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Original Research Article

Profile of urinary tract stone in Makassar, Indonesia

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ABSTRACT

Background: Urinary tract stone disease (urolithiasis) is still a significant health issue throughout the world. In Asia, regions with very high urolithiasis incidence stretch from Sudan, Saudi Arabia, United Arab Emirates, Pakistan, India, Myanmar, Thailand, Indonesia, and Philippines. Demographic and regional variations in cases of urolithiasis may provide clues to their etiology and prevalence. The aim of this study was to determine the characteristics of urolithiasis patients and their management in Makassar.
Methods: This was a single centre retrospective descriptive study using data from patient medical records at Dr. Wahidin Sudirohusodo Hospital Makassar in 2015-2017. Patients' demographic, clinical, and management characteristics were recorded.
Results: From 1,166 urolithiasis patients, author found men were more dominant than women with ratio of 2.2: 1. Age distribution were more common in the range of 40-60 years (58.32%). The distribution of patients with high Body Mass Index (BMI) were relatively common included overweight 20.5% and obese 13.81%. The majority of cases were unilateral urolithiasis (89.28%), with stones were largely found in kidney (59.41%). Extracorporeal Shock Wave Lithotripsy (ESWL) was the method more commonly performed (48.13%) followed by lithotripsy.
Conclusions: This study showed that urolithiasis were commonly found in the age group of 40-60 years, predominantly male, and high BMI were relatively common. The majority of cases were unilateral urolithiasis, mostly located in kidney. Urolithiasis were mostly managed by ESWL and lithotripsy.

Keywords: Bilateral, Body Mass Index, Extracorporeal shock wave lithotripsy, Incidence, Unilateral, Urolithiasis

INTRODUCTION

Urinary tract stone (urolithiasis) has been known since the days of Babylon and Ancient Egypt, but until now it is still a significant health issue throughout the world. The reported incidence of urolithiasis tends to increase worldwide and ranks third in urinary tract system diseases after urinary tract infections and prostate pathological conditions.[1,2]

Demographic and regional variations in urolithiasis cases may provide clues to the etiology and prevention of urolithiasis. Robertson reported that increased cases of urolithiasis in the UK was associated with increased consumption of animal protein. Similar conditions may occur in Indonesia due to increasing standard of living and by implementation of Nutrition Improvement Program. In addition, Indonesia is also located on the trajectory of the Stone Belt countries.[3,4] From various literatures, it is estimated that 1-12% of population in the world suffer from urolithiasis. The incidence of urolithiasis is vary across different regions of the world, ethnicity and geography.[5,6] The incidence of urolithiasis is estimated about 1-5% in Asia, 5-9% in Europe, 13% in North America, 7% in Japan, 9.8% in Taiwan, and 20% in Saudi Arabia.[7,8] The incidence of nephrolithiasis in

Indonesia in 2002 based on data collected from hospitals throughout the country was 37,636 new cases, with a total number of visits of 58,959 patients.[1]

The aim of this study was to determine the demographic and clinical characteristics of urolithiasis patients and their management at Dr. Wahidin Sudirohusodo Hospital.

METHODS

This was a single centre retrospective descriptive study using data from patient medical records at Dr. Wahidin Sudirohusodo Hospital Makassar from January 1st, 2015 to December 31st, 2017. Demographic and clinical characteristics consisted of gender, age, Body Mass Index (BMI), stone location, the anatomical side of the stone (unilateral or bilateral), and its management. The inclusion criteria of this research were female and male patients of any age who had urolithiasis and complete history of treatment during 2015-2017, in Dr. Wahidin Sudirohusodo Hospital, Makassar. Author excluded patients with incomplete data. The data were presented in the form of numbers and percentages, while the average value and Standard Deviation (SD) were obtained through descriptive statistical analysis of SPSS v.22. BMI variables were determined based on WHO classification: underweight (BMI<18.5), normal (BMI 18.5-24.9), overweight (BMI 25-29.9), and obese (BMI≥30).

RESULTS

In this 3-year study, author recorded a total of 1,166 urolithiasis patients and found insignificant differences in the number of patients each year of this study. Out of them, 803 patients were male (68.87%) and 363 patients were female (31.13%), with sex ratio 2.2: 1. The mean age was 50±12.68 years (range 5-92 years). Author found age distribution were largely in the age group of 51-60 years (30.53%) and 41-50 years (27.79%). While the least age group was below 20 years (1.46%). The mean BMI was 21.24±2.88 (range 14.06-35.38) with distribution of BMI groups were 2.49% underweight, 63.21% normal weight, 20.50% overweight, and 13.81% obese (Table 1).

This study recorded data of anatomical site of urinary stones lodgment of sample population. Patients were found to have stones located in 1 or more anatomical sites. Kidney was the most frequent site of urinary stone in this study, found in 827 patients. Ureter was the second most frequent site of stone lodgment followed by urinary bladder and urethra There was only 1 patient with stone located in urethra (Figure 1).

Distribution of patients based on unilateral or bilateral organ involvement; author found the majority of cases affected unilateral organ. In this study, from all nephrolithiasis and ureterolithiasis patients, 86.83% of them were unilateral cases (Figure 2).

Table 1. Demographic and clinical characteristics of patients.

	Characteristics	n (%)
Number of urolithiasis patients	2015	401(34.39%)
	2016	406(34.82%)
	2017	359(30.79%)
Gender	Male	803(68.87%)
	Female	363(31.13%)
	Mean	50±12.68
	Range	5-92
	< 20	17(1.46%)
Age (years)	21-30	51(4.37%)
	31-40	189(16.21%)
	41-50	324(27.79%)
	51-60	356(30.53%)
	≥ 61	229(19.64%)
	Mean	21.24±2.88
	Range	14.06-35.38
Body mass index	Underweight	29(2.49%)
	Normal	737(63.21%)
	Overweight	239(20.50%)
	Obese	13.81%

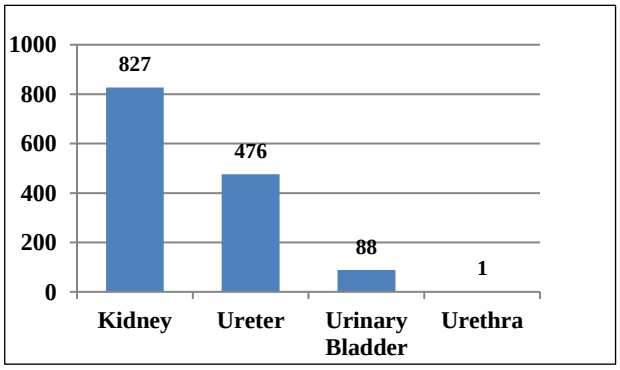

Figure 1: Anatomical site of urinary stone.

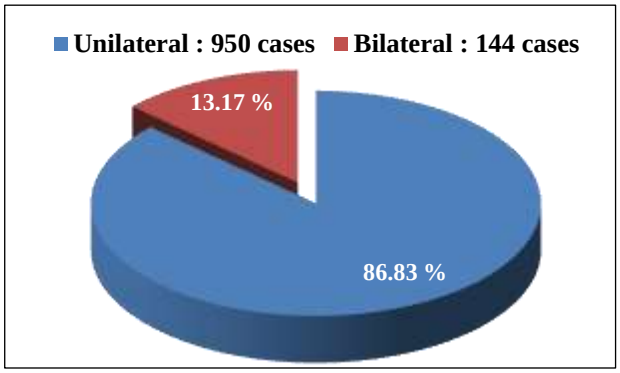

Figure 2: Distribution of unilateral or bilateral urolithiasis case.

The management of urolithiasis patients recorded in this study were open surgery, minimal invasive surgery, and

non-invasive management. Depend on condition of patients, anatomical site of stones lodgment, size and type of stones, and other clinical considerations, some patients were managed only by 1 method of treatment while others were managed by 2 or more procedures. Among all methods of treatment, ESWL was procedure most frequently performed followed by lithotripsy (Figure 3).

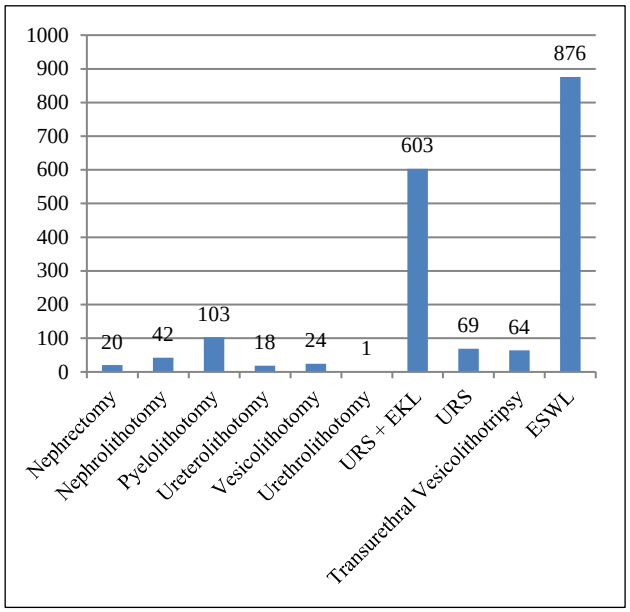

Figure 3: Distribution of urolithiasis management.

DISCUSSION

The prevalence of nephrolithiasis is estimated 1%-5%, with the possibility of experiencing urinary stones vary depending on age, sex, race, and geographic location.[5,6] Urolithiasis occurs due to a multi-factorial process that still lacks definite theories.[2,9]

This study showed that urolithiasis affected male more than female with ratio of 2.2: 1. These data are consistent with various studies which state that urolithiasis is more frequent in male.[7] Research by Thomas Knoll et al, found that cases of urolithiasis were dominated by men compared to women with a ratio of 2.7:1.[7,8] The case of urolithiasis is more commonly affected men, probably due to urinary calcium content, as the main substance of stone formation, which is higher in men while urinary citrate content as stone formation inhibitor is higher in women.[10] Some hormones are known to have a role in the process of urinary stone formation where estrogen inhibits calcium and oxalate excretion and increases citrate production while testosterone decreases citric excretion.[11,12]

Age is one of risk factors for urolithiasis, which is marked by a significant increase in the incidence of urolithiasis over the age of 40 years.[7,8] Hiatt et al, stated that incidence of urolithiasis was relatively rare at the age before 20 years and the peak incidence of this disease is at the age range of 40-60 years.[6] This is consistent with the description of age distribution of urolithiasis patients in this study where the greatest number of urolithiasis patients were found in the age group between 41-60 years (58.32%) and over the age of 60 years (19.64%). The exact cause of high incidence of urolithiasis in the productive age group is not yet known, but the reduced effect of estrogen in menopausal women and prostate pathological conditions such as Benign Prostatic Hyperplasia (BPH) in men over 40 years may be contributing factors to the development of urolithiasis.[12-14]

Obesity is another risk factor that plays a role in the occurrence of urolithiasis.[15] In this study, patients with high BMI had fairly high percentage accounted for 20.50% overweight and 13.81% obese. According to John R. Asplin there is a significant relationship between obesity and urolithiasis. Increased nutrient intake can increase urinary tract substances such as calcium, oxalate, or uric acid. Metabolic syndrome associated with obesity, will affect the metabolism of acid-base in the kidney, decrease urine pH and will increase the occurrence of uric acid stones. According to Ozdu Aydogdu the prevalence of urolithiasis increases with obesity.[15-17]

The distribution of urolithiasis patients based on location of stones was mostly found in the upper urinary tract: kidneys (59.41%) and ureter (34.20%). These results are in accordance with the literature which states that stones are more likely to form in the upper urinary tract.[18] Qaader et al. in their study found 84.6% cases of urolithiasis were in the upper urinary tract.[19] While research by Amy E. Krambeck et al, from 1,633 cases, they found nephrolithiasis as the majority of cases.[20] Based on anatomic location, unilateral urolithiasis was recorded as the majority of cases (89.28%), compared to bilateral urolithiasis. This finding is consistent with study by Ferraro et al, which reported about 11% of bilateral urolithiasis cases out of 2,861 cases studied.[9] While Noviandrini et al. reported bilateral urolithiasis cases were about 10% (560 cases) from a total of 5,741 cases. However, the association between formation of urinary tract stones with the side location of stones remains uncertain.[21]

The distribution of urolithiasis management is in accordance with the treatment modality at Dr. Wahidin Sudirohusodo hospital. ESWL was the most performed procedure, about 48% of all cases followed by lithotripsy. These results are consistent with the study by Omer A. Raheem and Dah Shyong Yu who reported the management of urolithiasis in the kidney and ureter were most commonly treated by ESWL and minimal invasive surgery.[22,23]

CONCLUSION

The results of this study illustrate the demographic and clinical characteristics of urolithiasis patients and their management at Dr. Wahidin Sudirohusodo Hospital Makassar. Urolithiasis patients were mostly found in the

age group of 41-60 years, men were more affected than women, and 34.31% of patients had high BMI. The majority of cases were unilateral urolithiasis and urinary stones were most commonly located in kidney. ESWL and lithotripsy were procedures mostly performed.

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