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Original Research Article

Correlation nutritional status with uric acid level in Minangkabau men ethnicity

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ABSTRACT

Background: Hyperuricemia is a predictor of metabolic syndrome influenced by many factors, one of which is nutritional status. A highly prevalence overweight and obesity in ethnic Minangkabau is quite high which can increase the prevalence of hyperuricemia. This study aims to determine the relationship of nutritional status intake with Minangkabau ethnic male uric acid levels.
Methods: This study used a cross-sectional design, done in August to November 2016. Nutritional status was obtained through the measurement of body mass index (BMI) based on height and weight. The uric acid level examined in the Prodia laboratory. Data were analyzed by using chi-square test.
Results: Most of subject were obesities. A total of 21% subjects suffers hyperuricemia. Statistic test results showed that there was a significant relationship between nutritional status and serum uric acid levels ($p < 0.0001$).
Conclusions: There was a significant relationship between nutritional status and serum uric acid levels in Minangkabau ethnic men in Padang city.

Keywords: Minangkabau, Nutritional status, Obesity, Uric acid

INTRODUCTION

Hyperuricemia is a pathological condition that can be modified. Hyperuricemia can cause an increase in cardiovascular disease, hypertension, diabetes, and kidney disease and is a predictor of metabolic syndromes. A decrease in serum uric acid levels can prevent the onset of the disease, one of which is through lifestyle modification.[1]

This uric acid level is also influenced by taste or ethnicity and gender. A cohort study conducted by Coley et al, stated that African-American race is associated with higher uric acid levels than Caucasians, and there are no differences between the male and female uric acid.[2] Likewise with the research of Maynard et al and Singh which stated that the incidence of hyperuricemia was higher in the black race than in white, but in this study men had a higher risk of suffering from hyperuricemia than women.[3,4]

Some studies also say that nutritional status is associated with uric acid levels. Lumunon's study on the elderly stated that there was a relationship between nutritional status and the incidence of gout arthritis.[5]

Likewise with Beberashvili's research which states that there is a relationship between nutritional status and uric acid levels.[6] Improved nutritional status is associated with an increase in body fat. This will cause an increase in the amount of leptin that plays a role in the synthesis and regulation of uric acid in the blood.[7,8]

Minangkabau ethnic is a society in West Sumatra that has a diet high in saturated fat and low in vegetables and fruits which are sources of fiber, compared to other ethnic groups in Indonesia.[9] The prevalence of overweight and obesity in the Minangkabau ethnic group is also quite high. Desmawati's research on Minangkabau ethnicity in Padang city found that 35% of respondents were overweight and obese with a mean BMI of 26,297±4.03kg/m^2.[2,10] This study aims to determine the relationship of nutritional status with Minangkabau ethnic male uric acid levels.

METHODS

This research was a descriptive analytic study by using cross-sectional design. This research was conducted in Padang, west Sumatera in September to October 2016. The sample was taken randomly from all Padang city Government Civil Servants. The number of subjects was 138 people.

Inclusion criteria

- Male sex,
- Aged 40-50years
- And were willing to be research subjects.

Exclusion criteria

- Subjects who were suffering from fever and infectious diseases,
- Suffering from severe illnesses such as kidney failure and cancer.
- Besides that, subjects who could not be found in three visits were also excluded from the study.

The subject was given an explanation of the research and if he was willing to become sample, the subject will sign an informed consent. The participation of subjects in research was voluntary and without coercion of anyone.

Nutritional status was calculated based on height and weight. Height was measured using stature meter and body weight was measured using calibrated scales. Height measurements are done twice by standing up against the wall and the back of the head, shoulders, hips, calves and heels touching the wall. weight measurement was also done twice. Subjects wear thin clothes, do not wear shoes or footwear and do not carry any weight. All the examination done by trained people.

Examination of serum uric acid levels was carried out after subjects fasting for 8-12hours. About 3ml of venous blood taken in the cubital fossa area, was carried out by a trained laboratory officer after the subjects signed informed consent. Uric acid levels were examined at the Prodia Laboratory in Padang city. Data was analyzed by Chi-Square test with a significance level of $p < 0.05$. This research has been approved by the Ethics Committee of Medical Faculty, Andalas University.

RESULTS

This research has been carried out in a cross-sectional design, in male civil servants in sub-districts in Padang city aged 40-50years. The number of samples that meet the research criteria are 140 people. After analyzing all of data, there were 2 subjects whose data was invalid, so they were excluded from the study. The total subjects analyzed were 138 people. All of subject in this study was Minangkabau ethnicity, that means their parent and their grandparent were Minangkabau ethnicity too, and nobody was married with another ethnic (cross ethnicity marriage). Nutritional status stated by Body Mass Index (BMI) that measured based on weight and height examination. Distribution of nutritional status of subject can be seen in below table.

Examination of serum uric acid levels is carried out after subjects fast for 8-12 hours. The average uric acid level of the study subjects was 5.75±1.39mg/dL. Most of the respondent's uric acid levels were within normal limits, but almost a quarter of the subject have hyperuricemia (21%).

Table 1: Distribution of nutritional status of subjects (n=138).

Nutritional status	f	(%)
Underweight	10	7.3
Normal	37	27.0
Overweight	29	21.2
Obese	61	44.5

Table 1 shows that most subjects was obese, when was calculated as overweight and obese, authors can find that about 65.7% of subject have overweight and obesity. But, still found about 7.3% subject was underweight.

Table 2: The relationship of nutritional status with serum uric acid levels of the subjects.

Serum uric acid level			P value
Nutritional status	**Normal (%)**	**High (%)**	
Normal	53 (94.6)	3 (5.4)	0.000
Overweight	34 (79.1)	9 (20.9)	
Obese	21 (55.3)	29 (21.2)	

Table 2 depicts that the statistical test results showed that there was a significant relationship between nutritional status and serum uric acid levels of study subjects ($p < 0.05$). subjects who have more nutritional status and obesity have higher uric acid levels than normal nutritional status.

DISCUSSION

The results this study was conducted in all districts in the city of Padang with the number of subjects as many as

138 people. All of subjects was male. This study showed that most of the study subjects had more nutritional status and obesity, even almost 45% classified as obese. This result is higher than Harbuwono's study that state the prevalence of obesity in the Indonesian adult population is 23.1%.[11] Rahmi et al, state that the prevalence of overweight has increased since the early 1990s, with higher prevalence rates in women compared with men.[12]

Obesity is a risk factor for an increase in uric acid levels. In people who are overweight and obese, there is an increase in uric acid mainly due to an increase in body fat. In addition, the body surface area also affects uric acid levels where fat people will produce more gout compared to thin people. In obesity, there is also an increase in uric acid synthesis, but on the other hand, uric acid excretion decreases.[13]

In obesity, there is also a moderate level of oxidative stress, so it requires enough antioxidants to neutralize it.[14] In this study, it was found that antioxidant intake was low in food intake of research subjects. This result is contrary to the results of Nursilmi's research on female elderly in Posbindu Sinarsari. This may be due to the research being carried out on women and most subjects had normal nutritional status.[15]

In this study, 21% of subjects suffered from hyperuricemia. Epidemiologically, hyperuricemia is more common in men than in women. Research in China, Japan, Nepal, and Thailand reports that the incidence of increased uric acid is more common in men than in women.[1,16-18] High uric acid levels are also often found in adults compared to adolescents and children.[18]

This study done on Minangkabau ethnicity male. Several previous studies say that ethnicity influences the uric acid level. Coley et al, stated that uric acid level was higher in African-American race than Caucasian race.[2] Others study say that incidence of hyperuricemia was higher in the black race than in white.[3,4] Increased levels of uric acid can be caused by hormonal influences, where estrogen hormones play a role in accelerating uric acid excretion. This hormone does not exist in men. This statement supports the results of previous studies which said that uric acid levels were higher in men than women.[3,4] However, Coley et al. getting different results is that male uric acid levels are no different from women.[2]

Statistical test results show that there is a significant relationship between nutritional status and serum uric acid levels of study subjects. This study is in line with the study of Akram et al, which states that obesity is associated with hyperuricemia.[19] This study also in line with Lumunon's study on the people above 60years old, that stated there was a relationship between nutritional status and the incidence of gout arthritis.[5] Likewise with Beberashvili's research which states that there is a relationship between nutritional status and uric acid levels 6. Improved nutritional status is associated with an increase in body fat. This will cause an increase in the amount of leptin that plays a role in the synthesis and regulation of uric acid in the blood.[7,8]

Serum uric acid is also a reliable as prediktor of pre-metabolic syndrome. There is no explanation yet how is the mechanism for increasing serum uric acid in obese people, but it has been observed that uric acid is a significant determinant factor of changes in body mass index. Besides that, nutritional status also plays a role in influencing uric acid levels through the role of hyperglycemia and insulin resistance which often occurs in people who have more weight or obesity.[20,21]

Another possible cause of increased uric acid levels in the study subjects was a high intake of purine and high fructose. A high purine and high fructose diet play a role in increasing uric acid levels, where purine is the main substrate that forms uric acid. Likewise, with fructose, where one of the results of fructose metabolism is uric acid. More research is needed on this.[13,22,23]

CONCLUSION

From the results of this study it can be concluded that the majority of research subjects have a nutritional status of obesity. As many as 21% of subjects suffer from hyperuricemia. There was a significant relationship between nutritional status and serum uric acid levels in Minangkabau ethnic men in Padang City.

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