Brawijaya Journal of Urology
November 2025, Volume 6, Issue 2
p-ISSN: 2721-4982 **e-ISSN**: 2722-4546
DOI: doi: 10.11594/bjurology.2025.006.02.3

The Profile of Urinary Tract Stone Patients and Challenges in Eastern Region of West Nusa Tenggara

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Introduction. Indonesia is among the most populated countries inside the stone belt region. Evaluation and management of urinary tract stones (UTS) may be influenced by several constraints. This study aims to describe characteristics of UTS patients and associated challenges in the eastern part of West Nusa Tenggara Province.
Methods. A retrospective cross-sectional study was conducted at Bima Regional General Hospital. We included 235 UTS patients who underwent ultrasonographic (USG) and had complete medical records from January 2022 until June 2024.
Results. UTS patients were more common in males—158 patients (67.2%), the age group of 46–60 years (34.5%), and kidney stone (KS) cases (72.8%). The majority of stone sizes were <5 mm in 123 patients (52.3%), followed by >20 mm in 52 patients (22.1%). There were only 9 patients (3.8%) who were referred. There were 42 (17.8%) hydronephrosis patients, which has a significant relationship with the location of the stone ($p<0.001$). There were 18 patients (7.7%) who experienced chronic kidney disease (CKD), and 48 of 140 adult males (34.3%) had benign prostate hyperplasia (BPH), which has a significant relationship with age ($p<0.001$).
Conclusion. Most of UTS patients were males in the age range of 46–60 years, predominantly with KS cases, and only a few patients referred. The presence of related diseases such as hydronephrosis, CKD, and BPH added complexities. Several constraints also made management of UTS more challenging. It is crucial to improve facilities, provide health education, and fulfill the needs of urologists in certain regions for better UTS management.

Keywords: challenges, Indonesia, urologist, urinary tract stone

Introduction

Urinary tract stone disease (UTS) is one of the most common urologic diseases in the world. The prevalence could vary depending on the geographical location and socioeconomic status in different regions worldwide. UTS prevalence ranges from 1 to 19.1% of the total population in Asia, while it is 5% to 9% in Europe [1]. The systematic analysis of the Global Burden of Disease study reported that the incidence of UTS in Indonesia increased by approximately 30.4% from 2000 to 2021 [2]. To our knowledge, there was no updated data for UTS in the West Nusa Tenggara region.9

The lack of facilities and the unavailability of a urologist in certain regions could lead to undiagnosed and delayed treatment of UTS, which may lead to some serious complications. A meta-analysis of a cohort of more than 4 million participants reported that kidney stone (KS) is linked to the increasing risk of chronic kidney disease (CKD) at any stage [3]. For this reason, early diagnosis and prompt treatment of UTS by a urologist is crucial. Therefore, the fulfillment of urologists has to be encouraged as well, especially in peripheral areas. The descriptive study of UTS disease in certain peripheral areas becomes important for disease prevention and treatment strategies.

To the best of our knowledge, there are no reports of UTS disease in the eastern region of West Nusa Tenggara. Therefore, through this study, we describe the profile of UTS disease and associated challenges at the Bima Regional General Hospital.

Materials and Method

This retrospective cross-sectional study consists of patients who were diagnosed with UTS at the Bima Regional General Hospital as a referral hospital in the eastern region of West Nusa Tenggara. The data were collected from January 2022 to June 2024. The data were obtained from medical records that meet the eligible criteria on which UTS was diagnosed using USG. We excluded the patients who have incomplete data. These data include gender, age, stone size, stone location or diagnosis, management modality, and related diseases (hydronephrosis, CKD, and BPH). We also added statistical analysis within a 95% confidence interval (CI) to assess the relationships between several variables, including stone size and location in relation to the incidence of hydronephrosis, patient age in relation to the incidence of chronic kidney disease (CKD), and age in relation to the incidence of benign prostatic hyperplasia (BPH) in adult male patients. This study was approved by the ethics committee of the Bima Regional General Hospital with approval number 400/741/06.2/2024.

Result

This study includes 235 UTS patients at the Bima Regional General Hospital from January 2022 to June 2024. The data showed 158 patients (67.2%) were male and 77 (32.8%) were female (Table 1). The highest incidence age group in this study was 46–60 (34.5%), followed by patients older than 60 years old at 33.6%, and there were 4 patients (1.7%) below 15 years old. The mean age of this research was 51.8 with a 16.4 standard deviation (SD). As shown in the data (Table 1), the majority were KS, which was 171 patients (72.8%), followed by bladder stone (BS) in 43 patients (18.3%). The data also revealed that there are some patients who have KS combined with BSs—12 patients (5.1%).

Table 1. Clinical Characteristics of UTS Patients

Variable	Frequency (n = 235)	Percentage
Gender		
Male	159	67.7%
Female	76	32.3%
Age (years)		
<15	4	1.7%
15-30	21	8.9%
31-45	50	21.3%
46-60	81	34.5%
>60	79	33.6%
	51.8 (mean)	16.4 (SD)
Location		
KS	171	72.8%
Ureteral Stone (US)	2	0.9%
BS	43	18.3%
Urethral stone (UHS)	2	0.9%
KS + US	5	2.1%
KS + BS	12	5.1%
Stone Size (mm)		
<5	123	52.3%
5-10	41	17.4%
10-20	19	8.1%
>20	52	22.1%
	13.1 (mean)	16.6 (SD)
Management Modalities		
Medications	188	80.0%
Surgery	38	16.2%
Refer	9	3.8%
Hydronephrosis		
Yes	42	17.8%
No	193	82.2%
CKD		
Yes	18	7.7%
No	217	92.3%
BPH (male)	(n = 140)	
Yes	48	34.3%
No	92	65.7%

This study classified stones into several groups based on size. In Table 1, the data showed that most patients had stone sizes below 5 mm, specifically 123 patients (52.3%), followed by stones larger than 20 mm, which were found in 52 patients (22.1%). This study revealed that 188 patients (80%) received medications, while 38 patients (16.2%) underwent surgery. The patients who accepted to be referred in this research were 9 patients (3.8%). Table 1 also showed that there were 42 hydronephrosis patients (17.8%), 18 patients (7.7%) experienced CKD, and 48 (34.3%) of 140 male patients had benign prostate hyperplasia. The statistical test within the 95% confidence interval (CI) indicated a statistically significant relationship between the location of the stone and the incidence of hydronephrosis ($p<0.001$), but did not show significance for the different groups of stone sizes ($p=0.226$) (Table 2). Chi-square test also showed a significant relationship between age group and incidence of BPH in UTS patients ($p<0.001$) (Table 3). The relationship between age and incidence of CKD in UTS patients was not statistically significant with $p<0.169$ (Table 4).

Table 2. Relationship of stone size and location to hydronephrosis incidence

		Hydronephrosis			p-value
		Yes	No	Total	
Stone Size (mm)	<5	21	102	123	**0.226**[¥]
	5-10	9	32	41	
	10-20	6	13	19	
	>20	6	46	52	
	Total	193	42	235	
Location	KS	32	139	171	**<0.001**[€]
	US	2	0	2	
	BS	0	43	43	
	UHS	0	2	2	
	KS + US	5	0	5	
	KS + BS	3	9	12	
	Total	193	42	235	

[¥]Chi square test
[€]Fisher exact test performed due to 7 cells (58.3%) have expected count less than 5

Table 3. Chi square test for relationship of age of UTS patient to BPH incidence

		BPH			p-value
		Yes	No	Total	
Age (years)	**31-45**	2	28	30	**<0.001**
	46-60	14	34	48	
	>60	32	30	62	
	Total	48	92	140	

Table 4. Fisher exact test on Age of UTS patients to CKD incidence

		CKD			p-value
		Yes	No	Total	
Age (years)	**<15**	4	0	4	**0.169**
	15-30	21	0	21	
	31-45	47	3	50	
	46-60	77	4	81	
	>60	68	11	79	
	Total	217	18	235	

Discussion

UTSs could be affected by some factors, such as age, gender, weather, and body mass index and also may be related to other diseases. A recent study in Saudi Arabia reported that two of the most significant factors were male age and old age [4]. This study was also in line with previous studies on gender and age. The recent study that was conducted in General Hospital Surakarta from October 2020 to March 2022 showed that the prevalence of UTSs in male patients (70.3%) was higher than in females (29.7%), and the age group of 46 to 59 years had the highest prevalence in the study [5]. A single major center analysis study in Cipto Mangunkusumo General Hospital reported 277 patients; 188 patients (65%) were male and 97 patients (35%) were female, with a peak age of 51 to 60 years old [6]. Likewise, in our study, most of the patients were male: 158 patients (67.2%) and 77 female patients (32.8%), with the highest prevalence in the age group 46 to 60 years in 81 patients (34.5%), followed by the age group above 60 years in 79 patients (33.6%). In our study, the mean age was 51.8 with 16.4 of the standard deviation (SD).

UTS can occur in all parts of the urinary tract. In this study, most cases were KS in 171 patients (72.8%), followed by BS in 43 patients (18.3%). Our study also revealed that there are 12 patients (5.1%) who simultaneously had KS and BS. In the report of the UTS profile at Tabanan Hospital from

July 2014 until June 2016, the majority of patients (44.2%) had KS, followed by USs (36.3%) [7]. A study by Aritonang et al. in Kardinah Hospital in 2018 reported that 27 patients (38%) had KSs, proximal USs in 16 patients (22.5%), distal USs in 8 patients (11.3%), and BSs in 19 patients (26.8%) [8]. A recent study conducted in Soetomo General Hospital Surabaya in 2016 reported that KS was the most common location (68%), followed by US (19%) and then BS (13%) [9]. The recent study of 623 patients conducted by Muhamad et al. in Kustati Islamic General Hospital from October 2020 until March 2022 showed that KS was the majority of cases, followed by US and BS [5]. Our study was in line with previous studies that KS was the most common location. However, our data of the US and BS as the second common location had different prevalences to some recent studies.

We classified the stone size into several groups: below 5 mm, 5-10 mm, 10-20 mm, and larger than 20 mm. Some guidelines still use that stratification of stone size for the treatment algorithm [10]. The study conducted in Somalia reported that 60% of UTS patients had stone sized 5 to 22 mm [11]. A study in the northeastern city of India reported that the majority of 621 patients, which is 56.8%, had a stone size of 11–20 mm, and 14.5% of patients had a stone size larger than 20 mm [12]. Our data shows that most of the stones were below 5 mm in 123 patients (52.3%), followed by stones that were above 20 mm in 52 patients (22.1%). In our research, the stone size mean was 13.1 with a 16.6 standard deviation (SD).

In this study, there were 18 UTS patients (7.7%) that experienced CKD, and there was no statistically significant difference with the group of age with a $p<0.169$ (Table 4). The causes of CKD can vary; one of them was UTSs. Alhasan et al. reported a statistical relationship between UTSs and CKD at Sultan Agung Islamic Hospital Semarang [13]. Our study revealed that 48 out of 140 adult male patients (34.3%) experienced BPH, and there was a statistically significant relationship with the age group, with a $p<0.001$ (Table 3). Some studies reported that UTSs are also associated with BPH through association with several risk factors such as age, prostate volume, and diabetes mellitus [14,15]. However, several associated risk factors, such as age, prostate volume, and diabetes, were not included in this study due to data limitations. Obstruction of the urinary tract was a common etiology of hydronephrosis. According to a study by Nuraj et al. from Kosovo, KSs are the main causes of hydronephrosis, followed by USs [16]. This finding may align with our results that there were 42 UTS patients (17.8%) who had hydronephrosis, and KSs were the most common location in this study. As shown in Table 2, this study also reported that there was a statistically significant relationship between the incidence of hydronephrosis and the location of the stone ($p<0.001$) but no significance to stone size groups ($p=0.226$). However, more research is required to confirm this relationship.

Stone burden was related to several factors, such as socioeconomics, education, referral distance, and availability of a urologist. Likewise, the study using multivariate analysis by Bayne et al. revealed that the referral distance and urologist density were related to the stone burden larger than 20 mm [17]. Our hospital was a referral hospital in the eastern region of West Nusa Tenggara. However, it was still unable to provide urological health services due to the absence of a urologist. This circumstance may delay the diagnosis and prompt treatment. Perhaps this could explain the high prevalence of stones above 20 mm as the second common group size of stone in our research.

Regarding the unavailability of urologists, it was very challenging for us in the peripheral area to evaluate and treat the UTS disease properly. More than that, the nearest urologist from our district was in the capital province, which is about 12 hours by vehicle. Our study revealed that most of the patients were treated by medications (80%), followed by operations (16.2%), and only a few patients accepted to be referred (3.8%).

The management of UTS varies depending on the stone size and location. As mentioned in EAU Guidelines, percutaneous nephrolithotomy (PCNL) was recommended for KSs larger than 20 mm, which is not available in our hospital due to the absence of a urologist [10]. If the management modality is not yet available in the peripheral area, clinicians should consider referring the patient. However, there are some challenges affecting the referral systems, such as human resource constraints, financial issues, communication challenges, and patient failure to comply with the referral process [18]. The failure of the referral process may delay the stone management. Delayed stone treatment could increase the morbidity, increasing the frequency of antibiotic and imaging use [19]. A recent study reported that delayed stone surgery is associated with the complexity of stone treatment [20].

The limitation of this research was related to the comprehensiveness of the medical record. Our research could not provide data regarding stone composition, body mass index, comorbidities, complications, and patient compliance about the referral process. Further research is important to

provide more data on the profile of UTS in the eastern region of West Nusa Tenggara.

Conclusion

The burden of stone disease in the Bima Regional General Hospital has to be considered a serious problem. Several reports that can be drawn as highlights of the problem are as follows: Among the 235 patients with complete medical records, the majority were males, patients aged 40–60 years, and kidney stone cases. Stones smaller than 5 mm accounted for 52.3% of cases, followed by those larger than 20 mm at 22.1%, and only a small number of patients accepted the referral option (3.8%). There were several associated diseases also found in this study, such as CKD (7.7%), BPH (34.3%), and hydronephrosis (17.8%), which may be associated with delays in early diagnosis and prompt treatment. Limited facilities, the absence of a urologist, and several constraints in rural areas increase the challenges. Upgrading facilities, promoting health education in society, and fulfilling the needs of urologists in rural regions may enhance UTS management in the future.

Conflict of Interest

The authors declare no conflict of interest.

References

[1] Liu Y, Chen Y, Liao B, Luo D, Wang K, Li H, et al. Epidemiology of urolithiasis in Asia. *Asian J Urol*. 2018;5:205–14. doi: 10.1016/j.ajur.2018.08.007.

[2] Awedew AF, Han H, Berice BN, Dodge M, Schneider RD, Abbasi-Kangevari M, et al. The global, regional, and national burden of urolithiasis in 204 countries and territories, 2000–2021: a systematic analysis for the Global Burden of Disease Study 2021. *E Clinical Medicine*. 2024;78. doi: 10.1016/j.eclinm.2024.102924.

[3] Zhe M, Hang Z. Nephrolithiasis as a risk factor of chronic kidney disease: a meta-analysis of cohort studies with 4,770,691 participants. *Urolithiasis*. 2017;45:441–8. doi: 10.1007/s00240-016-0938-x.

[4] Bokhari AA, Aldarwish HA, Alsanea SA, Al-Tufaif MA, Alghaslan SA, Alghassab AA, et al. Prevalence and Risk Factors of Urolithiasis Among the Population of Hail, Saudi Arabia. *Cureus*. 2022. doi: 10.7759/cureus.26983.

[5] Muhamad P, Bi Utomo A, Hanggono Achmad T. Characteristics of Patients With Urinary Tract Stones and Profile of Uric Acid and Cholesterol at Kustati Islamic General Hospital Surakarta In The Period of October 2020 to March 2022. *Indonesian Journal of Urology*. 2023. doi: 10.32421/juri.v30i2.873.

[6] Widyasmara HB, Birowo P, Rasyid Nur. Urinary Stone Composition Analysis in Indonesian Population: A Single Major Centre Analysis. *Indonesian Journal of Urology*. 2018. doi: 10.32421/juri.v25i2.406.

[7] Diatmika ANO, Santoso D, Yatindra IBT. Urinary stone profile at Tabanan Hospital within July 2014 to June 2016. IOP Conf Ser Mater Sci Eng, vol. 434, Institute of Physics Publishing; 2018. doi: 10.1088/1757-899X/434/1/012320.

[8] Johannes A, Zulfikar A. Metabolic Syndrome Traits In Urolithiasis Patients. Indonesian *Journal of Urology*. 2020. doi: 10.32421/juri.v27i2.490.

[9] Reza K, Anny RS, Tarmono D. Profile of Patients With Urinary Tract Stone at Urology Department of Soetomo General Hospital Surabaya in January 2016-December 2016. *Indonesian Journal of Urology*. 2020. doi: 10.32421/juri.v27i1.506.

[10] EAU Guidelines. Edn. presented at the EAU Annual Congress Madrid 2025 [Internet]. 2025 [cited 2025 Sept 26]. Available from: https://uroweb.org/guidelines/urolithiasis

[11] Dirie NI, Adam MH, Garba B, Dahie HA, Maryan MA, Mohamed FY, et al. The prevalence of urolithiasis in subjects undergoing computer tomography in selected referral diagnostic centers in Mogadishu, Somalia. *Front Public Health*. 2023;11. doi: 10.3389/fpubh.2023.1203640.

[12] Faridi M, Singh K. Preliminary study of prevalence of urolithiasis in North-Eastern city of India. *J Family Med Prim Care*. 2020;9:5939. doi: 10.4103/jfmpc.jfmpc_1522_20.

[13] Alhasan AT, Ferdiansyah R, Hutomo DMH, Sari RK. Relationship of Urinary Tract Stones with The Incidence of Chronic Kidney Disease at Sultan Agung Islamic Hospital Semarang. *Annals of R.S.C.B*. 2020;24(2):10-18.

[14] Jung JH, Park J, Kim WT, Kim HW, Kim HJ, Hong S, et al. The association of benign prostatic hyperplasia with lower urinary tract stones in adult men: A retrospective

multicenter study. *Asian J Urol*. 2018;5:118–21. doi: 10.1016/j.ajur.2017.06.008.

[15] Tjahjodjati IS, Noegroho BS, Sihombing AT. Urinary Tract Stones Risk Factors in Patients with Benign Prostatic Hyperplasia in West Java, Indonesia. *Althea Medical Journal*. 2021;8. doi: 10.15850/amj.v8n2.2257.

[16] Nuraj P, Hyseni N. The diagnosis of obstructive hydronephrosis with Color Doppler ultrasound. *Acta Informatica Medica*. 2017;25:178–81. doi: 10.5455/aim.2017.25.178-181.

[17] Bayne DB, Usawachintachit M, Armas-Phan M, Tzou DT, Wiener S, Brown TT, et al. Influence of Socioeconomic Factors on Stone Burden at Presentation to Tertiary Referral Center: Data From the Registry for Stones of the Kidney and Ureter. *Urology*. 2019;131:57–63. doi: 10.1016/j.urology.2019.05.009.

[18] Nakayuki M, Basaza AHD, Namatovu HK. Challenges Affecting Health Referral Systems in Low-And Middle-Income Countries: A Systematic Literature Review. European *Journal of Health Sciences*. 2021. doi: 10.47672/ejhs.809.

[19] Friedlander J, Kavoussi N, De S, Ozayar A, Shakir N, Antonelli J, et al. The Consequences of Delaying Stone Treatment. *Journal of Urology*. 2015;193. doi: 10.1016/j.juro.2015.02.2712.

[20] Bayne D, Maru J, Srirangapatanam S, Hicks C, Neuhaus J, Scales C, et al. Effects of Delayed Surgical Intervention Following Emergency Department Presentation on Stone Surgery Complexity. *J Endourol*. 2023;37:729–37. doi: 10.1089/end.2022.0843.