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URIC ACID/HDL RATIO (UHR) IN HYPERTENSION PATIENTS WITH COMPLICATIONS AND WITHOUT COMPLICATIONS

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ABSTRACT

Background: Uric acid can cause functional and structural changes in blood vessels that allow hypertension to occur, but there are many other triggering factors that can cause an increase in uric acid levels such as age, genetics, gender and others. Likewise with HDL levels, HDL has the ability to move cholesterol and atheroma in the arteries and transport it back to the liver for excretion and reuse. This causes high HDL levels to protect a person from cardiovascular disease and low HDL will increase the risk of heart disease and hypertension. The study aims to see the average picture of the results of the uric acid/HDL Ratio (UHR) examination in patients with hypertension with complications and without complications in Jambi City.
Method: This study used descriptive observational method with cross sectional research design. The sampling technique was carried out by purposive sampling with the inclusion and exclusion criteria. The samples of this study were 60 hypertension patients at the Putri Ayu Health Center. UHR examination was carried out in February-June 2024 at the Jambi Province Regional Health Laboratory Center using the Dialab tool.
Result: The results showed that the average UHR results in patients with hypertension with complications and without complications obtained (0.820) p value > (0.05).
Conclusion: Based on the results obtained, it can be concluded that there is no significant difference between UHR levels in hypertension patients with complications and without complications.

Keywords: Hypertension; Uric Acid; HDL; UHR

INTRODUCTION

Hypertension is one of the most common degenerative diseases and has a high mortality rate and affects a person's quality of life and productivity (Masriadi, 2016). Hypertension or high blood pressure is an increase in systolic and diastolic blood pressure above 140/90 mmHg on two measurements with an interval of five minutes in a state of rest / calm. Long-term (persistent) increases in blood pressure can damage the kidneys (kidney failure), heart (coronary heart disease) and brain (causing stroke) if not recognized early and treated appropriately (Kemenkes RI, 2014).

Risk factors for hypertension are divided into two categories, some can be controlled and some cannot be controlled. Controllable risk factors include obesity or overweight, unhealthy lifestyle and lack of physical activity, smoking, unhealthy diet, and consuming too much high sodium food. alcohol consumption, stress, diabetes and increased uric acid (hyperuricemia) (Bell K et al, 2015).

Uncontrolled hypertension will cause various complications, including myocardial infarction, coronary heart disease, congestive heart failure, stroke, hypertension encephalopathy, chronic kidney failure and hypertension retinopathy. Of the various complications that may arise if the affected is the kidney organ, kidney function will be disrupted so that the rate of removal of metabolic waste including uric acid is disrupted. This will cause a buildup of uric acid so that there will be an increase in uric acid levels (Nuraini, 2015).

Uric acid is a purine catabolism process that produces nitrogen compounds, the process of purine catabolism occurs due to two things,

namely from purines contained in food and from endogenous DNA nucleic acids. Uric acid in large quantities is excreted by the kidneys, but can also be excreted through the gastrointestinal tract, but in small amounts (Prayogi, 2017). Increased uric acid levels are caused by the body producing large amounts of uric acid while the excretion of uric acid through the urine has decreased. About 20-30% of gout sufferers are caused by purine synthesis that does not run normally, triggering an increase in uric acid levels (Chris Tanto, 2014).

The balance between production and secretion can determine the amount of uric acid levels in the blood. If the balance is disturbed, it can cause an increase in uric acid levels, which is usually called hyperuricemia (Rajagukguk et al., 2021). Hyperuresemia is a condition where a person has uric acid levels above normal values caused by excessive production and inefficient excretion of uric acid in the kidneys (Li et al, 2020). Based on Fitria's research (2015) states that there is a significant relationship between hyperuricemia and hypertension. This study is also in line with Novitasari et al (2018) which states that there is a significant relationship between hyperuricemia and hypertension. However, there are other triggering factors that cause an increase in uric acid levels such as genetics/family history, excessive intake of purine compounds, excessive alcohol consumption, obesity, hypertension, impaired renal function and certain medications (especially diuretics).

Hypertension is often accompanied by metabolic changes such as impaired glucose tolerance, hyperinsulinemia, obesity, humoral changes (increased plasma renin activity, catecholamines, aldosterone) and followed by hemodynamic changes (left ventricular hypertrophy, and impaired diastolic function). Metabolic changes that occur are caused by one of the factors influenced by low levels of High Density Lipoprotein (HDL) (Syahril et al, (2019).

HDL is one type of lipid profile and is a good fat. HDL works to transport bad cholesterol from the blood vessel endothelium so that there is no accumulation of cholesterol in the blood vessel endothelium and then transported to the liver and then disposed of through the digestive tract (Kuang H et al, 2018). HDL is referred to as good cholesterol because it can remove excess bad cholesterol from blood vessels to the liver for disposal so as to prevent thickening of the walls of blood vessels or prevent the process of arterosclerosis (Kasron, 2015).

HDL has the ability to move cholesterol and atheroma in the arteries and transport it back to the liver for excretion and reuse. This causes high HDL levels to protect a person from cardiovascular disease and low HDL will increase the risk of heart disease and hypertension. The risk of coronary heart disease (CHD) and hypertension increases by 2 to 3% for every 1.0 mg/dl decrease in HDL cholesterol (Andini, 2013). This study is in line with Syahril et al (2019) which states that HDL levels have a significant relationship with the incidence of hypertension, in people who have low HDL levels are 10 times more at risk of developing hypertension compared to people who have normal HDL levels.

Based on research conducted by Gulali Aktas et al (2022) stated that the median uric acid to HDL ratio (UHR) in poorly controlled hypertension was significantly higher than well-controlled hypertension. Other research also shows that people with low HDL cholesterol levels have high uric acid levels.

METHODS

This study used descriptive observational method with cross sectional research design. The sampling technique was carried out by purposive sampling with the inclusion and exclusion criteria. The samples of this study were 60 hypertension patients at the Putri Ayu Health Center. UHR examination

was carried out in February-June 2024 at the Jambi Province Regional Health Laboratory Center using the Dialab Autoanalyzer.

RESULTS AND DISCUSSION

This study was conducted on patients with hypertension with a total of 60 respondents at the Putri Ayu health center. Sampling and examination were carried out on May 06 - June 22 2024. The parameters observed were uric acid levels and HDL levels in hypertension patients. Respondents were then grouped based on the characteristics of the respondents sourced from the questionnaire sheet. An overview of the characteristics of respondents can be seen in the table below.

Tabel 1. Characteristics of respondents with hypertension

Characteristic		Frequency	Presentation
Gender	Man	17	28.3 %
	Woman	43	71.7 %
	Total	60	100.0 %
Age	<46	2	3.3 %
	>46	58	96.7 %
	Total	60	100.0 %
Complication status	Complication	24	40 %
	Non Complication	36	60 %
	Total	60	100.0 %

Research respondents based on gender are sgrouped into 2 categories, namely men and women. Based on table 4.1, the results of the analysis of the characteristics of respondents based on gender show that the number of female respondents (71.7%) is more than respondents with male gender (28.3%). Based on age, research respondents were grouped into 2 categories, namely <46 years and >46 years. The analysis showed that the age group >46 years had a higher percentage (96.7%) than the age group <46 years (3.3%). Based on complications, respondents with a history of no complications had a high percentage (60%) compared to respondents who had a history of heredity (40%).

3.1. Overview of UHR in Hypertension Patients with Complications and Without Complications

The data in this study were analyzed to determine the average results of UHR examination in hypertension patients with complications and without complications at the Putri Ayu Health Center, Jambi City in 2024. Previously, the Normality Test was carried out on uric acid levels and HDL levels and the results showed a p-value> 0.05 which showed that uric acid levels and HDL levels were normally distributed and then continued with the T test to see differences. While for UHR in the Normality Test is not normally distributed so it is continued with the Mann Whitney test.

3.1.1. UHR for Hypertension Patients in Jambi City in 2024

The research data were analyzed descriptively to see the average UHR in hypertension patients with complications and without complications at the Putri Ayu Health Center in Jambi City in 2024 and the following results were obtained:

Table 2. Average Uric Acid, HDL, UHR in patients with hypertension at the Putri Ayu Health Center in Jambi City in 2024

Variable	N	Median	Mean	Min	Max	Std. Deviation
Uric acid	60	4.700	5.015	2.10	10.60	1.81620
HDL	60	45.50	47.41	24.00	88.00	13.7844
UHR	60	0.0967	0.1143	0.03	0.26	0.05260

Based on the table above, it can be seen that the average percentage value of uric acid levels is in the normal range (3.4-7.0mg/dl) for men and (2.4-5.7) for women. while the average percentage of HDL levels is below the normal range (>55mg/dl) for men and (>65) for women. And the average value of the percentage of UHR in Hypertension patients in Jambi City in 2023, which is 0.1143.

3.1.2. UHR in patients with hypertension

The data from the study were analyzed using an independent T test to see the picture of UHR in Hypertension patients with

complications and without complications so that the following results were obtained:

Table 3. Average Uric Acid, HDL, UHR in patients with hypertension at the Putri Ayu Health Center, Jambi City in 2024

Variable	n	Mean	Std. Deviation	Std. Error Mean	P. value
Complications	24	5	2.16363	0.44165	
Without complications	36	4.7	1.52954	0.25492	0.218

The table above shows that the average uric acid level is higher in hypertension patients with complications. And statistical tests show a p value> 0.05, which means there is no significant difference in uric acid levels in hypertension patients with complications and without complications.

Table 4. Average HDL levels in patients with hypertension with complications and without complications

Variable	n	Mean	Std. deviation	Std. Error Mean	P. value
Complications	24	55.33	15.76917	3.21887	
Without Complications	36	42.13	9.23395	1.53899	0.000

The table above shows the average HDL level is higher in patients with hypertension with complications. and statistical tests show a p value <0.05 which means there is a significant difference between HDL levels with complicated and uncomplicated hypertension patients.

Table 5. Average UHR in patients with hypertension

Mann Whitney Test			
Variable	n	Mean	P.Value
Complication	24	29.88	
Without Complications	36	30.92	0.820

Based on the table above, it can be seen that hypertension patients without complications have a higher average UHR (0.1192) The results analyzed with Mann whitney obtained an P value (0.820). P >0.05 so it can be concluded that there is no significant difference between UHR levels in hypertension patients with complications and without complications.

CONCLUSION

The results of the research that has been carried out regarding the examination of UHR in patients with hypertension with complications and without complications in 2024 can be concluded, there is no significant difference between UHR in patients with hypertension with complications and without complications p value> (0.05).

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CONFLICT OF INTEREST

The author affirms the absence of any conflict of interest.

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