THE PREVALENCE OF KIDNEY FAILURE DUE TO URINARY CALCULI IN THE UROLOGY INPATIENT CARE DR. SOETOMO HOSPITAL FROM JANUARY 2016 TO DECEMBER 2017

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ABSTRACT

Objective: *This study aims to know the profile of patients with kidney failure due to urinary calculi in the Urology Inpatient Care Soetomo General Hospital from January 2016 to December 2017.* ***Material & Methods:*** *A retrospective descriptive study was performed among 35 patients with kidney failure due to urinary tract stones. Individual patient data were obtained from the medical record.* ***Results:*** *The sex ratio known from the study between men and women was 60%:40%. The age distribution was dominated by the patient within the range of 41-50 years old (38.14%) then followed by 51-60 and 31-70 years old (28.58% each), least found on <40 and >70 years old patient (2.86% each). Most of the urinary calculi were found in kidney (55.56%) then ureter (40%), and least found on urethra and bladder (2.22% each). Most types of renal failure found were Chronic Kidney Disease (48.57%), then Acute Kidney Injury (40%) then Acute Chronic Kidney Disease (11.43%).* ***Conclusion:*** *Chronic Kidney Disease was the most common type of renal failure found in the study compared to the other types such as Acute Kidney Injury and Acute Chronic Kidney Disease. Calculus of kidney was the most frequent urinary calculi found. Men are more at risk of having kidney failure due to urinary calculi. 41-50 years old patients were found the most in this study.*

Keywords: *Acute kidney injury, chronic kidney disease, urinary calculi.*

ABSTRAK

Tujuan: *Mengetahui profil pasien gagal ginjal akibat batu saluran kemih di rawat inap bagian urologi rumah sakit Dr. Soetomo periode Januari 2016 sampai Desember 2017.* ***Bahan & Cara:*** *Sebuah studi retrospektif deskriptif pada 35 pasien ginjal akibat batu saluran kemih. Data pasien didapat dari rekam medis.* ***Hasil:*** *Perbandingan antara jenis kelamin laki-laki dan perempuan adalah 60% : 40%. Kelompok usia paling banyak: usia 41-50 tahun yaitu 13 pasien (38.14%). Kemudian diikuti oleh kelompok usia 51-60 tahun dan 61-70 tahun yang masing-masing sebanyak 10 pasien (28.58%) dan kelompok usia dibawah 40 tahun dan diatas 70 tahun masing-masing sebanyak satu pasien (2.86%). Batu saluran kemih terbanyak berada di ginjal yaitu 25 pasien (55.56), batu di ureter yaitu 18 pasien (40%), batu di buli-buli dan uretra masing-masing sebanyak satu pasien (2.22%). Jenis gagal ginjal terbanyak adalah Chronic Kidney Disease (48.57%), lalu Acute Kidney Injury (40%) dan Acute on Chronic Kidney Disease (11.43%).* ***Simpulan:*** *Chronic Kidney Disease adalah jenis gagal ginjal terbanyak dibanding lainnya, yaitu Acute Kidney Injury dan Acute on Chronic Kidney Disease. Batu ginjal merupakan batu saluran kemih terbanyak. Laki-laki lebih berisiko terkena gagal ginjal akibat batu saluran kemih. Pasien usia 41-50 tahun ditemukan terbanyak dalam studi ini.*

Kata Kunci: *Acute kidney injury, chronic kidney disease, batu saluran kemih.*

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INTRODUCTION

The urinary tract can experience several disorders, one of which is caused by urinary tract stones (urinary calculi). Stones in the urinary tract are the third most common disease found in the urinary tract.[1] In Indonesia, it is estimated that there are 170.000 cases of urinary calculi every year also

there are approximately one in 1000 people in the population are hospitalized for suffering from urinary calculi.[2]

Urinary calculi have the risk of obstructing if the size of the stone is large. Obstruction of the urinary tract can cause urine to flow back to the more proximal area. If this condition weren't treated properly, this obstruction would damage the kidney structure and induce a permanent malfunction.[3]

Acute Kidney Injury (AKI) is generally a state of decreased kidney function that could become chronic. Urinary calculi are one of the risk factors for AKI. AKI would cause damage to the nephron which leads to a clinical syndrome in the form of Chronic Kidney Disease (CKD) if the decline in kidney filtration function happened continuously.[4]

OBJECTIVE

This study aims to know the profile of patients with kidney failure due to urinary calculi in the Urology Inpatient Care Soetomo General Hospital from January 2016 to December 2017.

MATERIAL & METHODS

This retrospective descriptive study was performed among 35 patients with kidney failure due to urinary tract stones. The number of the sample used in this study was determined by total sampling methods for the sample that qualified the inclusion and exclusion criteria. Individual patient data were obtained from the medical record. Variables that are used i.e: age, gender, calculi location, and type of kidney failure.

RESULTS

Table 1. Profile of patients with kidney failure due to urinary calculi in the Urology Inpatient Care Soetomo General Hospital.

Patients Profile	Total (n=35)	Percentage (%)
Age (years old)		
<40	1	2.86
41-50	13	37.14
51-60	10	28.57
61-70	10	28.57
>70	1	2.86
Gender		
Men	21	60
Women	14	40

The sample in this study consists of 21 men (60%) and 14 women patients (40%). There are 13 patients within the range of 41-50 years old (38.14%), then 10 patients within the range of 51-60 and 31-70 years old (28.58% each), and only one patient each found below 40 and above 70 years old (2.86% each).

Table 2. Urinary calculi location of patients with kidney failure due to urinary calculi in the Urology Inpatient Care Soetomo General Hospital.

Urinary Calculi	Total (n=45)	Percentage (%)
Location		
Kidney	25	55.56
Ureter	18	40
Bladder	1	2.22
Urethra	1	2.22

The location of urinary calculi was found frequently in the kidney as much as 25 (55.56%), calculus of ureter in 18 (40%), and least amount found on urethra and bladder only one each (2.22% each) from the total 45 calculus found among all of the samples.

Table 3. Renal failure types of patients due to urinary calculi in the Urology Inpatient Care Soetomo General Hospital.

Type of Renal Failure	Total (n=35)	Percentage (%)
AKI	14	40
CKD	17	48.57
ACKD	4	11.43

The most frequent type of renal failure found was Chronic Kidney Disease by 17 patients (48.57%), then Acute Kidney Injury as much as 14 patients (40%) then 4 patients with Acute on Chronic Kidney Disease (11.43%).

DISCUSSION

Patients with urinary calculi are 2 times more at risk of experiencing kidney failure.[5] 42.2% of patients with ESRD were preceded by previously known episodes of urinary calculi.[6] The number of cases of urinary calculi in old and male are more often than women because men in elderly age were

usually experiencing Benign Prostate Hyperplasia with urethral stricture and prostate adenocarcinoma. The degenerative process in the form of progressive atrophy in the cerebral cortex and neurons causes a decrease in the function of voiding muscles. The muscle is then replaced by fat and connective tissue. Besides, as men got aged there is a decrease amount of the hormone testosterone which clinically stimulates the prostate gland to enlarge. Testosterone suppresses osteopontin (a stone inhibitor compound) in the kidney and increases the excretion of oxalate in urine.[7]

One of the hypotheses behind the occurrence of this disorder is unilateral Post Obstructive Uropathy. It is a mechanism that begins with obstruction by Urinary calculi which increases the pressure of the distal urinary tract and then triggers renal (intratubular) hypertension which then triggers a decrease in blood volume to the kidney so that the Glomerulus Filtration Rate decreases. This incident is temporarily found as Acute Kidney Injury, but if it occurs in the long period it becomes Chronic Kidney Disease. Chronic Kidney Disease happened caused by interstitial fibrosis and a decrease in functional nephrons.[4]

The incidence of kidney calculi was plenty because it is related to the process of urine formation which mainly occurs in the kidneys. Some substances in this process could crystallize, and in certain concentrations can settle in the form of solid deposits that attach to the kidney wall. This crystal can grow through the accretion process to form kidney stones.[4] Kidney stones are initially formed in the tubules of the kidneys then move into the calix, infundibulum, renal pelvis, and can even fill the pelvis and the entire kidney calix.

Stones with a size that is not too large will be driven by peristalsis motion by the muscles of the pelvicalyceal system and move distally towards the ureter into ureteric stones. If the size is large enough it often stays in the ureter.[3] The diameter of the ureteral lumen varies and it narrows in several points. The diameter of the junctura ureteropelvic is about 2 mm, then in the middle part about 10 mm, when crossing the external iliac artery is about 4 mm, and in the ureterovesical juncture of about 3-4 mm.[3] Small size and location of urinary calculi which didn't cause strain on the urinary mucosa causes minimal pain. This is one of the reasons why the patients chose to delay the doctor's examination until other trouble occurred, such as Acute Kidney Injury, appeared.[8]

CONCLUSION

Chronic Kidney Disease was the most common type of renal failure found in this study compared to the other types such as Acute Kidney Injury and Acute Chronic Kidney Disease. Calculus of kidney was the most frequent urinary calculi found. Men are more at risk of having kidney failure due to urinary calculi. The patients within the range of 41-50 years old were found the most in this study.

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