

CHOLESTEROL LEVEL AS PREDICTING OF URIC ACID INCREASE IN ELDERLY

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ABSTRACT

Uric acid cause inflammation accompanied deformity knees and legs. Elderly increase from 841 million in 2013 to more than 2 billion in 2050. Prevalence of uric acid in Asia regions the lowest Papua New Guinea 1% highest Marshall Islands 85% and Indonesia 18%. Uric acid is main factor predicting kidney failure. The study objective to identify risk factors for elderly uric acid in ordering impacted of volcano areas in Sleman district. Study design were used cross sectional. Population study is elderly under Pakem center health service age 50 - 95 years ordering inclusion and exclusion criteria. Sample was required 66 elderly. Blood sample 5 ml with aseptic with parameter by Easy Touch GCU. Data were collecting by 2 enumerator ordering Pakem center health service. Data were analyzed by SPSS versi 20 with statistic test linear regression with 95% Confidence interval. Mean of age 68,17±9,6 years old, body weigh 51,0±9,7 kilo, systole blood pressure 141,97±0,3 mmHg, diastolic blood pressure 75,15±10,2 mmHg, cholesterol 194,9±49,2 mg/dl, uric acid 4,9±1,3 mg/dl. Age have been predicting $\beta = 0,056$, body weigh $\beta = 0,058$, systole blood pressure $\beta = 0,07$, diastole blood pressure $\beta = 0,08$, cholesterol $\beta = 0,21$, glucose $\beta = 0,07$ being uric acid for elderly. Above normal average of blood pressure, cholesterol level, uric acid. Cholesterol level is main factor predicting of uric acid.

Keyword: *Uric acid, cholesterol, glucose, elderly.*

ABSTRACT

Asam urat menyebabkan inflamasi dan kerusakan sendi lutut dan kaki. Usia lanjut meningkat dari 841 juta tahun 2013 menjadi lebih dari 2 juta tahun 2050. prevalensi asam urat di asia terendah papuanugini 1%, tertinggi di Marshall island 85% dan Indonesia 18%. Tujuan penelitian mengetahui model risiko pada lansia terkait asam urat di wilayah dampak gunung berapi Sleman Yogyakarta. Rancangan penelitian dengan *cross sectional*. Populasi lansia di puskesmas Pakem yang berusia antara 50 - 95 tahun memenuhi kriteria inklusi dan kriteria eklusi. Sampel sebesar 66 lansia. Sampel darah 5 ml dengan teknik antiseptik dan dianalisis dengan alat *Easy Touch GCU*. Pengambilan data oleh petugas perawat di Puskesmas Pakem sebanyak 2 orang. Analisis data dilakukan dengan SPSS versi 20 dengan uji regresi linier dengan kepercayaan 95% CI : $\alpha = 0,05$. Rerata usia subjek 68,17±9,6 tahun, berat badan rerata 51,0±9,7 kilo, tekanan darah sistole 141,97±0,3 mmHg, tekanan darah diastole 75,15±10,2 mmhg, kadar kolesterol 194,9±49,2 mg/dl, Asam urat 4,9±1,3 mg/dl. Umur memprediksi $\beta = 0,056$, berat badan $\beta = 0,058$, tekanan darah sistol $\beta = 0,07$, tekanan darah diastole $\beta = 0,08$, kolesterol $\beta = 0,21$, kadar gula darah $\beta = 0,07$ terhadap kejadian asam urat pada lansia. Rerata diatas normal tekanan darah, kadar kolesterol, kadar asam urat. Kadar kolesterol merupakan faktor berkontribusi paling besar dalam memprediksi asam urat pada lansia.

Kata kunci: Asam urat, kolesterol, gula darah, lansia.

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INTRODUCTION

Uric acid is the residual metabolism result of purine that food consumed.¹ Accumulation of uric acid can trigger gout which developing arthritis. Accumulation of uric acid cause inflammation accompanied deformity knees and legs.² Uric acid is the end result of purin metabolism. Metabolism purine difficult to dissolve water, but the blood uric acid is dissolved in the form of sodium.

World population ageing 2013 estimate that elderly currently the fastest-growing of the population. Elderly expected increase from 841 million in 2013 to more than 2 billion in 2050.³ Based The United States estimate more than 5.7 million people incident of uric acid. The incidence of uric acid up to 46% and is predicted in 2030th to 8 million people.⁴ Prevalence uric acid in Asia regions total of 24 countries, that the lowest Papua New Guinea 1% and highest Marshall Islands 85%.⁵ Study in Sydney⁶ Australia that prevalence of hyperuricemia was 22.2%. Prevalence uric acid in Indonesia 18%.⁵

Previous study in Korea that average rate of hypercholesterolemia 36%.⁷ Study in China⁸ that range of risk factors mortality of elderly including obesity, hyperglycemia, high blood pressure, high triglycerides, and cholesterol. Purine metabolism dissolved under $\text{pH} > 7$. Increase 100 mg/day consumption were increasing cholesterol 2-3 mg/dl. Consuming fiber and vitamins were reduce cholesterol synthesis in the blood.² Previous study result⁹ that study that first, uric acid levels were positively associated with serum TG, TC, LDL cholesterol and the ratio of TG to HDL cholesterol. In other study, we found a positive association with triglycerides and LDL-cholesterol and a negative one with HDL-cholesterol.¹⁰ The study objective to identify risk factors for elderly uric acid in ordering impacted of volcano areas in Sleman district.

METHOD

Study design with a cross sectional. Population study as elderly (aged 50-95 years) who visited for an annual health examination in Puskesmas Pakem during Desember 2019 who elderly in inclusion and exclusion criteria.

Sample frame were collected base on medical record elderly have visited Puskesmas Pakem during December 2019. Sample was collected as 66 elderly with systematic random sampling. Participant include study were invited to health check-up in Puskesmas Pakem. Study variable such as independent variable age, weigh, systolic blood pressure, diastolic blood pressure, glucose level, cholesterol level and dependent variable is uric acid.

Blood sample were require sample venous blood (5 mL) each participant under strict aseptic precautions. Blood serum was separated for analysis of biochemical parameters. Glucose,

cholesterol and uric acid levels were analysis with “Easy Touch GCU”. Data were collected for age with popullation card data. Weight data were collected with “Xiaomi Mi Smart Scale” by calibrated. Blood pressure systole and diastole was measured twice in the right arm of subjects who had been resting for at least 10 min in a seated position using a “omran blood pressure monitor”.

Data were collecting with 2 enumerator have been certificate of health ministry from Puskesmas Pakem and 1 lecturer education staff. Before data collecting were skills training enumerator for 2 day. Training activities to ensure validity and reliability so same perception related procedure for checking blood pressure, glucose level, cholesterol level and uric acid level. Statistical analysis was performed using IBM SPSS version 20. Results are expressed as mean ± standard deviation (SD). The relationship between variable cholesterol and other with uric acid were assessed by linear regression. For assess correlation variable independent and dependent were analysis with Pearson’s correlation coefficients, *P*-value less than 0.05 was considered to be statistically significant.

RESULTS

Based data analysis of 66 elderly included with univariate, bivariate and multivariate. Variable were analyzed included gender, age, body weight, systolic and diastolic blood pressure, glucose level, cholesterol level and uric acid level. The results of data analysis are shown in the following table 1:

Table 1. Prediction of Variable Body Weight, Systole and Diastole Blood Pressure, Glucose, Cholesterol for Uric Acid Elderly

Variable	N	Mean	SD	β	constant	R ²	P
Age	66	68,17	9,6	0,236	2.610	0,056	0,056
Weight	66	51	9,7	0,24	3,183	0,058	0,052
Systole	66	141,97	0,3	0,081	4,034	0,007	0,517
Diastole	66	75,15	10,2	-0,087	5.791	0,008	0,487
Cholesterol	66	137,7	57,4	0,466	2,38	0,217	0
Glucose	66	194,9	49,2	0,082	4,64	0,007	0,511
Uric acid	66	4,9	1,3	-	-	-	-

Table 1 show the various of characteristic of participant categorized on 66 sample that A high average of age 68.17 ± 9.6 years. This condition based in aging criteria is post elderly. Average of body weight 51.0 ± 9.7 kg, it categorical condition. Average of systolic blood pressure is 141.97 ± 0.3 mmHg, which categorical is high blood pressure. Average of diastolic blood pressure is 75.15 ± 10.2 mmHg, which condition is lower. A high serum total cholesterol 194.9 ± 49.2 mm/dl, which categorical is normal high. Mean of uric acid 4.9 ± 1.3 mm/dl, which condition is normally uric acid.

Analysis regression of 66 samples for correlation uric acid that age no significant correlation with uric acid $p = 0,056$. no significant weight correlation uric acid $p = 0,052$. Systolic blood pressure no significant related uric acid $p = 0,517$. Diastolic blood pressure no significant correlation with uric acid $p = 0,487$. Glucose level no significant correlation with uric acid $p = 0,511$. Cholesterol level significant correlation with uric acid $p = 0,000$.

Based on table 1, show age was predicted uric acid 0.056 or 5.6% ($R^2 = 0,056$) to have uric acid disorder for elderly. Weight has predicted 5.8 % ($R^2 = 0,058$) have uric acid for elderly. Systolic blood pressure predicting 0.7% ($R^2 = 0,007$) uric acid for elderly. Diastole blood pressure was predicting 0.8% ($R^2 = 0,008$) uric acid for elderly. Glucose level has predicting 0.7 % ($R^2 = 0,007$) uric acid for elderly. Cholesterol level predicting uric acid 21,7% ($R^2 = 0,217$). Based Multivariate analysis that variable highest contributing for uric acid is cholesterol.

Based multivariate analysis that factor contributing increasing uric acid for elderly which increased of age every years was increasing uric acid 0,236 ($\beta = 0,236$). Increase weigh 1 kg was increase uric acid 0,24 ($\beta = 0,240$). Systolic blood pressure increase 1 mmHg was increased uric acid 0,081 ($\beta = 0,081$). Diastolic blood pressure increase 1 mmHg was decrease uric acid 0,087 ($\beta = 0,081$). Total cholesterol increase 1 mm/dl was increased uric acid 0,446 ($\beta = 0,446$). Increase glucose level 1 mm/dl was increased uric acid 0,082 ($\beta = 0,082$). Based result that main factors dominant predicting uric acid is cholesterol.

DISCUSSION

Study result that average of elderly age included categorical post elderly. Compare previous study¹¹ that average age almost same. This condition reported that in Yogyakarta province highest life time population compare other province in Indonesia.

Mean weight of elderly with normal categories. Compare other study relative same. Based systolic blood pressure with categorical high compare WHO criteria for elderly (under 140,0 mmHg).³ It compare to other studies is relative normal. Study difference compare previous study¹² That difference caused by condition of elderly an increase average blood pressure. Who conducted a review of uric acid that average blood pressure was relatively normal. This situation could be due to lower age of elderly compare.¹³The blood pressure more higher for elderly. Different result study were also shown who conducted a study of uric acid on 8.662 subject means of blood pressure was lower than this study.¹³

Cholesterol level with high categories, compare other study¹⁴ have different result that low cholesterol level for elderly. different caused this study with high average of age than other.

Glucose level (194.9 ± 49.2) it is above of normal. Glucose higher caused factors age 68.17 ± 9.6 , condition build increase glucose level. Previous study¹³ Conclude that increase of age to be related glucose intolerance cause in-balance of insulin produce.

Mean of uric acid with normal categories previous study¹⁵ that 3591 subjects prevalence of hyper-uremia only 17.5 %. It condition caused that average of weight normal result. Weight one of indicator for cholesterol level. Previous study¹⁶ That increasing uric acid is followed increasing weight loss index and is a prediction of an high uric acid. Elderly is potential for weight loss caused condition food intake in-balance.

Study result that age contribution increase uric acid but no significant correlation. It caused average of body weight participant in normal condition. Increase of age doesn't in order increasing of body weight. Previous study shown that ⁵ no significant correlation age with uric acid $p = 0,19$. It condition that uric acid caused other factors such as lipid.

Weight contribution increase uric acid, but no significant correlation. It is condition that average of weight participant with normal categories. Compare previous study have been differences that previous study¹⁶ fat and body weight level are factors associated with hyper-uremia.

Conducted a study in Malaysia found that were associated with cholesterol $p = 0.035$, low lipoprotein cholesterol $p = 0.019$ ¹⁷. Study ¹² that factors dominant for uric acid as BMI (*Body Mass Index*) OR 1.73 (1.29–2.32).

Systole blood pressure contribution increase uric acid, in other diastole decrease uric acid, but no significant contributing for uric acid. Condition caused that average of blood pressure with normal categories.

Previous study conducted that hyper-uremia was significantly related to blood pressure systolic and diastolic $p < 0.001$.¹⁸ Previous study¹⁷ concluded that conditional of hypertension are related to uric acid. Previous study¹⁹ that 3591 subjects free of hypertension for uric acid prediction that subject with hypertension in (20.7%). Differences result caused this study average blood pressure in normal condition, other more higher.

Glucose level contributing increase uric acid but, no significant. It condition caused average of body weight relative normally. Previous study¹³ that people from 50 years and above are more prone to increase glucose. Study²⁰ has been shown that rats administered with uric acid exhibited glucose intolerance, which were probably mediated by hypothalamus inflammation and neuroendocrine alterations as uric acid produces.

Study shown that cholesterol level contributing significant increase uric acid. It caused that uric acid is residual end product of purine metabolism both from food consumed and protein breakdown. Food consumed over a component of lipid fractions such as more accurate markers of dyslipidemia.

Previous study shown that significant predicting uric acid elderly such as cholesterol level. Previous study²¹ conducted a review that cholesterol related uric acid level. Study⁷ shown that

obesity significant related cholesterol. Study⁹ that positively associated with serum cholesterol and uric acid. Food consumed imbalance and control factor increased obesity. It condition lipid pathogenesis thus dyslipidemia.

Based regression analysis showed that dominant factor affecting uric acid is cholesterol level. Previous study²² total cholesterol level can be influenced by nutrition intake such as fatty food. Cholesterol level are dominant factors in increasing uric acid in elderly.

Cholesterol caused of malnutrition condition. Over consumed increased fat and body weight. It is lipid produce. Study^{23, 24} fat and body weight level are factors associated with hyper-uremia. Previous study² concluded that accumulation of uric acid in the body can trigger gout.

Study¹⁵ that LDL-C>100 mg/dl, triglyceride >150 mg/dl, HDL-C≥40 mg/dl were significant predictors of vascular complication such as purine. Residual of end product of purine metabolism both from food consumed and protein breakdown²⁵. Food consumed over a component of lipid fractions and markers of dyslipidemia. Purine overlap metabolism is makers of uric acid.

CONCLUSIONS

Blood pressure, cholesterol, uric acid level are relatively high for elderly. The dominant factor predicting uric acid elderly is blood cholesterol levels.

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