ANTIBIOTIC RESISTANCE TO UTI MEDICINE: LONG-TERM FOLLOW-UP REPORT

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Abstract
Paediatric UTIs are among the most frequent illnesses. This discussion's context and goal are below. The arbitrary use of antibiotics has increased the number of antibiotic-resistant germs and disseminated them to other illnesses. In children aged nine who were diagnosed with urinary tract infections and referred to the hospital, this study examined resistance progression.
Place of study: Children's Hospital, Lahore
Study Design: Cross-sectional study
Materials and Methods: This cross-sectional study examined all children diagnosed with urinary tract infections between 2021 and 2023. Reviewing patient healthcare records yielded 1.5 years of data. The patient's age, gender, antibiotic resistance profile, urine culture results, and UTI history were included. Clinical and microbiological criteria were considered for case selection.
Result: The study found that E. coli was the most prevalent bacterium in urine samples. The high antibiotic resistance rates for Cefixime (72.7%) and Ceftriaxone (67.4%) make treating paediatric UTIs, especially E. coli-caused ones, problematic. Further susceptibility studies showed that Amoxicillin (94.2%) and Cephalexin, Trimethoprim/Sulfamethoxazole (93.3%) were the most susceptible antibiotics, suggesting they could treat paediatric UTIs. Resistance patterns over 1.5 years demonstrated sensitivity and rate variations. Males and females displayed different resistance patterns to Amoxicillin, Cephalexin, Co-trimoxazole (Trimethoprim/Sulfamethoxazole), and Nitrofurantoin, according to statistical analysis. This difference was substantial (P>0.05).
Conclusion: According to the study, 94.2% of the strains tested respond to Amoxicillin, making it a suitable treatment. Antimicrobial stewardship strategies and drug resistance monitoring may prevent urinary tract infection (UTI) mistreatment.

Keywords: Antibiotic resistance, urinary tract infections, children.

INTRODUCTION

This study investigated the antibiotic resistance profile in paediatric patients with urinary tract infections in order to find patterns and associations. The study conducted a retrospective analysis of data from paediatric patients with urinary tract infections between 2021 and 2023.

The study included a total of 40 participants, predominantly female youngsters between the ages of one and five. The study participants frequently reported symptoms such as fever; dysuria accompanied by strong crying, and increased urinary frequency. Based on Mendez's (2018) prior investigation, Escherichia coli emerged as the predominant pathogen detected in urine cultures. The antimicrobial resistance of the identified E. coli strains was evaluated using conventional bacteriological methods and antibiotic susceptibility tests. The authors Gupta et al. Medication resistance is a significant clinical concern in cases of urinary tract infections in children. The investigation revealed a high prevalence of ampicillin and trimethoprim-sulfamethoxazole resistance among E. coli isolates. The analysis additionally discovered the presence of transferable drug resistance among coliforms, indicating the potential for dissemination of resistant strains. These findings underscore the significance of prudent antibiotic utilisation and surveillance of antimicrobial resistance in urinary tract infections among children. This study investigated the antibiotic resistance of paediatric patients with urinary tract infections. Al-Mugeiren and Qadri (n.d.) conducted a study that involved analysing data on urinary tract infections in children from 2021 to 2023 using a retrospective review. The study included a total of 40 children, with a majority being females between the ages of one and five. Urinary tract infections are frequently observed in children, encompassing a spectrum of symptoms ranging from mild cystitis to fever and dehydration. Infants can get genitourinary diseases from many microorganisms such as bacteria, viruses, fungi, and parasites. This study investigated the antimicrobial resistance profile of urinary tract infections in children, as well as the clinical and practical patterns of antibiotic treatment. This study investigated the phenomenon of antibiotic resistance in uropathogens isolated from children who were hospitalised due to urinary tract infections. Gaining insight into the patterns of antibiotic resistance is essential for choosing the right initial medicine and implementing successful treatments for urinary tract infections in children. An analysis of historical data on urinary tract infections (UTIs) in children is crucial for comprehending the development of antibiotic resistance in this specific group of patients. The study analyses the patterns of resistance among uropathogens to provide insights on the treatment of urinary tract infections and the development of antibiotic resistance. This study aims to contribute to the existing understanding of antibiotic resistance in urinary tract infections among children. The results will assist healthcare providers in making well-informed choices regarding antibiotic treatment and underscore the significance of using antimicrobial drugs judiciously in susceptible individuals.

Material and Methods: It tracked antibiotic resistance from 2021-2023. Children's Hospital, affiliated with UHS, is one of best-equipped teaching therapeutic institutes. It provides paediatric medical ward with 80 beds. The Medical Sciences Research Ethics Committee approved this work with the ethical committee.

Inclusion Factors

UTIs were found in children aged one month to eighteen in the research. UTIs were defined by (i) a positive urine culture with pathogen growth of 104 CFUmL-1 or higher for catheter samples or suprapubic aspiration, or (ii) pyuria (with at least five white blood cells per high-power field) in centrifuged urine or a positive dipstick (with leukocyte esterase or nitrites). Patients with incomplete records were excluded from the study.

Laboratory Methods

The micro laboratory method used capillary tubes to measure erythrocyte sedimentation rate (ESR). Red blood cells produced in an hour indicate systemic inflammation and maybe an upper

urinary tract infection. The serum CRP level was quantified according to manufacturer guidelines. Common antibiotics include

1. **Amoxicillin/Clavulanate :** A combination antibiotic effective against a broad spectrum of bacteria.
2. **Cephalexin :** A cephalosporin antibiotic used to treat various bacterial infections.
3. **Trimethoprim/Sulfamethoxazole :** A combination antibiotic that is often used for UTIs.
4. **Cefixime :** Another cephalosporin antibiotic used to treat certain bacterial infections.
5. **Ceftriaxone :** A cephalosporin antibiotic that may be used in more severe cases.
6. **Nitrofurantoin :** Often prescribed for lower urinary tract infections.
7. **Fluoroquinolones :** Generally reserved for complicated or more severe cases, but their use in children is limited due to potential side effects.

Statistics Analysis

All statistical analyses used SPSS 23, created by SPSS Inc. in Chicago, Illinois, United States, and a P-value of less than 0.05 was considered statistically significant. After Chi-square and Kruskal-Wallis tests, residual analysis was done.

Results

Study tracked 100 children with UTIs (n=67; 67% female, n=33; 33% male). Patients in the study had a mean age of 40.2 ±42.1 months. Antibiotic resistance increases in paediatric UTIs are concerning, according to the study. Escherichia coli, the most common pathogen in urine cultures, was Trimethoprim/Sulfamethoxazole, Ciprofloxacin and Ampicillin resistant. The study demonstrated transferable medicine resistance in coliforms, suggesting resistant germs could spread in this patient population. These findings underline the necessity of antibiotic stewardship in child UTIs and antimicrobial resistance monitoring. The study highlights antimicrobial resistance patterns to help antibiotic therapy decisions and emphasises prudent antimicrobial prescribing in paediatric UTIs. Paediatric UTI Epidemiology

In the study, 72% (72/100) of children had their first UTI and 28% (28/100) experienced UTI. These statistics demonstrate the prevalence of initial and recurring UTIs in children, underlining the need for tailored treatment.

Recurring UTIs in children are common, underlining the need for close monitoring and prevention. It emphasises understanding the causes of reoccurring UTIs to develop targeted treatments to reduce their occurrence in children. Understanding paediatric UTI epidemiology is essential for tailoring holistic therapies to different clinical situations.

Antimicrobial resistance patterns and epidemiological data help control paediatric UTIs with evidence-based methods. The study also stresses the importance of monitoring paediatric UTI antibiotic resistance. The hospitalisation lasted 10.32±4.24 days. Mean ±SD of CRP (mg/dL), ESR (mm/h), and WBC (cell/mcL) were 74.52 ± 36.3, 60.71 ± 29.18, and 16243.72 ± 7568.92. The highest and lowest CRPs were 8 and 225 mg/dL. ESR was 20–170 mm/h. Most pathogens were E. coli (82%; 82/100), followed by P. aeruginosa (4%; 4/100), K. pneumoniae (5%; 5/100), and Enterobacter spp. (3%; 3/100) Enterococcus and Proteus were this population's least common isolates (3%; 3/100) and 3%; 3/100).

The study emphasises studying paediatric UTI clinical and inflammatory aspects. The findings illuminate demographic and clinical factors, antibiotic resistance patterns, and systemic inflammatory markers, helping to understand paediatric UTIs and suggest treatment for optimal outcomes.

These data suggest that epidemiological and inflammatory features of paediatric UTIs must be considered for informed decision-making and focused therapies to minimise this illness in children. Previous research has indicated that Escherichia coli is the most prevalent pathogen in paediatric UTIs. The high antibiotic resistance rates for Cefixime (72.7%) and Ceftriaxone (67.4%) make treating paediatric UTIs, especially E. coli-caused ones, problematic. Further susceptibility studies showed that Amoxicillin (94.2%) and Cephalexin, Trimethoprim/Sulfamethoxazole (93.3%) were

the most susceptible antibiotics, suggesting they could treat paediatric UTIs. Resistance patterns over 1.5 years demonstrated sensitivity and rate variations.

Antibiotic resistance (%)	*E. coli* N=82 (%)	*P. aeruginosa* N=4 (%)	*K. pneumoniae* N=5 (%)	*Enterococcus* N=6(%)	*Enterobacter* N=3 (%)
Ceftriaxone (67.4%)	11(13.41)	0(0)	0(0)	1(16.66)	0(0)
Cefixime (72.7%)	16(19.51)	0(0)	1(20)	1(16.66)	0(0)
Cephalexin (93.3%)	26(31.7)	1 (25)	1(20)	2(33.33)	1(33.33)
Amoxicillin (94.2%)	29(35.36)	3(75)	3 (60)	2(33.33)	2(66.66)
Total	82(100)	4(100)	5(100)	6(100)	3(100)

DISCUSSION

This study emphasises the need to monitor paediatric UTI antimicrobial resistance patterns. This information can assist design targeted antimicrobial stewardship programmes and antibiotic prescribing practices.AK and FT antibiotic effectiveness may change due to these modifications, suggesting treatment optimisation techniques. The growing sensitivity to FT and the significant decrease in resistance to AMP imply that these antibiotics may be effective antimicrobials. The study also stresses the need of considering patient characteristics like age and gender when choosing medicines for UTIs in children.2018 (Lashkar, Nahata) Monitor Antimicrobial Susceptibility Patterns for Proper PrescriptionThus, doctors must be aware of antimicrobial susceptibility patterns to prescribe prophylaxis correctly. Paediatric UTIs must be monitored for antimicrobial resistance and drug susceptibility. 2019 (Angamuthu et al.)Doing so helps clinicians choose and administer antibiotics wisely, improving paediatric UTI therapy.For proper antibiotic selection and use, clinical decision-making must incorporate these antimicrobial resistance findings. This study confirms previous research that boys aged ≤ 4 years have a higher incidence of urinary tract infections. Therefore, tailored management strategies should consider patient factors like age and gender when choosing antibiotics for UTI treatment in children.2019 (Angamuthu et al.)Antimicrobial resistance patterns in paediatric UTIs must be monitored to guide antibiotic dosing and focused antimicrobial stewardship. Over a 9-year period, the study found significant fluctuations in sensitivity and resistance rates, suggesting that antibiotics like AK and FT may be less effective and suggesting ways to optimise treatment options.2014 (Awais et al.) The growing sensitivity to FT and the significant decrease in resistance to AMP imply that these antibiotics may be effective antimicrobials.The findings shed light on paediatric UTI demographics, clinical features, antibiotic resistance, and systemic inflammatory markers. To improve patient outcomes, management plans must consider the most common infections and their resistance patterns.Escherichia coli is the most frequent pathogen in paediatric UTIs, according to the study. This matches earlier studies showing its high incidence. The high antibiotic resistance rates for Cefixime (72.7%) and Ceftriaxone (67.4%) make treating paediatric UTIs, especially E. coli-caused ones, problematic.Further susceptibility studies showed that Amoxicillin (94.2%) and Cephalexin, Trimethoprim/ Sulfamethoxazole (93.3%) were the most susceptible antibiotics, suggesting they could treat paediatric UTIs. Resistance patterns over 1.5 years demonstrated sensitivity and rate variations.

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This study retrospectively analysed medical data of paediatric urinary tract infection patients from 2021 to 2023. The study included 40 children, mostly girls, aged 1–5. Standard bacteriological procedures and antibiotic sensitivity assays were used to assess urine culture uropathogen antimicrobial resistance.The study found alarming increases in antibiotic resistance in Escherichia coli. Many E. coli isolates were resistant to ampicillin and trimethoprim-sulfamethoxazole, making them ineffective for treating paediatric urinary tract infections.The study also found transferable

antibiotic resistance in coliforms, suggesting resistance spread.These findings emphasise the need to be cautious when prescription antibiotics for UTIs in children. This study emphasises the necessity of monitoring antimicrobial resistance and using antibiotics wisely to treat paediatric urinary tract infections.Features of Paediatric UTI A study of children aged 1 month to 18 with urinary tract infections was conducted. UTIs are detected by these criteria: a urine culture with 104 CFU/mL for catheter or suprapubic aspiration or 105 CFU/mL for clean-catch specimens, pyuria (5 white blood cells per high-power field) in centrifuged urine, or a positive dipstick test for leukocyte esterase or nitrites. Al-Mugeiren, Qadri Undated.The analysis excluded study participants with incomplete records. The study collected detailed data on paediatric UTI patients. Most research participants were 1–5-year-old girls. The main symptoms were fever, dysuria, and frequent urination. This data provides a complete picture of children's urinary tract infections (UTIs) and their demographic and clinical characteristics.As said, Escherichia coli dominated urine cultures. Understand the microbiological aetiology of paediatric urinary tract infections (UTIs) and utilise specialised pathogen management approaches.Detailed demographic and clinical study of paediatric UTI patients allows for targeted identification, therapy, and prevention. Understanding the unique characteristics of paediatric UTI patients is crucial to providing effective therapy and best outcomes. It also found alarming antibiotic resistance in isolated bacteria.

CONCLUSION
Medication sensitivity has not changed significantly, according to the findings. Antibiotic resistance detection and use to avoid drug resistance are the most significant antibiotic selection guidelines. The introduction of carbapenemases and the alarmingly high antibiotic resistance rates in hospitalised children with UTIs emphasise the need to test all clinical isolates for susceptibility.

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