**The Prevalence of Hyperuricemia and Associated Factors in Depok**

Eflita Meiyetriani1,2, Hamzah3, Florensia Lima4

1Department of Nutrition, Faculty of Health Sciences University of Pembangunan Nasional “Veteran” Jakarta

2 SEAMEO RECFON

3Department of Public Health, Faculty of Health Sciences University of Pembangunan Nasional “Veteran” Jakarta

4Department of Nursing, Faculty of Health Sciences University of Pembangunan Nasional “Veteran” Jakarta

Corresponding author : [eflita@seameo-recfon.org](mailto:eflita@seameo-recfon.org)

**ABSTRAK**

Dalam beberapa tahun terakhir telah terjadi peningkatan kejadian hiperurisemia dan hal terakhir ini telah menarik perhatian karena berkaitan dengan penyakit yang berhubungan dengan gaya hidup orang dewasa, bersama dengan hipertensi, diabetes dan dislipidemia. Hasil penelitian terdahulu menunjukkan ada hubungan antara resistensi insulin dan hiperurisemia dengan metabolik sindrom.Belum ada data yang pasti mengenai besarnya angka kejadian hiperurisemia pada masyarakat Indonesia. Penelitian potong lintang ini bertujuan untuk mengetahui prevalensi hiperurisemia dan faktor-faktor yang mempengaruhinya di Kota Depok, Jawa Barat. Penelitian ini merupakan penelitian potong lintang yang dilaksanakan di Kota Depok pada periode bulan Maret 2014 sampai Mei 2014. Sebanyak 70 orang yang memenuhi kriteria inklusi dan bersedia menjadi responden penelitian terlibat dalam penelitian ini.Uji kai kuadrat dilanjutkan dengan analisis multivariat uji regresi logistik dilakukan untuk mendapatkan faktor-faktor yang berhubungan dengan hiperurisemia. Sebanyak 18,6% mengalami hiperurisemia dimana frekuensi yang lebih sering pada laki-laki, usia di atas 50 tahun, pendidikan akhir sekolah dasar, tidak bekerja dan memiliki riwayat mengonsumsi makanan yang mengandung tinggi purin. Analisis multivariat menunjukkan hubungan yang signifikan antara jenis kelamin, usia, pekerjaan dan riwayat konsumsi purin. Oleh karena prevalensi hiperurisemia yang relatif tinggi maka disarankan perubahan perilaku konsumsi makan dan kontrol terhadap kosumsi purin yang dapat meminimalisir terjadinya kondisi ini. Lebih lanjut disarankan untuk banyak minum dan makan buah-buahan, menghindari stress dan melakukan aktivitas fisik secara teratur.

Kata kunci: *asam urat, jenis kelamin, pengetahuan, umur, tingkat pendidikan*

**ABSTRACT**

In recent years, there has been an increase in the prevalence of hyperuricemia, and the latter has attracted attention as an adult lifestyle-associated disease, together with hypertension, diabetes, and dyslipidemia. Previous study showed there is a strong association between insulin resistance and hyperuricemia and the metabolic syndrome.Until now, there are still no definitive data regarding the prevalence of hyperuricemia in Indonesian.This study aims to estimate the prevalence of hyperuricemia and associated risk factors in Depok City, West Java. This was a cross sectional study design which was held in Depok, West Java on the period of March until May 2014. Seventy respondents with no history of hyperuricemia who fulfilled the criteria and would like to participate in this study were followed up to join this study.Chi-square testand multivariate analysis using logistic regression test were done to obtain associated risk factors to hyperuricemia. About 18.6% subjects presented hyperuricemia,which was more frequent inmales, age ≥50 years old, with elementary school background, not working and had history of purine consumption. In the multivariate analysis, the association was remained significant with gender, age, work status and history of purine consumption. The high level of hyperuricemia prevalence suggests us changingfood consumption and controllingpurine consumption to minimize the occurrence of this condition. Moreover, we recommend drinking a lot of water and eating fruits, avoiding stress and doingregular light exercise or perform physical activities.

*Keywords: uric acid, purin, gender, knowledge, age, level of education*

**Introduction**

The increasing frequency of hyperuricemia and gout are most likely caused by westernized lifestyle and environment.Hyperuricemia often accompanies metabolic syndrome, hypertension, diabetes, dyslipidemia, chronic renal disease, and obesity, and the serum uric acid level is known to vary significantly depending on meals, lifestyle, gender, and previous use of diuretics. 1

There are no definitive data regarding the prevalence of hyperuricemia in Indonesian. This is because Indonesia consists of various tribes; therefore, the prevalence rate was so varied among regions.The incidence of hyperuricemia is estimated around 2.3 -17.6%; while, the incidence of gout is varied between 0.16 to 1.36%. The results showed that the prevalence of hyperuricemia in Central Java were 24.3%in male and 11.7% female. In USA, the prevalence of asymptomatic hyperuricemia in the general population is approximately 2-13%. 2

Hyperuricemia people have high level of uric acid in the body. Several people underestimate the hyperuricemia due to the lower burden consequences than other diseases, such as heart disease and stroke.3According to previous study, hyperuricemia is associated with various chronic diseases, such as arterial hypertension, cardiovascular diseases, obesity, dyslipidemias, diabetes mellitus, metabolic syndrome, gout, and some neoplasms which can increase the risk of death. Gout is a rheumatic disease characterized by the deposit of sodium monourate in the joints and periarticular tissues, and it is one of the main diseases resulting from hyperuricemia. Individuals with gout disease have low quality of life resulting from activity-limiting symptoms,namely intense pain and inflammation of the affected joints. 4

Uric acid is a final metabolite of purine metabolism in humans. Although many mammals such as rats have uricase, an enzyme that degrades uric acid into allantoin, humans lost uricase during the course of evolution. As a result, uric acid tends to accumulate. Naturally, there purines in the body and the purine can be found in all forms of food from living cells, for example plant (vegetables, fruits, nuts) or animal sources (meat, offal, sardines).1,5

In general, more men have higher level uric acid and it increases appropriate to the increasing age. While,women a little bit less to suffer from hyperuricemia due to the estrogen protective hormone. Estrogen helps the body to remove uric acid through urine.While in men, uric acid tends to be higher than women because they do not have estrogen. Normal levels of uric acid in serum: women: 2.4 - 6 mg / dL, Men: 3.0 - 7 mg / dL of clinical experience, usually without symptoms: <5 mg / dL.6

Hyperuricemia, usually defined as a serum urate (SU) level >7 mg/dL, may be present in up to 18% of some populations.7Hyperuricemia can be caused by overproduction of urate, or, far more commonly, by inefficient excretion by the kidney. The level of SU may also increase with aging and weight gain.8-10 At least two third of patients with hyperuricemia can be expected to remain asymptomatic, and current evidence does not support treating asymptomatic hyperuricemia.11-15

Depok City is one of the main city in Central Java which growing rapidly. This situation could influence the environtment and the lifestyle. Based on study in Depok City, there is an increasing of adult lifestyle-associated disease. There is a strong association between insulin resistanceand hyperuricemia and the metabolic syndrome. Previous study showed the prevalence of metabolic syndrom in Depok City remained 23.8%. Therefore, this study aims to estimate the prevalence of hyperuricemia and associated risk factors in Depok City, West Java.16,17

**Methods**

The design of this study is a quantitative analytical research using *cross sectional* research design. The population in this study were the people who live in the Pancoran Mas Village, Pancoran Mas subdistrict, Depok. Sampling was done with sample size of 70 people with the criteria respondents aged 25-70 years, not obese and do not suffer from disease (gout, history of hypertension, kidney disorders, intestinal disorders, heart disease and lung cancer)and willing to be a respondent.

Uric acid levels is the amount of uric acid levels in the blood after calculated using rapid test digital uric acid which is expressed in units of mg / dl. Divided into two categories, namely hiperuricemia (examination showed results above 7.0 for women and 6.0 for men) and in the category of normal range (examination of the results showed less than 7.0 for women and 6.0). Purine consumption is consumption of food that is eaten every day in this high purine-containing foods (eg seafood, meat, bowel, chips, durian, avocado, butter / fried). Age is divided into two categories, the first age less than 50 years representing the younger group. Both age above 50 years old group represents.Chi-square test and multivariate analysis using logistic regression test were done to obtain associated risk factors to hyperuricemia.

**Results**

Table 1 shows that the majority of respondents were female. Most respondents education is elementary school, not working, has good knowledge on nutrition and more than 40 percent has history of purine consumption.

**Table 1. Characteristics of the subject**

| **Variable** | **Category** | **n (%)** |
| --- | --- | --- |
| Age | Less than 50 years | 43 (61.4) |
|  | 50 years and over | 27 (38.6) |
| Gender | Male | 15 (21.4) |
|  | Female | 55 (78.6) |
| Level of education | Elementary school | 45 (64.3) |
|  | Junior and high school | 18 (25.7) |
|  | Higher education | 7 (10.0) |
| Work status | Working | 10 (14.3) |
|  | Not working | 60 (85.7) |
| Nutritional knowledge on hyperuricemia | Poor | 23 (32.9) |
|  | Good | 47 (67.1) |
| History of purine consumption | Yes | 29 (41.4) |
|  | No | 41 (58.6) |

**Table 2. Bivariat analysis correlation risk factors with hyperuricemia, Depok**

| Variables | Uric Acid | | *P value* | *OR* | *95% CI* | |
| --- | --- | --- | --- | --- | --- | --- |
| Normal (%) | Hyperuricemia (%) | Min | Max |
| Age (years) |  |  |  |  |  |  |
| Less than 50 years | 38 (88.4) | 5 (11.6) | 0,117 | 3.2 | 0.92 | 11.12 |
| 50 years and over | 19 (70.4) | 8 (29.6) |  |  |  |  |
| Gender |  |  |  |  |  |  |
| Male | 9 (60.0) | 6 (40) | 0.026 \*) | 0.22 | 0.059 | 0.80 |
| Female | 48 (87.3) | 7 (12.7) |  |  |  |  |
| Level of education |  |  |  |  |  |  |
| Elementary school | 36 (80) | 9 (20) | 0.566 |  |  |  |
| Graduated from junior high / high school | 16 (88.9) | 2 (11.1) |  | 0.5 | 0.097 | 2.58 |
| Higher Education | 5 (71.4) | 2 (28.6) |  | 1.6 | 0.27 | 9.63 |
| Working status |  |  |  |  |  |  |
| Working | 4 (40) | 6 (60) | 0.002 \*) | 0.088 | 0.020 | 0.39 |
| Not working | 53 (88.3) | 7 (11.7) |  |  |  |  |
| History of purine consumption |  |  |  |  |  |  |
| Yes | 22 (75.9) | 7 (24.1) | 0,242 | 1.59 | 1.23 | 2.05 |
| No | 35 (85.4) | 6 (14.6) |  |  |  |  |
| Nutrional knowledge on hyperuricemia |  |  |  |  |  |  |
| Poor | 21 (91.3) | 2 (8.7) | 0.196 | 0.54 | 0.16 | 1.81 |
| Good | 36 (76.6) | 11 (24.4) |  |  |  |  |

\*): Significant, α = 5%

**Table 3 Multivariateanalysis of logistics regression (final model)**

| Variables | B | P value | OR | 95% C.I.for OR | |
| --- | --- | --- | --- | --- | --- |
| Min | Max |
| Work status (working) | -3.892 | *0.002* | 0.020 | 0.002 | 0.243 |
| Age (more than 50 years) | 0.065 | *0.074* | 1.068 | 0.994 | 1.147 |
| History of purin consumption (no) | -3.508 | *0.012* | 0.030 | 0.002 | 0.461 |
| Constant | -0.716 | 0.685 | 0.489 |  |  |

**Bivariate analysis**

Bivariate analysis showed that gender (male) and working status (working) had relationship with hyperuricemia. However there aren’t relationships between age, level of education, history of purin consumption and knowledge on nutrional with hyperuricemia.

**Multivariate analysis**

The multivariat analysis shows that work status, age and purin consumption were related with hyperuricemia.

**Discussion**

In this study, respondents who suffer from hyperuricemia in the Village Pancoran Mas, Depok was 18.6%. This finding was similar with other study in Indonesia.  The prevalence of hyperuricemia in Legian Kuta, Bali in 2008 was 16.9%. Moreover this figure is similar to previous studies in other areas of Bali. Like a preliminary study in the village of Sembiran with 18.2%, the research on the island of Bali Ceningan with 17%, research in Denpasar with 18.2%, whereas in the Ubud area is around 12% and the village of Tenganan Pegrisingan Karengasam 2008 of 18.63%. More over, research in the rural population in Central Java, found the prevalence of hyperuricemia was 24.3%.6

The results showed that age does not significantly affect prevalence of hyperuricemia. This finding similar with study byAndry, et al. in 2009, there was no significant relationship between ages less than 50 years with respondent’s ≥ 50 years with hyperuricemia. It is known that the enzyme that oxidizes uric acid urikinase be alotonin throwaway decreases with increasing one's old age. If the formation of this enzyme disrupted the blood uric acid levels to be increased. 18,19

Kuzuya, et al. on 50,000 men and 30,000 women in Japan nonhiperuricemia who received the annual examinations at the health authority from 1989 to 1998 found that after some time the serum uric acid increased in all groups, but the men who were born later (younger) hadhigher levels of uric acid in men older. The study also proves that there are always people who are older tend to have high levels of uric acid are higher.20

The results showed that gender has a significant relationship to the occurrence of hyperuricemia, it is due to the influence of hormones in this the female which called estrogen. Uric acid levels begin to rise during puberty in men but women remain low until menopause due to the effects of estrogen urikosurik. In the human body there are enzyme urate oxidase or urikase that will oxidize uric acid into allantoin. Urikase deficiency in humans will lead to high levels of uric acid in serum. 21

The results of the analysis between level of education and hyperuricemia revealed that there is no significant relationship between the level of education and hyperuricemia.

The results of the analysis of the working status with the incidence of hyperuricemia can be concluded that there is a significant relationship between working status withhyperuricemia. This finding similar with the research conducted by Andry et al (2009) that many office workers suffering from hyperuricemia which amounted to 60%. Krisnatuti et al (1997) said that one of the causes that affect uric acid levels is a sport or physical activity.19,21

The results purine intake history can be concluded that the respondents consume as much as 24.4% purine suffering from hyperuricemia compared with those who did not consume purin (8.7%).From the chi square test  there is no significant relationship between a history of consumption of purine with hyperuricemia. This finding similar with study conducted by Andry, et al (2009) showed from 30 people who have uric acid levels above normal, 27 (90%) consume foods high in purines. While the results of bivariate analysis using chi square test P = 0.071 obtained. This shows that consumption did not significantly influence the levels of uric acid in the office workers in the village of Karang Turi Brebes Brits districts.19

However in the multivariate analysis, the association was remained significant with gender, age, work status and history of purine consumption. Research conducted by Choi et al (1998) found that consumption of purines contained in meat and seafood related to the risk of elevated uric acid levels, then dairy products may lower risk of gout and purine consumption of plant origin does not affect the risk of gout.In general, respondents in the study consume all the foods that contain high levels of purines either of animal origin, including meat and milk are also from plants. According Sustrani et al (2004) the consumption of complex carbohydrates such as rice, bread, sweet potato and cassava can spur disposal of excess uric acid in the blood. 18

According to previous studies, some foods canhelp increase or decrease the serum uric acid levelsdepending on their purine content. Thereis still little information on the exact amount ofpurines contained in foods, since their contentand availability depend on the food processing procedures, among other factors. 22

This research suggested modifiable risk factors for hyperuricemia, such as control of high purin consumption, multiply drinking water and eating fruits that contain fluid; avoiding stress and regular light exercise or perform physical activities. For future study, it is sugessted to carry out further research and make a more in-depth research and broader about factors that influence the prevalence of hyperuricemia.

**Conclusion**

About 18.6% of the subjects presented hyperuricemia,which was more frequent inmales, age ≥50 years, with elementary school background, not working and has history of purin consumption. In the multivariate analysis, the associations remained significant with gender, age, work status and has history of purin consumption. The high hyperuricemia prevalence suggests that changes in nutritional profile and control of high purin consumption could help minimize occurrence of this condition. More over multiply drink water and eat fruits that contain fluid and the low purine diet, avoid stress and regular light exercise or perform physical activities. For next researcher, it is sugessted to carry out further research and make a more in-depth research and broader about factors that influence the incidence of hyperuricemia.

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**Conflict of Interest**

The authors affirm no conflict of interest in this study.

**References**

1. Kuwabara, Masanari. Hyperuricemia, Cardiovascular Disease and Hypertension. *Pulse* 2015;3:242–252.DOI: 10.1159/000443769. Karger, Basel. 2015
2. Hensen and Tjokorda R. 2007. *Relations consumption Purin with Hipersemia In Bali tribe in the area of Rural Tourism.* http://ejournal.unud.ac.id/abstrak/4% 282% 29.pdf. accessed on March 17, 2011.
3. Sylvia, Anderson, et al, *Patofisiologi Konsep Klinis Proses-Proses Penyakit.* ECG. Jakarta. 2006
4. Poletto Juliana, Helena Aiko Harim, Sandra Roberta Gouvea Ferreira, Suely Godoy Agostinho Gimeno. Hyperuricemia and associated factors: a crosssectional study of Japanese-Brazilians. *Cad. Saúde Pública, Rio de Janeiro*, 27(2):369-378, fev, 2011. http://dx.doi.org/10.1590/S0102-311X2011000200018
5. Precise Nucleus Edition News Letter-1). Uric acid or Gout.www.mirbrokers.com / ... / Newsletter% 2070% 201% 20Edisi% 20 -% 20Asam% 20Urat% 20310120111.pdf. Accessed on 13 March 2014.
6. KurniariPande Ketut, Gde Kambayana, Tjokorda Raka Putra. Hubungan Hiperurisemia dan *Fraction Uric Acid Clearance* di Desa Tenganan Pegringsingan Karangasem Bali. *J Peny Dalam, Volume 12 Nomor 2 Mei 2011*
7. Mikuls TR, Farrar JT, Bilker WB, et al. The treatment of asymptomatic hyperuricemia: results from the population-based general practice research database (GPRD). *Arthritis Rheum*. 2003;48(suppl 9):S612.
8. Rott KT, Agudelo CA. Gout. *JAMA*. 2003;289:2857-2860.
9. Meigs JB, Wilson PW, Nathan DM, D’Agostino RB Sr, Williams K, Haffner SM. Prevalence and characteristics of the metabolic syndrome in the San Antonio Heart and Framingham Offspring Studies. *Diabetes*. 2003;52:2160-2167.
10. Ford ES, Giles WH, Dietz WH. Prevalence of the metabolic syndrome among US adults: findings from the Third National Health and Nutrition Examination Survey. *JAMA*. 2002;287:356-359.
11. Campion EW, Glynn RJ, DeLabry LO. Asymptomatic hyperuricemia. Risks and consequences in the Normative Aging Study. *Am J Med*. 1987;82:421-426.
12. Langford HG, Blaufox MD, Borhani NO, et al. Is thiazide-produced uric acid elevation harmful? Analysis of data from the Hypertension Detection and Follow-up Program. *Arch Intern Med*. 1987;147:645-649.
13. Hall AP, Barry PE, Dawber TR, McNamara PM. Epidemiology of gout and hyperuricemia. A long-term population study. *Am J Med*. 1967;42:27-37.
14. Fessel WJ. Renal outcomes of gout and hyperuricemia. *Am J Med*. 1979;67:74-82.
15. Johnson RJ, Feig DI, Herrera-Acosta J, Kang DH. Resurrection of uric acid as a causal risk factor in essential hypertension. *Hypertension*. 2005;45:18-20.
16. Cohen Eytan, Ilan Krause, Abigail Fraser, Elad Goldberg and Moshe Garty. Hyperuricemia and Metabolic Syndrome: Lessons from a Large Cohort from Israel. *IMAJ 2012; 14: 676-680*
17. Anita, Betri. *Hubungan karakteristik individu, asupan makan dan faktor lainnya terhadap sindrom metabolik pada pegawai negeri sipil di lingkungan pemerintahan daerah kota Depok tahun 2009*. Tesis FKM UI. 2009
18. Sustrani, Lanny, *et al*. *Asam Urat.* PT Gramedia Utama, Jakarta. 2006
19. Andry, Saryono dan Arif Setyo Upoyo. *Analisis Faktor-faktor yang mempengaruhi Kadar Asam Urat Pada Pekerja Kantor di Desa Karang Turi, Kecamatan Bumi Ayu Kabupaten Brebes*. Jurnal Keperawatan Soedirman (The Soedirman Journal of Nursing), Volume 4 No.1 Maret 2009)
20. Kuzuya M, Ando F, Iguchi A, Shimokata H. Effect of aging on serum uric acid levels: Longitudinal changes in a large Japanese population group. J Gerontol A Biol Sci Med Sci 2002;57:M660-4.
21. Krisnatuti, Diah, et ​​al. *Perencanaan Menu untuk Penderita Asam Urat,* Self spreader, Jakarta. 2008
22. Rohmatulum. *Gambaran asupan bahan makanan sumber purin dengan kadar asam urat pada penderita hiperurisemia rawat inap di RS RKU Muhammadiyah Temanggung*. Skripsi Unimus. 2010