

CHARACTERISTICS OF NEPHROLITHIASIS PATIENTS AT ULIN GENERAL HOSPITAL BANJARMASIN 2017-2018 PERIOD

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Abstract: The purpose of this study was to determine the characteristics of nephrolithiasis patients at Ulin General Hospital Banjarmasin based on sex, age, and residence place of patients. This study was conducted at Ulin General Hospital Banjarmasin, using a descriptive method with a retrospective approach. A total of 100 nephrolithiasis patients were obtained by total sampling according to inclusion and exclusion criteria. The results of this study showed that all nephrolithiasis patients in the 2017-2018 period were recorded, there were 58 male patients (58%), while there were 42 female patients (42%). The results showed that nephrolithiasis patients at Ulin General Hospital Banjarmasin were more than 55-64 years old (31%) and Banjarmasin was the area where most nephrolithiasis patients with a number of 35 patients (35%). This study showed the characteristics of age, sex, and residence place of patients were the risk factors that influence the incidence of nephrolithiasis at Ulin General Hospital Banjarmasin.

Keywords: Patient Characteristics, Nephrolithiasis, Ulin General Hospital Banjarmasin.

INTRODUCTION

Nephrolithiasis is reported to affect about 1 in 11 people in the United States with a prevalence of 8.8% which is a contributor to chronic kidney disease and poses a life threat to patients.¹ The incidence of nephrolithiasis in Indonesia in 2002 from the latest data accumulation of hospitals throughout Indonesia was 37,636 cases, with the number of visits was 58,959 patients. Hospitalized patients were 19,018 patients, and the number of deaths was 378 patients.^{2,3}

According to Novak et al. (2009) in the Sex prevalence of pediatric kidney stone disease in the United States: an epidemiologic investigation stated that nephrolithiasis is a disease commonly experienced by postmenopausal women in about 5% -7% of the United States population¹. In Indonesia, the prevalence of nephrolithiasis which diagnosed by doctors in interviews was 0.6%. The highest prevalence is in the Special Region of Yogyakarta by 1.2%, then Aceh by 0.9%, by 0.8% respectively in West Java, Central Sulawesi and Central Java.⁴

According to the 2013 Riskesdas data, the prevalence of the 55-64 years age group was 1.3%, slightly decreased at the age of 65-74 years to 1.2%, and the age of ≥ 75 years by 1.1%. The highest incidence was in male patients with a proportion of 0.8% compared to female patients at 0.4%.

The prevalence of nephrolithiasis in South Kalimantan is 0.4%.⁴ South Kalimantan is geographically divided into 13 districts and cities with an area of 1.96% of the total area of Indonesia. The water sources mostly from PAM/Ledeng (23.36%), rivers (16.61%), and unprotected wells (13.41%) with the main (89.15%) occupation of agriculture, livestock, forestry, and fisheries.⁵ River water in South Kalimantan is getting worse due to heavy metal pollution, especially the Martapura River and the Barito River. High quality and

turbidity during rain and salt levels exceed water quality standards during drought due to water intrusion based on PDAM Bandarmasin data.⁶ Geographical conditions also affect drinking water quality with nephrolithiasis according to "Krisna DNP" (2011) in the article Risk Factors of Kidney stones Disease.

This study aimed to determine the characteristics of nephrolithiasis patients at Ulin General Hospital Banjarmasin based on sex, age, and geographical location.

RESEARCH METHODS

This study used a cross-sectional retrospective approach with descriptive methods. The variables of this study were observed without intervention.

The subjects of this study were nephrolithiasis patients at Ulin General Hospital Banjarmasin 2017-2018 and a total sampling technique. Data analysis by collecting data and then displayed descriptively by identifying nephrolithiasis patients in the Urological Surgery Ward and Clinic obtained from the medical record data at Ulin General Hospital Banjarmasin then tabulated in table, followed by the calculation of its percentage and frequency. Inclusion criteria include the medical record data from nephrolithiasis patients recorded as patients at Ulin General Hospital Banjarmasin with a complete medical record of patient data, including patient biodata (name, sex, age, and address of the patient). Exclusion criteria for samples in this study were nephrolithiasis patients with other stone diseases in the urinary tract and incomplete patient medical records.

RESULTS AND DISCUSSION

A total of 100 samples were obtained in which 11 of them with the stone analysis data.

Table 1. Characteristics of Nephrolithiasis Patients at Ulin General Hospital Banjarmasin 2017-2018

No.	Categories	n	Relative Frequency (%)
1.	Sex		
	- Male	58	58
	- Female	42	42
2.	Age		
	- 15-24 years old	3	3
	- 25-34 years old	4	4
	- 35-44 years old	19	19
	- 45-54 years old	28	28
	- 55-64 years old	31	31
	- 65-74 years old	13	13
	- ≥ 75 years old	2	2
3.	Geographical Location		
	- Banjarmasin	35	35
	- Banjarbaru	8	8
	- Banjar District	9	9
	- Tanah Laut District	8	8
	- Barito Kuala District	5	5
	- Tanah Bumbu District	4	4
	- Balangan District	0	0
	- Tabalong District	5	5
	- Hulu Sungai Tengah District	2	2
	- Hulu Sungai Selatan District	0	0
	- Hulu Sungai Utara District	3	3
	- Kotabaru District	2	2
	- Tapin District	2	2
	- Outside of South-Kalimanta	17	17

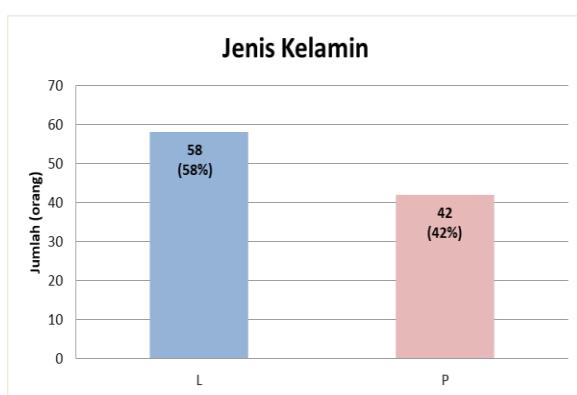


Figure 1. Frequency and relative frequency of nephrolithiasis patients at Ulin General Hospital Banjarmasin 2017-2018 based on sex

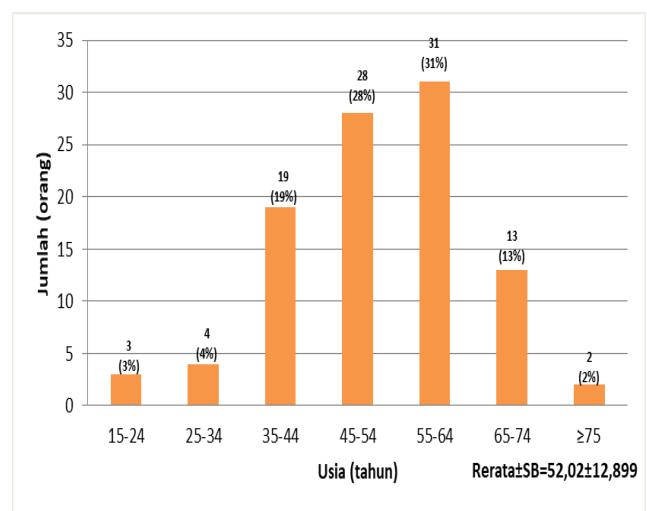


Figure 2. Frequency and relative frequency of nephrolithiasis patients at Ulin General Hospital Banjarmasin 2017-2018 based on age

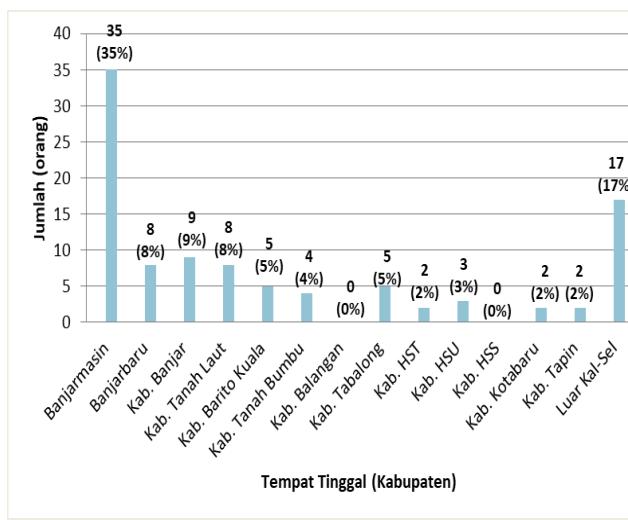


Figure 3. Frequency and relative frequency of nephrolithiasis patients at Ulin General Hospital Banjarmasin 2017-2018 based on patients's geographical location

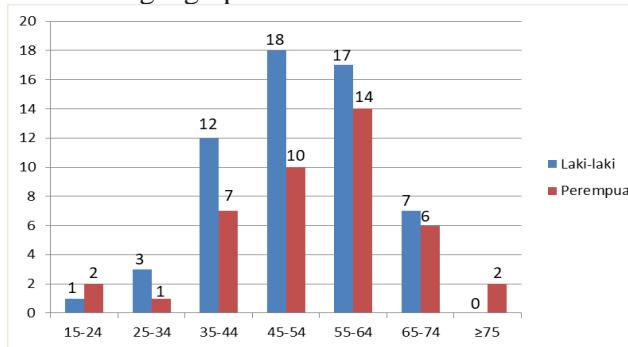


Figure 4. Distribution of nephrolithiasis patients's age based on sex at Ulin General Hospital Banjarmasin 2017-2018

Based on Figure 1. which has been groupd by sex throughout 2017-2018. The result shows there are more 58 male patients (58%) than women with the number of 42 patients (42%). This is similar as research by Sihaloho SM (2017) at Elisabeth Hospital Medan, which states that there were more male patients with urinary track stones of 115 (63.5%) than women with the number of 66 ed(36.5%) . This study mentions the high incidence of urinary tract disease in men caused by the anatomical urinary tract in men is longer than women, thus naturally male

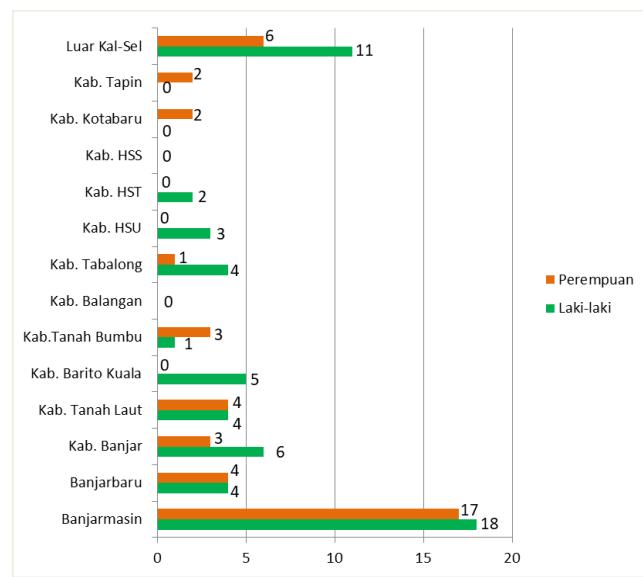


Figure 5. Distribution of nephrolithiasis patients's sex based on geographical location at Ulin General Hospital Banjarmasin 2017-2018

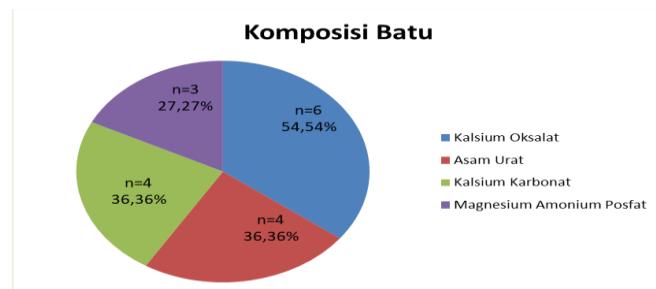


Figure 6.Description of Stone composition analysis on nephrolithiasis patients at Ulin General Hospital Banjarmasin 2017-2018

urine has higher calcium levels than in women, and female urine contains higher citrate levels (inhibitors), besides the content of the hormone testosterone in men can increase the production of endogenous oxalate in the liver, as well as in the female hormone estrogen which is able to prevent the aggregation of calcium salts.⁷

Figure 2. shows the results of nephrolithiasis patients in Ulin General Hospital Banjarmasin 2017-2018 based on age. The age distribution is divided according to age category based on 2013

Riskesdas data. This study shows the cases of nephrolithiasis in Ulin General Hospital Banjarmasin with an average age of 52.02 mostly in patients aged 55-64 years old (31%), followed by ages 45-54 years old (28%), age 35-44 years old (19%), and age 65-74 years old (13%). The results showed the same as data from the Indonesian Ministry of Health through the Indonesian Ministry of Health Data and Information Center in 2013 on kidney stones which showed that nephrolithiasis patients in Indonesia were people aged over 45 years old and most were at the age of 50 years old and above.⁴

In adults, the peak incidence of stones is in the fourth to sixth decade of life.⁸ At this age and increasing age causes circulatory disorders such as hypertension, high cholesterol levels. Where hypertension can cause calcification in the kidneys thus will have the possibility to turn into stone. High cholesterol can stimulate calcium oxalate crystal aggregation as well as calcium phosphate to facilitate the formation of urinary tract stones.⁹

According to Figure 3, Banjarmasin City is the most common area of nephrolithiasis patients (35%), due to the Ulin General Hospital Banjarmasin is located in Banjarmasin. This prefigures that some regions show greater incidence than other regions known as stone belts. The same result was also mentioned in the research by Haerudin H et al. (2013) in Majalengka District Hospital that some regions show greater incidence than other regions (stone belt).¹⁰

The study conducted by Shoag J et al. (2015) showing the occurrence of stone belts in southern United States associates with the high temperatures with an average of 30°C in nephrolithiasis patients.¹⁴ Geographical, temperature and climatic conditions are extrinsic factors that influence the incidence of nephrolithiasis. According to the theory proposed by Haerudin H et al. (2013) based on his research entitled Relationship Characteristics of Patients with

Nephrolithiasis in Majalengka District Hospital 2013 that countries with tropical climates and temperatures in high and hot work environments affect individuals living in hot climates and exposure to light rays high ultraviolet tends to lack fluid (dehydration) and decreased urine excretion which causes increased concentration in urine and can facilitate the formation of stones.¹⁰

Based on the age distribution of nephrolithiasis patients by sex (Figure 4). The mean age for males is 51,017 years old and the average age for females is 53,407 years old. The effect of the female estrogen hormone can prevent aggregated calcium salts. Meanwhile, men have higher levels of the hormone testosterone, causing an increase in levels of hepatic endongal oxalate which will further facilitate crystallization.⁹ Therefore, the mean age of women in nephrolithiasis patients at Ulin General Hospital Banjarmasin is higher at the age of 53,407 years due to women's estrogen levels which have begun to decrease at the age of 50.

Based on Figure 5., nephrolithiasis patients at Ulin General Hospital Banjarmasin in Banjarmasin City, Banjar District, Barito Kuala, HSU, HST, and Outside South Kalimantan were dominated by male patients. This can be due to community habits, in which men have more risk factors. Besides being caused by intrinsic factors such as hormone levels, the results are also affected by extrinsic factors such as occupation, weather in an area, diet, and hydration status (fluid intake). Work with long sitting activities affects the incidence of nephrolithiasis because a lot of sitting interferes with the body's metabolic processes. In Banjarmasin, it is likely that the majority of the work is more seated therefore it gets the most occurrences compared to other regions. In addition, in the area of South Kalimantan the average air temperature/maximum temperature in January-December 2017 was 34.46°C and 2018 was 31.67°C.^{12,13} This situation is

similar to the study by Shoag J et al. (2015) the occurrence of stone belts in the southern United State that high temperatures with an average of 30°C were associated with the incidence of nephrolithiasis.¹⁴ Countries with tropical climates and hot work environment temperatures affect individuals who live in areas with hot climates and exposure to high ultraviolet light tends to experience a lack of fluids (dehydration) and decreased urinary excretion which causes increased concentration in the and facilitate the formation of stones.¹⁰

The medical record data from nephrolithiasis patients in this study also showed that from 100 nephrolithiasis patients who were the subjects of the study, 11 of them were found to have an examination of stone composition analysis from laboratory data (Figure 6.) with the most composition being calcium oxalate (54.54 %), uric acid (36.36%) and calcium carbonate (36.36%). This study has the same results as the study by Pawar AS et al. (2018) in the USA (The United States of America) in patients with horseshoe kidney found stone composition from stone analysis was mainly calcium oxalate (64.2%).¹⁴

Risk factors for calcium oxalate stones include low urine volume, hypercalciuria, hyperuricosuria, and hypocitraturia.⁸ This is theoretically due to the pathogenesis of calcium oxalate stone formation is a large process and basically includes nucleation, growth of crystals, crystal aggregation (collection. and retention of crystals. Various substances in the body have an effect in the process of stone formation, thereby affecting one's ability to increase or inhibit stone formation. Promoters facilitate the formation of stones while inhibitors prevent it. In addition to low urine volume and low urine pH, high calcium, sodium, oxalate and urate are also known to promote the formation of calcium oxalate stones. Many inorganic substances (citrate, magnesium) and organic substances (nephrocalcin, urine prothrombin fragment 1, osteopontin) are known to inhibit stone formation.¹⁵

To prevent the formation of urinary tract stones, some foods are recommended to be avoided such as high-sodium tomatoes, cranberries, grapes, spinach, potatoes, and consumption of fish oil more Some habits are recommended to do such as increasing fluid intake, increasing eating foods that are inhibiting the formation of stones that contain citric acid such as oranges, lemons, and melons. Increasing potassium intake is also recommended, such as dairy products and almonds.¹⁶

CONCLUSIONS

Characteristics of nephrolithiasis patients in Ulin General Hospital Banjarmasin based on sex showing most are male with the number of 58 patients (58%).

Characteristics of nephrolithiasis patients in Ulin General Hospital Banjarmasin based on the age showing the most patients are aged 55-64 years old with 32 patients (32%) and an average age of 52.02 years old.

Characteristics of nephrolithiasis patients at Ulin General Hospital Banjarmasin based on geographical location showing the most frequent are patients who live in the Banjarmasin city with the number of 35 patients (35%).

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