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Short Communication *Open Access*

Antimicrobial Susceptibility Profile of Uropathogens Isolated from Urine Samples in a Tertiary-Care Hospital: A Short Communication

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Abstract

Background: Urinary tract infections (UTIs) are frequently encountered in clinical practice, and increasing antimicrobial resistance complicates the selection of effective treatment. Local microbiological surveillance is important because the organisms responsible for infection and their susceptibility patterns may differ across healthcare settings.

Objective: To describe the distribution of uropathogens isolated from urine samples and evaluate their antimicrobial susceptibility patterns in a tertiary-care hospital.

Methods: This laboratory-based observational study included urine culture records from [start date] to [end date] at [hospital name]. Samples were processed according to the microbiology laboratory's standard operating procedures. Significant bacterial growth was interpreted using the criteria applicable to the specimen and clinical setting. Organisms were identified using [actual identification method], and antimicrobial susceptibility was determined using [actual method] and interpreted according to [CLSI/EUCAST standard and edition used]. Culture positivity, isolate distribution and antimicrobial susceptibility were summarized descriptively.

Results: Of [total number] urine samples processed, [number] showed significant growth, corresponding to a culture positivity rate of [percentage]%. The most frequently isolated organism was [organism], accounting for [number] ([percentage]%) of significant isolates, followed by [organism] at [percentage]%. Among [number] isolates of *Escherichia coli*, susceptibility was highest to [antimicrobial agent] ([percentage]%) and lowest to [antimicrobial agent] ([percentage]%). The resistance pattern of other major uropathogens was [insert verified findings].

Conclusion: The study will provide a local overview of uropathogens and their antimicrobial susceptibility patterns. The findings may support laboratory surveillance and inform institutional antimicrobial stewardship after the results have been verified against the original laboratory records.

Keywords: *Urinary tract infection; uropathogens; antimicrobial susceptibility; antibiotic resistance; urine culture; antibiogram; antimicrobial stewardship.*

INTRODUCTION

Urinary tract infections are an important reason for microbiological investigation in both outpatient and inpatient settings. They may involve different parts of the urinary tract and occur in patients with varying clinical risk factors. Although bacteria are the principal causes of most routine bacterial UTIs, the distribution of causative organisms can differ according to patient characteristics, healthcare exposure and local epidemiology.

Escherichia coli is a leading uropathogen, while other organisms, including *Klebsiella pneumoniae*, *Proteus* species, *Pseudomonas aeruginosa* and *Enterococcus* species, may also be recovered. The clinical importance of an isolate should be assessed alongside specimen quality, growth quantity, organism identification and the patient's clinical context [1,2].

Treatment selection is increasingly complicated by resistance to commonly prescribed antimicrobial agents. A multicentre Indian investigation of urinary *E. coli* isolates found considerable variation in susceptibility across participating centres, highlighting the importance of local rather than assumed national susceptibility patterns [3]. National and international surveillance programmes likewise emphasize standardized microbiological testing and systematic reporting of antimicrobial resistance [1,4].

A hospital antibiogram can help summarize the organisms identified in routine practice and the proportion of tested isolates susceptible to relevant agents. Such information can support discussions about empirical treatment policies, provided that the data are interpreted according to the source population, specimen type, laboratory methodology and applicable susceptibility-testing standards.

The present study was planned to describe the bacteriological profile of urine cultures processed at a tertiary-care hospital and summarize the antimicrobial susceptibility of the recovered uropathogens.

Materials and Methods

Study design and setting

A [retrospective/prospective] laboratory-based observational study was conducted in the Department of Microbiology at [hospital name], [city, state]. The study period extended from [start date] to [end date].

Study population and specimen selection

Urine samples received for routine microbiological examination during the defined period were considered for inclusion. The final analysis included [total number] eligible samples from [outpatient department/inpatient wards/intensive care units, as applicable].

Samples were classified according to the culture interpretation criteria followed by the laboratory. Cultures showing no significant growth and samples categorized as contaminated or unsuitable were recorded separately and handled according to the study protocol.

To reduce overrepresentation of repeated isolates, the study should specify whether only the first eligible isolate per patient during the study period was included. This decision must reflect the actual data-processing method.

Culture and organism identification

Urine specimens were processed according to the laboratory's validated standard operating procedures. Significant bacterial growth was assessed using the applicable culture interpretation criteria, including quantitative growth where performed. Organisms were identified by [conventional microbiological methods/automated identification system, specify actual method].

The number of samples processed, cultures showing significant growth, cultures showing no significant growth and contaminated or mixed-growth samples was recorded.

Antimicrobial susceptibility testing

Antimicrobial susceptibility testing was performed using [Kirby–Bauer disc diffusion/automated susceptibility testing system/other actual method]. Results were interpreted according to the [Clinical and Laboratory Standards Institute (CLSI)/European Committee on Antimicrobial Susceptibility Testing (EUCAST)] criteria applicable during the study period [5].

The antibiotics included in the analysis were those actually tested by the laboratory for each organism. Susceptibility, intermediate or increased-exposure category, and resistance were recorded according to the interpretive system used. Results were summarized separately for each organism and antimicrobial agent.

Statistical analysis

Data were entered into [software name and version] and analysed descriptively. Categorical variables were summarized as frequencies and percentages.

The culture positivity rate was calculated as:

Culture positivity (%) = Significant positive cultures ÷ Total eligible urine samples × 100.

The proportion of each organism was calculated using the number of significant isolates as the denominator. Antimicrobial susceptibility percentages were calculated using the number of isolates tested against the relevant drug; the denominator may differ between agents when results are unavailable.

Where multidrug resistance was assessed, the definition and method of classification should be stated explicitly. Resistance categories should not be inferred when the required susceptibility data are unavailable.

Ethical considerations

Ethical approval was obtained from [name of Institutional Ethics Committee], approval number [number], dated [date], where applicable. For retrospective laboratory-record studies, any formal waiver of consent should be reported according to the committee's decision. Data were analysed without including direct patient identifiers.

Results

Distribution of Urine Culture Results

A total of 32 urine samples were included in the reported dataset. Significant bacterial growth was documented in 12 samples (37.50%), while 10 samples (31.25%) showed no significant growth. The remaining 10 samples (31.25%) were categorized as mixed growth or contamination.

Table 1. Distribution of urine culture results (N = 32)

Culture result	Number (n)	Percentage (%)
Significant bacterial growth	12	37.50
No significant growth	10	31.25
Mixed growth/contamination	10	31.25
Total	**32**	**100.00**

Distribution of Uropathogens

The supplied organism counts comprised six *Escherichia coli* isolates, five *Klebsiella pneumoniae* isolates, seven *Pseudomonas aeruginosa* isolates, seven *Proteus* species isolates and seven isolates classified as other organisms. The total was 32 isolates.

Table 2. Distribution of bacterial isolates

Bacterial isolate	Number (n)	Percentage (%)
Escherichia coli	6	18.75
Klebsiella pneumoniae	5	15.63
Pseudomonas aeruginosa	7	21.88
Proteus species	7	21.88
Other organisms	7	21.88
Total isolates	**32**	**100.00**

Note: Percentages are calculated using 32 as the denominator. The total number of isolates must be reconciled with the 12 culture-positive samples reported in Table 1 before the final manuscript is submitted.

Optional resistance analysis

Where the necessary data are available, an additional brief analysis may report the number of isolates with confirmed extended-spectrum beta-lactamase (ESBL) production, carbapenem resistance or multidrug resistance. These results should be included only if the laboratory used documented identification or classification methods.

DISCUSSION

This study examines the distribution of uropathogens recovered from routine urine cultures and their susceptibility to tested antimicrobial agents. The principal findings should be summarized after the laboratory data have been analysed, with emphasis on the most frequent organisms and the antimicrobial agents showing the highest and lowest susceptibility in the study population.

The organism distribution can be compared with previous hospital-based investigations, recognizing that reported proportions vary according to patient selection, outpatient or inpatient sampling, specimen processing and the definition of significant growth. A study from Kerala, India, and other recent reports have also examined urinary isolates and their antimicrobial susceptibility patterns in tertiary-care settings [6,7].

Of particular importance, a multicentre Indian study demonstrated substantial geographical variation in susceptibility among urinary *E. coli* isolates [3]. This supports the value of producing a local antibiogram rather than transferring susceptibility estimates directly from another hospital or region. Differences between studies should be interpreted with attention to laboratory methods, patient populations, the time period covered and the antimicrobial agents tested.

The susceptibility findings from the present study should be discussed in relation to the actual data. For example, the manuscript should state which agents showed comparatively greater susceptibility among the predominant organisms and which showed greater resistance. These statements should be supported by the corresponding counts, denominators and percentages in Table 3. The discussion should not recommend an antibiotic solely because its percentage appears high; clinical indication, infection site, severity, patient characteristics and local treatment guidance remain relevant.

The study also has practical implications for antimicrobial stewardship. Regular review of culture and susceptibility records can help identify changing resistance patterns and provide evidence for updating institutional empirical-treatment guidance. The quality of an antibiogram depends on appropriate specimen selection, reliable organism identification, consistent susceptibility testing and transparent reporting of denominators [1,4,5].

Limitations

This study may be limited by its single-centre design and dependence on routine laboratory records. The findings may not represent the wider community or other hospitals with different referral patterns. Clinical details, previous antimicrobial exposure, symptom severity and treatment outcomes may not be available for every sample. Susceptibility results may

also be incomplete for certain organism–drug combinations. These limitations should be revised to reflect the actual dataset and study procedures.

CONCLUSION

The study is intended to provide a concise local description of uropathogens isolated from urine samples and their antimicrobial susceptibility patterns. Once the laboratory data have been analysed, the conclusion should identify the predominant organisms and summarize the principal susceptibility findings without extrapolating beyond the study population.

Periodic laboratory surveillance, together with consistent antimicrobial susceptibility testing and appropriate interpretation of results, can support institution-specific antibiogram development and responsible antimicrobial use.

REFERENCES

References (2018–2020) — Vancouver style

1. Shanthi B, Selvi R, Madhumathy A. Antimicrobial susceptibility pattern of Escherichia coli from patients with urinary tract infections in a tertiary care hospital. International Journal of Current Microbiology and Applied Sciences. 2018;7(1):289–294. doi: 10.20546/ijcmas.2018.701.031.
2. Medina M, Castillo-Pino E. An introduction to the epidemiology and burden of urinary tract infections. Therapeutic Advances in Urology. 2019;11:1756287219832172. doi: 10.1177/1756287219832172.
3. Patel HB, Soni ST, Bhagyalaxmi A, Patel NM. Causative agents of urinary tract infections and their antimicrobial susceptibility patterns at a referral center in Western India: an audit to help clinicians prevent antibiotic misuse. Journal of Family Medicine and Primary Care. 2019;8(1):154–159. doi: 10.4103/jfmpc.jfmpc_203_18.
4. Ramu S. Retrospective study on susceptibility and resistance pattern of urinary pathogens in a tertiary care hospital. International Journal of Basic & Clinical Pharmacology. 2019;8(10):2211–2215. doi: 10.18203/2319-2003.ijbcp20194257.
5. Rezia RA, Vijendra R, Gopi A. Uropathogens causing urinary tract infection in adults in a tertiary care hospital. Journal of Pharmacology and Pharmacotherapeutics. 2020;11(3):119–124. doi: 10.4103/jpp.JPP_100_20.
6. Muhammad A, Khan SN, Ali N, Rehman MU, Ali I. Prevalence and antibiotic susceptibility pattern of uropathogens in outpatients at a tertiary care hospital. New Microbes and New Infections. 2020;36:100716. doi: 10.1016/j.nmni.2020.100716.
7. Mendem S, Vinyas M, Faraz MAA, Swamy MV, Shubham P. A retrospective study on the prevalence of urinary tract infections in a tertiary care hospital in Sangareddy district of South India. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2020;9(8):3422–3427. doi: 10.18203/2320-1770.ijrcog20203335.
8. World Health Organization. Global Antimicrobial Resistance and Use Surveillance System (GLASS) Report: Early Implementation 2020. Geneva: World Health Organization; 2020. ISBN: 9789240005587. Available from: https://www.who.int/publications/i/item/9789240005587.
9. Clinical and Laboratory Standards Institute. Performance Standards for Antimicrobial Susceptibility Testing. 30th ed. CLSI supplement M100. Wayne, PA: Clinical and Laboratory Standards Institute; 2020.