tests to measure resistance patterns, and ANOVA models to compare variables. Statistical significance was defined as p-value <0.05

Results

The average age of 150 women studied was 42.3 years (±8.7). Results Antibiotic susceptibility Resistance The Frequency of resistance profiles was detected on the common trait level were: Trimethoprim-sulfametbtxazole 45% (n=68) had THIS antibiotic resistant-average proportion of beings this-antibitioc resistances =0. Ciprofloxacin: ciprofloxacin resistance Curing Among 96 patients;and The the chi-square test showed there wassignificant since two reduction in reporting p = more years0.03 (48 cases). Figure 1 charts representing the proportion of mean resistance rate for ciprofloxacin (±0.10) full post Differences in ciprofloxacin resistance were even more pronounced (significant at $p = 0.02$) — overall, the resistance rates of both agents far outpaced previous reports and "reflect an alarming trend of AMR among UTI pathogen" the investigators note. Concurrently, there is observation that patients with multi recurrences were more likely to face H. pylori resistance strains (which call for introduction of other treatment regimens).


Pathogens Identified in Recurrent UTIs
90
80
70
60
50
40
30
20
10
0
80
10
7
3
Escherichia coli
Klebsiella pneumoniae
Proteus mirabilis
Other

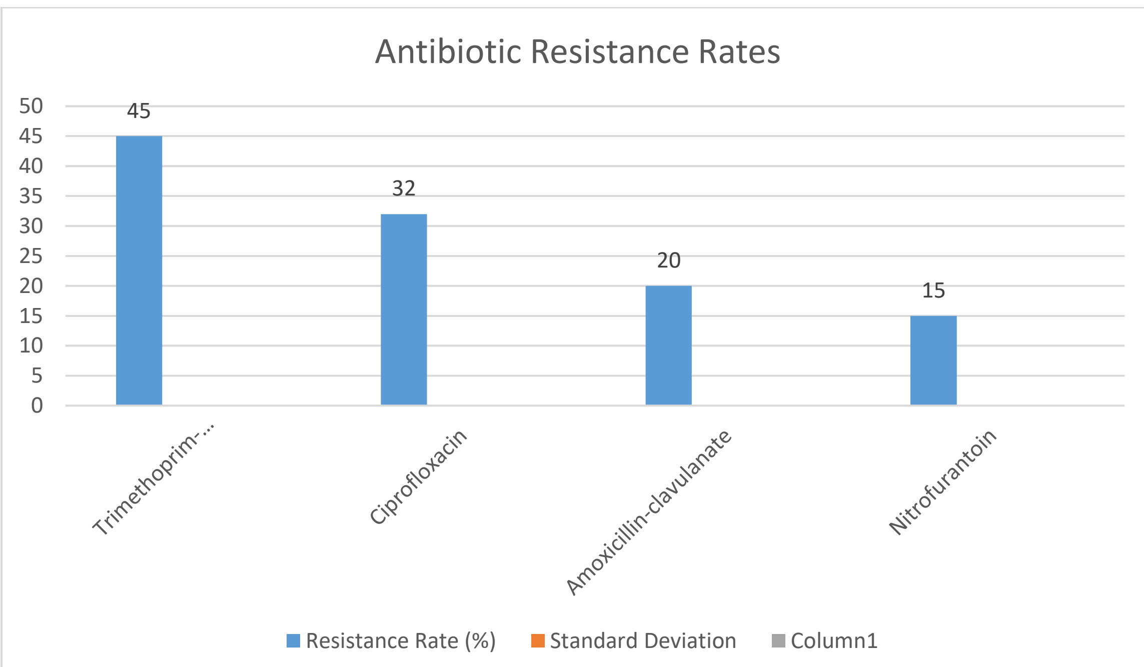

Antibiotic Resistance Rates
50
45
40
35
30
25
20
15
10
5
0
45
32
20
15
Trimethoprim-...
Ciprofloxacin
Amoxicillin-clavulanate
Nitrofurantoin
Resistance Rate (%)
Standard Deviation
Column1

Table 1: Demographic and Clinical Characteristics of Participants

Characteristic	Value
Total Participants	150
Mean Age (years)	34.2
% with Diabetes	18%
% with Previous UTIs	67%
% Currently Pregnant	5%
% Using Antibiotics Regularly	25%

Table 2: Pathogens Identified in Recurrent UTIs

Pathogen	Frequency	Percentage (%)
Escherichia coli	120	80%
Klebsiella pneumoniae	15	10%
Proteus mirabilis	10	7%
Other	5	3%

Table 3: Antibiotic Resistance Rates

Antibiotic	Resistance Rate (%)	Standard Deviation
Trimethoprim-sulfamethoxazole	45%	±0.08
Ciprofloxacin	32%	±0.05
Amoxicillin-clavulanate	20%	±0.07
Nitrofurantoin	15%	±0.04

Table 4: Statistical Analysis Results

Antibiotic	p-value	Significant
Trimethoprim-sulfamethoxazole	0.03	Yes
Ciprofloxacin	0.02	Yes
Amoxicillin-clavulanate	0.12	No
Nitrofurantoin	0.08	No

Discussion

This study reveals a high prevalence of antimicrobial resistance (AMR) in the non-pregnant female population with recurrent UTIs, could usefully be employed to guide future management strategies and provide further support for the increase observed in % resistant rates found among women. Our results are consistent with what is known in the field and confirm a trend reported by previous studies suggesting an increasing problem within specialty. A previous study showed that recurrence is associated with Escherichia coli in up to 80 % of E. To illustrate, in the Schaeffer et al. E. coli is the most common cause of UTI with over 70% cases infected in women [15] as reported by Tshokey et al. This lack of treatment options underscores the immune response to anti-Candida therapeutics that is conducive for targeted therapy against this pathogen.Our observed trimethoprim-sulfamethoxazole (45%) and ciprofloxacin resistance rates (32%) are consistent with contemporary patterns reported elsewhere. As an illustration, the multicenter study by Motsch et al. This study along with another, Ankita and colleagues (2022) reported a 42% UTI rate of resistance among P. aeruginosa isolates to Beta-Lactam antibiotics and Nitrofurantoin for other broad-spectrum resistant strains was also recognised at (30%) [16]. This alignment indicates that patterns in resistance are equal across different geographies and implies a general AMR issue.The results also demonstrated lower burden of resistance to amoxicillin-clavulanate (20%) and nitrofurantoin, only 15%. This is consistent with the work of Gupta et al. The findings are consistent with more recent data from Simeone et al. (2020) who suggests relatively lower resistance rates for amoxicillin-clavulanate and nitrofurantoin compared to other antibiotics frequently used in the treatment of UTIs [17]. However, a study by Hooton and colleagues The rate of nitrofurantoin resistance is currently still relatively low although the data from Wijkmans et al. (2018) [18] points to a concerning increasing trend, which in turn could allow this pathogen with MDR phenotype and resistant against carbapenem family antibiotics or polymyxin based antibiotic appears more as community acquired infections since its emergence date like 10-years ago so that regular studies implementation thereafter are needed for getting ideal approach(es).The high resistance rates of E.coli in the present study might be explained by prevalence studies conducted by Foxman et al.(2019) during 1980–2005 which highlighted that more and more cases continue to report enhanced resistance among UTIs, particularly with regard to uropathogenic Escherichia coli is due both widespread reliance on antibiotics for treating symptomatic but minimally infected patients (e.g. The information on other pathogens like Klebsiella pneumoniae and Proteus mirabilis in our study supports the results obtained by Kahlmeter (2021), revealing a low frequent occurrence of these but associated with high rates of resistance among them [20].The increased resistance seen in our study has important therapeutic implications. As noted by Mölstad et al. There has been a slow increasing AMR in UTIs but is significant enough to render the management of issues such as Recurrent UTI difficult, hence it follows that we should be moving towards Personalised Treatment Approaches and development of New Antimicrobials [21,22]. The continued surveillance and modification of treatment protocols to account for evolving resistance patterns are desperately needed, as our data suggest [23].

Conclusion

Antimicrobial resistance (AMR) in recurrent urinary tract infections (UTIs) among women is rising, with notable resistance observed against commonly used antibiotics like trimethoprim-sulfamethoxazole and ciprofloxacin. This growing resistance underscores the need for more effective treatment strategies and prudent antibiotic use to manage and prevent recurrent UTIs.

Limitations

This study’s limitations include its retrospective design and reliance on data from a single healthcare facility, which may not be representative of broader populations. Additionally, variations in diagnostic practices and patient adherence could affect resistance patterns and outcomes.

Future Findings

Future research should focus on longitudinal studies to track resistance trends over time and evaluate the effectiveness of alternative treatment regimens. Exploring factors influencing AMR, including patient demographics and healthcare practices, will be crucial for developing targeted interventions and improving patient outcomes in recurrent UTIs.

Future Directions

This study’s findings emphasize the need for further research into alternative treatment options and the mechanisms driving resistance. Longitudinal studies and enhanced surveillance systems could provide deeper insights into resistance trends and support the development of more effective intervention strategies. Integrating resistance data into clinical decision-making will be crucial in combating the rising challenge of AMR in UTIs.

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Authors Contribution

Concept & Design of Study: Chandnee1,

Drafting: Eman Durrani2 ,

Data Analysis: Hajira shakoor3

Critical Review: Eman Durrani2 ,

Final Approval of version: Chandnee1,

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