RISK FACTORS ASSOCIATED WITH URINARY TRACT INFECTION IN GERIATRIC AND ITS MICROBIOLOGIC CHARACTHERISTICS

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RISK FACTORS ASSOCIATED WITH URINARY TRACT INFECTION IN GERIATRIC

AND ITS MICROBIOLOGIC CHARACTHERISTICS

Tuntas Dhanardhono Helmia Farida** Tri Nur Kristina***

Abstract

Background *: Urinary Tract Infections(UTI) is a general understanding to describe invasion of microorganism in urinary tract. The severity of any functional disability, nature of underlying illnesses, anatomic or physiologic abnormalities of the genitourinary (GU) tract, and use of indwelling bladder catheters determine the types of organisms and chronicity of bacteriuria.*
Purpose *: To analyze factors which associated with Urinary Tract Infections in geriatric patients.*
Methods *: Observational retrospective study conducted by reviewing medical record on 2004 of geriatric patients in Dr.Kariadi Hospital. Independent variables consist of sex, catheterization, initial antibiotics, DM and urine stasis. Dependent variable is geriatric patients who are diagnose as UTIs patients based on urine culture result. Statistic analysis is conducted with descriptive analysis and logistic regression using SPSS 13.00 for windows.*
Results *: Sex and catheterization ($p<0.05$) associated as the risk factors of UTIs in geriatric patient. Intial antibiotics, diabetes mellitus and urine stasis ($p\geq0.05$) were not significant as risk factor of UTIs in geriatric patients. The pattern of microorganism was as follows, Eschericia coli(46.9%), Enterobacter aerogenes(27.1%), Staphylococcus epidermidis(10.4%), Pseudomonas aeruginosa(9.4%), yeast cell(3.1%), Staphylococcus aureus(2.1%) and Candida sp(1.0%). E.coli still be the most prevalent microorganism. Staphylococcus epidermidis should be considered as contamination. The sensitivity test shown that E.coli had antibiotic sensitivity to meropenem(100%), vancomycin(100%) and cefepim(92.9%).*
Conclusion *: Sex and catheterization associated with UTIs in geriatric patients. Initial antibiotics, DM and urine stasis do not associated with UTIs in geriatric patients.*
Keywords *: Urinary Tract Infections, geriatric patients.*

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FAKTOR-FAKTOR RESIKO BERASOSIASI DENGAN INFEKSI SALURAN KEMIH PADA PASIEN GERIATRI DAN KARAKTERISTIK MIKROBIOLOGINYA

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Abstrak

Latar belakang : Infeksi Saluran Kemih (ISK) adalah kondisi yang menggambarkan invasi kuman pada saluran kemih. Jenis kuman dan kondisi bakteriuri ditentukan oleh derajat sakit gangguan fungsi tubuh, penyakit terdahulu, abnormalitas anatomi dan fisiologi dari traktus urogenital, dan penggunaan kateter.
Tujuan : Untuk menganalisis faktor-faktor yang memiliki asosiasi dengan infeksi saluran kemih pada pasien geriatri.
Metode : Jenis penelitian ini adalah observasional retrospektif dengan mengambil data dari rekam medik pasien geriatri tahun 2004 di Rumah Sakit dr.Kariadi. Variabel bebas terdiri dari jenis kelamin, tindakan kateterisasi, terapi antibiotik inisial, DM dan stasis urin.Variabel tergantung adalah pasien geriatri dengan diagnosa ISK

berdasarkan hasil kultur urin. Analisis statistik menggunakan uji *Chi-square* dan regresi logistik dengan SPSS 13.00.

Hasil : Jenis kelamin dan tindakan kateterisasi ($p<0.05$) berasosiasi sebagai faktor resiko ISK pada pasien geriatri.Terapi antibiotik inisial, diabetes melitus dan stasis urin ($p\geq0.05$) tidak berasosiasi secara bermakna sebagai faktor resiko ISK pada pasien geriatri. Pola kuman yang didapatkan pada penelitian ini yaitu *Eschericia coli*(46.9%), *Enterobacter aerogenes*(27.1%), *Staphylococcus epidermidis*(10.4%), *Pseudomonas aeruginosa* (9.4%), *Yeast cell*(3.1%), *Staphylococcus aureus*(2.1%) and *Candida sp*(1.0%). *E.coli* masih menjadi kuman penyebab terbanyak. *Staphylococcus epidermidis* perlu dipikirkan sebagai kuman kontaminan. Uji sensitivitas memperlihatkan *E.coli* peka terhadap meropenem(100%), vankomisin(100%) dan cefepim(92.9%).

Kesimpulan : Jenis kelamin dan tindakan kateterisasi berasosiasi dengan ISK pada pasien geratri. Terapi antibiotik inisial, DM dan stasis urin tidak berasosiasi dengan ISK pada pasien geriatri.

Kata kunci : Infeksi Saluran Kemih, pasien geriatri.

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INTRODUCTION

Urinary tract infection is the most common disease in geriatrics and the 2nd most cause of sepsis as well.[1] Diagnosis, prevention, and treatment can often be complex because clinical manifestations can be atypical and host defense diminish with age.[2] Urinary pathogens are isolated more in elderly patients with UTIs than in younger patients. The severity of any functional disability, nature of underlying illness such as DM, prostate hypertrophy and tumour of pelvic, presence of anatomic or physiologic abnormalities of the genitourinary tract, and use of indwelling bladder catheters determine the types of organism and chronicity of bacteriuria.[2,3] Some factors which are examined in this research, such as sex, initial antibiotics therapy, catheterization, Diabetes mellitus and stasis urine.

The initial step in diagnose of a possible urinary tract infections is laboratory examination of urine specimens.[4] Determination of the number and type of bacteriuria in the urine is an important diagnostic procedure. Growth number of $>10^5$ colony-forming units (CFU)/ml from a properly collected midstream "clean-catch" urine sample indicates infection.[5,6,7] Some patients (e.g. small children, elderly people, or hospitalized patients), can not provide a urine sample. In such cases, a catheter may be inserted into the bladder to collect urine.[8] The most common agent that can effect the urinary tract are the gram-negative bacilli.[5] If physicians suspect that bacteria other than *Escherecia coli* may be present, Gram stain is used to help predict the species.[9] Disc diffusion sensitivity test measure drugs ability to restrict the growth of bacteria. Minimum Inhibition Concentration (MIC) test is exactly able to measure antibiotics concentration needed to restrict growth of standardized inoculums on one condition.[8]

Characteristics of disease in geriatric patients are often multiple and cumulative, relieved one to others or as the influencing factors.[1] Several risk factor of infection in geriatrics such as environment, physiological changes, co-morbid disease and immunity disturbance. [1,10] Based on those reason above, writer is interested to look after any factors which may interfere urinary tract infections in geriatric patients. The research objective is to analyze factors which associated with Urinary Tract Infections in geriatric patients.

METHODS OF RESEARCH

Observational retrospective study conducted by reviewing medical record on 2004 of geriatric patients in Dr.Kariadi Hospital. Target populations are geriatric patients who have been examined for urine culture and sensitivity test. The accessible populations are geriatric patients who have been examined for urine culture and sensitivity test in clinical microbiology laboratory of Dr.Kariadi Hospital/Faculty of Medicine UNDIP Semarang. The sample are withdrawn from accessible population, consist of geriatric patients who follow the urine examination in Dr.Kariadi Hospital on 2004.

Independent variables examined in this research such as sex, initial antibiotics therapy, catheterization, diabetes mellitus and stasis urine. The information of those variables were achieved from medical records of geriatric patients, except stasis urine which is assumed from patients who are diagnosed with prostate hypertrophy, tumor of vesicae urinary, stricture and retention of urine.

Urinary tract infection is a dependent variable of this research. The amount of colony 10^2-10^4 organism/ml urine by mid-stream urine or ≥10^5 organism/ml urine by catheterization assumed as bacteriuria. Samples which have already obtained will be edited, coded and then entree to SPSS file. Cleaning data is also required. Classification of each variable is follows the operational definitions. Statistics analysis is by descriptive analysis to show crosstabulations of each variables as risk factors. Each variable may have the opportunity to be the risk factor of urinary tract infection in geriatrics. Significant variables are shown by criteria $p<0.25$.[11] Because urinary tract infection is a nominal variable, to measure the association of each variables among others to UTIs, multivariate analysis by logistic regression is required. Significant result of logistic regression is by $p<0.05$. To analyze the data of this research is employed by SPSS 13.00 for windows.

RESULT

Geriatric patients who follow urine examination in Dr.Kariadi Hospital on 2004 are withdrawn as 199 patients. 37(18,6%) patients were managed with clean catch urine sampling. It consist of 22(59,5%) sterile result, 3(7,1%) patients with 10^2-10^4 CFU/ml result, and 12(32,4%) patients with positive UTIs (≥10^5 CFU/ml)

samples. Meanwhile, 162(81,4%) patients were managed with catheterization. It was divided into 78(48,1%) sterile sample result and 82(51,9%) patients with positive UTIs (10^2-10^4 CFU/ml or ≥10^5 CFU/ml) samples. Based on the result of urine culture, they are divided into 96 (48.2%) patients with ≥10^5 or 10^2-10^4 CFU/ml bacterial count and 103 (51.8%) patients with sterile result. The amount of colony 100 or more (≥10^5 organism/ml urine) assumed as bacteriuria. Based on distribution of sex, there are 109(54.8%) women and 90(45.2%) men. Description of microorganism pattern and sensitivity test result is withdrawn from the patients with positive urine culture (≥10^5 or 10^2-10^4 CFU/ml). Distribution of age are shown in the following diagram

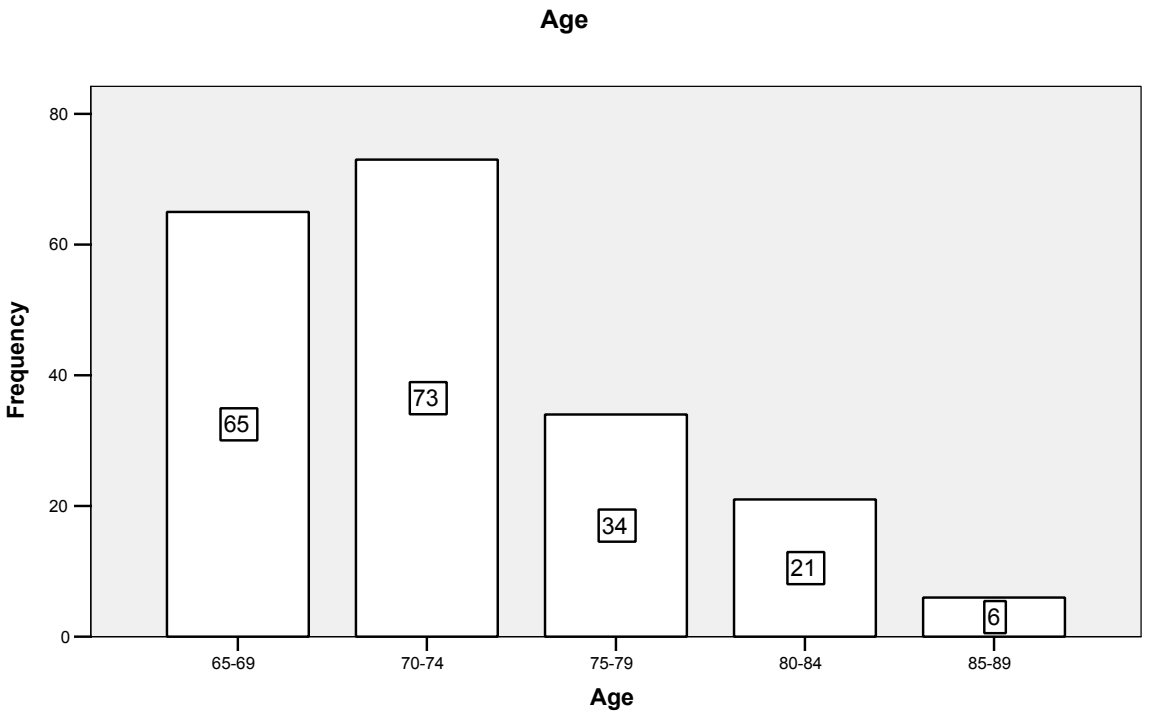


Diagram 1. Distribution of age in geriatric patients Dr. Kariadi Hospital who enroll urine examination on 2004

Some variables want to be analyzed whether is it significant or not to be the risk factor of UTIs in geriatric patients of Dr.Kariadi Hospital. There are sex, initial antibiotics therapy, catheterization, DM and stasis of urine. The correlation of each independent variable to dependent variable is shown in table 1.

Table 1. Cross tabulation of independent variables to dependent variable

Variables		UTI		RR	95 % CI		*p*
		+	-		Lower	Higher	
Sex	Women	63(57.8%)	46(42.2%)	2,4	1,334	4,195	0,003
	Men	33(36.7%)	57(63.3%)				
Initial AB	Y	87(51.8%)	81(48.2%)	2,6	1,142	6,036	0,020
Therapy	N	9(29.0%)	22(71.0%)				
Catheterizatio	Y	84(51.5%)	78(48.1%)	2,2	1,055	4,769	0,033
n	N	12(33.3%)	25(67.6%)				
	Y	35(62.5%)	21(37.5%)	2,2	1,188	4,225	0,012
DM	N	61(42.7%)	82(57.3%)				
	Y	25(55.6%)	20(44.4%)	1,5	,749	2,850	0,264
Stasis urine	N	71(46.1%)	83(53.9%)				

From the table above is shown that all of the variables such as sex, initial antibiotics therapy, catheterization, DM and stasis urine have the opportunity to be the risk factor of UTIs in elderly patients. Women have 2.4 times chance as the risk factor of urinary tract infection in geriatric patients than men. Patients who are employed with initial antibiotics might have 2.6 chance of UTIs. Catheterization in geriatric patients will be more risky than in elder patients without catheterization as much as 2.2 times. Diabetes mellitus and urine stasis are also two patophysiologic changing in geriatrics body which may interfere UTIs than they who aren't suffer from.

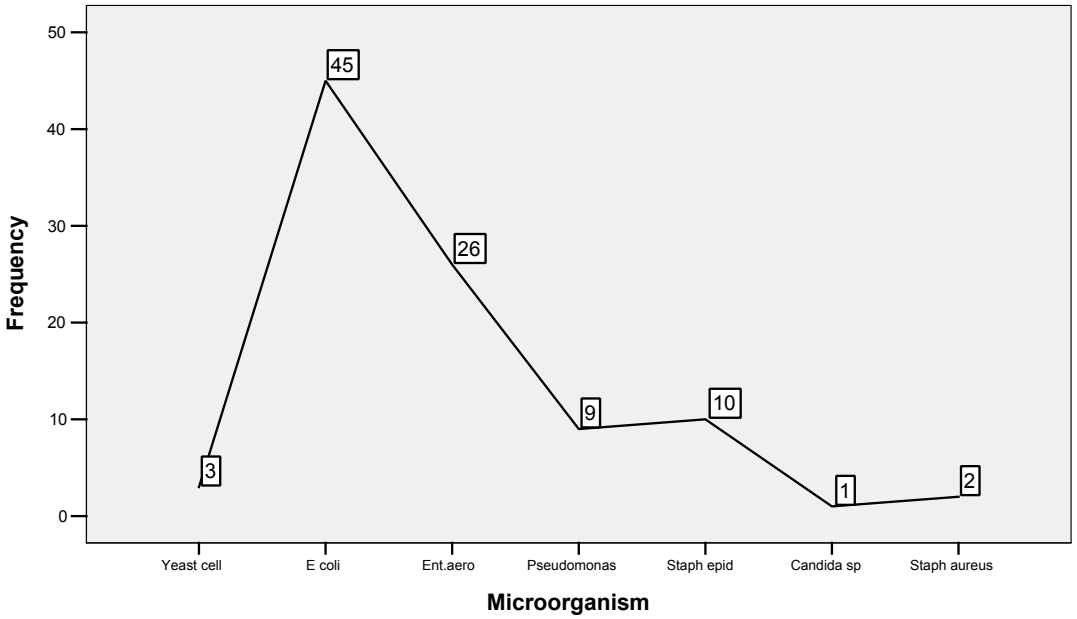
Table 2. Logistic regression of independent variables to dependent variable

Variables	***p***
Sex	0,009
Initial AB Therapy	0,182
Catheterization	0,042
DM	0,161

Some risk factor that has been analyzed in this research result in different score. Statistics analysis is by descriptive analysis to show crosstabulations of each variables as risk factors. Sex, initial antibiotic therapy, catheterization and diabetes mellitus are variables that fulfill $p<0.25$ and allowed to entrée to logistic regression analysis. Significant result of logistic regression is by $p<0.05$. Sex ($p=0.009$) and catherization($p=0.042$) are consider as significant factor associated with UTIs.

In this research, The pattern of microorganism are as follows, *E.coli* (46.9%), *Enterobacter aerogenes* (27.1%), *Staphylococcus epidermidis* (10.4%), *Pseudomonas aeroginosa* (9.4%), *Yeast cell* (3.1%),

Staphylococcus aureus (2.1%) and *Candida sp* (1.0%) shown in graphic below.



Graphic 1. Frequency of microorganism as the result of urine culture from UTIs patients

E.coli has antibiotics sensitivity to meropenem (100%), vancomycin (100%) and cefepime (92.9%). *E.coli* resistant to ciprofloxacin. *Staphylococcus epidermidis* has antibiotics sensitivity to vancomycin (100%), ciprofloxacin (100%) and nitrofurantoin (100%). *Staphylococcus epidermidis* is most resistant to penicillin (85.7%). More detail information is described in table 2.

Table 3. Description of sensitivity test of some microorganism to several antibiotics.

No	Antibiotics	Microorganism

			E coli	E aerogenes	P aeruginosa	S epidermidis	S aureus
1	Amk	S	37(90.2%)	19(76.0%)	8(88.9%)	9(90.0%)	2(100.0%)
		R	4(9.8%)	6(24.0%)	1(11.1%)	1(10.0%)	0(.0%)
2	Amp	S	1(9.1%)	0(.0%)	0(.0%)	1(33.3%)	
		R	10(90.9%)	11(100.0%)	7(100.0%)	2(66.7%)	
3	Cef	S	39(92.9%)	24(52.0%)	5(71.4%)	5(55.6%)	2(100.0%)
		R	3(7.1%)	1(4.0%)	2(28.6%)	4(44.4%)	0(.0%)
4	Cefta	S	27(71.1%)	11(52.4%)	3(50.0%)	2(33.3%)	
		R	11(28.9%)	10(47.6%)	3(50.0%)	4(66.7%)	
5	Cpz	S	9(69.2%)	3(100.0%)		1(50.0%)	
		R	4(30.8%)	0(.0%)		1(50.0%)	
6	Ctx	S	31(72.1%)	11(44.0%)	3(33.3%)	4(44.4%)	1(50.0%)
		R	12(27.9%)	14(56.0%)	6(66.7%)	5(55.6%)	1(50.0%)
7	Cpm	S	9(75.0%)	3(100.0%)		2(50.0%)	
		R	3(25.0%)	0(.0%)		2(50.0%)	
8	Chlo	S	4(80.0%)	1(25.0%)	1(25.0%)		1(100.0%)
		R	1(20.0%)	3(75.0%)	3(75.0%)		0(.0%)
9	Cip	S	0(.0%)			1(100.0%)	
		R	1(100.0%)			0(.0%)	
10	Dbk	S	11(55.0%)	3(33.3%)	1(33.3%)	3(50.0%)	1(100.0%)
		R	9(45.0%)	6(66.7%)	2(66.7%)	3(50.0%)	0(.0%)
11	Ery	S			0(.0%)		1(100.0%)
		R			1(100.0%)		0(.0%)
12	Fos	S	33(89.2%)	18(75.0%)	6(85.7%)	8(80.0%)	2(100.0%)
		R	4(10.8%)	6(25.0%)	1(14.3%)	2(20.0%)	0(.0%)
13	Gat	S	20(52.6%)	10(41.7%)	4(57.1%)	3(50.0%)	1(100.0%)
		R	18(47.4%)	14(58.3%)	3(42.9%)	3(50.0%)	0(.0%)
14	Gen	S	24(61.5%)	9(36.0%)	2(22.2%)	5(50.0%)	2(100.0%)
		R	15(38.5%)	16(64.0%)	7(77.8%)	5(50.0%)	0(.0%)
15	Mer	S	23(100.0%)	10(90.9%)	3(100.0%)	2(28.6%)	
		R	0(.0%)	1(9.1%)	0(.0%)	5(71.4%)	
16	Ntf	S	24(82.8%)	9(60.0%)	2(40.0%)	1(100.0%)	
		R	5(17.2%)	6(40.0%)	3(60.0%)	0(.0%)	
17	Oxa	S				4(50.0%)	2(100.0%)
		R				4(50.0%)	0(.0%)
18	Pen	S	5(20.0%)	2(15.4%)	0(.0%)	1(14.3%)	0(.0%)
		R	20(80.0%)	11(84.6%)	4(100.0%)	6(85.7%)	1(100.0%)
19	Ttr	S	7(16.7%)	6(25.0%)	1(11.1%)	4(44.4%)	2(100.0%)
		R	35(83.3%)	18(75.0%)	8(88.9%)	5(55.6%)	0(.0%)
20	Ctm	S	7(16.7%)	5(20.0%)	1(11.1%)	4(40.0%)	1(50.0%)
		R	35(83.3%)	20(80.0%)	8(88.9%)	6(60.0%)	1(50.0%)
21	Van	S	1(100.0%)		0(.0%)	9(100.0%)	2(100.0%)
		R	0(.0%)		1(100.0%)	0(.0%)	0(.0%)

Note : Amk = AmikacinChlo = Chloramphenicole Mer = Meropenem
Amp = Amphicilin Cip = Ciprofloxacin Ntf = Nitrofurantoin
Cef = Cefepime Dbk = Dibekacin Oxa = Oxacyclin
Cefta = Ceftazidime Ery = Erytromycin Pen = Penicilin
Cpz = Cefoperazone Fos = Fosomycin Ttr = Tetracyclin
Ctx = Cefotaxim Gat = Gatyfloxacin Ctm = Cotrimoxazole
Cpm = Cefpirom Gen = Gentamycin Van = Vancomycin

DISCUSSION

In this research, we gain 199 sample of geriatric patient who follow urine examination in microbiology laboratory of Dr.Kariadi Hospital on 2004. 96 samples of all objects are considered as urinary tract infections

with criteria as ≥ 10^5 or 10^2-10^4 CFU/ml microorganisms. The amount of colony 100 or more (10^5 organism/ml urine) assumed as positive bacteriuria. [9]

Sex statistically significant to UTIs assessment (*p=0.009*). Women most common to get infected because of some reason, there are urethra anatomic structure, loss of immunity and possibly low personal hygiene according to gradual aging.[8] Anatomically, women has shorter urethra that lead to pathogenesis of infection than men.[14] In women, the normal flora is dependent on the action of estrogen hormones that promote the deposition of glycogen in cells lining the vagina.[6]

Initial antibiotics management of geriatric patients who examine their urine specimens should be by prescribing empirics antibiotics. Geriatric patients usually suffer multiple disease, urinary tract infections with complication (come from catheterization, special management, anatomic or functional changes of genitourinary, stones, obstructions, immunosuppresion, renal disease or diabetes) ideally requires broad spectrum antibiotics.[18] The choice of drug will be based on past experience with drugs that are known to be effective against the microbe. In Hospital institutions, prescribing initial drugs requires microorganism sensitivity pattern to antimicrobials.[14] Wherever possible, antimicrobial selection should be delayed until culture results are available. If empirical therapy is required, antimicrobial selection is based on variables such as route of administration, anticipated infecting organism and susceptibility, and patient tolerance.[15] Bivariate analysis show *p=0.02*, and statistically initial antibiotics may determine as risk factor of UTIs (RR=2.6). Systemic antimicrobial drug therapy seems to prevent UTIs, but primarily for patients catheterized for 3 to 14 days. Using these methods, urinary catheter-associated UTI can often be prevented for weeks, but not longer terms. Inappropriate management may lead to resistance of the agents to antibiotics.[10,15]. Logistic regression analysis show that initial antibiotics (p=0.182) doesn't have association to urinary tract infections among other variables. Antimicrobial selection requires microorganism sensitivity pattern to antimicrobials. Thus, if those condition has already fulfill, others factor may influence UTIs instead of initial antibiotics management itself.

Catheterization plays role in association to urinary tract infections (*p=0.033*, chi-square). Urinary catheterization opens the bladder to infection from organisms deposited on the catheter itself (from the hands of the operator, for example) and from organisms that gain access to the lumen of the catheter once it is in place. Catheter modalities can lead to infection while insertion.[17] Long term indwelling catheters are most frequently

used in elderly individuals resident in long term care institutions. Catheter-associated urinary tract infections are the most common nosocomial infection and a frequent cause of significant morbidity, sepsis, and death.[15] Urinary tract infection (UTI) usually follows formation of biofilm on both the internal and external catheter surface. The biofilm protects organisms from both antimicrobials and the host immune response.[15] As the duration of catheterisation is the principal determinant of infection with long-term indwelling catheters, it is not clear that any interventions can decrease the prevalence of bacteriuria in this setting. Thus, aseptic catheter insertion and a properly maintained closed drainage system are crucial to reducing the risk of bacteriuria. Logistic regression results in *p=0.042* for catheterizations. The significant value may be interfered by other factors, present along with catheter procedure, which tend to influence significant bacteriuria. The incidence of infection is approximately 5 to 7 percent for each day of catheterization and closely linked to unalterable host factors such as age, female sex, and debilitating disease.[15] It can not be regretted that the weakness of this study is by reviewing past source information. So, other determinant factors such as terms of catheterization and prophylactic drugs which may influence risk of catheter to UTIs was hardly achieved and still not assess yet.

In this research, significant bacteriuria is found in patient with diabetes mellitus. As a single factor patients with DM give 2.2 times risk opportunity which associated with UTIs than patients without diabetes mellitus. DM (*p=0.012, chi-square*) could be a risk factor which determine UTIs in elder patients.[21] Patients who diagnosed as diabetes mellitus suffer insulin deficiency which cause retention of amino acid transport into cell and its incorporation to protein.[18] Thus, negative nitrogen balance occur. This may lead to obstruction of immune production then cause decreasing of human immunity. By this condition, infection will easily occur and in contrary recovery will hardly achieved.[18] But, logistic regression result show that diabetes mellitus is not significant in association to UTIs in this research. Comprehensive study to diabetes mellitus patients related to UTIs is needed with wide spectrum variables.

In this research urine stasis are classified from patient with prostate hypertrophy, carcinoma of vesica urinary, urine retentions and stricture. Eventhough stasis only 1.5 times higher than patients without stasis to have chance as urinary tract infection risk factor, urine stasis could influence UTIs in geriatrics patients. Stasis may interfere the pathway of urine outflow.[1,20] Prostate hypertrophy in elderly men may lead to bladder outlet obstruction and consequently increased residual urine. Bladder infections occur when frequent complete emptying fails to take place. This allows accumulation of urine, a nutritious medium for many bacteriuria, and

permits multiplication of pathogens bacteria. Stasis of urine was not included to logistic regression because bivariate analysis had $p \geq 0.05$ for urine stasis.

Eschericia coli is the most microorganism which caused UTIs.[8,16,20] Result from urine culture obtained that *E.coli* as the most common agent with 46.9%. *Enterobacter aerogenes* took the second most common agent with 27.1% and *Staphylococcus epidermidis* 10.4%. Hadi Martono (1995), in his research achieved that microorganism as the cause of UTIs in geriatrics such as *E.coli*, *Proteus mirabilis* and *Klebsiella sp*. Eventhough *E.coli* still be the most causative agent, the pattern of bacteriuria is shifted to different agent. *Staphylococcus epidermidis* is a coagulase-negative staphylococcal. It is a human normal flora, and sometimes may cause infection commonly in insertion devices.[9,19] In catheterization patients, *Stapylococcus epidermidis* is count by 11(91.7%)agents while in midstream urine 1(8.3%)agent. The result of urine culture placed *Stapylococcus epidermidis* in the third most prevalent microorganism should further analyzed as contamination.

The result of sensitivity test to several antimicrobial drugs such as amikacin, amphicilin, cefepime, ceftazidime, cefoperazone, cefotaxime,cefpirom,chloramphenicole, ciprofloxacine,dibekacin, erythromycin, fosfomycin, gatyfloxacin, gentamycin, meropenem, nitrofurantoin, oxacyclin, penicylin, tetracycline, cotrimoxazole and vancomycin show that *Escherecia coli*, which the most common agent found, is still had sensitivity to meropenem (100%), vancomycin (100%) and cefepime (92.9%). In this research, sensitivity of *E.coli* to vancomycin only obtained in one case compare to amikacin with 37 cases whereas *E.coli* also gain high sensitivity (90.2%). *E.coli* is resistant to amphicilin(90.9%), tetracycline and cotrimoxazole (83.3%), and penicillin(80%). In one case, sensitivity test found that *E.coli* resistant to ciprofloxacin(100%). While *Staphylococcus epidermidis* as a Gram-positive bacillus is sensitive to vancomycin (100%), ciprofloxacin (100%) and nitrofurantoin (100%). Staphylococcus epidermidis which probably be a contamination is most resistant to penicillin(85.7%). The finding of *S.epidermidis* as the third most pravelent number of agents make a doubtness , is it as a causative agents or even a contamination. As a coaugalse-negative staphylococcal and part of human normal flora it may infects via inserted devices.[8] Almost of the urine specimens examined in this research are collected by catheterization. In accordance to sensitivity test result, it should be prior attention in handling catheterization to avoid contamination. Because *S.epidermidis* sensitivity test show high resistance to most antibiotics, proper analysis according to the sifted of microorganism pattern and sensitivity result is required.

CONCLUSION AND SUGGESTION

Sex and catheterization are factors which have association with urinary tract infection in geriatric patients. Initial antibiotics therapy, diabetes mellitus and urine stasis are not factor which associated with urinary tract infection in geriatric patients.

The pattern of microorganism are as follows, *E.coli*(46.9%), *Enterobacter aerogenes*(27.1%), *Staphylococcus epidermidis*(10.4%), *Pseudomonas aeruginosa*(9.4%), *Yeast cell*(3.1%), *Staphylococcus aureus* (2.1%) and *Candida sp*(1.0%).

The sensitivity test show that *E.coli* has antibiotic sensitivity to meropenem(100%), vancomycin(100%) and cefepim(92.9%). *Staphylococcus epidermidis* as the most Gram-positive coccus has antibiotics sensitivity to vancomycin (100%), ciprofloxacin (100%) and nitrofurantoin (100%).

This observational study still has many weakness. There will be need more comprehensive research which directly assess variables involved in patients with urinary tract infections. Catheter application procedure, terms of catheterization, terms of hospitalization and appropriate treatments based on sensitivity test are some variables that may associated with urinary tract infections in geriatrics patients which have not analyzed yet due to lack of information. Different result of this research is still need to be studied and investigated furthermore.

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