International Journal Of Health, Engineering And Technology (IJHET) *E-ISSN 2829 - 8683*
Volume 4, Number 6, March 2026, *Page. 2565 - 2572*
Email : editorijhess@gmail.com

Characteristics And Comorbidities In Patients With Urinary Tract Infections (UTI)

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Abstract

Urinary tract infection (UTI) is a common urogenital infection in both community and hospital settings, most frequently caused by Escherichia coli. In Indonesia, UTIs are estimated to reach 90–100 cases per 100,000 population annually and occur more often in females due to a shorter urethra that facilitates microbial entry. This study aimed to describe UTI case characteristics by age, sex, hypertension, diabetes mellitus, recurrent UTI history, and clinical manifestations at Universitas Kristen Indonesia Hospital during 2020–2021. A descriptive design was applied using secondary data from medical records. A total of 102 patients met the inclusion and exclusion criteria. The highest proportion of cases occurred in the 22–59-year age group (53 patients; 52.0%). Female patients predominated (62; 60.8%). Hypertension was identified in 45 patients (44.1%) and diabetes mellitus in 25 (24.5%). Recurrent UTIs were found in 53 patients (52.0%). Dysuria was the most frequent clinical manifestation (81; 79.4%). These findings indicate that UTIs at this hospital mostly affected adult females and were commonly accompanied by hypertension and recurrent infection, with dysuria as the leading symptom.

Keywords: Characteristics, Comorbidities, Urinary Tract Infection.

INTRODUCTION

Infectious diseases remain a major driver of morbidity and mortality in many low- and middle-income countries, particularly when early detection is delayed and clinical management is suboptimal. One of the most frequently encountered infections in both community settings and health care facilities is urinary tract infection (UTI). UTI presents a broad clinical spectrum, ranging from mild lower UTI detectable through urinalysis to severe upper UTI and urosepsis that can be life-threatening (Zeng et al., 2022; Guo et al., 2023). From a pathogenesis perspective, most UTIs are caused by uropathogens, with uropathogenic Escherichia coli (UPEC) as the dominant etiologic agent in community-acquired cases. UPEC remains clinically challenging due to its ability to adapt, persist, form intracellular bacterial communities, evade host defenses, and increase the likelihood of recurrence (Guo et al., 2023; Hawkey & Williams, 2025).

The global burden of UTI is substantial and has shown an upward trajectory, driven by population aging and the increasing complexity of patients in health services. The Global Burden of Disease (GBD) 2019 analysis estimated approximately 404.6 million UTI cases in 2019, with around 236,000 deaths and 5.2 million disability-adjusted life years (DALYs). It also documented marked increases in the absolute burden over the past three decades (Zeng et al., 2022). Another report based on GBD 2019 highlights higher age-standardized incidence among females than males and a rising burden in older age groups. These patterns align with anatomical susceptibility in females, hormonal and functional changes, and immune decline in older adults (Yang et al., 2022).

Female vulnerability to UTI is commonly explained by anatomical and microbial ecology factors, including a shorter urethra and closer proximity of the periurethral area to the rectum, which facilitates bacterial colonization and ascension (Yang et al., 2022). Age is also a key determinant. Increased UTI burden among older adults can be understood through immunosenescence, multimorbidity, urinary dysfunction, and higher exposure to invasive procedures in hospitals, all of which increase the risk of recurrent infection and complications (Yang et al., 2022; ISID, 2024). In neonatal populations, sex-related differences may also occur depending on circumcision status and early-life risk factors, underscoring that age-related patterns vary across the life course and care

context. In health care facilities, UTI becomes more complex due to its linkage with health care-associated infections, particularly catheter-associated urinary tract infection (CAUTI). The CDC reports that approximately 75% of hospital-acquired UTIs are associated with urinary catheters, and 15% to 25% of hospitalized patients receive catheters during their stay. CAUTI contributes to increased morbidity, mortality, length of stay, and costs, yet it is largely preventable when infection prevention practices are consistently applied (Centers for Disease Control and Prevention, 2024). This evidence indicates that patient characteristics, procedural factors, and hospital policies shape UTI patterns and clinical outcomes.

Beyond demographic factors, comorbidities strongly influence UTI risk, especially diabetes mellitus (DM) and hypertension. DM increases UTI susceptibility through impaired leukocyte function, altered tissue perfusion, bladder dysfunction related to neuropathy, and glycosuria that supports bacterial growth (Salari et al., 2022). A meta-analysis in type 2 DM reported a pooled UTI prevalence of about 11.5%, with higher prevalence among females, suggesting interaction between metabolic vulnerability and anatomical risk (Salari et al., 2022). In Indonesia, the 2023 Indonesian Health Survey (Survei Kesehatan Indonesia, SKI) reported a doctor-diagnosed DM prevalence of 1.7% across all ages, with notable interprovincial variation. Jakarta ranked among the highest at 3.1% (Kementerian Kesehatan Republik Indonesia, Badan Kebijakan Pembangunan Kesehatan, 2024). This trend matters clinically because a larger high-risk population can translate into more UTI cases, recurrence, and complications, particularly in hospital settings (Salari et al., 2022; Kementerian Kesehatan Republik Indonesia, Badan Kebijakan Pembangunan Kesehatan, 2024).

Hypertension is also relevant as a comorbidity because it correlates with aging, chronic kidney disease risk, and vulnerability to adverse outcomes during acute illness. SKI 2023 reported hypertension prevalence among individuals aged 15 years and older of 8.0% based on doctor diagnosis and 29.2% based on measurement. This gap reflects under-detection and suboptimal control, which may compound the risk of complications in a wide range of clinical conditions including infections (Kementerian Kesehatan Republik Indonesia, Badan Kebijakan Pembangunan Kesehatan, 2024). Conceptually, these comorbidities can be positioned as host susceptibility factors within an epidemiologic framework such as the agent-host-environment model. In this model, uropathogens act as the agent, metabolic and cardiovascular status represent host vulnerability, and exposure to health services such as catheterization and hospitalization constitutes environmental risk (Centers for Disease Control and Prevention, 2024; Salari et al., 2022).

A prominent issue in the last five years is increasing antimicrobial resistance among uropathogens. Resistance raises the risk of empirical treatment failure, prolongs symptoms, increases recurrence, and elevates the probability of severe complications. An Indonesian study covering 2020 to 2022 reported a 35% prevalence of multidrug-resistant (MDR) bacterial isolates among UTI patients, with E. coli as the most frequent isolate (39.6%). The study also identified age and male sex as independent risk factors for MDR, emphasizing the importance of mapping local patient profiles and clinical risk factors to support more precise antibiotic policies (Sari et al., 2024). In parallel, mechanistic literature underscores that UPEC persistence and intracellular survival can complicate eradication, contribute to recurrent UTI, and increase risk of systemic spread such as urosepsis (Guo et al., 2023; Hawkey & Williams, 2025). If these problems remain unaddressed, consequences may include repeated hospital visits, longer hospital stays, rising costs, renal complications, and preventable sepsis-related mortality, especially among vulnerable patients (Centers for Disease Control and Prevention, 2024; Guo et al., 2023).

Prior studies show consistent patterns while also leaving clinically important gaps at the local level. Globally, research consistently identifies older age and female sex as major correlates of UTI burden, while DM increases susceptibility and may worsen outcomes (Zeng et al., 2022; Salari et al., 2022). However, differences emerge in the magnitude of prevalence, pathogen distribution, antimicrobial resistance patterns, and the relative contribution of specific risk factors. These differences often reflect variations in study design, case definitions, patient mix (inpatient versus

outpatient), and local clinical practices. For example, the pooled prevalence estimate in type 2 DM (Salari et al., 2022) contrasts with the Indonesian hospital-linked findings highlighting high MDR proportions and distinct MDR risk factors (Sari et al., 2024). This variability requires critical appraisal because hospital decision-making depends heavily on local patient characteristics, comorbidity profiles, and facility-specific epidemiology.

Against this background, a descriptive assessment that maps UTI patient characteristics and major comorbidities becomes necessary. This study focuses on the distribution of UTI cases by age, sex, hypertension, diabetes mellitus, recurrent UTI, and clinical manifestations among UTI patients at Rumah Sakit Umum UKI during 2020 to 2021. The research problem is formulated as follows: What is the distribution of UTI incidence based on age, sex, hypertension, diabetes mellitus, recurrent UTI, and clinical manifestations at RSU UKI in 2020–2021? The general objective is to describe patient characteristics and comorbidities among UTI patients in that period. The specific objectives are to describe case distribution across each variable (Kementerian Kesehatan Republik Indonesia, Badan Kebijakan Pembangunan Kesehatan, 2024; Salari et al., 2022).

This study is important because its findings can support risk stratification, improve screening and documentation of comorbidities (DM and hypertension), strengthen recurrence prevention strategies, and inform more targeted empirical management in the context of antimicrobial resistance. Ultimately, evidence from this local setting can contribute to improved service quality, fewer complications, and reduced clinical and economic burden associated with UTI when early detection and optimal care do not occur (Centers for Disease Control and Prevention, 2024; Sari et al., 2024).

RESEARCH METHODS

Study Design and Approach

This study employed a quantitative approach using a retrospective descriptive design based on medical record data. A descriptive design was selected because the study aims to present the distribution of urinary tract infection (UTI) cases according to patient characteristics and comorbidities, without implementing interventions or testing causal relationships (Creswell & Creswell, 2018; Notoatmodjo, 2018). A retrospective approach is appropriate because the study uses existing clinical documentation from a defined period (Hulley et al., 2013). The objective of this study is to describe the occurrence of UTI by age, sex, hypertension, diabetes mellitus, recurrent UTI, and clinical manifestations among patients at Rumah Sakit Umum (RSU) UKI during 2020–2021 (Sastroasmoro & Ismael, 2014).

Study Setting and Study Period

The study was conducted at the Medical Records Unit of RSU UKI, East Jakarta, which served as the data collection site. The analyzed cases were drawn from the service period of 2020–2021. Administratively, the research process took place from proposal submission to completion of the manuscript (October 2022 to July 2023), covering the stages of permitting, data retrieval, data processing, and analysis (Sastroasmoro & Ismael, 2014).

Data Sources and Data Type

This study used secondary data obtained from medical records of outpatients and inpatients diagnosed with UTI and recorded at RSU UKI during 2020–2021. Secondary data were chosen because the study variables were already documented in clinical notes and laboratory results, enabling efficient and consistent measurement (Notoatmodjo, 2018; Sugiyono, 2019). Primary data collection methods such as interviews, direct observation, or questionnaires were not used because the study focused on mapping case characteristics based on existing documentation (Creswell & Creswell, 2018).

Population, Sample, and Sampling Technique

The study population comprised all outpatients and inpatients diagnosed with UTI and recorded in RSU UKI medical records during 2020–2021. The study sample consisted of records that

met the predefined inclusion and exclusion criteria. Purposive sampling was applied to ensure that selected subjects were aligned with the study objectives and had complete data for all required variables (Sugiyono, 2019). This approach is commonly used in medical record-based studies when the researcher needs cases that satisfy specific clinical and administrative requirements (Sastroasmoro & Ismael, 2014).

Inclusion and Exclusion Criteria

Inclusion criteria were: (1) outpatients and inpatients at RSU UKI during 2020–2021 diagnosed with UTI supported by urinalysis findings of leukocytes >5 per high-power field (HPF), and (2) complete medical records containing age, sex, hypertension, diabetes mellitus, recurrent UTI, and clinical manifestations. Exclusion criteria were: (1) UTI cases without urinalysis results or not meeting the leukocyte >5/HPF criterion, and (2) records with incomplete data on the study variables. These criteria were applied to maintain internal validity and ensure consistent case definitions in observational research (Hulley et al., 2013; Sastroasmoro & Ismael, 2014).

Data Collection Technique

Data were collected through documentation review by systematically examining patient medical records. Documentation is appropriate for descriptive studies that rely on written sources or institutional archives as the basis for variable measurement (Notoatmodjo, 2018; Sugiyono, 2019). The researcher used a standardized data extraction form to ensure consistent recording of all variables (Sastroasmoro & Ismael, 2014). Data retrieval was conducted directly at RSU UKI after obtaining formal permission through an introductory letter from the Faculty of Medicine, Universitas Kristen Indonesia, and approval from the hospital (Notoatmodjo, 2018).

Operational Definitions of Variables

Operational definitions were applied to ensure that each variable was clearly measurable, consistent, and replicable, particularly in quantitative studies using clinical data (Creswell & Creswell, 2018; Sastroasmoro & Ismael, 2014). Age was defined as the patient's age recorded in the medical record and categorized into 5–11 years, 12–21 years, 22–59 years, and >60 years. Sex was recorded as female or male according to the medical record. Hypertension was defined as systolic blood pressure >140 mmHg and/or diastolic blood pressure >90 mmHg as documented in the record. Diabetes mellitus was defined as random blood glucose (GDS) >200. Recurrent UTI was defined as a documented history of UTI episodes within the previous two years (2020–2021). Clinical manifestations of UTI were defined as the presence of documented symptoms such as dysuria, urgency, frequency, weakness, nausea, vomiting, or flank pain, and were classified as present or absent.

Research Procedure

The planning stage included selecting the study design, defining variables, developing the data extraction form, and securing research permissions. The implementation stage involved identifying UTI medical records from 2020–2021, selecting eligible records based on inclusion and exclusion criteria, and extracting relevant variables into the standardized form. The final stage involved transferring data into a digital dataset for processing and analysis. A structured procedure improves research transparency and supports replicability (Creswell & Creswell, 2018; Sastroasmoro & Ismael, 2014).

Data Management and Data Analysis

Data management consisted of editing, coding, data entry, and cleaning. Editing was performed to verify completeness and clarity of the extracted variables. Coding converted categorical variables into numerical codes to facilitate processing. Data entry was conducted using statistical software such as SPSS. Cleaning was performed to detect input errors, duplication, and inconsistencies. These steps reflect standard quantitative data management practices to ensure data quality prior to analysis (Dahlan, 2019; Field, 2018). Data analysis was descriptive, presenting frequency distributions and percentages to describe UTI occurrence by age group, sex, hypertension, diabetes mellitus, recurrent UTI, and clinical manifestations (Triola, 2018; Dahlan, 2019).

RESULTS AND DISCUSSION

Univariate Analysis

The medical record data that have been collected were processed using SPSS. Univariate analysis was applied to observe the frequency distribution of each variable. The results of the analysis are presented in the form of tables to provide a clear overview of the distribution patterns in the study sample.

UTI Patients by Age

Table 1. Frequency Distribution of UTI Patients by Age

Age Group (years)	N	Percentage (%)
5-11	4	3,9
12-21	6	5,9
22-59	53	52,0
>60	39	38,2
Total	**102**	**100,0**

Based on Table 4.1, the frequency distribution of urinary tract infection (UTI) patients by age group shows that the 22–59 years group had the highest number of patients diagnosed with UTI, with 53 patients (52.0%). The second-largest group was patients older than 60 years, totaling 39 patients (38.2%). Meanwhile, the 5–11 years group had the smallest number of UTI patients, with only 4 patients (3.9%).

This finding is consistent with a study by Alfi Sholihah (2017), which reported that the age group above 45 years had the highest number of UTI patients, with 12 out of 30 patients included in the study. In addition, another study by Nurul (2015) also reported that the 46–65 years age group had the largest number of UTI patients, namely 391 out of 871 patients.

The incidence of UTI tends to increase among women aged 35–65 years due to gynecological surgical procedures or urinary tract prolapse. In contrast, among men in the same age range, UTI occurs more frequently due to urinary tract obstruction caused by benign prostatic enlargement and the use of catheters. These explanations support the observed concentration of UTI cases in adult and older age groups in the present study.

UTI Patients by Sex

Table 2. Frequency Distribution of UTI Patients by Sex

Sex	N	Percentage (%)
Female	62	60,8
Male	40	39,2
Total	**102**	**100,0**

The data in Table 4.2 indicate that among 102 UTI patients, 62 patients (60.8%) were female. From the total number of patients, 40 (39.2%) were male with UTI.

This result aligns with the findings of Setiyo Ramdani (2019), which showed that UTI occurs more often in females, with 78 cases (78.8%) out of 99 patients. This pattern can be explained by anatomical factors in females. Women have a shorter urethra, and the urinary tract is located closer to the rectum, which facilitates the entry of microorganisms into the urinary tract. Therefore, sex-related anatomical differences remain a key clinical explanation for why female patients are more frequently affected in both community and hospital settings.

UTI Patients by Hypertension, Diabetes Mellitus, and Recurrent UTI

Table 3. Frequency Distribution of UTI Patients by Hypertension, Diabetes Mellitus, and Recurrent UTI

Hypertension	N	Percentage (%)
Yes	45	44,1
No	57	55,9
Diabetes melitus		
Yes	25	24,5
No	77	75,5
Recurrent UTI		
Yes	53	52,0
No	49	48,0
Total	**102**	**100,0**

Based on Table 3, 45 patients (44.1%) had hypertension, 25 patients (24.5%) had diabetes mellitus, and 53 patients (52.0%) experienced recurrent UTI.

This is consistent with a study conducted by Hardiyanti Amiruddin (2017), which reported that 18 UTI patients had diabetes mellitus out of 83 patients. Alfi Sholihah (2017) reported that recurrent UTI was found in 13 patients out of 30, and the same study found that 6 out of 30 UTI patients had hypertension. Santi Herlina (2015) also reported recurrent UTI in 27 out of 96 patients.

Several groups are prone to recurrent UTI, including those with predisposing factors such as structural or functional abnormalities of the genitourinary tract, antibiotic resistance, or the need for prolonged therapy. These factors may contribute to persistence of infection, incomplete bacterial eradication, or repeated exposure to risk factors, which can increase the likelihood of recurrence. In a hospital context, recurrent UTI is also clinically relevant because it may signal underlying complications, require repeated antibiotic courses, and increase the risk of resistant organisms.

UTI Patients by Clinical Manifestations

Table 4. Frequency Distribution of UTI Patients by Clinical Manifestations

Clinical Manifestation	N	Percentage (%)
Dysuria		
Yes	81	79,4
No	21	20,6
Frequency		
Yes	15	14,7
No	87	85,3
Weakness (lethargy)		
Yes	23	22,5
No	79	77,5
Nausea		
Yes	43	42,2
No	59	57,8
Vomiting		
Yes	25	24,5
No	77	75,5
Flank pain		
Yes	29	28,4
No	73	71,6
Fever		
Yes	47	46,1
No	55	53,9
Chills		
Yes	8	7,8
No	94	92,2
Suprapubic pain		
Yes	32	31,4
No	70	68,6
Hematuria		
Yes	7	6,9

No	95	93,1
Total	**102**	**100,0**

Based on Table 4.4, it can be concluded that the majority of respondents experienced dysuria, with 81 patients (79.4%). Other frequently reported complaints included fever in 47 patients (46.1%), nausea in 43 patients (42.2%), and hematuria was the least common symptom.

These findings are consistent with the study by Setiyo Ramdani (2019), which reported that dysuria was the most commonly observed symptom among UTI patients, followed by urinary frequency. Differences in symptom patterns can occur depending on the anatomical location of infection within the urinary tract, whether the infection involves the upper urinary tract (e.g., kidneys) or the lower urinary tract (e.g., bladder and urethra). Clinically, lower UTI often presents with dysuria, urgency, and frequency, whereas upper UTI may more commonly present with systemic symptoms such as fever, flank pain, nausea, vomiting, and chills. This clinical reasoning helps explain why dysuria dominated in this study, while systemic symptoms such as fever and nausea were also relatively common among a substantial proportion of patients.

CONCLUSION

Based on this study on the characteristics and comorbid conditions among urinary tract infection (UTI) patients at Rumah Sakit Umum UKI during 2020–2021, the highest occurrence was found in the 22–59-year age group, with 53 patients (52.0%). Of the 102 recorded UTI cases, most patients were female (62 patients; 60.8%), indicating that UTI was more common among women in this setting and period. Common comorbidities included hypertension in 45 patients (44.1%) and diabetes mellitus in 25 patients (24.5%), and more than half of the patients experienced recurrent UTI (53 patients; 52.0%). Regarding clinical manifestations, dysuria was the most frequent symptom (81 patients; 79.4%), followed by fever (47 patients; 46.1%) and nausea (43 patients; 42.2%). These findings contribute a clear profile of UTI patients at RSU UKI and can support stronger risk-factor screening, improved vigilance for recurrent cases, and more targeted clinical management based on the most common patient characteristics and presenting symptoms.

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