
**RELATIONSHIP BETWEEN URIC ACID LEVELS AND RISK FACTOR
IN HYPERTENSIVE PATIENT**

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Abstract

Background: Hypertension is a major health problem in both the developed and developing countries. The prevalence of hypertension in Indonesia according to the basic health research in 2013 was 25,8% while the prevalence in Yogyakarta was 25,7%. Hypertension is a risk factor of myocardial infarct and CVA (cerebrovascular accidents). Cardiovascular disease is the leading cause of death worldwide.

Method: This research was an analytic observational study with cross sectional approach. It has been conducted at PKU Muhammadiyah Hospital of Gamping from March - 24 March 2016. Subjects were obtained using total sampling method. The researcher used medical records to determine the uric acid level and blood pressure. There were 41 samples that were analyzed in this study.

Result: This study shows (1) there is no significant impact between uric acid levels towards systolic blood pressure ($p=0.817$) and uric acid levels towards diastolic blood pressure ($p= 0.274$), (2) the systole and diastole blood pressure has a positive correlation with the uric acid levels, the systole has a very weak correlation ($r=0.037$) and so does the diastole ($r=0.175$).

Conclusion: There is no relationship between uric acid levels and risk factor in hypertensive patient.

Keywords

Keywords: Uric acid levels; hyperuricemia; blood pressure; hypertension.

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1. Introduction

Hypertension is a major health problem in both the developed and developing countries. According to the survey that is conducted by World Health Organization (WHO) in 2010, approximately 40% of population aged over 25 years old are diagnosed with hypertension.

According to the result of basic health research conducted by Research and Development Ministry of Health Republic of Indonesia (Rikesdas) in 2013, approximately 25,8% population aged over 18 years old are diagnosed with hypertension. According to the WHO in 2014, of 56 million deaths worldwide, about 38 million (68%) are due to four Non-Communicable Diseases, which are: cardiovascular disease, cancer, diabetes, and chronic pulmonary disease. Cardiovascular disease is the leading cause of death worldwide of 17,5 million (46%).

Hypertension is a disease that nowadays is more common to be found in Indonesia, especially in big cities. Hypertension has a direct risk factor to myocardial infarct and CVA (cerebrovascular accidents) (Tambayong, 2000). The hypertension is hard to be cured but it can be controlled to a normal range (Sidabuntar et al, 1991).

Hypertension is a condition where the systolic blood pressure ≥ 140 mmHg and diastolic blood pressure ≥ 90 mmHg (Sidabuntar et al, 1991). The measurement scale is nominal. Results categories are hypertension and normotensive. Blood pressure measurement is done by using spigmomanometer cuff wrapped around correspondent's upper arm, the stethoscope is placed over the brachial artery just bellow the cuff's edge. While listening with the sthetoscope, inflate the cuff until the heart sound is disappear and then inflate again at about 30 mmHg more and then release air from the cuff at a moderate rate. The first knocking sound is the systolic pressure and when the knocking sound disappears, that is the diastolic pressure (Muttaqin, 2009).

The uric acid levels is level of uric acid in a serum. The normal rate of uric acid levels for male is 7,0 and below whereas for female is 6,0 mg/dL and below. The measurement scale is nominal. Results categories are hyperuricemia and normal (Chernecky, C & Berger, B., 2012).

2. Material and Methods

This research was an analytic observational study with cross sectional approach. This research aimed to study the dynamics of relationship or correlation between risk factor and its impact. The researcher used medical records to determine the uric acid level and blood pressure. There were 41 samples that are analyzed in this study.

Inclusion criteria in this study are in patients in RS PKU Muhammadiyah Gamping from the period of January 2014 - December 2015, both males and females aged 30-90 years that are suffering from hypertension and had been conducted the uric acid measurement. Whereas the exclusion criteria are pregnant women, diabetes patients, and renal failure patients.

Data collection was obtained from medical records in RS PKU Muhammadiyah Gamping. Data retrieved from medical records include patients identity, blood pressure measurement, uric acid levels, and patients history.

3. Result and Discussion

1.1 Study Sample Characteristic

This study has been conducted in RS PKU Muhammadiyah Gamping from 8 March - 24 March 2016. Samples used in this study were obtained as a secondary data from medical records from the period of January 2014 - December 2015. Using total sampling method, there were 41 subjects that are suffered from hypertension consist of

20 males and 21 females. Out of 41 subjects, 11 subjects were having hyperuricemia and 30 others were normal. Subject characteristic can be seen further as followed.

Table 1. Sample Distribution Based on Age in Hypertensive Patients

Age	Number	Percentage
< 40 y.o	3	7.32 %
40-60 y.o	14	34.14 %
≥ 60 y.o	24	58.54 %
Total	41	100 %

Table 1 shows the prevalence of hypertensive patients increases with age. This sample study shows that hypertensive patients mostly in the age group ≥ 60 years.

Table 1 shows the distribution of hypertensive patients according to age group. Ages has main role in hypertension prevalence. The risk for hypertension increase with age (Rahajeng E, Tuminah S, 2009). This result is consistent with the result from basic health research conducted by Research and Development Minsitry of health Republic of Indonesia in 2013 that declared that prevalence of hypertension based on measurement by paramedics is increased with age.

Table 2 Sample Distribution Based on Sex and Uric Acid Levels

Sex	<i>Normouricemia</i>	Percentage	<i>hyperuricemia</i>	Percentage
Male	11	55.00%	9	45.00%
Female	19	90.48%	2	9.52%

Table 2 shows that the percentage of patients with hyperuricemia is higher in male with the number of 55,00% compared to the female which is only 9.52 %

Table 2 shows percentage of hypertensive patients that also has hyperuricemia is higher in male group compared to the female group. The same results also can be found in a research done by Rahman in Ain Shams University Hospital in 2014. Uric acid levels are higher in men because it tends to increase along with age.

Women have estrogen that helps the excretion of uric acid trough urine so that the uric acid levels in women begin to increase when they have menopause (Igrisa,V.J, 2015). The relationship between high uric acid levels with age is due to change of renal function that unable to remove uric acid adequately.

1.2 *The Effect of Uric Acid Levels Towards Hypertension*

The result of uric acid levels and blood pressure measurement obtained from correspondents were then processed using SPSS. Simple linear regression test was used in this study to determine the relationship between uric acid levels and hypertension. To perform the normality test this study used Shphiro-Wilk statistic test because the samples in this study are less than 50, which were only 41 samples obtained.

After normality test was conducted, simple linear regression test was used to predict the impact of independent variable towards the dependent variable. The impact can be seen by comparing significanr value with probability value (0.05) and also the number of coefficient regression (b). The independent variable in this study is uric acid levels whereas the dependent value is hypertension (systole and diastole blood pressure).

Table 3 The result of Simple Linear Regression test. The relationship Between Uric Acid Levels and Blood Pressure (SBP and DBP).

Variable	<i>p</i>	<i>b</i>
TDS	0.907	0.168
TDD	0.108	1.376

From table 3, it determines the significant value of uric acid levels towards systolic blood pressure ($p = 0.907$) and uric acid levels towards diastolic blood pressure ($p = 0.108$). It shows that there is no strong relation between independent variable and dependent variable in this study. The result of coefficient regression indicate any addition of 1mg/dL uric acid levels will increase systolic blood pressure up to 0.168 and diastolic blood pressure up to 1.376.

Regression test in this study shows that there is no significant impact of uric acid levels to hypertensive patients both in systolic blood pressure and diastolic blood pressure. The result is proved by the table P value > 0.05 , which is $p = 0.817$ in systolic blood pressure and $p = 0.274$ in diastolic blood pressure. More specifically it can be seen from coefficient regression value. The result of coefficient regression indicate any addition of 1mg/dL uric acid levels will increase systolic blood pressure up to 0.168 and diastolic blood pressure up to 1.376.

The results of this study are not consistent compared to the results obtained by Mustazifah in 2010 which stated that patients with hyperuricemia have 16 times more likely to suffer hypertension compared to those who have normal level of uric acid and there was a significant relationship between hyperuricemia and hypertension with p value $p = 0,001$.

More specific study that had been conduct by Korea Association of Health Promotion suggest that there is no significant relationship between uric acid levels and blood pressure both in men and women aged ≥ 60 years (men $p = 0.05$; women $p = 0.12$).

The relationship between uric acid levels and blood pressure are known from many studies. But the relationship between uric acid levels and blood pressure in different age groups can not be explained yet.

In another study identifying the relationship between uric acid levels and blood pressure, it was found that the risk of hypertension is increased up to 13% with every 1 mg/dL of uric acid levels increasing, and this was more clearly to be found in younger individu and in women group (Grayson et al., 2011). The increasing of uric acid levels is significant in some conditions such as obesity, dyslipidemi, diabetes, smoker, and individu with decreased renal function in the progression of hypertension.

1.3 Relationship Between Uric Acid Levels and Hypertension

To determine the relationship between uric acid levels and hypertension this study used correlation test to identify the closeness relationship held between variables. The closeness relation in this study means the relationship between uric acid levels and blood pressure both systole and diastole. The decision made based on the spearman correlation test by comparing the significant value with a probability value (0.05). Whereas to determine the closeness relationship held between variables that are tested is views on the correlation coefficient value.

Table 4 The result of Spearman Correlation Test

Variable	<i>P</i>	<i>R</i>
SBP	0.817	0.037
DBP	0.274	0.175

According to the correlation test results table based on decision making it can be conclude that there is no significant relationship between both uric acid levels and systolic blood pressure ($p = 0.817$) and diastolic blood pressure ($p = 0.247$). Based on spearman correlation test, it is identified that correlation coefficient of uric acid levels and systolic blood pressure ($r = 0.37$) and uric acid levels and diastolic blood pressure ($r = 0.175$), this value indicates that there is almost no relationship at all between both uric acid levels and systolic blood pressure and diastolic blood pressure.

Table 4 shows that uric acid levels barely has a correlation with both systolic ($p=0.817$; $r= 0.037$) and diastolic ($p= 0.274$; $r= 0.175$) blood pressure. Similar finding also can be seen in study done by Mustafiza (2010) that stated uric acid levels has moderate correlation with systolic blood pressure ($p<0.001$, $r=0.619$) and weak correlation with diastolic blood pressure ($p<0.001$, $r=0.460$) it indicates that the higher uric acid levels the higher systolic and diastolic blood pressure.

Another study stated that there is a positive correlation between uric acid with systolic ($p=0.001$, $r=0.269$) and diastolic ($p=0.046$, $r=0.153$) blood pressure (Feigh et al., 2008). The increase in blood pressure just like in hypertension condition will reduce blood flow to the kidney. low renal blood flow will stimulate the reabsorption of uric acid. In other hand, with increase of blood pressure the risk of mycrovascular disease will also increase that can lead to tissue ischemia. After that the ischemia itself will cause the release of lactate and increase the production of uric acid. Lactate inhibits secretion of uric acid by blocking organic anion transporter in distal tubules. The decrease of uric acid's secretion also caused by reduced amount of uric acid that is delivered to renal secretory tubules. Increased production of uric acid occurs due to ischemia that caused breakdown of ATP into adenosine and xanthine which are former product of uric acid formation. As a result, the level of uric acid increase.

4. Conclusion

This study conclude that there is no relationship between uric acid levels and risk factor in hypertensive patient.

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