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Epidemiology, Anthropometric, and Clinical Characteristics of Urinary Tract Stone at Tabanan Hospital in 2021

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Abstract: ***Objective: To identify epidemiology and clinical characteristics of urinary tract stone at Tabanan Hospital in 2021. Material & methods: This was a descriptive cross-sectional study using primary data collected from anamnesis and anthropometric measurement of urinary tract stone patient who came to Urology Polyclinic of Tabanan Hospital in 2021. A total of 84 patients were included. The variables which being investigated were age, sex, job, chief complaints, location of stone, hydronephrosis complication, body mass index, and abdominal circumference. Results: The average age of the patients was 53.39 ± 11.21, with a male-to-female sex ratio of 1.7:1.Most of the patients worked as farmer (26.2%) and housewives (26.2%). Majority of the patients had chief complaint of flank pain (71.4%), stone location in kidney (90.5%) on the left side (42.9%), and had hydronephrosis (67.1%). There were 28.6% obese grade I and 4.8% obese grade II patient based on BMI, and 26,2% had abdominal obesity. Conclusion: This study reveals the pattern of epidemiology, anthropometric, and clinical characteristics of urinary tract stone and provides a basis for further study.***

Keywords: urinary tract stone, flank pain, kidney stone, body mass index, abdominal obesity

1. Introduction

Urinary tract stone or urolithiasis is the presence of stone that is formed by mineral deposits in the urinary tract. The prevalence of urinary tract stone were varied across the different country, ranging from about 7-13% in North America, 5-9% in Europe, and 1%–19.1% in Asia.[1,2]Based on data from Riskesdas 2013, the prevalence of urinary tract stones in Indonesia is 0.6%, but this number is only based on patients who have been diagnosed by a doctor, so the exact number in the community is likely to be higher. It is estimated that there are 170,000 cases per year in Indonesia. In Bali, the prevalence of urinary tract stones is 0.7%, slightly higher than the national prevalence (Riskesdas, 2013).[3]

Epidemiologic features and clinical manifestation is important for leading physician to diagnosis of urinary tract stones as early as possible and to order efficient diagnostic procedures. The most common symptoms are usually flank pain, nausea, dysuria, or hematuria.[4]Urinary tract stones account for a lot of economic costs each year, either for hospitalization, symptomatic stone removal procedures, or time lost from work.[5] Therefore, nephrolithiasis prevention measures are very important.

Lifestyle and diet have been associated with the incidence of urinary tract stones. Previous studies stated that prolonged sitting position, less physical activity, low fluid intake, high sodium diet, and high body mass index might be the risk factors for urinary tract stones.[4,6]Identify those risk factors are beneficial for taking action to prevent urinary tract stones. This study investigates the current characteristics of urinary tract stone in a single center.[7]

Objective

The purpose of this study is to identify the epidemiology, anthropometry, and clinical characteristics of urinary tract stones at Tabanan Hospital in 2021.

2. Materials & Methods

This was a descriptive cross-sectional study conducted in Urology Polyclinic of Tabanan Hospital from 1 January 2021 until 31 December 2021. The study used primary data collected from anamnesis and anthropometric measurements of urinary tract stone patients who came to the Urology Polyclinic of Tabanan Hospital in 2021. Diagnosis of urinary tract stones was made by an urologist based on anamnesis, urologic examination, and urology CT scan. The variables being investigated were age, sex, job, chief complaints, location of stone, body mass index, and abdominal circumference. Anthropometric measurements were done by using a digital weight scale and measuring tape. BMI was classified based on Asia-Pacific guidelines. Abdominal obesity was defined based on AHA/NHLBI/IDF guidelines for Asia population (waist circumference ≥90 cm in men and ≥80 cm in women).

3. Results

There were 84 patients diagnosed with urinary tract stone who came to Urology Polyclinic of Tabanan Hospital in 2021 and included in this study. The average age of the patients was 53.39 ± 11.21 years old. Most of the cases were male (63.1%), in age group 46-60 years old, and worked as farmer or housewives as seen in **Table 1**.

Table 1: Distribution of Urinary Tract Stones Patient Based on Gender, Age, Job

Patient Profile	Number (n=84)	Percentage (%)
Gender		
Male	53	63.1
Female	31	36.9
Age group		
≤15	0	0
16-30	2	2.4
31-45	13	15.5
46-60	44	52.4
61-75	21	25.0
≥76	4	4.8
Occupation		
Jobless	6	7.1
Retired	6	7.1
Farmer	22	26.2
Housewive	22	26.2
Security	4	4.8
Merchant	4	4.8
Labour	7	8.3
Office worker	5	6.0
Driver	4	4.8
Teacher	3	3.6
Student	1	1.2

Majority of the patients had chief complaint of flank pain, stone on the left side, and located at kidney (**Table 2).** Based on anthropometric measurement, 28.6% patient were obese grade I and 4% were obese grade II. There were 26.2% patient with abdominal obesity (**Table 3)**

Table 2: Distribution of Urinary Tract Stones Patient Based on Chief Complaint, Stone Location, Stone Side, and Hydronephrosis

Patient Profile	Number (n=84)	Percentage (%)
Complaint		
Flank Pain	60	71.4
Hematuria	3	3.6
Urinary retention	7	8.3
Abdominal pain	10	11.9
Dysuria	4	4.8
Stone side		
Right	26	31.0
Left	36	42.9
Bilateral	22	26.2
Stone location		
Kidney	76	90.5
Ureter	8	9.5
Bladder	0	100.0
Hydronephrosis		
Yes	48	57.1
No	36	42.9

Table 3: Distribution of Urinary Tract Stones Patient Based on BMI and Abdominal Obesity

Patient Profile	Number (n=84)	Percentage (%)
Body Mass Index		
Underweight (<18.5)	7	8.3
Normal (18.5-22.9)	31	36.9
Overweight (23-24.9)	18	21.4
Obese I (25-29.9)	24	28.6
Obese II (≥30)	4	4.8
Abdominal Obesity		
Yes	22	26.2
No	62	73.8

4. Discussion

This study describes the characteristics of urinary tract stone patients visiting Urology Polyclinic of Tabanan Hospital in the year 2021 with total of 84 patients. The previous study which investigated urinary tract stones in Tabanan Hospital was conducted from July 2014 until June 2016with total of 266 patients.[8] The number of patients was decreased in this study because there was COVID-19 pandemic that made patients hesitant to go to hospital, due to the fear of contracting COVID-19. The number of samples in this study isin line with other hospital in Indonesia such asat Urology Department of Soetomo General Hospital Surabaya with 62 urinary tract patients from January-December 2016 and at Sanglah Hospital Denpasar from November 2013-October 2014 with 141 patients.[4,10]

More than half of patients in this study are between the age of 46-60 years old, similar to the finding in Soetomo General Hospital and Beijing Tsinghua Changgung Hospital.[4,10]In Minnesota USA, the peak incidence is from 30-44 years old.[11]Study found that urinary tract stone incidence was more likely to develop in older age, especially in uric acid stone, due to its association with metabolic syndrome and renal insufficiency which more commonly occur in older age.[10]

In this study, the majority of the patients were male, in line with the finding in China and USA.[11,12] Testosterone hormone in males appears to promote stone formation by increasing oxalate production in the liver, while estrogen has the reverse effect. In addition, woman has a higher citric acid level which disrupts the formation of calcium oxalate stone.[4,8]

Most of the patients in this study worked as farmer or housewives, because the most common job in Tabanan area is farmer. Study stated that individuals who worked in warmer conditions or with high activity possess a higher risk of stone formation, due to more perspiration which leads to more concentrated urine. On the other side, people with a sedentary lifestyle have higher risk of metabolic syndromes, therefore indirectly increases the risk of stone formation. Individual who often holding up micturition during working, has lack access to bathroom, and lack of fluid intake also possess a higher risk.[12]

The chief complaint in this study is mostly flank pain, in line with all previous studie.[8-12]However, some of the patient also felt abdominal pain instead of flank pain, therefore suspicion

of urinary tract stone still should be included in the differential diagnosis of patient with abdominal pain. The side of the stone is almost similar on the right, left, and bilateral. Urinary tract stone is more common in kidney compared to ureter, similar to the study in Soetomo General Hospital.[4]It is probably because urinary tract stones can be formed in kidney and passed down toward ureter.

Approximately a quarter of the patients in this study have obesity. A prospective study of 3 large cohorts reported that men weighing more than 100 kg have 1.4 times higher risk of stone formation compared to men weighing less than 68.2 kg. In younger women with those weight categories, the risk of stone formation is even 1.9 times higher.[13]This study was supported by another study in Japan which stated that the risk of developing kidney stones was 1.48 times higher than those without abdominal obesity.[14] A study in Turkey also showed that patient with urinary stones have significant higher BMI compared to non urinary stones patient.[15]

Obese patient especially abdominal obesity increase the risk of stone formation by the mechanism of insulin resistance which increase ammonia and decrease urinary pH.[7,13-16]Visceral adipose tissue in abdominal obesity will produce inflammatory cytokines which impair insulin signaling, therefore causing insulin resistance.[17]In normal people, insulin activate Na+/H+ exchanger in renal tubular epithelium which trapped ammonia in renal tubule. In patient with insulin resistance, those process will be impaired therefore ammonia will be able to pass renal tubule and being excreted. The decreased of ammonia in the body will decrease buffering capacity of the body, therefore urinary pH will decrease.[16] Increase of ammonia and decrease of urinary pH are the risk factors for stone formation. Patient with obesity also tend to have excess consumption of lithogenic substances.[7]

5. Conclusion

Most of the patients were in age group 46-60 years old, more male than female, and worked as farmer or housewives. The most common clinical manifestation of the patient was flank pain, stone location in kidney and on the left side. There were 28.6% obese grade I and 4.8% obese grade II patient based on BMI, and 26,2% had abdominal obesity. This study reveals the pattern of epidemiology, anthropometric, and clinical characteristics of urinary tract stone and provides a basis for further study

References

[1] Sorokin I, Mamoulakis C, Miyazawa K, Rodgers A, Talati J, Lotan Y. Epidemiology of stone disease across the world. World J Urol. 2017;35(9):1301-1320.
[2] Liu Y, Chen Y, Liao B, et al. Epidemiology of urolithiasis in Asia. Asian J Urol. 2018;5(4):205-214.
[3] Badan Penelitian dan Pengembangan Kesehatan Kementerian RI. Riset Kesehatan Dasar (Riskesdas) tahun 2013. Jakarta: Balitbangkes RI; 2013.
[4] Reza K, Anny S R, Tarmoni D. Profile Of Patients With Urinary Tract Stone at Urology Departement of Soetomo General Hospital Surabaya in January 2016-December 2016. Indonesian Journal of Urology. 2020;27: 22–5.
[5] Hyams ES, Matlaga BR. Economic impact of urinary stones. Transl Androl Urol. 2014;3(3):278-283.
[6] Lin BB, Lin ME, Huang RH, Hong YK, Lin BL, He XJ. Dietary and lifestyle factors for primary prevention of nephrolithiasis: A systematic review and meta-analysis. BMC Nephrol. 2020;21(1):1–13.
[7] Carbone A, Al Salhi Y, Tasca A, Palleschi G, Fuschi A, De Nunzio C, Bozzini G, Mazzaferro S, Pastore AL. Obesity and kidney stone disease: a systematic review. Minerva Urol Nefrol. 2018 Aug;70(4):393-400.
[8] Diatmika ANO, Santoso D, Yatindra IBT. Urinary stone profile at Tabanan Hospital within July 2014 to June 2016. IOP Conf Ser Mater Sci Eng. 2018;434(1).
[9] Suryanto F, Subawa A. Gambaran Hasil Analisis Batu Saluran Kemih di Laboratorium Patologi Klinis RSUP Sanglah Denpasar Periode November 2013 - Oktober 2014. E-Jurnal Med Udayana. 2017;6(1):1–4.
[10] Wang S, Zhang Y, Zhang X, Tang Y, Li J. Upper urinary tract stone compositions: the role of age and gender. Int Braz J Urol. 2020;46(1):70-80
[11] Krambeck AE, Lieske JC, Li X, Bergstralh EJ, Melton LJ 3rd, Rule AD. Effect of age on the clinical presentation of incident symptomatic urolithiasis in the general population. J Urol. 2013;189(1):158-164.
[12] Malieckal DA, Goldfarb DS. Occupational kidney stones. Curr Opin Nephrol Hypertens. 2020;29(2):232-236.
[13] Taylor EN, Stampfer MJ, Curhan GC. Obesity, weight gain, and the risk of kidney stones. JAMA. 2005; 293(4):455-62.
[14] Kabeya Y, Kato K, Tomita M, Katsuki T, Oikawa Y, Shimada A, Atsumi Y. Associations of insulin resistance and glycemic control with the risk of kidney stones. Intern Med. 2012;51:699–705.
[15] Inci M, Demirtas A, Sarli B, Akinsal E, Baydilli N. Association between body mass index, lipid profiles, and types of urinary stones. Ren Fail. 2012;34(9):1140-3.
[16] Li H, Klett DE, Littleton R, Elder JS, Sammon JD. Role of insulin resistance in uric acid nephrolithiasis. World J Nephrol. 2014;3(4):237-242.
[17] Hardy OT, Czech MP, Corvera S. What causes the insulin resistance underlying obesity?. Curr Opin Endocrinol Diabetes Obes. 2012;19(2):81-87.