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RISK FACTORS INFLUENCING THE OCCURRENCE OF URINARY TRACT INFECTIONS IN INPATIENTS

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ABSTRACT

A urinary tract infection is an infection of the urinary tract both upper and or lower, where the number of bacteria is greater than 10^5 bacterial colonies per unit per ml in a urine specimen. Several studies have shown that there are risk factors that can cause urinary tract infections such as age, gender, long lying down, and other predisposing factors. Objective: To identify the factors that influence the occurrence of urinary tract infections in H. Adam Malik Hospital Medan. Method: This study was designed cross-sectional approach. 59 patients were applied in this study using consecutive sampling. Data were collected using a questionnaire and analyzed using chi-square and Fisher. Results: the results showed that there was no relationship ($p>0.05$) among age ($p=0.869$; OR=0.9), gender ($p=0.812$; OR=1.1), predisposing factors with diabetes mellitus ($p=0.146$), human immunodeficiency virus ($p=0,286$), kidney disease ($p=0,386$), autoimmune ($p=0,641$) and there were significant relationship ($p< 0.05$) among prolonged lying down ($p=0.04$; OR=3,1) were the most significant factor related to urinary tract infection without urinary catheter. Conclusions: the results showed that there was no relationship among age, gender, or predisposing factors such as diabetes mellitus, human immunodeficiency virus, kidney disease, or autoimmune disease with the incidence of urinary tract infection. Long lying down is a relationship with urinary tract infection.

Keywords: risk factors; urinary tract infections; without urinary catheter predisposing factors

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INTRODUCTION

Urinary tract infection (UTI) is an infection of the urinary tract both upper and lower, where the number of bacteria> 10^5 bacterial colonies per unit per ml (CFU/ml) in a urine specimen (Karah et al., 2020). Urinary tract infections (UTIs) are some of the most common bacterial infections, affecting 150 million people annually worldwide (Mancuso et al., 2023). According to the National Kidney and Urological Disease Information Clearinghouse (NKUDIC), UTI is the second most common infectious disease after respiratory tract infections with 8.3 million cases every year (Fauzi Farhat et al., 2022). The results of research at H. Adam Malik General Hospital Medan about 30-40% of cases of infection obtained were UTIs and 44.4% of patients did not use urinary catheters (Ardiansyah et al., 2021). Healthcare-associated urinary Tract Infections (HAUTI) are a substantial burden to patients and the healthcare system and account for 40% of all hospital-acquired infections and fully 80% of these infections are attributable to urinary catheter use (Werneburg, 2022). A survey of adult hospital admissions in England, Wales, Northern Ireland, and the Republic of Ireland found UTIs to be the second most common cause of HAUTI. In Australia, there is no specific national strategy or surveillance system for managing HAUTI and catheter-associated urinary

tract infections (CAUTI) despite being one of the most commonly reported HAIs, and recent data show that UTIs increase hospital stays. UTIs are a significant cause of morbidity in infant boys, older men, and women of all ages (Podkovik et al., 2019).

The overall prevalence of HAUTI was 1.4% and the prevalence of CAUTI was 0.9% (10). Staphylococcus aureus (20%) and candida species (20%) were the most common pathogens identified among patients with HAUTI (Perdana et al., 2023). Overall, 1.7% of patients hospitalized for more than 2 days developed HAUTI. Older adults and women were at greater risk for HAUTI. It is estimated that for each HAUTI, the average length of hospital stay was 4 days. The incidence of HAUTI, in addition to the length of hospital stay, shows that HAUTI has a significant impact on health services (Levi et al., 2021).UTIs are caused by a wide variety of pathogens, including Gram-negative and Gram-positive bacteria, and fungi. Uncomplicated UTIs typically affect women, children, and elderly patients who are otherwise healthy. The most common causative agent for uncomplicated and complicated UTIs is Uropathogenic Escherichia coli (UPEC). For uncomplicated UTIs, other causative agents include (in order of prevalence) Klebsiella pneumoniae, Staphylococcus saprophyticus, Enterococcus faecalis, group B Streptococcus (GBS), Proteus mirabilis, Pseudomonas aeruginosa, Staphylococcus aureus, and Candida spp (Zhou et al., 2023). This infection is divided into lower UTI (cystitis) and upper UTI (pyelonephritis). Several risk factors are associated with cystitis, including female gender, previous UTI, sexual activity, vaginal infection, diabetes mellitus (DM), obesity, and genetic disorders. UTI is associated with factors that compromise the urinary tract or host defenses, including urinary tract obstruction, urinary retention caused by neurological disease, immune system, renal failure, renal transplantation, pregnancy, and the presence of foreign bodies such as calculi, indwelling catheters (Reginawati et al., 2023).

Several factors such as gender, age, race, circumcision, DM, urinary catheter, genitourinary tract abnormalities, pregnancy, infant, parent, and hospitalization status have significant risk for recurrent UTI. Hospitalization, female gender, catheter use>6 days, genitourinary abnormalities, and DM were found to have a statistically significant association ($p<0.05$) with UTI. However, place of residence, ethnicity, education level, unmarried, circumcision, pregnancy, hypertension, HIV, abortion, and sexual intercourse, were found to have no significant association with UTI (Storme et al., 2019a).RSUP H. Adam Malik Medan as the main referral hospital needs to have data on factors that influence UTI. This is related to infection control in hospitals, especially in Indonesia, as a step to reduce the negative impacts caused by the emergence of these infections and prevent the incidence of UTIs from increasing. Therefore, this researcher aims to determine the factors that influence the occurrence of UTI at RSUP H. Adam Malik Medan.

METHOD

This study was designed cross-sectional method. It was conducted from September 2020 to January 2021 by involving 59 patients. The study was conducted in the inpatient ward of Urology, Neurology, Internal Medicine, Lung, ENT, Obstetrics and Gynecology, and Surgery at H. Adam Malik General Hospital Medan. A urine culture examination was carried out in the Microbiology laboratory of H. Adam Malik General Hospital Medan. The sampling technique was a nonprobability sampling, namely; consecutive sampling. The inclusion criteria of the sample were (1) patients who were hospitalized for more than 5 days and who showed signs and symptoms of UTI but did not use a urinary catheter; and (2) adult patients with routine urine examinations while hospitalized and continued having urine culture examinations. Meanwhile, the exclusion criteria included patients who use a urinary catheter.

The researcher recorded the patients with suspected UTIs who did not use a urinary catheter and who had been treated for more than 5 days in an inpatient room. Then, the researcher explained the purpose of the research. Next, the researcher determined the population and sample to be studied. Furthermore, the researcher asked for approval from the patients by filling out the consent form for urine examination. Finally, the researcher took the middle portion of the urine specimen to get clean and sterile urine. The tools and materials used in this research were urine collection bottles, a shelf for putting urine bottles, hand soap, and tissue. Data were analyzed using Chi-Square if the data did not meet the requirements for the Chi Square test, then Fisher's test would be carried. The study has received approval from the Health Research Ethics Commission, Faculty of Medicine, University of North Sumatra/H. Adam Malik General Hospital Medan (No.220/TGL/KEPK FK USU-RSUP HAM/2020).

RESULTS

Based on Table 1, the highest number of patients treated at RSUP H. Adam Malik Medan is the patients in the group age of <50 are 33 people (55.9%). In terms of gender, most of the patients are female with a frequency of 31 people (52.5%). In addition, most of the patients long lying down with a frequency of 37 people (62.7%). Furthermore, the most predisposing factors are kidney disease with a frequency of 23 people (39%), diabetes mellitus and autoimmune disease with a frequency of 5 people (8.5%), and HIV with a frequency of 3 people (5.1%). Moreover, the number of patients diagnosed with UTI is 37 people (62.7%). The total number of patients is 59 people (100.0%).

Table 1.
Respondent characteristics (n=59)

Respondent characteristics	f	%
Age (year)		
≥50	26	44.1
<50	33	55.9
Gender		
Male	28	47.5
Female	31	52.5
Predisposing factors		
Diabetes mellitus		
Yes	5	8.5
No	54	91.5
HIV		
Yes	3	5.1
No	56	94.9
Kidney disease		
Yes	23	39.0
No	36	61.0
Autoimmune disease		
Yes	5	8.5
No	54	91.5
UTI diagnosis		
Yes	37	62.7
No	22	37.3

Table 2 There is no relationship between age and the incidence of UTI (0.869>0.05). The Odds Ratio (OR)=0.9 (95% CI=0.32-2.64) means that patients 50 years old have the same incidence of UTI as age <50 years, so age is not the risk factor for UTI occurrence. There is no relationship between gender and the incidence of UTI (812>0.05). The OR=1.1 (95% CI=0.39-3.2) means that men experience the same incidence of UTI as women, so gender is not the risk factor for UTI occurrence. There is a relationship between long lying down with the incidence of UTI (0.04<0.05). The OR=3.1 (95% CI=1,03-9.5) means that long lying

down has a UTI incidence of 3.1 times greater than those who don't long lie down. So long lying down is a risk factor for the occurrence of UTI.

Table 2.
Relationships among age, gender, long lying down, and UTI

Variable	UTI			%	Total	%	p-value	OR (CI 95%) lower-upper
	Yes		No					
	n	%	n					
Age (year)								
≥50	16	27.1	10	16.9	26	44.1	0.869**	0.9(0,32-2.64)
<50	21	35.6	12	20.3	33	55.9		
Total	37	62,7	22	37.3	59	100.0		
Gander								
Male	18	30.5	10	16.9	28	47.5	0.812**	1.1 (0.39-3.2)
Female	19	32.2	12	20.3	31	52.5		
Total	37	62.7	22	37.3	59	100.0		
Long laying down								
Yes	22	37.3	15	25.4	37	62.7	0.04**	3.1 (1.03-9.5)
No	7	11.9	15	25.4	22	37.3		
Total	29	49.2	30	50.8	59	100.0		

Table 3, there is no relationship between DM and the incidence of UTI (0.14>0.05). Those who suffer from DM (8.5%) are as likely to experience UTI as those who do not suffer from DM (54.5%), so DM is not a risk factor for UTI. There is no relationship between HIV and UTI (0.286>0.05). Those with HIV (5.1%) are as likely to experience UTI as those without HIV (57.6%), so HIV is not a risk factor for UTI. There is no relationship between kidney disease and the occurrence of UTI (0.386>0.05)). Odds Ratio (OR) = 1.63 (95%CI = 0.54-4.95). Those with kidney disease (27.1%) are as likely as those without kidney disease (35.6%) to experience UTI, so kidney disease is not a risk factor for UTI. There is no relationship between autoimmune disease and the occurrence of UTI (0.641>0.05)). Odds Ratio (OR) = 2.6 (95%CI = 0.27-24.36). Those suffering from autoimmune disease (6.8%) are as likely as those without autoimmune disease (55.9%) to experience UTI, so autoimmune disease is not a risk factor for UTI.

Table 3.
Relationship between predisposing factors and UTI

Predisposing factors	UTI			%	Total	%	*p-value*	OR(CI 95%)
	Yes		No					
	f	%	f					
Diabetes mellitus								
Yes	5	8.5	0	0,0	5	8,5	0.146*	-
No	32	54.2	22	37.3	54	91,5		
HIV								
Yes	3	5.1	0	0,0	3	5,1	0.286*	-
No	34	57.6	22	37.3	56	94,9		
Kidney disease								
Yes	16	27.1	7	11.9	23	39	0.386**	1.63
No	21	35.6	15	25.4	36	61		(0.54-4.95)
Autoimmune disease								
Yes	4	6.8	1	1.7	5	8.5	0.641**	2.6
No	33	559	21	35.6	54	91.5		(0.27-24.36)

DISCUSSION

UTI is an infection that often occurs in hospitals. In this study, the characteristics of patients who experience urinary tract infections without using a urinary catheter based on age, gender, prolonged lying down, and predisposing factors (Ilyas et al., 2022). From the research results obtained the number of patients as many as 59 people with suspected UTI treated >5 days who did not use a urinary catheter. Diagnosis of UTI in patients based on urine culture examination results obtained as many as 37 (62.7%) people with positive results and 22 (37.3%) people with negative results. The cases of infection obtained were UTIs. Patients who did not use a urinary catheter were positive for 55.6% and negative for 44.4%. The occurrence of UTI in women was more (50.3%) than in men (49.7%). Urine culture was performed with positive results of 55.6% and negative results of 44.4% (Indriati & Silviani, 2024).From the research results, it was found that there were more patients aged <50 years, as many as 33 people (55.9%) than those aged ≥50 years, as many as 26 people (55.9%). More patients who experienced UTI were aged <50 years as many as 21 people (35.6%) than those aged ≥50 years as many as 16 people (27.1%). This study shows that there is no relationship between age and UTI. Because those aged ≥50 years (27.1%) experienced the same UTI incidence as those aged <50 years (35.6), so age is not a risk factor for UTI. This is in line with previous research that there is no relationship between age and the incidence of UTI (p>0.005) and other research also states that there is no relationship between age and the incidence of UTI (p>1,000) (Lee et al., 2013; Widiyastuti & Soleha, 2023).

The elderly will be disease susceptibility. At the age of 50 years will be susceptible to disease and decreased ability to maintain sterility in both the bladder and urethra due to the involution of thymus cells (Moura et al., 2019). UTIs can occur at a young age due to sexual intercourse (Storme et al., 2019b) and unclean perineum as a result of fecal incontinence (Knol et al., 2022). We found that gender has no relationship with urinary tract infections. Males and Females have an equal chance of suffering from infection (Deltourbe et al., 2022; Hariati et al., 2019). The study was female have a short urethra. An equal chance of developing a urinary tract infection is due to personal hygiene (Reginawati et al., 2023). Poor personal hygiene in males and females, especially in the genital area at risk of infection (Umami et al., 2021).From the results of the study, it was found that there was a relationship between prolonged lying down and UTI. Long lying down is a risk factor for UTIs (Naber et al., 2022). Lying for a long time means immobilization which causes changes in urine elimination so that urine becomes static. When lying down or supine, the kidneys and ureters advance into a flat area. Urine produced by the kidneys enters the bladder without the help of gravity. Because the force of gravity cannot be generated by peristaltic contraction of the ureter, the renal pelvis is filled before urine enters the ureter. If fluid intake is reduced, it causes fluid to decrease, so that the urine becomes concentrated and infection can occur (Potter et al., 2019).

We found that there was no correlation between the factors predisposing to UTI. This study found that diabetes is not a risk factor for UTI (Ahmed et al., 2023; Walelgn et al., 2021). This study is not the same as a previous study and the study was contradictive with the theories found (Odoki et al., 2019). DM causes some abnormality in the body's defense system that enables increased risk for other infections. The high concentration of glucose in the urine is a good medium for the growth of pathogenic microorganisms (Sohail et al., 2022). This study is not in line with other studies and contradicts the theory that the risk of developing UTI depends on Personal hygiene, factors mobilization, Severity of frailty, factors lifestyle, and controlled blood sugar (Chao et al., 2021). We found that there was no association between HIV and UTI. This is similar to the Odoki et al. (2019) study. HIV is susceptible to UTIs because it is related to immune function, determined by lymphocytes, and

the number of CD+ cells and HIV is most infected with UTIs through homosexual contact (Chandwani et al., 2022).

We found that kidney disease was not associated with urinary tract infection. As many as those with kidney disease did not have kidney disease, kidney disease was not a risk factor for UTI. This is not in line with the research conducted in previous studies that there is a relationship between kidney disease and the incidence of UTIs (Yamashita et al., 2022). UTIs occur due to the invasion of microorganisms ascending from the urethra to the bladder. Poor personal hygiene, especially in the genital area at risk of infection (Reginawati et al., 2023). Pathogens originating from the intestine then enter the urinary tract through the urethra and then enter the bladder. Furthermore, in the bladder, the pathogens multiply and ascend through the ureters to the renal pelvis and parenchyma (McLellan & Hunstad, 2016). The risk of developing a urinary tract infection is due to personal hygiene. Also, Prevention or reduction of frailty may have a beneficial influence on the possible future risk of UTI in patients with kidney disease. The risk of developing UTI depends on the severity of frailty, lifestyle factors, and medications (Mititelu et al., 2024).

We found that autoimmune disease was not associated with urinary tract infection. This study is not in line with research conducted by Hidalgo-Tenorio et al. (2004) that there is a relationship between autoimmune diseases and the incidence of UTI. Autoimmune diseases, one of which is Systemic Lupus Erythematosus (SLE), are very susceptible to UTIs. It is associated with changes in cellular and humoral immunity as well as with corticosteroid treatment. UTIs can be avoided if early diagnosis and effective treatment can be made (Renaudineau et al., 2023).

CONCLUSION

The diagnosis of UTI in patients based on the results of urine culture examination was obtained in as many as 37 (62.7%) people with positive results and 22 (37.3%) people with negative results. The results showed that there was no relationship between age and the incidence of UTI. This means that age 50 years has the same incidence of UTI as age <50 years, so age is not a risk factor for UTI occurrence. The results show that there is no relationship between gender and UTI incidence. The results showed that there was a relationship between prolonged lying down with the incidence of UTI. The results showed that the relationship between predisposing factors and UTI had no relationship between DM, HIV, kidney disease, and autoimmune disease with the incidence of UTI. This means that DM, HIV, kidney disease, and autoimmune disease have the same incidence of UTIs as those who do not suffer from these diseases, so DM, HIV, kidney disease, and autoimmune diseases are not risk factors for UTIs.

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