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Characteristics of Urinary Tract Stone Operation Patients at Ibnu Sina Hospital Makassar, 2018-2022

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ABSTRACT
Urinary tract stones are stones that are formed due to the deposition of crystals of organic and inorganic material in urine, which can be found in the upper and lower parts of the urinary tract. The incidence of urinary tract stones every year is 457 out of 100,000 of the global population, while in Indonesia in 2013 it was 0.6%. To determine the characteristics of patients with urinary tract stone surgery at the hospital. Ibnu Sina Makassar 2018-2022. Descriptive observational research using secondary data and the number of samples used was 32 samples and used a total sampling technique. Based on research conducted from 32 samples with the largest age distribution being 46-55 years, namely 11 patients (34.4%), the gender was mostly male, 23 patients (71.9), based on family history, it was found that the entire sample did not have a family history of BSK, namely 32 patients (100%), complaint back pain in 28 patients (87.5%), based on the most common location in the proximal ureter, 16 patients (48.5%) , stone size 11-20 mm, namely 14 patients (31.3%), treatment given by URS in 27 patients (84.4%). , the length of stay was 4-8 days, namely 22 patients (6.8%), based on comorbid hypertension in 11 patients (31.3%). Most urinary tract stone sufferers are aged 46-55 years, male, have no family history of BSK, complaints low back pain, stone location in the proximal ureter, stone size 11-20 mm, URS management, length of stay 4-8 days, and comorbid hypertension.

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INTRODUCTION

Globally, every year there are 457 people with urinary tract stones out of 100,000 populations. Males have a prevalence of 10.6% (140.6 out of 100,000 population) while females are 7.1% (65.8 out of 100,000 population). The actual incidence of urinary tract stones is still unknown, but it is estimated that there are 170,000 cases each year.(Setyowati et al., 2021) The Special Region of Yogyakarta ranks first in the province with the highest prevalence (1.2%), in Aceh (0.9%), in West Java (0.8%), in Central Java (0.8%), and Central Sulawesi (0.8%).(Mayasari & Wijaya, 2020)

The incidence of urinary tract stones in the United States with a total of 13% cases. Meanwhile, in North America it is estimated to be around 7-13%, in Europe 5-9%, in Asia 1-5%, and the highest cases reported in Saudi Arabia 20.1%.(Rusdi et al., 2022) In developing countries such as India, Thailand, and Indonesia, the prevalence ranges from 2-15%, this is due to the influence of economic development of these countries being reported to be lower.(Ali & Hotasi, 2020)

The classification of urinary tract stones is classified based on size, location, X-ray imaging characteristics, etiology of stone formation, stone composition, and risk of recurrence. The size of the stone is usually classified in 1 or 2 dimensions, which are divided into several sizes, namely 5 mm, 5-10 mm, 10-20 mm, and >20 mm. Based on the location of the stones, they are divided into several locations, namely the kidneys, ureters, vesica urinaria, and urethra.(Noegroho et al., 2018)

The formation of urinary tract stones is related to the occurrence of previous recurrences and is very important in the management of pharmacology and medical treatment in patients with urinary tract stones. About 50% of urinary tract stones can also be found to recur at least once in a lifetime.(Setyowati et al., 2021)

Risk factors for urinary tract stones are young age, hereditary factors, gout stones, stones due to infection, hyperparathyroidism, metabolic syndrome, and medications.(Setyowati et al., 2021)

In previous studies, based on the results of a study on the characteristics of urinary stone patients at Martha Friska Hospital Medan in 2015-2017, the majority of urinary stone patients were 30-50 years old, male gender, location of stones in the ureter, and medical management of Ureteronescopy (URS).

THEORETICAL REVIEW

Urinary tract stones are the third most common disease in the field of urology after urinary tract infections (UTIs). Urinary tract stones are the formation of stones caused by the deposition of crystals composed of organic and inorganic matter in the urine in excessive amounts or due to other factors that affect the solubility of substances. Urinary tract stones (BSK) can be found in the upper urinary tract system and lower urinary tract.(Anggraeny et al., 2021) Urinary tract stones in men are 3-4 times more abundant than in women, because urinary calcium levels in women are lower than in men and are more common in adults between the ages of 30-60. (Simanullang, 2019)

METHODOLOGY

Tools & Materials

The tools and materials used in this study were using the results of medical records of urinary tract stone patients at Ibnu Sina Hospital Makassar in 2018-2022.

Design

This type of research is a descriptive research and the design of this research is observational using secondary data in the form of medical records from Ibnu Sina Hospital Makassar.

Data Analysis

The data analysis used is univariate data. Univariate analysis was carried out on each variable of the research results and only knew the characteristics of the data.

RESEARCH RESULTS

This study aims to find out the characteristics of urinary tract stone surgery patients at Ibnu Sina Hospital Makassar in 2018-2022. In this study, an observational description design was used with secondary data taken from Ibnu Sina Hospital Makassar in 2018-2022. It was carried out by taking secondary data from the medical records of urinary tract stone patients and obtained as many as 45 recorded data. Then from the medical record data, there are only 32 data that meet the inclusion criteria.

The data collected was then grouped and processed to determine the prevalence of urinary tract stones cases based on characteristics, namely age, gender, family history, complaints, stone location, stone size, management, length of hospitalization, and comorbidities. Then the results obtained are presented in the form of a table accompanied by an explanation.

Distribution of Urinary Tract Stones by Age

Table 1. characteristics of Urinary Tract Stone Surgery Patients by Age

Age	Frequency	Percentage (%)
12-16 Year	1	3.1
26-35 Years	4	12.5
36-45 Years	6	18.8
46-55 Years	11	34.4
56-65 Years	7	21.9
>65 Years	3	9.4
Total	**32**	**100**

Based on table 1, it shows that the distribution of urinary tract stone patients recorded in the medical records of Ibnu Sina Makassar Hospital in 2018-2022 based on age obtained is the most at the age of 46-55 years as many as 11

patients (34.4%), as well as the age of 56-65 years as many as 7 patients and at least 1 patient at the age of 12-16 years (3.1%).

Distribution of Urinary Tract Stones by Gender

Table 2. Distribution of Urinary Tract Stone Surgery Patients by Gender

Gender	Frequency	Percentage (%)
Man	23	71.9
Woman	9	28.1
Total	**32**	**100**

Based on table 2, it shows that the distribution of urinary tract stone patients recorded in the medical records of Ibnu Sina Hospital Makassar in 2018-2022 based on gender was obtained with the most male sex, namely 23 patients (71.9%) and the fewest female as many as 9 patients (28.1%).

Distribution of Urinary Tract Stone Surgery Patients Based on Family History

Table 3. Distribution of Urinary Tract Stone Surgery Patients Based on Family History

Family History	Frequency	Percentage (%)
No family history of BSK	32	100
There is a family history of BSK	0	0
Total	**32**	**100**

Based on table 3, it shows that the distribution of urinary tract stone patients recorded in the medical records of Ibnu Sina Hospital Makassar in 2018-2022 based on family history, it was obtained that all samples did not have a family history of urinary tract stones, namely 32 patients (100%).

Distribution of Urinary Tract Stone Surgery Patients Based on Complaint History

Table 4. Distribution of Urinary Tract Stone Surgery Patients by Complaints

Complaints	Frequency	Percentage (%)
Back Pain	28	87.5
Disuria	3	9.4
Hematuria	1	3.1
Total	**32**	**100**

Based on table 4, it shows that the distribution of urinary tract stones patients recorded in the medical records of Ibnu Sina Hospital Makassar in 2018-2022 is based on the complaints experienced by the most patients with hip pain, which is 28 patients (87.5%) and the least complaints experienced by patients, namely hematuria as many as 1 patient (3.1%).

Distribution of Urinary Tract Stone Surgery Patients Based on Stone Location

Table 5. Distribution of Urinary Tract Stone Surgery Patients by Stone Location

Stone Location		**Frequency**	**Percentage (%)**
Ureter	Proximal	9	28.1
	Medial	2	6.3
	Distal	5	15.6
Kidney		14	43.8
Urinary Bladder		2	6.3
Urethra		0	0
Total		**32**	**100**

Based on table 5, it shows that the distribution of urinary tract stones recorded in the medical records of Ibnu Sina Hospital Makassar in 2018-2022 based on the location of stones obtained the most is located in the ureters of 16 patients, each of which is proximal (6.3%), medial (28.1), and distal (15.6) and in the kidneys as many as 14 patients (43.8%) and at least 2 patients (6.3%) located in the urinary vesica (6.3%).

Distribution of Urinary Tract Stone Surgery Patients by Stone Size

Table 6. Distribution of Urinary Tract Stone Surgery Patients by Stone Size

Stone Size	**Frequency**	**Percentage (%)**
<5 mm	4	12.5
5-10 mm	14	43.8
11-20 mm	10	31.3
>20 mm	4	12.5
Total	**32**	**100**

Based on table 6, it shows that the distribution of urinary tract stone patients recorded in the medical records of Ibnu Sina Makassar Hospital in 2018-2022 based on the size of stones obtained the most, namely stones measuring 5-10 mm as many as 14 patients (43.8%), while the least size stones are >5 and > 20 mm respectively as many as 4 patients (12.5%).

Distribution of Urinary Tract Stone Surgery Patients Based on Management

Table 7. Distribution of Urinary Tract Stone Surgery Patients by Procedure

Governance	Frequency	Percentage (%)
URS	27	84.4
URS+EKL	2	6.3
URS+Litotripsi	2	6.3
Vesikolitotomi	1	3.1
Total	**32**	**100**

Based on table 7, it shows that the distribution of urinary tract stone patients recorded in the medical records of Ibnu Sina Makassar Hospital in 2018-2022 based on management was obtained the most, namely URS as many as 27 patients (84.4%), and URS+EKL as many as 2 patients (6.3%), while the least management was URS+Lithotripsy as many as 2 patients (6.3%) and vesicolitotomy as many as 1 patient (3.1%).

Distribution of Urinary Tract Stone Surgery Patients Based on Length of Stay

Table 8. Distribution of Urinary Kidney Stone Surgery Patients by Length of Stay

Length of Hospitalization	Frequence	Percentage (%)
3 Days	6	18.8
4-8 Days	22	68.8
9-12 Days	4	12.5
Total	**32**	**100**

Based on table 8, it shows that the distribution of urinary stone patients recorded in the medical records of Ibnu Sina Hospital Makassar in 2018-2022 based on the length of hospitalization, which is at most 4-8 days as many as 22 patients (68.8%), and 3 days as many as 6 patients (18.8%), while at least 9-12 days as many as 4 patients (12.5%).

Distribution of Urinary Tract Stone Surgery Patients by Comorbid

Table 9. Distribution of Urinary Tract Stone Surgery Patients by Comorbidities

Komorbid	Frequency	Percentage (%)
No history of comorbidities	16	50.0
Hypertension	10	31.3
Diabetes Melitus	6	18.8
Total	**32**	**100**

Based on table 9, it shows that the distribution of urinary tract stone patients recorded in the medical records of Ibnu Sina Makassar Hospital in 2018-2022 based on comorbidities was obtained with the most hypertension as many as 10 patients (31.3%) and the fewest diabetes mellitus as many as 6 patients (18.8%).

DISCUSSION

Distribution of Urinary Tract Stones by Age

Urinary tract stones are the formation of stones caused by the deposition of crystals composed of organic and inorganic matter in the urine in excessive amounts or due to other factors that affect the solubility of substances.(Suryanto & Subawa, 2017) Risk factors for urinary tract stones are age, hereditary factors, gout stones, stones due to infection, hyperparathyroidism, metabolic syndrome, and medications.

Based on this study, it was found that from the results of medical records with urinary tract stones from 32 patients, the most common cases of urinary tract stones were found at the age of 46-55 years as many as 11 patients (34.4%), as many as 7 patients aged 56-65 years and at least 1 patient at the age of 12-16 years (3.1%).

In this study, it can be concluded that urinary tract stones are more common at the age of 51-60 years because of increasing age, the work of the urinary tract system also weakens, this can raise suspicions of an increase in degenerative diseases. The degeneration process is a process of declining the function of the body's organs along with age, in this case a decrease in kidney function. Urinary tract stones that occur at a young age are caused by heredity factors, but they can also be caused by the wrong lifestyle and diet.(Suryanto & Subawa, 2017)·(Hastutik et al., 2023)

This is in line with the research of Suryanto F., et al (2017) which explained that the most age is >50 years old with a total of 75 patients (53.3%), while the least is the age of <30 years with a total of 11 patients (7.8%).(Suryanto & Subawa, 2017)

This is also in line with the research of Maulana K., et al (2023) which explained that the most age is 41-60 years old with a total of 44 patients (64.7%), while the least is the age of 21-40 years with a total of 12 patients (17.6%).(Susanti, 2023)

Distribution of Urinary Tract Stones by Gender

Based on this study, it was found that from the results of medical records with urinary tract stones from 32 patients, the most common cases of urinary tract stones were found in male patients as many as 23 patients (71.9%) compared to female patients as many as 9 patients (28.1%).

In this study, it can be concluded that urinary tract stone disease is more suffered by male patients than by women. This is because the level of calcium in the urine that plays a role in the formation of stones is higher in men than in women, and also the level of citrate that plays a role in inhibiting the formation of stones is lower in men. There is also a role of sex hormones, namely the hormone estrogen in women which acts as an inhibitor of calcium salt

aggregation, as well as reducing oxalate excretion and plasma oxalate concentration. In contrast to the testosterone hormone in men which has the opposite role to the hormone estrogen, namely increasing endogenous oxalate which then facilitates crystallization.(Kaniya & Uyun, 2020)

Based on research conducted by Haryadi, et al (2020) explained that the most common cases of urinary tract stones were found in male patients as many as 21 patients (52.5%) compared to female patients as many as 19 patients (47.5%).(Kaniya & Uyun, 2020)

In a study conducted by Anggraeny F.S., et al. (2021) showed that patients with urinary tract stones with male sex (78.2%) were more than women (21.8%).(Anggraeny et al., 2021)

Distribution of Urinary Stone Patients Based on Family History

Based on this study, it was found that from the results of medical records with urinary tract stones from 32 patients based on family history, it was found that all samples did not have a family history of urinary tract stones, namely 32 patients (100%).

In this study, it can be concluded that urinary tract stone disease does not have a family history of BSK because the cause is not hereditary. This can happen because the hereditary factor is not the only factor in BSK, but there are other factors.

This is in accordance with research by Rusdi F.A., et al (2022) which showed that there were more patients who did not have a family history of BSK as many as 24 patients (80%) and only 6 patients who had a family history of BSK (20%).(Rusdi et al., 2022)

Distribution of Urinary Tract Stone Patients Based on Complaint History

Based on this study, it was found that from the results of medical records with urinary tract stones from 32 patients, the most common cases of urinary tract stones were found with the most complaints of peripheral pain, namely 28 patients (87.5%) and dysuria as many as 3 patients (9.4%) and at least hematuria as many as 1 patient (3.1%).

In this study, it can be concluded that urinary tract stones are more common in patients with low back pain complaints because the pain can be in the form of colic pain or non-colic pain. Colic pain occurs because the peristaltic activity of the smooth muscle of the calyx system or ureters increases in an attempt to remove stones from the urinary tract. The increase in peristaltic causes his intraluminal pressure to increase so that there is a stretch of the nerve terminals that gives a sensation of pain. Non-colic pain occurs due to stretching of the renal capsule due to hydronephrosis or infection of the kidneys.(Purnomo, 2014)

This data is in accordance with the research of Elmasry H., et al (2020) which stated that the most common cases of urinary tract stones were found in 14 patients (16%) and at least 1 patient (2%) with hematuria complaints.(Elmasry et al., 2020)

In addition, Kurniawan R., et al.'s research (2020) explained that the most common cases of urinary tract stones were found in 49 patients (79%) with

complaints of low back pain and at least 1 patient (2%) with urinary retention complaints and 5 patients (8%).(Kurniawan et al., 2020)

Distribution of Urinary Tract Stone Patients Based on Stone Location

Based on this study, it was found that from the results of medical records with urinary tract stones from 32 patients, the most common cases of urinary tract stones were found in the ureters, which were located in the ureters of 16 patients (48.5%), respectively in the proximal (6.3%), medial (28.1), distal (15.6), and in the kidneys as many as 14 patients (43.8%) and at least located in the urinary vesica as many as 2 patients (6.3%).

In this study, it can be concluded that urinary tract stones are more common in the ureters because the diameter is smaller compared to the kidneys and vesica urinaria. This is in accordance with the literature that states that the ureter is a small duct that connects the kidneys and the urinary vesica. The ureters narrow in 3 places, namely in (1) the border between the ureters and the renal pelvis or known as the ureteropelvic junction, (2) the crossing between the ureters and the iliac arteries in the pelvic cavity, and (3) when the ureters enter the bladder. In general, small stones with a maximum diameter of 5 mm will be able to pass through the ureters and usually come out with urine but the ureteral stones can also get stuck in all three places causing pain.(Zamzami, 2018)

Penelitian yang dilakukan oleh Zamzani (2018) menjelaskan bahwa pasien yang mengalami penyakit batu saluran kemih paling banyak terletak di ureter yaitu 696 pasien (49.1%) dan paling sedikit di vesica uretra sebanyak 190 pasien (13.4%). (Zamzami, 2018)

This is in accordance with research found by Shintya, et al. (2019) that patients with urinary tract stones have the most diureters, namely 69 patients (36.7%) and the least urinary diivesica as many as 18 patients (9.6%).(Shintya et al., 2019)

However, there are also results that are not in line with this study, namely the research of Tubagus Y.E., et al. (2017) showed that patients who experienced urinary tract stones were most located in 157 patients (67.38%) and the least were located in urinary tract stones as many as 17 patients (7.3%).(Tubagus et al., 2017)

Distribution of urinary tract stones by stone size

Based on this study, it was found that from the results of medical records with urinary tract stones from 32 patients, the most common cases of urinary tract stones were found in 14 patients (43.8%), while the least size of stones were <5 and > 20 mm in 4 patients (12.5%).

In this study, it can be concluded that urinary tract stones are more common stones with a size of 5-10 mm because the number of stone-free stones is the most at a size of 5-10 mm so that stones are easily solved with the URS procedure.(Noegroho et al., 2018)

Research by Bahceci T., et al. (2021) explained that patients with urinary tract stones were found with the most stones of <10 mm as many as 77 patients (82.8%), while the least size of stones was >10 mm as many as 40 patients (76.9%).(Bahceci et al., 2021)

As the results of previous research conducted by Alini I., et al (2022), patients with urinary tract stones were found with the most stones of <10 mm in size as many as 20 patients (55.6%), while the least size of stones was >20 mm as many as 1 patient (2.8%).(Alini & Rizaldi, 2022)

Distribution of Urinary Tract Stone Patients Based on Management

Based on this study, it was found that from the results of medical records with urinary tract stones from 32 patients for the most management, namely URS as many as 27 patients (84.4%), URS+EKL as many as 2 patients (6.3%), and URS+Lithotripsy as many as 2 patients (6.3%), while the management with the least vesicolitotomy was 1 patient (3.1%).

This study can be concluded that urinary tract stone disease is the most common with URS management because stones with a size of 10-20 mm are better achieved by using URS and the use of URS is more effective for ureteral stones, but has a greater risk of complications than ESWL.(Noegroho et al., 2018)

The action of URS with EKL was used to destroy and remove stones in the urethra with a stone size of 5-10 mm according to the results obtained. The action of URS with lithotripsy is one of the effective methods to break down urethral stones or urinary vesica by inserting a stone breaker (lithotriptor) into the urinary vesica with indications for stones of >20 mm size. Meanwhile, the management of the least surgical procedure is vesicolitotomy because the results obtained are very rare with an indication of the size of the stone >20 mm. (Noegroho et al., 2018)·(Purnomo, 2014)

This is in line with the research of Simanullang P. (2019) which explains that patients who experience urinary tract stones have the most with the management of URS as many as 183 patients (57.9%) and the fewest are medikamentosa as many as 8 patients (2.5%).(Simanullang, 2019)

Distribution of Urinary Stone Patients Based on Length of Stay

Based on this study, it was found that from the results of medical records with urinary tract stones from 32 patients with a maximum length of hospitalization of 4-8 days as many as 22 patients (68.8%), and 3 days as many as 6 patients (18.8%) while at least 9-12 days as many as 4 patients (12.5%).

In this study, it can be concluded that urinary tract stones are more common with a length of hospitalization of 4-8 days because the flow of admission of surgical patients according to the procedures of Ibnu Sina Hospital from the beginning of admission, surgery time, and post-surgery has a long time vulnerability.

In the event of an inpatient room to which the participant is fully entitled, the participant may be admitted to a higher level of treatment class for a minimum of 3 days. The standardization of the inpatient treatment period generally consists of a routine physical examination checklist, medication checklist, and patient nutrition checklist.(Ferdi, 2018)·(Kemenkes, 2014)

Research by Deswanto I.A., et al. (2017) which explained that patients who experienced urinary tract stones had a maximum length of hospitalization of 8 days (10.7%) and at least 3 days (3.7%).(Deswanto et al., 2017)

Distribution of Urinary Tract Stones by Comorbid

Based on this study, it was found that from the results of medical records with urinary tract stones from 32 patients in comorbidities, it was found that the most hypertensive patients were 10 patients (31.3%), and the fewest was diabetes mellitus as many as 6 patients (18.8%).

In this study, it can be concluded that urinary tract stones are more common with comorbidities of hypertension because hypertensive patients experience a decrease in citrate levels in the urine. Citrate is one of the substances that can inhibit the formation of calcium stones, a decrease in citrate levels in the urine is caused by increased reabsorption of citrate in the proximal tubules due to the presence of metabolic acidosis. An increase in sodium intake of 100 mmol is thought to lead to an increase in calcium excretion of 25 mg. And high sodium consumption can facilitate the formation of stones by increasing urine pH, cystine excretion and decreasing citrate excretion. (Agustin et al., 2019)

Insulin resistance is a hallmark of diabetes mellitus, which is known to induce intracellular acidosis and interfere with ammoniagenesis in the proximal tubules, both of which contribute to an increased risk of stone formation, particularly uric acid stones.(Rosen et al., 2022)

This is in accordance with the research of Parajuli P., et al. (2023) which shows that patients who experience urinary tract stones have the most hypertensive comorbidities (54%) and the least 14 patients with diabetes mellitus (31%).(Parajuli et al., 2023)

The research of Fedrigon D., et al. (2019) explained that patients who experienced urinary tract stones had the most comorbidities of hypertension as many as 25 patients (41.6%) and diabetes mellitus as many as 11 patients (18.3%).(Fedrigon et al., 2019)

CONCLUSIONS AND RECOMMENDATIONS

The conclusion of this study is that most urinary tract stone patients aged 46-55 years are male and without a BSK family member. The main complaints were the most low back pain according to the location of the most proximal ureters and the size of the stone 11-20 mm as for the management of the most URS. The duration of the most hospitalization is 4-8 days and the most comorbidities are hypertension. Suggestions for future researchers to research other characteristics that may affect urinary tract stone patients and increase the number of research samples.

FURTHER STUDY

Based on the conclusion of this study, further research is recommended to explore the underlying factors contributing to the high prevalence of urinary tract stones in males aged 46–55, particularly those without a family history. Future studies could focus on lifestyle, dietary habits, and occupational risks that may influence stone formation in this demographic. Additionally, investigating the correlation between stone size, location, and symptom severity could help improve early diagnosis and management strategies. Research on optimizing URS procedures and shortening hospitalization duration, especially in patients

with comorbid hypertension, would also be beneficial for enhancing patient outcomes and reducing healthcare costs.

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