

Demographical and Clinical Characteristic of Urolithiasis Inpatient in Buleleng District General Hospital on 2021

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Abstract

Urolithiasis is the most common emergency condition in urology and is often diagnosed in urology centers. It is important to know the epidemiology of urolithiasis to help improve medical services for urolithiasis patients. Urolithiasis prevalence has increased in the world. Bali Province occupies the fourth rank with a prevalence of kidney stones of 0.7%, and Buleleng Regency is included in the top five cases of urolithiasis in Bali with a 0.9% prevalence. Unfortunately, data in Buleleng Regency has not been tabulated in detail in terms of demographic and clinical characteristics. The purpose of this research was to observe and analyze the demographic and clinical characteristics of inpatients with urinary tract stones at Buleleng District Hospital in 2021. This research is a descriptive cross-sectional study using secondary medical record data with a total sampling method. The data were analyzed using descriptive statistics. Of the 45 samples, the dominant result in the age group of 15-64 years was 86.7%, male (75.6%), employee occupation group (64.4%), and Buleleng district (31.1%). The dominant clinical symptoms are back pain (82.2%), nephrolithiasis (68.8%), size > 20 mm (93.3%), enforced by BOF (86.7%), urinalysis (95.6%), managed by URS flexible lithotripsy (73.3%), urinary tract infection as a complication (53.3%), and no comorbidities (80.1%). Most of the urolithiasis patients are male office workers in the productive age group, predominating in Buleleng District, and managed with URS flexible lithotripsy with predominant complications of UTI (urinary tract infection) and no comorbidities.

Keywords: urolithiasis, demographic, clinical characteristic, inpatient

INTRODUCTION

Urinary tract stones, also known as urolithiasis, are the most common emergency disease in urology, and their prevalence has increased globally, including in developing countries. Data from RSUP Dr. Cipto Mangunkusumo in Indonesia recorded a rate of 0.5%, while the PGI Cikini Hospital recorded 530 cases of urolithiasis.

The prevalence of urinary tract stones diagnosed in Bali has not been recorded clearly and in detail. Indonesia's basic health research data only recorded kidney stone disease in the province of Bali. The data states that the prevalence of kidney stones in Bali in 2013 was 0.7%. Karangasem district is the number one district with the highest prevalence of kidney stones in Bali at 1.2%, and Buleleng district is included in the top five cases of urolithiasis in the province of Bali with a prevalence of 0.9%.⁽³⁾ Data for urinary tract stones as a whole and their accompanying causes and complications have not been recorded clearly and in detail.

In Indonesia, the incidence of urolithiasis is still relatively high; it is reported that men are four times more likely to experience urolithiasis than women.⁽⁴⁾ According to prevalence, as many as 79% of cases of urinary tract stones appear in men and often in the age group of 60 to 65 years. Demographically, large urinary tract stones are found among entrepreneurs, farmers, fishermen, and laborers.⁽⁶⁾

Mild and severe complications that can arise from urolithiasis include urinary tract obstruction, hypertension, pyonephrosis, chronic pyelonephritis, and acute and chronic renal failure, and it can cause myocardial infarction. In addition, it is stated that kidney stones can increase the risk of fracture, renal carcinoma, and cardiovascular disease for sufferers⁽⁸⁾. Oral therapy and surgical intervention can be performed according to indications in each case of urinary tract stones. In addition, the risk of recurrence is estimated to be 50% within 5 years of the first attack. In terms of the patient's quality of life, patients with kidney

stones or urinary tract stones have a lower quality of life in health aspects than patients without stones, and it is stated that kidney stone disease greatly affects the quality of life of patients in several aspects, such as work, lifestyle, and financial costs for health care.(9)

Based on the high prevalence of urinary tract stones based on demographics and clinically suffered, it is known that the demographic and clinical characteristics of urinary tract stone inpatients at Buleleng District Hospital do not yet have detailed data, and see the impact of progression, complications given, and the impact on the quality of life of patients with urinary tract stones, the authors want to conduct research related to "Demographic and Clinical Characteristics in Patients Treating Urinary Tract Stones at Buleleng District Hospital in 2021." Buleleng District Hospital was designated as the research location because there had not been any previous research on this matter at this location.

METHODS

This research is a descriptive cross-sectional study using secondary medical record data in Buleleng District General Hospital with a total sampling method and was held from August until September 2022. The reachable population for this study were all patients who had been diagnosed with urinary tract stones who were hospitalized at the Buleleng District General Hospital in 2021. The data were analyzed using descriptive statistics and presented in the form of a distribution table for urolithiasis patients with average values, frequencies, and percentages. Additionally, the analysis of correlation employs the Pearson comparison test to determine the

correlation between the variables of age and stone size. The medical records of patients diagnosed with urinary tract stones were incomplete, unreadable, and lost. Additionally, multiple medical records were excluded from the analysis.

RESULT

The research data were taken from secondary data through collection and observation from the medical records of inpatient urinary tract stones at Buleleng General Hospital in 2021. Through these observations, a total of 46 patient medical record data were obtained, with a total of 45 patient medical records, and 1 medical record was removed because there were multiple medical records. The data were processed and analyzed using descriptive statistics and presented in the form of a distribution table for urolithiasis patients with average values, frequencies, and percentages.

Of the 45 samples, the demographic characteristics of urolithiasis were dominant in the age group of 15–64 years (86.7%), dominant in males (75.6%), in the employee occupation group (64.4%), and in the Buleleng district (31.1%). Low back pain (82.2%), kidney stones (68.8%), stones larger than 20 mm (93.3%), BOF enforcement (86.7%), urinalysis (95.6%), URS flexible lithotripsy (73.3%), urinary tract infection complications (53.3%), and the absence of comorbidities (80.1%) are the most common clinical symptoms.

Based on the data, the researcher is comparing the data correlation of the age with the stone size. From the Shapiro-Wilk normality tests of age and stone size variables (Table 1), it shows the variables of age were in normal distribution because the Sig. value is > 0.05.

Table 1. Normality Test of Variables

	Shapiro-wilk Normality		
	Statistic	df.	Sig.
Age	.969	45	.264
Stone Size	.930	45	.009

Table 2. Respondent Baseline Characteristics

Variables	Number of Respondents (n=45)		
	n	%	
Age			
< 15 years	1	2.2 %	
15-64 years	39	86.7%	
>64 years	5	11.1%	
Gender			
Male	34	75.6 %	
Female	11	24.4%	
Occupation			
No occupation	3	6.7%	
Office Worker	29	64.4%	
Entrepreneur	5	11.1%	
Farmer/Fishermen/Laborer	8	17.8%	
Region			
Banjar	2	4.4%	
Baturiti	1	2.2%	
Buleleng	14	31.1%	
Busungbiu	4	8.9%	
Gerokgak	3	6.7%	
Kubutambahan	6	13.3%	
Sawan	5	11.1%	
Seririt	1	2.2%	
Sukasada	6	13.3%	
Tejakula	3	6.7%	
Dominant clinical symptoms			
Colic pain	3	6.7%	
Referred pain	2	4.4%	
Dysuria	3	6.7%	
Back pain	37	82.2%	
Stone location			
Nephrolithiasis	Upper Pole	13	28.9%
	Middle Pole	4	8.9%
	Lower Pole	14	31.1%

Ureterolithiasis	Proximal	14	31.1%
Stone size			
10 mm-20 mm		3	6.7%
>20 mm		42	93.3%
Diagnosed			
Radiology	USG	2	4.4%
	Plain Abdominal Radiograph	39	86.7%
	CT Scan	4	8.9%
Microscopic	Urinalysis	43	95.6%
Intervention			
Conservative		2	4.4%
PCNL		3	6.7%
URS flexible lithotripsy		33	73.3%
Open surgery		7	15.6%
Complication			
Urinary tract infection		19	42.2%
Hematuria		11	24.4%
Hydronephrosis		11	24.4%
Sepsis		4	8.9%
Comorbidity			
Hypertension		5	11.1%
Covid-19		2	4.4%
Diabetes mellitus		2	4.4%
No comorbidity		36	80.1%

DISCUSSION

The highest age was found in patients hospitalized for urinary tract stones at Buleleng District Hospital in 2021, with an average age of 48 years or an age range of 15-64 years, or productive age. On the other hand, it was found that cases of urinary tract stones were often experienced by individuals aged 40 to 60 years with a male-to-female ratio of 2:110, and research by Simanullang Poniyah(11) also found cases of urolithiasis of 54.1% at the age of 30-50 years. Meanwhile, the latest research by Fatasya12 states that urinary tract stones

are often found in the age range of 51-60 years (34.4%). 50% of stones are significantly influenced by genetic factors.(13) The incidence of urolithiasis increases with age; the age peak is often found in the range of 30-60 years and decreases in the following range. The age distribution of urolithiasis varies in each country, but what must be considered is the prevalence of middle-aged people. Middle-aged people are prone to urolithiasis caused by individual job stress (heavy work, low fluid intake, and high levels of dehydration) and sedentary lifestyles such as staying up late

or irregular eating patterns.(15)

The most common gender found was male, with 34 patients. This study is in accordance with research conducted by Diatmika¹⁰; it was found that cases of urolithiasis were often found in males more than females. Research by Fatasya¹², Simanullang Poniyah¹¹, and Haryadi et al. (2019) revealed that 63% of urinary tract stone patients were male. This phenomenon tends to occur due to different dietary habits. Men tend to consume alcohol, coffee, and lots of meat in excess compared to women. Also, the hormone testosterone can cause stones to form in the urinary tract. On the other hand, the hormone estrogen can stop stones from forming by controlling the production of 1,25-Dihydroxyvitamin D¹⁶.

At the Buleleng District Hospital, the most common occupation among inpatients with urinary tract stones was that of employees, accounting for 64.4%. Not in line with research by Fatasya¹², it was found that patients had jobs as farmers or laborers. This is not in line with research by Simanullang Poniyah¹¹, which also states that 53.2% of cases of urinary tract stones occur in entrepreneurs. The high number of incidents in employee work is caused by a lack of activity or mobilization or not moving much at work.

Buleleng District had the highest distribution of urinary tract stone inpatients at Buleleng District Hospital, with 14 patients (31.1%). We can conclude that a significant number of patients originated from urban areas. Diatmika¹⁰'s research revealed its prevalence in urban areas, while Riskesdas Bali found it primarily in rural areas. There is a correlation with urolithiasis, especially temperature, season, sunshine, humidity, atmospheric pressure, and rainfall. Countries or regions in the tropics and subtropics are known to have a higher prevalence of urolithiasis than those in temperate and cold climates¹⁶. Individuals living in hot climates are prone to dehydration, which results in an increased incidence of urinary tract stones. Heat can cause us to need a higher fluid intake; loss of sweat causes a decrease in urinary volume.

All cases of inpatient urinary tract

stones in 2021 will be diagnosed by radiology. 39 cases, or 86.7%, made the diagnosis by plain abdominal radiographs, and 43 out of 45 inpatients underwent urinalysis examination. In contrast to previous studies, 53.9% of cases underwent radiological examination in the form of BNO-IVP, and 452 patients out of 1418 cases, or only a portion of the total cases, underwent complete urinalysis. In contrast to previous research, as many as 40 patients with urinary tract stones in 2020 were diagnosed with a CT scan and urinalysis examination.(17) A total of 50 patients with urinary tract stones were confirmed by radiology; urine analysis was performed, and 64% or 32 cases had mixed-type urinary tract stones.(18)

The final examination is radiology. Enforcement with radio-diagnostics should use appropriate visualization to detect urinary tract stones. At the Buleleng District Hospital, radiological examination to detect all cases of urinary tract stones uses plain abdominal photos or BOF. The interpretation of each stone on the results of the BOF examination has differences according to the type of calcification in the stone.(19)

When viewed from the diagnostic performance, the resulting sensitivity is 59% and 95% for specificity. This figure is relatively low, so this measure is often used for previous monitoring and is less effective for early detection.(20) According to the guidelines for the clinical management of urinary tract stones in Indonesia (2018), it states that after carrying out an ultrasound examination, it is recommended to do a non-contrast CT scan. Non-contrast CT scan is more accurate than intravenous pyelography because it can measure the size and density of stones. Intravenous pyelography examination can be performed as a diagnostic examination if the patient does not allow a non-contrast CT scan.(21) Based on this theory, when viewed from the conditions in the field, the Buleleng District Hospital only carried out a plain photo examination of the abdomen, taking into account the specificity and costs spent.

Urinalysis is the gold standard examination in diagnosing urinary tract stones.(22) The focus of parameters in uri-

analysis is to see erythrocyturia, leukosuria, bacteriuria, nitrites, urine pH, urine color condition, and urine culture. The 2021 case found that the patient's urine pH range was 5.0 to 8.5 with the condition of the yellow urine being slightly cloudy. 42 cases found positive for erythrocyturia, leukosuria, bacteriuria, and nitrites. Specifically, it was not explained in more detail about the bacteria that were obtained after the examination was carried out. There was only 1 case that specifically listed the type of stone in the patient, namely 1 case with calcium oxalate stones.

The location of the most stones found in inpatients with urinary tract stones at Buleleng District Hospital was kidney stones in 31 patients (68.9%). Diatmika-10 found that the most common cases were kidney stones or nephrolithiasis. In line with the latest research conducted by Fatasya¹², it was stated that as many as 78.5% of cases of stone patients were found in the upper urinary tract. Haryadi et al. (2017) also found that as many as 60% of cases are found in the kidneys. Not in line with research by Simanullang Poniayah¹¹, which found as many as 70.9% of cases of urinary tract stones in the ureters.

Kidney stones in the world have a prevalence rate of 1.7% to 8.8%²³. This is influenced by the kidney as the organ of excretion of waste products of the human body's metabolism. The tendency of this phenomenon is multifactorial. One of them is the metabolic factor. A meta-analysis study states that there is an influence between cases of metabolic syndrome and the high prevalence of nephrolithiasis in both children and adults²⁴.

The most common stone size found is > 20 mm. In line with research by Fatasya¹², it was stated that stone sizes were >20 mm (44.1%). Not in line with research by Abdurrosid et al.(25). In previous studies, the stone size that was found was the stone size of 10-20 mm. The tendency of this case is due to metabolic processes that take place in the body. Metabolically, the formation of urinary tract stones requires supersaturation conditions in their formation. The process of forming stones met-

abolically depends on the volume of urine, which consists of calcium, phosphate, oxalate, and sodium ions. High ion levels, low urine volume, low urine pH, and low citrate levels make stones form more easily and quickly. Departing from this, if the events of its formation are sequenced, it can be sorted into urine saturation in the first stage, followed by supersaturation, nucleation, crystal growth, crystal aggregation, crystal retention, and calculus formation. (26)

As many as 33 patients, or 73.3% of cases in 2021, were treated using flexible ureterorenoscopy lithotripsy. Simanullang Poniayah(11), medical management of patients with dominant urinary tract stones using flexible lithotripsy ureterorenoscopy. This is not in line with research by Diatmika10, which states that 80% of cases are treated with PCNL, then 17% are managed with open surgery, and 3% are only done with ESWL. Research by Fatasya-12: 51.6% of cases were treated with open surgery.

URS lithotripsy therapy for nephrolithiasis or ureterolithiasis is currently widely used because of the advantages it provides in terms of ease of use, quality, and sterility. URS Lithotripsy has the advantages of a very small endoscope, the quality of the optics provided is good, and the tools used during the procedure can only be used once. Indications for therapy with URS lithotripsy are for stones measuring 10-20 mm and can be used for all locations of kidney stones, both top to bottom poles and ureteral stones, both proximal to distal. URS lithotripsy can be performed on all patients without specific contraindications.(21)

A comparative study of URS lithotripsy with PCNL showed that URS lithotripsy provided a good postoperative prognosis and a high success rate with lower morbidity in the treatment of intra-renal and ureteral stones.(27) URS lithotripsy is recommended to be performed more than PCNL, even though PCNL is a minimally invasive technique. The potential risks of complications include infection, bleeding, urinary fistulas, and the risk of organ perforation.

ration adjacent to related organs.(28) Treatment with URS lithotripsy and PCNL significantly reduced the indications for open surgery.

19 patients, or 42.2% of cases, experienced complications in the form of infections, specifically urinary tract infections. Not according to research stated that the dominant complication found was sepsis. Also in the study of Haque & Roekmantara(29), the complication that was often found was hydronephrosis in 42% of cases. Previous research also stated that the dominant complication found was hydronephrosis(30). The phenomenon of complications in the form of infections, namely urinary tract infections and urosepsis.

Urinary tract infection (UTI) is very common in patients with urolithiasis. This inflammation is caused by stagnation of urine due to obstruction from stones, allowing bacteria to attach and multiply in the urothelium(31). Persistent bacterial infection by urease-producing bacteria will form infectious stones(32). The presence of urolithiasis is associated with poorer clinical outcomes in UTI patients, including an increased risk of bacteremia, uroseptic shock, and acute renal failure(33).

As many as 36 patients, or 80.1% of cases in 2021, found no comorbidities. This is not in line with research from Diatmika-10; it was found that hypertension was the dominant comorbidity in previous studies of common comorbid diseases in cases of urinary tract stones. Previous research also stated that 288 out of 666 cases (43.24%) of patients had previously experienced urinary tract stones as a recurrence.(34) This is because, in terms of the pathomechanism of urinary tract stones, the formation of pure stones in most cases is caused by metabolic processes.(35)

CONCLUSION

In addition, based on the results of the research conducted, urolithiasis is still the most common emergency disease in the field of urology and is frequently diagnosed in urology centers with an increasing prevalence throughout the world. A special study conducted at the Buleleng District Hospital

described the main demographic and clinical characteristics of patients who were often found in male office workers of productive age spread across the Buleleng sub-district and were predominantly treated with flexible URS lithotripsy accompanied by complications of urinary tract infections without other comorbidities. Future research is recommended to examine with a larger sample the risk factor variables for urinary tract stones in detail to reduce the number of urinary tract stone cases.

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