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Brief Report

Bacterial Isolates and Antimicrobial Susceptibility Patterns in Outpatients with Suspected Urinary Tract Infections at National Hospital Kandy, Sri Lanka

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Abstract

Urinary tract infections (UTIs) are a common reason for outpatient consultations, and antimicrobial resistance complicates empirical treatment. This study assessed bacterial isolates and their antimicrobial susceptibility patterns among adults with clinically suspected UTIs attending the outpatient department of National Hospital Kandy, Sri Lanka, from 1 May to 31 July 2024. A descriptive cross-sectional study was conducted among 403 symptomatic adults. Midstream urine samples were cultured, and antimicrobial susceptibility was assessed using the disc diffusion method. Significant bacterial growth was identified in 98 samples (24.3%). Coliforms were the predominant isolates (67.3%), followed by *Staphylococcus saprophyticus* (14.3%). Among coliform isolates, susceptibility was highest to nitrofurantoin (92.4%), while resistance was highest to ciprofloxacin (48.5%) and co-amoxiclav (43.9%). These findings demonstrate substantial resistance to commonly used antibiotics among coliform isolates and support the importance of local urine culture and susceptibility data in guiding appropriate treatment.

Keywords: Urinary tract infection, antimicrobial resistance, antibiotic susceptibility, coliforms, urine culture

Introduction

Urinary tract infections are among the most common bacterial infections encountered in outpatient practice. Empirical treatment is frequently initiated before urine culture results are available; however, increasing antimicrobial resistance may reduce treatment effectiveness. Resistance patterns vary geographically, making local surveillance important for selecting appropriate empirical antibiotics.

Sri Lankan studies have documented antimicrobial resistance among urinary pathogens in community and outpatient settings. A study conducted in two teaching hospitals in Colombo reported resistance among urinary *Escherichia coli* isolates, while research from the Galle district identified extended-spectrum beta-lactamase-producing *E. coli* and *Klebsiella* species among patients with community-acquired UTIs (1,2). This study aimed to describe bacterial isolates and their antimicrobial susceptibility patterns among adults with clinically suspected UTIs attending National Hospital Kandy.

Methods

A descriptive cross-sectional study was conducted in the outpatient department of National Hospital Kandy from 1 May to 31 July 2024. A convenience sample of 403 adults aged 18 years or older with symptoms suggestive of UTI was included. Patients who had received antibiotics during the preceding seven days, had urinary catheterisation, or were

unable to provide a midstream urine sample were excluded. Written informed consent was obtained, and ethical approval was granted by the Ethical Review Committee of National Hospital Kandy.

Midstream urine samples were cultured on cysteine lactose electrolyte-deficient agar using a calibrated 1-µL loop and incubated at 37°C for 18-24 hours. Significant bacteriuria was defined as growth of a single organism at $\geq 10^5$ CFU/mL, or pure growth of 10^4-10^5 CFU/mL when supported by clinical correlation. Mixed growth was considered suggestive of contamination. Antimicrobial susceptibility was assessed using the Kirby-Bauer disc diffusion method on Mueller-Hinton agar with a 0.5 McFarland inoculum. Results were interpreted according to Clinical and Laboratory Standards Institute guidance, as reported in the original study. Descriptive statistics were used to summarise the findings.

Results

The study included 403 patients, of whom 228 (56.6%) were females and 175 (43.4%) were males. The mean age was 48.33 years. Significant bacterial growth was detected in 98 samples (24.3%). No growth was reported in 212 samples (53.0%); heavy mixed growth in 46 (11.4%); moderate mixed growth in 19 (4.7%); and no significant growth in 28 (6.9%). Among the 98 significant isolates, coliforms were the most common group (66; 67.3%), followed by *S. saprophyticus* (14; 14.3%), *Streptococcus species* (6; 6.1%), *Pseudomonas species* (4; 4.1%), *Acinetobacter* species (4; 4.1%), *Enterococcus* species (2; 2.0%) and *Proteus* species (2; 2.0%).

Among the 66 coliform isolates, nitrofurantoin showed the highest susceptibility, at 92.4% (61/66), with no reported resistance. Susceptibility to cefoxitin was 81.8% (54/66), cefuroxime 77.3% (51/66), and piperacillin-tazobactam 75.8% (50/66). Resistance was highest to ciprofloxacin, at 48.5% (32/66), followed by co-amoxiclav at 43.9% (29/66). Resistance to cefotaxime and ceftazidime was 33.3% (22/66) for each. The results for other bacterial species should be interpreted cautiously because of their small sample sizes. These findings are shown in Table 1.

Discussion

This study found significant bacteriuria in approximately one-quarter of symptomatic outpatients. Coliforms predominated among positive cultures, consistent with the recognised importance of Gram-negative bacteria in community-acquired UTIs. However, the study did not report species-level identification of the coliform isolates; therefore, these findings should not be interpreted as specific susceptibility estimates for *E. coli.*

The high ciprofloxacin resistance among coliform isolates is clinically relevant when considering empirical treatment. The Colombo outpatient study also documented antimicrobial resistance among urinary *E. coli* isolates, highlighting the importance of local resistance surveillance (1). In

Table 1. Distribution of bacterial isolates and selected antimicrobial susceptibility findings.

Organism	Frequency (%)	Key susceptibility findings
Coliforms	66 (67.3%)	Nitrofurantoin sensitive 92.4%; ciprofloxacin resistant 48.5%
Staphylococcus saprophyticus	14 (14.3%)	Nitrofurantoin sensitive 100%
Streptococcus spp.	6 (6.1%)	Ampicillin and vancomycin sensitive 100%
Pseudomonas spp.	4 (4.1%)	>50% sensitivity to tested antibiotics
Acinetobacter spp.	4 (4.1%)	Tetracycline resistant 75%
Enterococcus spp.	2 (2.0%)	Ampicillin and vancomycin sensitive 100%
Proteus spp.	2 (2.0%)	Nitrofurantoin resistant 100%

the Galle district, Priyadharshana and colleagues reported extended-spectrum beta-lactamase production among community-acquired urinary *E. coli* and *Klebsiella* isolates, demonstrating an additional challenge for antibiotic selection in Sri Lanka (2). International outpatient data have also shown considerable variation in resistance between countries, reinforcing the need to consider local rather than international susceptibility estimates when choosing empirical treatment (3).

Nitrofurantoin demonstrated high in-vitro susceptibility among the coliform isolates in this study. This finding may support its consideration for appropriately selected patients with uncomplicated lower UTI, subject to clinical assessment, renal function and local treatment guidance. It should not be used to treat suspected pyelonephritis because it does not achieve adequate renal tissue concentrations. The susceptibility findings alone do not establish clinical treatment effectiveness (4).

This study has several limitations. It was conducted at a single centre over three months using convenience sampling. The number of isolates of several bacterial species was small, limiting the reliability of species-specific estimates. The study did not report species-level identification of coliforms, the exact CLSI edition, or all antimicrobial disc potencies. Extended-spectrum beta-lactamase testing was not reported, and clinical outcomes were not assessed. The findings therefore describe the study population and should not be generalised to all patients in Sri Lanka.

Conclusion

Coliforms were the predominant bacterial isolates among outpatients with clinically suspected UTI at National Hospital Kandy. High in-vitro susceptibility to nitrofurantoin and substantial resistance to ciprofloxacin and co-amoxiclav were observed among coliform isolates. Local, regularly updated urine culture and antimicrobial susceptibility data are important to support appropriate empirical prescribing and antimicrobial stewardship.

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