



Characteristics of Urinary Tract Stone Patients Undergoing Extracorporeal Shock Wave Lithotripsy (ESWL) at Santa Elisabeth Hospital Medan

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Abstract. Urinary tract stones are a common disease that often occurs at the age of 30-50 years, and is more common in men. The treatment that is often carried out is extracorporeal shock wave lithotripsy (ESWL). This study aims to determine the characteristics of urinary tract stone patients undergoing ESWL. This research is descriptive and carried out in the ESWL room of the hospital. The sample was 60 urinary stone patients who underwent ESWL during April – May 2024, which was obtained by accidental sampling technique. The instrument used is the Questionnaire. The results of the study were obtained by the majority of respondents aged 36-56 years as much as 45%, the majority were male as much as 71.3%, the location of the majority urinary tract stones in the median renal stool was 58.3%. The majority size of the stone is 5-10 mm as much as 65%, the daily water consumption is the majority of 4 hours a day as much as 55%. For dietary issues, the majority consumed red meat protein 3-4 times a week as much as 60%, green vegetable consumption 1-2 times a week as much as 89.9%, daily salt consumption was mostly high as much as 75%, the majority rarely consumed soft drinks as much as 48.3%, and the majority consumed tea and coffee 3-4 times a week as much as 38.3%. Urinary tract stone disease is influenced by several factors including age, age over 30 years of age, decreased organ function, lifestyle such as physical activity, sitting time and also diet. In addition, less fluid intake also has an impact on stone formation, so men who are generally more physically active but lack fluid intake are more at risk.

Keywords: Consumption Patterns; ESWL Actions; Patient Characteristics; Risk Factor; Urinary Stones

1. INTRODUCTION

This urinary tract stone disease is a frequent disease in the field of urology after infections and pathological disorders of the prostate. This disease is a common disease that often occurs at the age of 30-50 years and is more common in men than women, estimated at 13% of men and 7% of women, the recurrence rate of BSK is around 50% after the individual suffers for 5 years and 80-90% after 10 years (Ulfatum Nisa, 2020).

Indonesia found that 0.6% of its population has experienced urinary tract stones. The prevalence was highest in Yogyakarta (1.2%), Aceh (0.9%), West Java, Central Java, and Central Sulawesi at 0.8% each. The prevalence is higher in men (0.8%), compared to women (0.4%). As many as 10% of Indonesians are at risk of suffering from urinary tract stones and 50% who have suffered from it will reappear in the future (riskesdas, 2018).

Stones in the urinary tract are formed by various factors. These factors include intrinsic factors, which are the circumstances that come from a person's body and extrinsic factors, which are influences that come from the surrounding environment. These intrinsic factors include: heredity; urinary tract stones are suspected to be inherited from their parents, age; most often at the age of 30-50 years, gender; The number of male patients is three times more than that of female patients. Some extrinsic factors include: water intake; lack of water intake and

high calcium levels in the water consumed can increase the incidence of urinary tract stones, diet; consumption of foods that contain a lot of protein, calcium and oxalate, work; This disease is often found in people who work a lot of sitting (>4 hours) or lack physical activity (Indonesian Association of Urologists, 2018).

Urinary tract stones prevention can be done by making sure to drink plenty of water every day to avoid dehydration. Should strive to drink up to 3 liters of fluid throughout the day. One person is advised to drink water, but drinks such as tea and coffee are also taken into account. There are several ways in the management of urinary tract stones. This depends on the size, shape, and location of the stone and the presence or absence of edema in the ureter. Stones with a size of 4-5 mm have a 40-50% chance of being able to come out spontaneously, while stones with a size above 6 mm have a chance of being able to come out spontaneously. Other modalities that can be done are the use of drugs that can dissolve stones, and actions such as ESWL, PCNL, RIRS, and URS (Indonesian Urologist Association.2018).

Implementation using ESWL shock wave concept, the stone is broken into fine granules and comes out along with urine. This procedure is performed without making a wound (non-invasive), without anesthesia and can be done without hospitalization. ESWL procedure can be performed on kidney stones, ureters and bulging of less than 2 cm in size and good kidney function. For larger stones additional measures are required.

The high prevalence of urinary tract stones (BSK) based on the demographics and clinics suffered, it is known that the demographic and clinical characteristics of urinary stone patients who underwent ESWL surgery at Santa Elisabeth Hospital Medan in 2024 do not have detailed data, and looking at the impact of progressivity, complications given, and the impact of quality of life of urinary stone patients, so the author wants to conduct research related to the characteristics of patients undergoing urinary stones, so the author wants to conduct research related to the characteristics of patients undergoing The Extracorporeal shockwave lithotripsy (ESWL) action at Santa Elisabeth Hospital Medan was designated as the research location because there had been no previous research on this subject at this location.

2. LITERATURE REVIEWS

Urinary tract stones or in medical terms called urolithiasis is a painful condition caused by the formation of stones in the urinary tract. Urinary tract stones can occur in a variety of sizes, shapes, colors, and compositions. The formation of these stones can occur along the urinary tract starting from the kidneys, ureters, bladder, to the urethra (Maulana, 2021). Urinary tract stones are polycrystalline aggregates formed from various kinds of crystalloids and

organic matrices. The formation of stones is influenced by the saturation of urine. Urine saturation depends on urine pH, ions, risk of solute concentration, and others (Sindawati et al., 2021).

The formation of urinary tract stones is thought to be related to urinary flow disorders, metabolic disorders, urinary tract infections, dehydration, and idiopathics. There are several factors that make it easier for urinary tract stones to occur. These factors are intrinsic factors that include the state of a person's body and extrinsic factors that include the influence of the environment around them (Prihadi et al., 2021).

The nucleation theory asserts that urinary tract stones are formed from crystals or saturated but, stones are not always formed from patients who have high excretory rates or are at risk of dehydration. The crystal inhibitor theory is another theory on the formation of stones. According to this theory, rocks are formed due to the low concentration of ions that are natural inhibitors of such rocks as magnesium, citrate and pyrophosphate. However, the validity of this theory is still questionable, because many people who experience ion deficiency do not experience urinary tract stones (Anggraeny et al., 2021).

3. METHODS

The type of research used in this study is descriptive research, with a cross-sectional design, namely conducting observations and momentary measurements of medical record data with the aim of describing the characteristics of patients undergoing ESWL procedures recorded at Santa Elisabeth Hospital Medan in January – December 2023.

The population in this study is urinary tract stone patients who underwent ESWL at Santa Elisabeth Hospital Medan in April-May 2024. The total population in this study is 60 people. In this study, the sample method chosen was accidental sampling. In other words, any respondent who happens to meet the researcher has the ability to be considered a sample if it is considered that the person who suddenly meets is suitable to obtain data (Nursalam, 2020).

This research variable is the characteristics of urinary tract stone patients who undergo Extracorporeal Shockwave Lithotripsy (ESWL) at Santa Elisabeth Hospital Medan in 2024. The research instrument discussed about data collection is called documentation, which is commonly used in interviews (as a guideline for structured interviews). In this study, validity and reliability were not carried out because a standard questionnaire was used. In this study, the univariate statistical method was used to identify independent variables, namely the characteristics of urinary tract stone patients who underwent extracorporeal shock wave lithotripsy (ESWL) at Santa Elisabeth Hospital Medan in 2024.

This research has also been ethically feasible from the health research commission of STIKes Santa Elisabeth Medan with letter number No: 070/KEPK-SE/PE-DT/III/2024.

4. RESULT AND DISCUSSIONS

Age Group	<i>f</i>	(%)
21-35 Year	10	16.7
36-50	27	45
51-65	23	38.3
Total	60	100

Gender	<i>f</i>	(%)
Male	43	71.3
Female	17	28.3
Total	60	100

Stone Location	<i>f</i>	(%)
Upper Calix	3	5.0
Median Calix	35	58.3
Lower Calix	9	15.0
Renal Pelvis	11	18.3
Ureter	2	3.3
Total	60	100

Stone Size (mm)	<i>f</i>	(%)
< 5	4	6.7
5-10	39	65.0
11-20	17	28.3
Total	60	100

Consumption of Water	<i>f</i>	(%)
< 2500 ml	50	83.3
>2.500 ml	10	16.7
Total	60	100

Riwayat Descendents	<i>f</i>	(%)
Yes	3	5.0
No	57	95.0
Total	60	100

Employment Status	<i>f</i>	(%)
< 4 Hours	27	45.0
>4 Hours	33	55.0
Total	60	100

Figure 1. Distribution of Urinary Tract Stone Patients Undergoing ESWL Procedure at Santa Elisabeth Hospital Medan.

Types of Diet	f	(%)
Red Meat		
Every day	1	14.6
3-4 Times of the Week	42	60.0
1-2 Times of the Week	15	
Infrequently	2	16.9
Total	60	100
Nuts		
3-4 Times of the Week	5	8.3
1-2 Times of the Week	25	41.7
Infrequently	28	46.7
Never	2	3.3
Total	60	100
Green Vegetables		
Every day	16	26.7
3-4 Times of the Week	38	63.3
1-2 Times of the Week	5	8.3
Infrequently	1	1.7
Total	60	100
Salt		
Every day	45	75.0
3-4 Times of the Week	14	23.3
1-2 Times of the Week	1	1.7
Total	60	100
Soft Drinks		
3-4 Times of the Week	4	6.7
1-2 Times of the Week	15	25.0
Infrequently	29	48.3
Never	12	20.0
Total	60	100
Tea and Coffee		
Every day	9	15.0
3-4 Times of the Week	23	38.3
1-2 Times of the Week	15	25.0
Infrequently	13	21.7
Total	60	100

Figure 2. Distribution of Urinary Tract Stone Patients Undergoing EWSL Action at Santa Elisabeth Hospital Medan Based on Patient Diet.

Discussions

Based on the results of data collection, the majority of urinary stone patients included in the age group of 36-50 years were 27 patients (45.0%), the age group of 51-65 years was 23 patients (38.3%) and 10 patients (16.7%) were included in the age group of 21-35 years). Age is one of the risk factors for developing urinary tract stones increasing with age, with the peak occurring at the age of 30-50 years, this is caused by several factors, including: Decreased Kidney Function, Aging Kidneys are less efficient in filtering minerals and blood, which can cause mineral buildup in the urine and the formation of stones, Urine tends to be more concentrated and acidic. These results are in accordance with research conducted by Silalahi,

(2020). Urinary tract stones are found at the age of 30-60 years. this condition may be caused by differences in Social, Economic, Cultural and Dietary Factors. Age over 30 years has a greater risk than age under 30 years, because at the age of more than 30 years there begins to be a decline in all organ functions, Ulfatum Nisa, (2020), Indonesian Association of Urologists, (2018).

Based on the results, the majority of urinary stone patients who underwent ESWL surgery had a male gender of 43 patients (71.3%) while the female gender was 17 patients (28.3%). Some of the factors that urinary tract stones are found in men: Hormones, men have higher testosterone levels, which can increase the risk of stone formation. Diet, Men tend to eat more red meat and other animal proteins, which can increase uric acid levels in the urine and increase the risk of stone formation. Occupation, Men are more likely to work in physical jobs that can lead to dehydration, which is a risk factor for urinary tract stones. Some medications that are more commonly used by men, such as diuretics and gout-lowering drugs, can increase the risk of stone formation. This result is almost in accordance with the research of Silalahi, (2020), the Indonesian Association of Urologists, (2018) and the comparison of the number of male patients is 3 times more than that of women Riskerdas, (2018).

Based on the results, it was found that most patients who underwent ESWL were patients with 35 cases of stones in the Median Calix (58.3%), 11 cases of stones in the Renal Pelvis, 9 cases (15 cases of stones), 3 cases of stones in Upper Calix (5%), and 2 cases of patients with stones in the ureter (3.3%). Urinary tract stones, or nephrolithiasis, can form in different parts of the urinary tract, from the kidneys to the urethra. Assuming the location of common urinary tract stones, kidney stones most often form in the kidneys, precisely in the papillae, the part of the kidneys where urine gathers before flowing into the ureter. About 70-80% of urinary tract stones form in the kidneys. Ultrasound can identify the location of stones on the calyx, pelvis, ureters, and others. In the United States, in patients with urinary tract stones, ultrasound examinations have a sensitivity of 78% and a specificity of 31% (Muhammad et al., 2017).

Based on the results obtained from 60 respondents, there were 39 patients (65%) who had stones measuring 5-10 mm, 17 patients (28.3%) who had stones measuring 11-20 mm, and 4 patients (6.7%) who had stones measuring less than 5 mm. Urinary tract stones, are hard mineral deposits that form in the kidneys or urinary tract. These stones can cause severe pain, nausea, vomiting, and even urinary tract blockage. The size of urinary tract stones can vary from a few millimeters to a few centimeters. Stones with a size of 5-10 mm are often referred to as small stones or medium stones, but researchers often find that these stones cannot come

out spontaneously so ESWL actions are often carried out, possibly the cause of the stone is old and hard.

The consumption of water in the results of this study was 2500ml as many as 10 people (16.7%). Urinary Stone patients with water consumption of less than 2500 ml is normal. The reason: dehydration is the main risk factor for urinary tract stones, has a higher risk of developing urinary tract stones, urine becomes more concentrated and acidic so it is difficult to dissolve minerals, so minerals crystallize and settle. A study in America found that Urinary Stone patients on average only drink 1500 ml per day. Prhadi et al, (2021), One of the factors that affect the occurrence of urinary tract stones is the consumption of water, drinking a lot of water every day to avoid dehydration must try to drink up to 3 liters of fluid throughout the day.

Based on the results of the study which showed that the majority of urinary stone patients who underwent ESWL surgery did not have a history of heredity as many as 57 patients (95%) and patients who had a history of hereditary only 3 people (5%).according to the researchers' assumption the hereditary history is not suitable is normal and supported by several studies, but in the results of this data with previous research, Maybe because the respondents are limited.patients with a history of urinary tract stones have a higher risk of developing urinary tract stones compared to those without a family history. This information can be helpful. Nurses and doctors to recommend preventive measures such as drinking plenty of water. A study also found that 60% of patients with idiopathic urinary tract stones have a genetic inheritance. One of the stones related to the genetic factors of cystine stones. Cystine stones are a genetic disease in which there is a metabolic disorder that results in abnormal absorption function of the digestive tract and in the mucosa of the renal tubules (Muammar et al., 2020).

Based on the results obtained, 33 patients (55%) who entered the category of sitting for more than 4 hours while 27 patients (45%) who entered the category of sitting for more than 4 hours for more than 4 hours (45%) were included.researchers assume that prolonged sitting or lack of physical activity can increase the risk of the formation of urinary tract stones where there will be crystal deposition so that stones will form. This study is in line with previous research by the Indonesian Association of Urologists, (2018), on a person whose work is sitting a lot or lacks physical activity and the results of the analysis of the relationship between the length of sitting and the incidence of urinary tract stones were obtained in the group who sat > 4 hours every day (Simanullang, 2019).

Frequency distribution of respondents is conscious of the patient's dietary consumption status

Based on the dietary consumption in the results of this study, the majority of respondents (60%) consumed red meat protein 3-4 times a week, consumed processed vegetables (89.9%) at least 1-2 times a week, salt consumption was relatively high with (75%) consuming daily, consumption of soft drinks was rare and tea and coffee consumption was moderate (38.3%) respondents consumed it 3-4 times a week. Researchers assume that patients who experience urinary tract stones are influenced by several factors, namely lifestyle habits, or a person's habits, lack of drinking water, a lot of animal protein consumption, green vegetables high in oxalate, high in salt, consumption of bottled/canned drinks, fizzy, high in sugar and colored. In this study, this dietary pattern did not all correspond to previous studies that affected urinary tract stones. Foods high in oxalate nuts, diets high in animal protein and high in salt can increase the risk of kidney stones but drinks such as tea and coffee are taken into account (Self, 2018). Foods high in oxalate such as spinach, this kale can interfere with limited function. such as Green Vegetables, Kidney Nuts and are very dangerous because these compounds are Toxic. by reducing the intake of foods high in oxalate, not eliminated but restricted.

5. CONCLUSION AND SUGGESTION

Based on the results of a study on the characteristics of urinary stone patients who underwent ESWL treatment at Santa Elisabeth Hospital Medan in 2024 on 60 respondents, it was found that: 1. The majority of respondents aged 36-56 years were 27 people (45.0%) 2. The majority of the male gender is 43 people (71.3%), 3. The location of urinary tract stones was the most in the median of the renal chamber as many as 35 people (58.3%) 4. The maximum size of the stone is 5-10 mm as many as 39 people (65.0%) (83.3%) 5. Majority of water consumption < 2500 ml daily as many as 50 people 6. No genetic history/heredity only 45 people (95.0%) 7. The status of sitting for > 4 hours every day was 33 people (55.%) 8. Dietary consumption (60%) consumed red meat protein 3-4 times a week, consumption of green vegetables (89.9%) 1-2 times a week, high salt consumption (75%) consumed daily, consumption of soft drinks infrequently (48.3%), consumption of tea and coffee (38.3%) 3-4 times a week.

For patients, they can apply a healthy lifestyle, such as maintaining a healthy diet, reducing animal protein consumption, high in oxalate such as green vegetables, nuts, high in salt, drinking soft drinks, containing caffeine, bottled drinks, colored, diligent exercise or

physical exercise, not sitting too long or more than 4 hours a day. such as maintaining a diet pattern, diligently exercising or physical exercise, drinking a lot of water at least 3000 ml every day. Patients are also expected to gain insight and knowledge about Urinary Tract Stones so that they can prevent the occurrence of Urinary Tract Stones, recognize the early symptoms of urinary tract stones, and the need for strict supervision from themselves, family and the environment.

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