

## CHARACTERISTICS OF URINARY TRACT STONE PATIENTS AT Dr. H. CHASAN BOESOIRIE TERNATE REGIONAL GENERAL HOSPITAL 2021-2023

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### ABSTRAK

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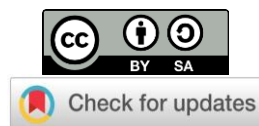
Urinary Tract Stones,  
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#### Abstract:

Urinary tract stones (UTC) are the occurrence of stones in the urinary tract organs. Environmental factors such as daily behavior, excess body weight, eating habits, and lack of fluid intake influence the occurrence of UTC. Hormonal, genetic, and anatomical factors can also play a role in its pathogenesis. The purpose of this study was to determine the characteristics of urinary tract stone patients at Dr. H. Chasan Boesoirie Ternate Regional Hospital. This type of research is descriptive research with a cross-sectional approach research design. The data used are secondary data in the form of medical records of UTC patients in 2021-2023. This study obtained a total sample of 171 people, the distribution of patients was mostly male (67.8%), adult age group ( $\geq 19$ -<45 years) (39.2%), normal body mass index (BMI) (49.1%), high school education (58.5%), and civil servant/military/police/state-owned enterprises/regional-owned enterprises occupation (21.1%). Men are at higher risk of experiencing UTC, allegedly due to the role of hormones. Workload, sweat, and lack of fluids that are common in productive age are risk factors for BSK. Obesity triggers urinary tract stones through increased uric acid, decreased urine pH, inflammation, and oxidative stress. Education level can affect the risk of BSK. Work can be a risk for BSK due to sun exposure to poor lifestyle.

#### Abstrak:

Batu saluran kemih (BSK) merupakan kejadian terbentuknya batu pada organ saluran kemih. Faktor lingkungan seperti perilaku sehari-hari, berat badan berlebih, kebiasaan makan, dan kurangnya asupan cairan mempengaruhi terjadinya BSK. Faktor hormonal, stress, dan anatomi juga dapat berperan dalam patogenesisnya. Tujuan penelitian ini untuk mengetahui karakteristik pasien batu saluran kemih di RSUD Dr. H. Chasan Boesoirie Ternate. Jenis penelitian ini adalah penelitian deskriptif dengan desain penelitian pendekatan cross sectional. Data yang digunakan adalah data sekunder berupa rekam medis pasien BSK tahun 2021-2023. Penelitian ini mendapatkan total sampel sebanyak 171 orang, distribusi pasien paling banyak berjenis kelamin laki-laki (67,8%), kelompok usia dewasa ( $\geq 19$ -<45 tahun) (39,2%), indeks massa tubuh (IMT) normal (49,1%), pendidikan SMA/MA (58,5%), dan pekerjaan PNS/TNI/POLRI/BUMN/BUMD (21,1%). Pria berisiko lebih mengalami BSK diduga karena peran hormon. Beban kerja, keringat, dan kurangnya cairan yang umum pada usia produktif menjadi faktor risiko BSK. Obesitas memicu batu saluran kemih melalui peningkatan asam urat, penurunan pH urin, peradangan, dan stress oksidatif. Tingkat pendidikan dapat berpengaruh terhadap risiko BSK. Pekerjaan dapat menjadi risiko BSK karena paparan sinar matahari hingga gaya hidup yang buruk.



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## INTRODUCTION

UTS or urolithiasis, are events where stones are created in the urinary tract organs. The organs in question are the kidneys, ureters, bladder, and urethra [1]. Genetic, non-infectious, infectious, and drug disorders are grouped based on their causes [1]. Complex interactions between external and genetic factors cause UTS, so it can be called a multifactorial disease. Environmental factors such as daily behavior, excess weight, eating habits, and lack of fluid intake affect the development of UTS. Hormonal, genetic, or anatomical factors may also play a role in its pathogenesis [2].

Developed countries such as the United States have a prevalence of urinary tract stones between 5–10%. The incidence is 7% in adult women and 13% in adult men [3]. Most Asian countries also have an increase such as China (4% to 6.4%), Japan (4.3% to 9.0%), South Korea (3.5% to 11.5%), Thailand (1.4% to 16.9%), Saudi Arabia (6.8% to 19.1%), and Iran (5.7% to 8.1%). Consumption of foods with high levels of fat and carbohydrates has been seen significantly in various countries in Asia [4].

Epidemiological data on urolithiasis in Indonesia are still very limited. A cross-sectional study conducted in Makassar involved 199 subjects with urolithiasis. The results showed that the majority of patients were in the age group of 31–45 years, with a male-to-female ratio of 4:1. The youngest patient detected was 2 years old. The most common stone composition found was calcium oxalate (87.4%), followed by uric acid [5].

Based on gender, several previous studies have shown that men have a higher prevalence of UTS than women, with a prevalence of 9% in women and 19% in men, although the difference is getting smaller [6]. One of the triggering factors that can also influence the development of BSK is obesity. Obesity is a health problem whose prevalence is increasing throughout the world [7]. Some researchers have also

found that people who are sedentary (usually with higher levels of education) are more likely to develop urinary tract stones. There is a tendency that people with high physical activity who usually have low education are more susceptible to urinary tract stones [4].

This study is crucial to dig deeper into how frequently urinary tract stones occur as well as uncover patterns based on gender, age, education level, body mass index (BMI), and occupation. Previous studies have indicated that several risk factors contribute to the development of urinary tract stones. This study is the first to study the general characteristics of UTS patients at Dr. H. Chasan Boesoirie Ternate Regional Hospital. and there is limited data on the characteristics of UTS patients in North Maluku at this time. This encourages researchers to dig deeper into the characteristics of UTS patients at Dr. H. Chasan Boesoirie Hospital in order to provide more accurate information about UTS disease in the related area. In addition, this research is also expected to provide information and increase awareness of health in the community, policy-making, and patient interventions specifically related to UTS.

## RESEARCH METHOD

This study uses a descriptive research type. This study took place at Dr. H. Chasan Boesoirie Ternate Regional Hospital and was conducted from June 2024 to August 2024. The population in this study were urinary tract stone patients at Dr. H. Chasan Boesoirie Ternate Regional Hospital. The sample used was the medical records of urinary tract stone patients in 2021-2023 who had been diagnosed by doctors through various examinations. In the sampling process, the technique used was simple random sampling which had met the inclusion criteria in the form of UTS patients who had been diagnosed by a doctor, had height and weight data, occupation, and age and exclusion in the form of incomplete

medical record data and adjusted to the calculation of the sample size.

The sample size used in this study was determined by the calculation of the Slovin formula. In its calculation, the population size was 298 and used a maximum error limit of 5% so the minimum number of samples in this study was 171 samples.

The data obtained were grouped based on variables with Microsoft Excel software and processed using Statistical Package for the Social Sciences (SPSS) software. Then, the data was analyzed univariately to see the characteristics of each variable that wanted to be known and displayed in the form of a frequency distribution table accompanied by a percentage of each variable. Univariate analysis was chosen in this study because it can provide an overview of the characteristics of variables, as well as help identify patterns and trends. In addition, this analysis focuses on one particular variable and can be applied to various types of data. This study has received an ethical approval recommendation from the Health Research Ethics Commission of the Faculty of Medicine and Health Sciences, Khairun University, with the number 022/UN44/C.9/KEP/2024.

**RESULT AND DISCUSSION**

This study was conducted from June to July 2024 regarding the characteristics of UTS patients at Dr. H. Chasan Boesoirie Hospital from 2021 to 2023. This study is the result of observation and data collection using secondary data from patient medical records. In the process, 171 samples were obtained. Distribution based on age, gender, education, occupation, and body mass index in urinary tract stone patients can be seen as follows:

**Table 1.**  
**Distribution Based On Age, Gender, Education, Occupation, And Body Mass Index In Urinary Tract Stone Patients**

Variable	N	%
Gender		
Female	55	32,2
Male	116	67,8
Age (Year)		
<1	0	0
≥1-<5	0	0
≥5-<10	2	1,2
≥10-<19	5	2,9
≥19-<45	67	39,2
≥45-<60	56	32,7
≥60	41	24
BMI		
<18,5	11	6,4
≥18,5-<25	84	49,1
≥25-<27	22	12,9
≥27	54	31,6
Education		
No School	7	4,1
Elementary School	22	12,9
Junior High School	13	7,6
High School	100	58,5
College	29	17,0
Occupation		
Not Working	8	4,7
Student	15	8,8
civil	36	21,1
servant/military/police/state-owned enterprises/regional-owned enterprises		
Private employee	26	15,2
Self-employed	30	17,5
Farmer/farm labourer	24	14
Fisherman	1	0,6
Labourer/driver/housemaid	0	0
Housewife	31	18,1
Other	0	0
Total	171	100

This study shows that the majority of samples are male, namely 116 samples (67.8%), and the rest are female, namely 55 samples (32.2%). The age category with the largest number is Adult, namely 67 samples (39.2%). Most samples have normal body weight, namely 84 samples (49.1%). The level of education in patients is dominated by high school, showing results of 100 samples (58.5%). Occupation shows results of 36 samples (21.1%) and is dominated by civil servant/military/police/state-owned enterprises/regional-owned enterprises occupations.

### **Characteristics of Urinary Tract Stone Patients Based on Gender**

This study shows the results in the form of the majority of samples being male, namely 116 samples (67.8%). Previous studies conducted at Martha Friska Multatuli General Hospital from 2015 to 2017 showed results that were in line with this study. The study found that men were the majority of urinary tract stone sufferers (67.40%), while women showed lower results (32.60%) [8]. This is also similar to research conducted by Shintya in 2017, which found that men had a higher number (66%) compared to women (34%) [9].

Urinary tract stones can affect both men and women. Men have a higher risk of developing urinary tract stones, according to several previously conducted studies. This difference is thought to be due to hormonal involvement in the formation of urinary tract stones in both men and women. The significantly increased risk of UTS can be explained in a study conducted in Germany focusing on testosterone replacement therapy, which showed a significant increase in patients given testosterone replacement therapy [10].

Testosterone's effect on kidney stone formation has been reported by Peng et al. through the mechanism of induction of apoptosis and necrosis of renal tubular epithelial cells via the HIF-1 $\alpha$ /BNIP3 pathway [11]. Changtong et al. revealed that testosterone can increase kidney stone disease by increasing the adhesion of calcium oxalate monohydrate crystal cells with increasing surface  $\alpha$ -enolase [12].

In addition, women are less at risk of developing urinary tract stones because they influence the hormone estrogen. A systematic review conducted by reviewing eight articles provided evidence that the development of kidney stone disease is correlated with estrogen levels. Administration of  $\beta$ -estradiol has been shown to inhibit the function of the putative anion transporter 1 (PAT1) specifically in tissue. In the case of the kidneys, estrogen

is known to downregulate PAT1, thus showing a decrease in oxalate transport activity, which has an impact on reducing stone formation [13].

### **Characteristics of Urinary Tract Stone Patients Based on Age**

This study shows that the highest number of urinary tract stone sufferers is in adulthood, which is 67 samples (39.2%). This number is followed by the pre-elderly with 56 samples and the elderly with 41 samples. The study conducted by Ratu at Dr. Wahidin Sudirohusodo Hospital, Makassar, showed results that are in line with this study. The study showed that the highest number of urinary tract stone sufferers based on age included in the adult age range of 31-45 years, which is 35.7%, then followed by the age range of 46-60 years, which is 29.6%, and the age range above 61 years, which is 24.1% [5].

The prevalence of urinary tract stones has been reported to increase, especially affecting the working age [14]. This is because urinary tract stones are often associated with heavy workloads, excessive sweating, and lack of fluid intake, which are usually found in the productive age group [15].

### **Characteristics of Urinary Tract Stone Patients Based on BMI**

In the study, it was found that urinary tract stone sufferers were dominated by people with normal BMI, namely 84 patients (49.1%). This is not in line with research conducted in Lampung by Ghopican. In his study, which studied the distribution of kidney stone patients based on BMI, it was found that the sample was dominated by patients with a BMI of more than 25, namely 32 samples [16].

Obesity is a risk factor for urinary tract stones. Aune et al. reported that there is a 1.4-fold risk of kidney stone formation in overweight patients and a 2 to 3-fold risk in obese and severely obese patients [17]. This can occur through various mechanisms such as increased uric acid

levels, decreased urine pH, and inflammation and oxidative stress, which are known to contribute to the development of urinary tract stones [18].

The distribution of patients based on BMI may vary with other studies that have been described. This is because urinary tract stones have various risk factors. Urinary tract stones are a multifactorial disease whose occurrence varies according to age, gender, race, place of residence, and geographic location [19]. This study means that obesity risk factors are not the only risk factors that can stand alone in UTS as described by this study, which is dominated by normal BMI, although it is something that can influence the formation of urinary tract stones through various mechanisms.

### **Characteristics of Urinary Tract Stone Patients Based on Education**

In the study conducted, the distribution of urinary tract stone patients based on education level found the highest results dominated by high school samples, namely 100 samples (58.5%). This is in line with a study conducted by Amira at the Dr. Pirngadi Regional General Hospital, which examined the characteristics of kidney stone patients. In her study, she found that the distribution of education levels was dominated by high school, namely 63 samples (78.8%) [20]. Other studies have also been conducted but have obtained different results. A study conducted by Ningrum focusing on the quality of life of patients showed that the education level of urinary tract stone patients was dominated by low education, namely 19 samples (79%) [21].

When compared to other studies, there are varying results regarding the level of education in patients with urinary tract stones. A study conducted by Hadibrata in 2021 showed that there was no relationship between kidney stone disease and education level. This can be seen from the results of the Chi-Square analysis showing a p-value of 1.000, which indicates that there is no relationship between the two.

Although education is related to the level of knowledge, there is no relationship between low, middle, and high education in the incidence of kidney stones. This may be because respondents with low education can have good knowledge about how to prevent kidney stones and vice versa [22]. Additionally, higher education (usually associated with sedentary jobs) is associated with an increased risk of urinary tract stones, especially for those with low fluid intake and less access to toilets and clean water [23].

### **Characteristics of Urinary Tract Stone Patients Based on Occupation**

This study illustrates that the highest distribution of jobs in urinary tract stone patients is among civil servants/military/police/state-owned enterprises/regional-owned enterprises as many as 36 samples (21.1%), followed by housewives with as many as 31 samples (18.1%) and self-employed with as many as 30 samples (17.5%). If we look at other research conducted by Simanullag in Medan, it was reported that the distribution of job frequency was dominated by self-employed individuals as many as 168 samples (53.2%), and civil servants as many as 102 samples (32.3%) [8]. Another result conducted by Hadibrata reported that housewives and traders dominated the frequency of work in his research [24].

The results of the study found that indoor work dominates the distribution of urinary tract stone patients. Sometimes, urinary tract stones are associated with outdoor work. A study conducted by Venugopal concluded that work that has stress due to high temperatures accompanied by manual and heavy workloads and prolonged dehydration are risk factors for urological and kidney diseases for workers with high-temperature exposure [25]. This is possible considering that North Maluku is an area with a tropical climate and high temperatures, which can affect a person's dehydration. UTS is correlated with workplace and

environmental temperatures. Heat exposure can cause sweating which leads to decreased extracellular fluid (ECF) and further dehydration. Low ECF causes increased vasopressin secretion which promotes water reabsorption from the renal filtrate and increases urine concentration [26]. However, other studies have shown that increasing sitting time contributes to an increasing trend in the prevalence of kidney stones [27]. Possible causes of a person with a sedentary job having an increased risk of stone formation are an unhealthy lifestyle, lack of physical activity, lack of fluid intake, and lack of access to toilets [23]

## CONCLUSION

Based on the study conducted, several important points can be concluded, namely: The distribution of urinary tract stone patients based on gender is dominated by men, the adult age group ( $\geq 19$ - $<45$  years), normal BMI, high school education, and the distribution based on occupation is dominated by civil servants/military/police/state-owned enterprises/regional-owned enterprises.

In this study, it is expected to be an evaluation material for various health programs, such as educational programs for the community with various media to maintain a healthy lifestyle and the importance of drinking water. In addition, it is recommended for further researchers to further explore and develop this research topic, for example by linking the incidence of urinary tract stones with various variables, using other studies such as case-control, cohort studies, or experiments to assess the effectiveness of urinary tract stone prevention interventions.

This study has limitations, namely only using data from medical records so there may be other factors that influence the variables. In addition, this study only assesses descriptively and does not look at the relationship between variables, so further research is needed.

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