Factors That Can Affect the Occurrence
Urinary Stones
M. Miftachul Ulum¹, Mujito², Imam Sunarno³

D3 Keperawatan Poltekkes Kemenkes Malang
miftachululumpromkes@gmail.com

ABSTRACT
Urinary tract stones are the biggest health problem in the field of urology with typical symptoms of pain that can lead to complications in the kidneys. The formation of the stones in the urinary tract (kidneys, ureters, and uretra) due to the deposition of substances in abnormal amounts caused by internal and external factors. The purpose of this study was to determine the factors that can influence the occurrence of Urinary Tract Stones. This study uses a literature review. The Literature Review search uses a database with Google Scholar and keywords that are adjusted to the Medical Subject Heading (MeSH). Data analysis used quality analysis methodology with checklists. The results showed the factors that influence the occurrence of urinary tract stones, among others; heredity, age, gender (male), obesity (BMI > 25) and behavior (regulation of fluid intake <1500 ml per day, diet (consumption of high oxalate vegetables), and length of time to sit. Education to the public through health services regarding the factors that can affect the incidence of urinary tract stones needs to be implemented.

Keywords: Factors, Urinary Tract Stones

INTRODUCTION

The urinary system is an excretory system that plays a very important role in maintaining the homeostatic balance of electrolyte and water concentrations in the body. The urinary system consists of the kidneys, ureters, bladder and urethra (Purnomo, 2011). Kidney is an organ shaped like a bean with weight and size depending on age, gender in males is generally larger than in females, the presence or absence of a kidney on the other side. The function of the kidney itself is to filter and remove waste such as toxins, excess salt, and urea. Kidneys that cannot perform their functions properly can lead to kidney disease. Kidney diseases include kidney failure, chronic kidney failure, polycystic kidney disease, kidney stones and urinary tract stones.
Urinary tract stones (BSK) is the process of stone formation in the urinary tract including the kidneys, ureters, bladder and urethra. Urinary tract stones (BSK) are the third most common disease in urology after urinary tract infections and benign prostate enlargement. Urinary tract stone formation can be classified based on its etiology, including: infection (magnesium ammonium phosphate, carbonate, ammonium urate), non-infectious (calcium oxalate, calcium phosphate, and uric acid), genetic disorders (cystine, xanthine) and the influence of drugs (Nur Rashid, 2018).

Urinary tract stone disease (BSK) has been known for centuries since the ancient Babylonian and Egyptian times (Lina, 2008). The discovery of stones in the bladder is not the same in different parts of the world, varies according to ethnic and geographical factors. The prevalence worldwide is on average 1-12% of the population suffering from urinary tract stones. In developed countries such as the United States, Europe, Australia, urinary tract stones are often found in the upper urinary tract, while in developing countries such as Thailand, India and including Indonesia, bladder stones are more common (Sulistyowati, 2013).

Urinary stone problems are still the most common cases in Indonesia among urological cases, although national urinary stone prevalence rates have not been obtained (Nur Rasyid, 2018). Men have a risk 4 times higher than women because in men the urinary tract is more complicated. In women it is 1-2 cm, while in men it can be up to 25 cm (Sulistyowati, 2013).

Based on the above background, the researcher can formulate the problem as follows: "What are the factors that can affect the occurrence of urinary tract stones?".

METODE PENELITIAN

Penelitian review pustaka (literatur review). Pencarian Literatur dilakukan Desember 2020 - Januari 2021. Sumber data yang didapat berupa artikel Nasional dan Internasional dengan tema yang sudah ditentukan.
Kata kunci (keyword) dalam literatur review ini di sesuaikan dengan judul disesuaikan dengan Medical subject Heading (MeSH). Strategi yang digunakan untuk mencari artikel menggunakan PICOS Freework.

Tabel 1.1 Format PICOS “Faktor-Faktor yang dapat mempengaruhi terjadinya Batu Saluran Kemih

RESEARCH METHODS
Literature review research. Literature search was carried out December 2020 - January 2021. The data sources obtained were in the form of National and International articles with predetermined themes.

The keywords in this literature review are adjusted to the title adapted to the Medical Subject Heading (MeSH). The strategy used to find articles is using PICOS Freework.

Table 1.1 Format of PICOS “Factors that can affect the occurrence of Urinary Stones

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Inclusion</th>
<th>Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>Patients who experience health problems due to urinary tract stones</td>
<td>Patients who do not experience health problems due to urinary tract stones</td>
</tr>
<tr>
<td>Intervention</td>
<td>No Intervention</td>
<td>No intervention</td>
</tr>
<tr>
<td>Comparison</td>
<td>Using the control group in the selected study</td>
<td>No comparison intervention</td>
</tr>
<tr>
<td>Outcome</td>
<td>Factors that can affect the occurrence of urinary stones</td>
<td>Factors that do not affect the occurrence of urinary tract stones</td>
</tr>
</tbody>
</table>
Based on the results of the Literature Review search through publications using keywords that have been adjusted using MeSH, the researchers found 5 journal articles according to these keywords.

**RESEARCH RESULT**

The average number of participants is more than two hundred individuals each study discusses the factors that can influence the occurrence of urinary tract stones. The highest study quality is for the factors that influence the occurrence of BSK and the lowest is for the description of knowledge about the occurrence of BSK. Studies according to this systematic review were conducted entirely in Indonesia with five journals (Martha K. Silalahi, 2020; Retno Sulistiyowati, 2013; Sianturi, d. 2017; Akmal, 2013; Sarwono, 2017).

Table 1.2 Summary of the literature on factors that can influence the occurrence of urinary stones
<table>
<thead>
<tr>
<th>No.</th>
<th>Writer Year Of Publication</th>
<th>Duration</th>
<th>Instrument or collection data method</th>
<th>Respondent</th>
<th>Factor that influence BSK</th>
<th>Signification</th>
<th>Conclusion</th>
</tr>
</thead>
</table>
| 1.  | Martha K. Silalahi Published Septemb er 2020 | Data collection at 2019 | - Instrument: Questionaire and observatio n sheet  
- cross sectional design | 32 respondents are patients with urinary tract stones | age, family history of urinary tract stones, gender, fluid intake, prolonged sitting at work and obesity | Frequency Distribution of Respondents in Urology Poly RSAU dr. Esnawan Space  
1. Age  
Early seniors – Seniors (28) 87.5%  
2. Gender  
Male (29) 90.6%  
3. Family History  
No history (25) 78.1%  
4. Fluid intake  
< 1500 ml (28) 87.5%  
5. Sitting time at work > 4 hours/day (29) 90.6%  
6. Obesity  
More than 25 (25) 87.5% | There is a relationship of factors associated with the incidence of urinary tract stones in poly urology. It can be concluded that age, gender, family history, fluid intake, length of time sitting at work and obesity have a significant relationship |
| 2.  | Retno Sulistiyo wati, Published October 2013 | Data Collecti on at 2013 | - Instrument: observatio n sheet  
- Design cross sectional | 45 male residents aged over 40 years, length of stay 30 years or more | analyzed the relationship between total hardness levels, calcium levels, magnesium levels in water and length of stay, the amount of water consumed, the habit of cooking water before consumption, the habit of holding back urine (BAK), the habit of consuming vegetables, exercise habits, cholesterol levels, calcium | Distribution of the frequency of risk factors with the incidence of urinary tract stone crystals in the residents of Mrisi Village, Responsiharjo District, Grobogan Regency  
1. Length of stay (24) 70.4%  
2. Consumption of vegetables >2x a day (21) 75%  
3. Water hardness (15) 62.5%  
4. Consumption of water with calcium content (13) 54.2%  
5. Water consumption < 2 liters (7) 46.7%  
6. Holding BAK (6) 75%  
7. Family history (5) 62%  
8. Consumption of eggs (3) 50%  
9. Consumption of water with magnesium content (2) 50%  
10. Boiling water (2) 100%  
11. Never exercise (26) 60.5%  
12. Take supplements (1) 100%  
13. Consumption of milk (1) 100%  
14. Abnormal cholesterol levels () | There is a relationship between the respondent's length of stay and the habit of consuming high oxalate vegetables with the incidence of urinary tract stone crystals in the urine. |
3. Sianturi, Mega N Dian Y, Published October 2017

Data Collection at August 2017

- Instrument: questionnaire
- Descriptive survey research method with cross-sectional design

| 50 BSK patients undergoing outpatient treatment | BSK patient's knowledge about dietary consumption prevention behavior, water consumption, physical activity, avoiding holding BAK |

Distribution of the frequency of BSK patients based on the level of knowledge of BSK recurrence prevention behavior

1. Diet
   - Less (18) 36%
   - Enough (31) 62%
   - Good (1) 2%
2. Drinking Water Consumption
   - Less (1) 2%
   - Enough (15) 30%
   - Good (34) 68%
3. Physical Activity
   - Less (19) 38%
   - Enough (24) 48%
   - Good (7) 14%
4. Avoiding the Habit of Holding BAK
   - Less (18) 36%
   - Enough (26) 52%
   - Good (6) 12%
5. BSK recurrence prevention behavior

There is a relationship between knowledge of BSK patients with BSK recurrence prevention behavior at H.Adam Malik Hospital Medan with a sufficient level.
<table>
<thead>
<tr>
<th>No.</th>
<th>Author(s)</th>
<th>Published Year</th>
<th>Data Collection Year</th>
<th>Instrument</th>
<th>Method</th>
<th>Sample Size</th>
<th>Analysis</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>Akmal</td>
<td>2013</td>
<td>2009</td>
<td>Questionnaire</td>
<td>Analytical descriptive research method with cross-sectional design</td>
<td>62 people in the treatment room and outpatients</td>
<td>The relationship between length of time sitting and diet with the incidence of urinary tract stones.</td>
<td>Distribution of respondents based on diet &amp; length of time sitting on the incidence of urinary stones at Wahidin Sudirohusodo Hospital Makassar in 2009. 1. Long Sitting Time: Old (37) 59.7% Not long (25) 40.3% 2. Diet: Often (34) 54.8% Rarely (28) 45.2%</td>
</tr>
<tr>
<td>5.</td>
<td>Sarwono</td>
<td>2017</td>
<td>January 2017</td>
<td>Questionnaire</td>
<td>Observasi</td>
<td>80 people</td>
<td>Analyzing the risk factors for urinary tract stones, namely Ca levels in drinking water, Intake of</td>
<td>The results of the analysis of risk factors for urinary tract stones in the village of Redisari, Rowokele sub-district, Kebumen Regency. 1. Drinking water intake (p value = 0.035) Significant 2. Habit of holding urine</td>
</tr>
</tbody>
</table>
Factors Affecting Urinary Tract Stones

1. Age

Age is one of the factors that play a role in the occurrence of urinary tract stones because the metabolic process has begun to decline. It was proven from 32 respondents, 28 experienced urinary tract stones with a result of 87.5% (Martha K. Silalahi, 2020). It can be seen in the literature journal that the early elderly age group - the elderly are more likely to experience urinary tract stones. Most often found at the age of 30-50 years (Purnomo, 2011). The decrease in metabolic processes in the body due to age can cause weakness in the working system of the urinary tract.

2. Gender

Gender is one of the factors that play a role in the occurrence of urinary tract stones. It is proven by the results of Martha K. Silalahi's research (2020) of 32 respondents who are taller in male sex experienced urinary tract stones with a result of 29 experiencing urinary tract stones with a result of 90.6%. The recurrence rate in men is three times higher than in women, this is influenced by serum testosterone which will result in an increase in endogenous oxalate production by the liver (Martha K. Silalahi, 2020).

3. Descendants
Heredity is one of the factors that play a role in the occurrence of urinary tract stones, the group of respondents with heredity has the opportunity to suffer from urinary tract stones 18 times with an incidence rate of 96% (Martha K. Silalahi, 2020). The results of the journal are supported by (Retno Sulistiyowati, 2013) family history is one of the supporting factors that also causes urinary tract stones with the results of 5 out of 45 male respondents aged over 40 years, length of stay 30 years or more with 62% results. have urinary tract stones.

4. Obesity

Obesity is one of the factors that play a role in the occurrence of urinary tract stones, with a greater incidence in the BMI> 25 group, obesity is 96.4%. Because obesity is a state of increasing body fat both throughout the body and in certain parts (Martha K. Silalahi, 2020). According to Sianturi, (2017) that knowledge on the prevention of recurrence of urinary tract stones totaled 50 patients in the category of dietary knowledge level with sufficient results, namely 31 patients with 62% results. Bad habits in controlling diet can affect the body's metabolism so that it increases the size or shape of the body.

5. Perilaku

1) Pengaturan Intake Cairan

Pengaturan intake cairan adalah salah satu faktor yang berperan dalam terjadinya batu saluran kemih, dengan kejadian lebih besar pada kelompok < 1500 ml yaitu 96,4% (Martha K. Silalahi, 2020). Pada penelitian Retno Sulistiyowati (2013) laki-laki berusia lebih dari 40 tahun, lama tinggal 30 tahun atau lebih yang mengkonsumsi air <2 liter 7 dari 45 pasien mengalami batu saluran kemih dengan hasil 46,7%. Didukung dengan tingkat pengetahuan pasien mengkonsumsi air minum untuk mencegah kekambuhan batu saluran kemih dengan keseluruhan 50 pasien 34 diantaranya mayoritas berkategorai baik 68% (Sianturi, d. 2017). Orang yang minumnya kurang dari 2 liter setiap hari berisiko terkena penyakit batu saluran kemih 2,112 kali lebih besar dibanding dengan orang yang minumnya cukup (Sarwono, 2017). Kurangnya asupan air dan tingginya kadar mineral kalsium pada air yang dikonsumsi, dapat meningkatkan insiden batu saluran kemih (Purnomo, 2011). Selain itu mengkonsumsi
alkohol secara berlebih akan memicu terjadinya peningkatan sitrat dalam urin, sedangkan minuman ringan (minuman bersoda) dapat meningkatkan kadar oksalat dalam urin sehingga penyebabkan batu saluran kemih (Sjabani, 2014). Asupan cairan yang kurang dari kebutuhan tubuh dapat memperlambat aliran urin sehingga pada orang dengan dehidrasi beresiko terkena batu saluran kemih.

2) Pola Diet

Pola diet adalah salah satu faktor yang berperan dalam terjadinya batu saluran kemih. Orang yang diet sering mengkonsumsi makanan berkalsium, oksalat dan kalium lebih rentan terkena batu saluran kemih diketahui 26 orang (41,93%) dalam penelitian Akmal (2013) dan 45,86% dalam penelitian Retno Sulistiyowati (2013). Pengetahuan tentang pola diet, mayoritas berkategori cukup 62% dari total keseluruhan 50 pasien (Sianturi, d. 2017). Intake makanan yang dapat menjadi penyebab terjadinya batu adalah tinggi sodium (garam), oksalat yang dapat ditemukan pada teh, kopi instan, minuman soft drink, kokoa, arbei, jeruk sitrun, dan sayuran berwarna hijau terutama bayam (Sjabani, 2014). Selain itu, lemak, protein, gula, karbohidrat yang tidak bersih, ascorbic acid (vitamin C) juga dapat memacu pembentukan batu (Purnomo, 2011). Mengatur pola makan sangat diperlukan untuk mencegah timbulnya batu saluran kemih.

5. Behavior

1) Fluid Intake Regulation

Regulation of fluid intake is one of the factors that play a role in the occurrence of urinary tract stones, with a greater incidence in the < 1500 ml group, namely 96.4% (Martha K. Silalahi, 2020). In Retno Sulistiyowati’s research (2013) men over 40 years of age, length of stay 30 years or more who consumed <2 liters of water 7 of 45 patients experienced urinary tract stones with a result of 46.7%. Supported by the level of knowledge of patients consuming drinking water to prevent recurrence of urinary tract stones with a total of 50 patients, 34 of whom were in the good category, 68% (Sianturi, d. 2017). People who drink less than 2 liters a day are at risk of developing urinary tract stones 2.112 times greater than people who drink enough (Sarwono, 2017). Lack of water intake and high levels of calcium minerals in the water consumed can increase the incidence of urinary tract stones (Purnomo, 2011). In addition, excessive alcohol consumption will trigger an increase in citrate in the urine, while soft drinks (soda drinks) can increase oxalate levels in the urine, causing urinary tract stones (Sjabani, 2014). Fluid intake
that is less than the body's needs can slow the flow of urine so that people with dehydration are at risk of developing urinary tract stones.

2) Diet Pattern

Diet is one of the factors that play a role in the occurrence of urinary tract stones. People who diet often consume calcium, oxalate and potassium foods are more susceptible to urinary tract stones, it is known that 26 people (41.93%) in Akmal's research (2013) and 45.86% in Retno Sulistiyowati's (2013) study. Knowledge of dietary patterns, the majority are in the sufficient category, 62% of the total 50 patients (Sianturi, d. 2017). Food intakes that can cause stones are high in sodium (salt), oxalate which can be found in tea, instant coffee, soft drinks, cocoa, strawberries, citron, and green vegetables, especially spinach (Sja"bani, 2014). In addition, fat, protein, sugar, unclean carbohydrates, ascorbic acid (vitamin C) can also stimulate stone formation (Purnomo, 2011). Regulating the diet is very necessary to prevent the onset of urinary tract stones

3) Long sitting time

Long sitting is one of the factors that play a role in the occurrence of urinary tract stones. The incidence of urinary tract stones caused by sitting time >4 hours/day is 93.1%. The results showed that the occurrence of urinary tract stones was caused by habits and conditions of sitting for too long, namely 25 people (Akmal, 2013). The theory states that patients who sit for too long will experience the release of bone calcium into the blood, which will lead to spurring of stone hypercalcemia due to the process of supersaturation of stone-forming materials in the renal tubules which will change the low saturation stable zone into a high saturation zone. Sitting time while working >4 hours/day of 32 patients 29 of them experienced urinary tract stones with 90.6% results in the study (Martha K. Silalahi, 2020). This explains that as often as possible you must mobilize to prevent sitting too long which is one of the factors for the accumulation of urinary tract stones.

4) Habit of holding back defecation
The patient's knowledge in avoiding the habit of holding urine to prevent the recurrence of urinary tract stones is mostly in the sufficient category of 52% (Sianturi, d. 2017). The habit of holding back urine causes urinary tract stones with a result of 29.2% (Sarwono, 2017). The habit of holding back urine will cause a urinary tract infection which can lead to the deposition of urinary tract stone crystals. Although this has a small effect on stone formation, it must also be handled with care.

DISCUSSION

Urinary tract stones are still the biggest health problem in the field of urology with typical symptoms of pain that can lead to complications such as kidney failure. Diseases that arise due to the deposition of substances in abnormal amounts can be caused by various factors, both internal and external. Various symptoms and complications that can arise from urinary tract stones make
many researchers interested in conducting research, especially about what factors can affect the occurrence of urinary tract stones. Based on the five literatures that have been reviewed, the results obtained according to Martha K. Silalahi (2020) there is a significant relationship between age, gender, family history, fluid intake, length of sitting at work and obesity with the incidence of urinary tract stones. Sarwono (2017) said that adults with water consumption of less than 2 liters per day are at risk of developing urinary tract disease (Urolithiasis). Supported by Akmal (2013) that there is a relationship between length of time sitting and diet with the incidence of urinary tract stones. In line with the research of Retno Sulistiyowati (2013), there are two risk factors that show a significant relationship with the incidence of urinary tract stone crystals in urine sediment, namely: length of stay and habits. Living in an area with high lime content will have kidney calcification as much as 52%, while in patients with hypertension 83% (Sarwono, 2017). Sianturi's research (2017) adds that the average respondent has sufficient knowledge about the behavior of preventing the recurrence of urinary tract stones.

The rate of recurrence of urinary tract stones is an average of 7% per year or approximately 50% in 10 years (Purnomo, 2011). As an effort to prevent the recurrence of urinary tract stone disease caused by these influencing factors. The community is expected to be able to pay attention to risk factors to know more about preventive measures or avoid the recurrence of urinary tract stones by modifying patterns and lifestyles. Increasing daily water consumption can dilute the urine so that it can prevent stone formation. Consumption of water in one day at least 8 glasses or the equivalent of 2-3 liters. Consume foods that are low in sodium and purines such as fish, vegetables and reduce animal protein (red meat) to reduce oxalate in the urine and the risk of stone formation in the urinary tract. According to Akmal (2013), people whose jobs are sitting and less mobile are more prone to urinary tract stones than people whose jobs are a lot of movement or physical work. Physical activity is highly recommended with balanced fluid intake.

Health workers are also expected to be able to provide health education regarding risk factors that can affect the incidence of urinary tract stones, so that patients and the community have broad knowledge and receive support from their families to avoid risk factors such as age, heredity, gender, obesity, fluid intake, diet., and long sitting.
CONCLUSION
Based on a review of research results on factors that influence the occurrence of urinary tract stones, it shows that most of the research journals analyzed show the factors that influence the occurrence of urinary tract stones are age, heredity, gender (male), obesity (BMI > 25), and behavior (regulating fluid intake of less than 1500 ml per day, dietary patterns (consumption of vegetables high in oxalate), and length of time sitting. Connected with research in a literature review study, it shows that there are factors that influence the occurrence of urinary tract stones.

SUGGESTION
The results of this literature review are an update of health science information that commonly occurs among the community, especially the urinary system and further researchers can develop and follow up on the latest research so that it is used as a guide in providing education to the community.

REFERENCES


