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Penulis : Afar Zimmauz Zaman, Dwimantoro Iman P, Lysa Veterini, Hotimah

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NPP. 16081074

**LPPM Universitas Nahdlatul Ulama Surabaya**

Website : lppm.unusa.ac.id

Email : lppm@unusa.ac.id

Hotline : 0838.5706.3867

# Paper 2

*by* Dwimantoro Iman Prilistyo 2

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## Correlation Of Blood Uric Acid Levels And Types Of Urinary Tract Stone On Urolithiasis Patients In Islamic Hospital Of Jemursari Surabaya

Aufar Zimamuz Zaman Al Hajiri,<sup>1</sup> Dwimantoro Iman Prilistyo,<sup>2</sup> Lysa Veterini,<sup>3</sup> Hotimah Masdan Salim<sup>4</sup>

<sup>1</sup>Student of Medical Faculty Nahdlatul Ulama University of Surabaya

<sup>2</sup>Departement of Urology Islamic Hospital of Jemursari Surabaya – Medical Faculty Nahdlatul Ulama University of Surabaya

<sup>3</sup>Departement of Pathology Islamic Hospital of Jemursari Surabaya – Medical Faculty Nahdlatul Ulama University of Surabaya

<sup>4</sup>Lecturer of Medical Faculty Nahdlatul Ulama University of Surabaya  
email address: aufarza@gmail.com

**Background:** Urinary tract stones are one of the most common causes of morbidity in urology throughout the world and become a health problem because commonly found in the productive age. Based on their types are uric acid stone, calcium oxalate stone and tri calcium phosphate stone. **Objective:** To analyze the correlation of blood uric acid levels with types of urinary tract stones on urolithiasis patients of Islamic Hospital of Jemursari Surabaya. **Method:** This study used an observational analytic method with a cross sectional approach design. The sample are patient diagnosed with urinary tract stone, has a history of uric acid level and urolithiasis stone analysis. The sample are 38 with simple random sampling techniques. **Results:** In this study we found that urinary tract stone was highest (30.95%) on 46-55 years old. Most types of stone are calcium oxalate (60.53%). High uric acid levels (52.63%) almost found in urinary tract stone patients. The result of analysis showed a relationship between uric acid levels and the type of stone significantly ( $p < 0.05$ ). **Conclusion:** There is a significant correlation of uric acid levels and urolithiasis.

**Keywords:** Uric acid stone, calcium oxalate stone, tri calcium phosphate stone, gout

### 1. Introduction

Urinary tract stones (urolithiasis) are stones in the urinary tract based on the location of stones, nephrolithiasis or stones in the kidneys, ureterolithiasis or ureteric stones, and vesicolithiasis or bladder stones. Urolithiasis is one of the most common causes of morbidity in urology throughout the world. Become a health problem that is often found on productive age, between the ages of 30-60 years.

According to data collected from hospitals throughout Indonesia on 2013 the incidence of urolithiasis in Indonesia amounted to 37,636 new cases. According to the 2013 Indonesia Basic Health Research (RISKESDAS), the prevalence of kidney stone diagnosed by doctors in Indonesia was 0.6 percent. The highest prevalence is in Yogyakarta (1.2%), Aceh (0.9%), West Java, Central Java, and Central Sulawesi, each by 0.8 percent. The prevalence of kidney stone disease increases with age, the highest at 55-64 years old (1.3%), decreases slightly at 65-74 years old (1.2%) and 75 years old (1.1%). Higher prevalence on men (0.8%) than women (0.4%). The prevalence in rural areas is as high as urban (0.6%). According to Sukahayat and Muhammad Ali (1975) in Mohammad Sja'bani (2014) reported that 96 samples of urinary tract stones were found with high uric acid levels, around 24 samples (25%) pure form and 76 samples mixes with calcium oxalate/calcium phosphate stone (79%), while calcium oxalate/calcium phosphate stones are 71 samples (73%) (Sja'bani, 2014). High serum uric acid levels not only in the formation of cases of uric acid stones but also triggering on the formation of other types of stones (Abbas, A.K; Aster, J.C; Kumar, 2015).

The forming of urinary tract stones caused by damage of balance system. The kidneys must filter the blood and excrete material with a low degree of solubility. These two opposite activities must be balanced in adaptation to diet, climate and activity. In theory urinary tract stones are formed in the urinary tract,

especially in areas that often experience inhibition of urine flow (Wortmann, 2013; Purnomo, 2014). The formation of urinary tract stones is thought to be related to urinary tract disorders, urinary tract infections, dehydration and other conditions that are still unknown (idiopathic). Epidemiologically there are several factors that facilitate the occurrence of urinary tract stones in a person. These factors are intrinsic and extrinsic factors. Intrinsic factors include hereditary, age, and gender. While extrinsic factors include geography, climate and temperature, water intake, diet, work, race / ethnicity, obesity, diabetes, and metabolic syndrome (Purnomo, 2011; Sakhaee et al, 2016).

Urinary tract stones generally contain elements of calcium oxalate, calcium phosphate, uric acid, magnesium-ammonium-phosphate, xanthin, cystine, silicates and other elements. Calcium stones are the most common type of stone, which is about 70 to 80 percent of all cases of urinary tract stones. This type of stone consists of calcium oxalate, calcium phosphate or a mixture of the two elements. Uric acid stones are a minority of all cases of nephrolithiasis, but significantly more common among stone formers with metabolic syndrome. A urine too acidic is recognized as the main disorder responsible for gout nephrolithiasis. Gout is 5% to 10% of all urinary tract stones. Between 75% and 80% of uric acid stones consist of pure uric acid stones and the remainder is a mixture of uric acid stones such as calcium oxalate. Gout is common in patients with gout, myeloproliferative, many patients with anti-cancer therapy use uricosuric drugs including thiazide (Purnomo, 2014).

Stone analysis provides valuable information that explains the differential diagnosis and helps in directing the management plan. The crystallographic findings of stones also help identify the occurrence of rare kidney stones, such as infection-induced cyst stones and stones, which are fully useful for treatment plans. Stone analysis also helps in the diagnosis of very rare stones, such as stones containing 2,8-hydroxyadenine or drugs (Asplin, 2008; Moe, OW; Sakhaee, Khashayar., Moe, 2016).

## 2. Material And Method

This study is quantitative, that use statistical data analysis. This study used an observational analytic study design with a Cross Sectional approach. The population is an electronic medical record data of urolithiasis patients at the department of urology Islamic Hospital of Jemursari Surabaya on January- February 2019.

Inclusion criterias are patients diagnosed with urinary tract stones in electronic medical record records, history of blood uric acid examination, and stone analysis. Exclusion criteria are patients over 75 years old. The sample size are 38 samples with simple random sampling technique.

## 3. Statistical Analysis

The statistical analysis is using IBM SPSS 25<sup>th</sup> version. The values are given as mean ± standard deviation (SD). Results of the Fisher Exact Test statistic show a significance value of <0.05.

## 4. Result

The results of the study from 38 research subjects found almost half (38.21%) at the age of 46-55 years, more than half (72.97%) in male sex, more than half (63.16%) types of calcium stones oxalate. Blood uric acid levels in 38 research subjects found normal uric acid levels as much as 47% and high uric acid levels as much as 53%. Data analysis using Fisher exact test showed value of p = 0.049 (<0.05) as significantly.

Table 1. Characteristics of data

Characteristics	N
Age	
26-35	2
36-45	8
46-55	13
56-65	11
> 65	4

Gender	
Male	28
Female	10
Type of Urinary Tract Stone	
Uric Acid Stones	12
Calcium Oxalate Stone	24
Tri Calcium Phosphate Stone	2
Uric Acid Levels	
Normal	18
High	20

**Table 2. Crosstabulation of Uric Acid Levels and Types of Urinary Tract Stones**

Type of Urinary Tract Stone	Uric Acid Level				Total	
	Normal		High		n	%
	n	%	n	%		
Uric Acid	3	23,07	10	76,9	13	100,0
Calcium Oxalate	14	60,86	9	39,13	23	100,0
Tri Calcium Phosphate	1	50,00	1	50,00	2	100,0
Total	18	47,36	20	52,63	38	100,0

## 5. Discussion

From the results of the study showed the frequency distribution of subjects based on range of age, at 26-35 years old there were 2 subjects (5.26%), at 36-45 years old there were 8 subjects (21.05%), at 46-55 years old there were 13 subjects (34.21%), at 56-65 years old had 11 subjects (28.95%), and above 65 years old there were 4 subjects (10.53%).

Half of the study (34.21%) were found on 46-55 years old. The several studies on urinary tract stones which show that the distribution of urinary tract stone patients based on age, according to Saparina's study (2017) the highest prevalence is on 46-55 years old (34%), whereas according to the Hasibuan study (2015) the highest prevalence found at above 50 years old (53.4%), and according to Suryanto et al (2017) the highest prevalence was over 50 years (53.2%). It can be concluded that the highest prevalence of urinary tract stones is on decades 4<sup>th</sup> to 6<sup>th</sup>. This occur physiologically, the entire metabolism of the human body will decrease with age due to degenerative processes.

The frequency distribution of subjects by gender, on male there were 28 subjects (72.97%) and 10 female subjects (27.03%). The several studies, according to Suryanto et al. (2017) urinary tract stones in men (74%) had a higher prevalence than women (26%), according to Saparina's study (2017) urinary tract stones in men (77%) also have a higher prevalence of women (23%). It can be concluded that the prevalence of urinary tract stones in men is 3-4 times higher than women.

Some theories that explain the causes of urinary tract stones are often in men, because have greater muscle mass than women so that the breakdown of muscle cells has an impact on increasing metabolic waste and predisposes to the formation of urinary tract stones. Another significant cause is anatomically, the male urinary tract is longer than the female, this allows for the deposition of larger stone substances in the male

urinary tract (Suryanto et al, 2017). Gender also affects blood uric acid levels, women has estrogen hormones that help in the process of gout excretion.

The frequency distribution of urinary tract stones, uric acid stones found on 13 subjects (34.21%), calcium oxalate stones on 23 subjects (60.53%) and tri calcium phosphate stones on 2 subjects (5,26 %). The several study by Ratu et al (2006), the most types of stone were calcium oxalate stones (57.4%), uric acid stones (32.2%) and tri calcium phosphate stones (10.6%). Trigger factors the formation of calcium oxalate stones due to a lack of urine volume and an increase in excretion of oxalic and calcium acids and citric deficiency. Increased oxalate excretion in urine is caused by a diet high in oxalate, vitamin C, and the presence of endogenous derivatives from glycine, glycolate, and hydroxyproline. Genetic factors also influence the absorption of oxalate in the intestine (Suryanto et al., 2017).

The frequency distribution of blood uric acid levels, on normal uric acid levels found in 18 subjects (47.37%) while high uric acid levels found in 20 subjects (52.63%). Many factors influence blood uric acid levels, including genetic factors, age, gender, lifestyle and diet. Based on Hasibuan study (2015) in kidney stone patients, out of total of 90 patients the highest had 61 gout patients (67.78%) and the remaining 29 patients had normal uric acid levels (32.22%).

## 2 6. Conclusion

There is a significant correlation of blood uric acid levels and type of urinary tract stone on urolithiasis patient in Islamic Hospital of Jemursari Surabaya.

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