Hyperuricemia Prevalence and its Metabolic Syndrome Profiles: A Pilot Cross Sectional Study in North Kayong Regency, West Kalimantan, Indonesia

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Abstracts

Background: The prevalence of hyperuricemia has increased overtime globally. Moreover, it has been linked with several metabolic syndromes. A study in Depok City and Denpasar showed prevalence of hyperuricemia were up to 18.6% and 18.2%, respectively. Urban lifestyle has been proposed to contribute for hyperuricemia; however, there is no published study conducted in rural population yet. Therefore, we performed this study to evaluate the prevalence and metabolic syndromes profile of hyperuricemic patients in rural area.

Methods: A cross sectional study was conducted at regional government hospital in North Kayong Regency, West Kalimantan. We retrieved all complete internal medicine outpatient data between October and December 2018. All non-pregnant, adult patients newly diagnosed with hyperuricemia or currently taking uric acid lowering drug were included in this study.

Result: A total of 44 out of 121 subjects (36.36%) had hyperuricemia; 25 subjects (56.81%) were male and had median age of 53 years old. Mean level of serum uric acid was 8.30±1.77mg/dl. The metabolic syndrome profiles (diabetes mellitus, obesity, hypertension, hypercholesterolemia and hypertriglyceridemia) vary among subjects; ranging from 20.45% (hypertriglyceridemia) to 86.36% (hypertension). **Conclusion:** Hyperuricemia and its metabolic disorders are an emerging burden of disease in rural area in Indonesia.

Keywords: Hyperuricemia, metabolic syndrome, prevalence

Introduction

The prevalence hyperuricemia is increasing globally. Previously, hyperuricemia was known to be more prevalent in developed country than developing country. Prevalence of hyperuricemia in US was 21.4% while in Bangladesh, the prevalence was 9.3% (men vs women; 8.4% vs 10.2%). However, this presented the fact that hyperuricemia was also common not only in advanced countries, but also in developing countries.[1, 2] However, there was no actual prevalence of hyperuricemia in Indonesia. Several studies conducted in urban area of Indonesia. In Depok City, West Java, prevalence of hyperuricemia was 18.6%, while in Denpasar, Bali the prevalence was 18.2%.[3, 4]

Balance between uric acid production and renal excretion determines the level of serum uric acid. Multiple factors such as race or inheritance, gender, age, obesity, hormones, dietary changes including greater of purine-rich processed foods, alcohol, fructose, lifestyles, and increasing use of diuretics affect serum uric acid level and eventually prevalence of hyperuricemia.[5, 6]

Hyperuricemia has been known for its role in gouty arthritis or kidney stones. Increasing comorbidities associated with hyperuricemia including hypertension, diabetes mellitus, hyperlipidemia, and morbid obesity favor hyperuricemia to be involved in pathophysiology of metabolic syndromes.[6] Underlying mechanisms involved in both fat storage and genetic factors. Recent studies also suggest the role of nucleic acid metabolism where stimulation of adenosine monophosphate (AMP) deaminase which promotes fat storage and insulin resistance. Therefore, uric acid appears as a key factor to promote fat storage. Another mechanism presented as high level of serum uric acid may trigger oxidative stress to vascular and leads to endothelial dysfunction. These are associated with the risk of atherosclerosis. Eventually, hyperuricemia is an important remediable risk factor for metabolic and cardiovascular diseases. [7, 8]

Up until now, there was no published study conducted in rural area in Indonesia. The objective of the study is to evaluate the prevalence and metabolic syndromes profile of hyperuricemic patients in rural area.

Methods

This is a primary cross-sectional study on hyperuricemia subjects in rural population that conducted at regional government hospital in North Kayong Regency, West Kalimantan. The object of the study was all complete internal medicine outpatient data between October and December 2018. All non-pregnant, adult patients newly diagnosed with hyperuricemia or currently taking uric acid lowering drug were included in this study. Subjects with CKD stage 3-5 were excluded from the study. The aim and method of the study were.

approved by hospital's ethic review board.

Subject's characteristic was collected from the medical records. Hyperuricemia was define as serum uric acid ≥ 7 mg/dL for male subjects and ≥ 6 mg/dL for female subjects.[9] For the metabolic profiles; subjects with body mass index ≥ 25 kg/m2 were categorized as obese. [10] Using the ESC/ ESH criteria, hypertension was determined as systolic blood pressure (SBP) ≥ 140 mmHg and/or diastolic blood pressure (DBP) ≥ 90 mmHg.[11] The presence of diabetes mellitus (DM) in subjects was determined by fasting blood glucose : ≥ 126 mg/dL and /or 2 h pp blood glucose : ≥ 200 mg/dL.[12] Hypercholestrolemia was defined as subject's total cholesterol ≥ 200 mg/dL, while hypertriglyceridemia was define as serum triglycerides ≥ 150 mg/dL.[13] Descriptive statistics are presented as mean ± standard deviation (SD) for continuous variables and percentages for categorical variables. Data were presented using frequency tabulation in tables.

Results

A total of 44 out of 121 (36.36%) internal medicine outpatients had hyperuricemia. Hyperuricemia was found slightly higher in male rather than female subjects (56.81% and 43.19%, respectively). Median age of the subjects was 53 years old (male vs female; 55 years old vs 60 years old). Mean uric acid level was 8.30±1.77mg/dL; higher in male than female subjects (8.75±1.76mg/dL vs 7.72 ± 1.69 mg/dL).

Table 1. Metabolic Profiles of Hyperuricemia Subjects

Metabolic Profiles	Frequency (n)	Percentage (%)
Hypertension	38	86.36
Diabetes Mellitus	11	25
Obesity	11	25
Hypercholestrolemia	17	38.60
Hypertriglyceridemia	9	20.45

Table 2. Comorbidities of Hyperuricemia Subjects

Comorbidities	Frequency (n)	Percentage (%)
1 comorbities	18	41
2 comorbidites	11	25
Hypertension and Obese	3	27
Hypertension and DM	3	27
Hypertension and Hypercholestrolemia	4	37
Hypertension and Hypertriglyceridemia	1	9
3 comorbidites	13	25
Hypertension, DM, Hypercholestrolemia	3	23.08
Hypertension, DM, Hypertriglyceridemia	3	23.08
Hypertension, Obese, Hypercholestrolemia	3	23.08
Hypertension, Obese Hypertriglyceridemia	1	0.77
Hypertension, Hypercholestrolemia, Hypertriglyceridemia	3	23.08
4 or more comorbidities	2	4

DM= Diabetes Mellitus

Hypertension was found to be most common comorbid in hyperuricemia subjects. On contrary, hypertriglyceridemia was the least common comorbid among the subjects (Table 1). All subjects had at least one metabolic comorbid. About 30% subjects had three metabolic comorbidities. Interestingly, 4% of the subjects had four or all metabolic comorbidities (Table 2).

Discussion

Prevalence of hyperuricemia in the study was higher in comparison to studies from other countries such as US (21.4%), China (8.4%), Northeast China (10.85%), Thailand (10.46%).[2, 14-16] In comparison to other big cities (Depok and Denpasar; 18.6% and 18.2%. respectively) in Indonesia, prevalence of hyperuricemia in this rural area was also higher.[3, 4] Genetic might influence hyperuricemia prevalence in this study. A study in Northern Sulawesi, Indonesia presented that genetic is considered as one of prominent risk factors (OR 14.42 (8.01–26.23) p < 0.0001). [17] Another heritability analytical study for hyperuricemia and gout presented that hyperuricemia had stronger genetic trait that gout. The concordance of hyperuricemia was 53% in monozygotic twin pairs and 24% in dizygotic twin pairs (p< 0.001).[18, 19]

Previous study presented that estrogen has uricosuric activity due to post-secretory tubular reabsorption of uric acid. Furthermore hormonal replacement therapy was found to be effective in reducing uric acid levels. Fifty years or older women had the their serum uric acid levels increased , at which age most women were in menopause and estrogen levels decreased greatly.[20] Hence, hyperuricemia was more common in men. Another study by Guan et al demonstrated the prevalence of hyperuricemia increased with age, with the highest prevalence among subjects age 65 years or older.[21] This corresponds well with this study that median age of female subjects with hyperuricemia was 60 years old.

Another risk factor that might influence the prevalence of hyperuricemia in the study was diet. High purine diet showed a significant relationship with hyperuricemia (OR 26.72; 95% CI 11.69-61.04; p < 0.001).[4] Previous study also showed hyperuricemia subjects had poor diet quality including low vegetable and dairy product intake (p<0.0001).[22] While most common diet in this study population were shellfish, offals and low vegetable intake. However, no data regarding each subject's diet quality and quantity presented in this study.

Prolonged sitting and lack of physical activity were an independent risk factors for increase serum uric acid level (p<0.001). Elevated serum uric acid level were caused by reduce insulin sensitivity and increase urine volume.[5] Most common occupation of our study population including farmer, fishermen, housewife, and employee. Although, there were no data of time quantity of subject's physical activity.

This first pilot study regarding hyperuricemia in rural area in Indonesia still has some limitation as we could not present the correlation between influencing factors and hyperuricemia. Further studies regarding their correlation were needed.

Conclusion

Hyperuricemia and its metabolic profiles are an emerging burden of disease in rural area in Indonesia.

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