

CORRELATION TRIGLISERIDA LEVEL AND MONOCYTE IN CORONARY HEART DISEASE AT ULIN GENERAL HOSPITAL BANJARMASIN

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Abstract: Coronary heart disease (CHD) is an unbalance condition between oxygen supply and demand in heart muscle which caused by coronary artery obstruction known as atherosclerosis. Both triglyceride and monocyte have important role in the process of atherosclerosis plaque forming which cause CHD. This research aimed to analyse correlation between triglyceride level and monocyte count in patients with coronary heart disease at Ulin General Hospital Banjarmasin on August 2014-August 2015. This research is an analytical observational research with cross-sectional approach. Total sample for this research are 94 CHD patients selected by inclusion criteria. The result discovered the average rate for triglyceride level is 114 mg/dL and for monocyte count is 0,62 thousand/ μ L. Based on result of data analysis with Pearson correlation test demonstrates the value of $r=0,347$ and $p=0,01$. It can be concluded that there is weak, significant and positive correlation between triglyceride level and monocyte count in CHD patients

Keywords: triglyceride, monocyte, coronary heart disease

INTRODUCTION

Coronary heart disease (CHD) is a condition of unbalance between oxygen supply and demand in heart muscle resulting hypoxia and accumulation of metabolic waste in the heart muscle caused by narrowing of the coronary arteries due to the occurrence of atherosclerosis.¹

The World Health Organization (WHO) on 2002 recorded that more than 11.7 million people died from CHD worldwide and is expected to increase by 11 million on 2020.² Basic Health Research by the Ministry of Health on 2013 noted that the prevalence rate of CHD in Indonesia is 0.5% or about 883,447 Indonesians have CHD. Meanwhile, according to data of Basic Health Research for South Kalimantan province recorded that the prevalence rate of CHD is 1,2 or 13,612 people of South Kalimantan population have CHD.³ From preliminary study at Ulin General Hospital Banjarmasin, it was obtained that 118 patients diagnosed CHD through coronary angiography method on August 2014-August 2015.⁴

According to *the American Heart Association* (AHA), there are a lot of risk factors of CHD. One of the risk factors of CHD is dyslipidemia, which is manifested by the increase of triglyceride levels.⁵ Triglycerides are a type of fat that can be found in the blood.⁶ Triglycerides are known not to be atherogenic, but according to Matsumoto et al, high triglyceride levels can promote the occurrence of atherosclerosis.⁷ The condition of dyslipidemia also increases the number of monocytes, an agranular leukocyte cell that plays a major role in the occurrence of atherosclerosis.⁸

According to Prasetyoningsih and Adipireno's research which use observational analytic method with *cross sectional* approach, from 96 patients of CHD who became the subject of the research, it was found that there is a weak negative relationship between monocytes

with lipid profile, which showed that the increase of monocytes count decreased total cholesterol, triglyceride, low density lipoprotein, and high density lipoprotein.⁹ In contrast to research by Gower et al through a study of 40 subjects, there was a positive correlation between triglyceride levels and monocyte count.¹⁰

Based on the high cases of CHD at Ulin General Hospital Banjarmasin and there is no research on the correlation between triglyceride levels with monocytes count in CHD patients at Ulin General Hospital Banjarmasin, then prospective researchers are interested to examine it.

RESEARCH METHODS

This is an observational analytic study using cross sectional design in CHD patients at Ulin General Hospital Banjarmasin.

The populations of this research were all CHD patients at Ulin General Hospital Banjarmasin on August 2014-August 2015 taken with *purposive sampling* technique. Samples were taken based on the inclusion criteria of CHD patients. Those are patients who had never undergone catheterization of coronary intervention who have laboratory results in the form of triglyceride levels and monocyte count. Exclusion criteria are CHD patients who have undergone heart ring insertion surgery and have other diseases that can cause high levels of monocytes in the blood.

The data collected were secondary data of laboratory examination in the form of triglyceride level and monocyte count obtained from patient's medical record. The data analysis was done by Kolmogorov Smirnov normality test and continued with *Pearson* correlation test because both variables were normal distributed with 95% confidence level.

This research was conducted from May to October 2016 in the Cath-Lab section and medical records of Ulin General Hospital Banjarmasin.

RESULTS AND DISCUSSION

Based on research of correlation between triglyceride level and monocyte count in CHD patients at Ulin General Hospital Banjarmasin on August 2014-August 2015, the research samples were

94 people consisted of 74 male patients (79%) and 20 female patients (21%). The sample was taken by using *purposive sampling* technique which is in accordance with inclusion and exclusion criteria that have been determined.

Table 1 Characteristics of CHD Patients at Ulin General Hospital Banjarmasin Period August 2014 - August 2015 based on Age.

No	Category	Average ± SD Age (Years)	Oldest Age (Years)	Youngest Age (Years)
1.	All Patients	54,66±8,06	77	24
2.	Male	54,5±8,21	74	24
3.	Female	55,25±7,65	77	47

According to table 1, the oldest age of patient who became sample is 77 years, the youngest is 24 years, and the average age is 54.66 years. The average age of male patients are 54.5 years, the oldest age

is 74 years, and the youngest is 24 years. The average age of female patients are 55.25 years old, the oldest age is 77 years and youngest is 47 years.

Table 2 Characteristics of CHD Patients at Ulin General Hospital Banjarmasin Period August 2014 - August 2015 Based on Triglyceride Level and Monocytes Count.

No.	Parameter	Average ± SD	Highest	Lowest
1.	Triglycerides levels (mg/dL)	114,43±52,39	294	32
2.	Monocytes count (thousand/μL)	0,63±0,118	1,2	0,32

Table 2 showed that the average triglyceride level was 114.43 mg / dL, the highest level was 294 mg / dL and the lowest was 32 mg / dL. There is no difference from the research of Gower et al, the results obtained that the examination of triglyceride levels in the fasting state is 128 mg / dL.¹⁰ The average

of monocyte count from table 2 was 0.63 thousand / μL with the highest value of 1.2 thousand / μL and the lowest was 0.32 thousand / μL. There is no difference from Sakti's research that examined the correlation between LDL levels and monocytes count in CHD patients, the average number of monocyte counts was 0.58 thousand / μL.¹¹

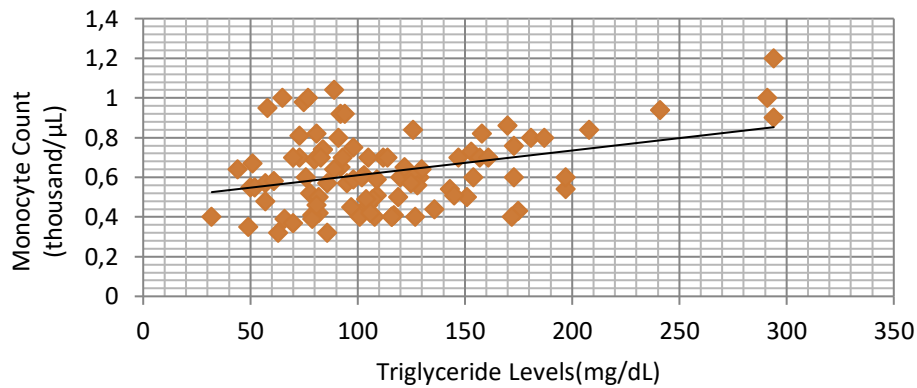


Figure 2 Graph of Correlation of Triglyceride Levels and Monocytes Counts in CHD Patients at Ulin General Hospital Banjarmasin on August 2014-August 2015.

Figure 2 is a scatter plot which shows the distribution of triglyceride level (horizontal) and monocyte count (vertical). This diagram shows a line illustrating the trend of distribution of data (best-fit line) that increases from left to right, this shows that the two variables have a positive correlation which means the increase of triglyceride levels can increase monocytes count.

The process of data analysis in this research began with Kolmogorov Smirnov normality test which showed that the data distribution of both variables is normal ($p > 0,05$), triglyceride levels ($p = 0,093$) and monocyte count ($p = 0,278$). The data analysis continued with Pearson correlation test and not significant correlation result ($p = 0,01$) with weak correlation ($r = 0,347$), therefore the result was weak, significant and positive correlation between triglyceride level and monocytes count in CHD patient at Ulin General Hospital Banjarmasin Period August 2014-August 2015. The result of this statistical test is in accordance with the original hypothesis stated that there is a positive correlation between triglyceride levels and monocytes count. The hypothesis of this research is based on the theory that the increase of triglyceride

levels can increase the regulation of monocytes in the blood circulation.¹⁰

Triglycerides take a role in promoting atherosclerosis which is the cause of CHD by increasing LDL levels formed from triglyceride metabolism in the liver. LDL then enters the layer of vascular intima tunica and oxidizes to ox-LDL. This modification of LDL causes the release of inflammatory cells such as monocytes. Monocytes will enter the intima tunica and turn into macrophages. Macrophages bind the ox-LDL that falls within the intima tunica and turns into atherosclerotic plaque that becomes the earliest stage of atherosclerosis.^{12,13}

The result of this research is in accordance with research conducted by Gower et al¹⁰, they conducted on 24 healthy people who were being given high fat foods to know the activity of inflammatory cells in a state of hypertriglyceridemia in humans. The correlation analysis between patient of triglyceride level when fasting with activity from monocyte cell using Pearson correlation test showed that there was positive correlation ($r = 0,65$) with value $P < 0,0001$. Thus, the increase of triglyceride levels can increase the activity of monocyte cells in the blood.¹⁰

Table 3 Distribution Result of Examination of Triglyceride Level with Monocytes Count in Coronary Heart Disease Patients at Ulin General Hospital Banjarmasin on August 2014-August 2015.

Examination	Normal	Abnormal
Triglyceride	74 Patients (78,72%)	20 Patients (21,28%)
Monocytes	92 Patients (97,87%)	2 Patients (2,13%)

Based on table 3, it is found that the percentage of triglyceride level and monocyte count of CHD patients at Ulin General Hospital Banjarmasin period August 2014-August 2015 is normal majority. Only 20 patients (21.28%) had abnormal triglyceride levels (> 150 mg / dL) and 2 patients (2.13%) had abnormal monocyte counts (<0.30 thousand / μ L or > 1 thousand / μ L).

The correlation result is positive which can be caused by several factors, such as factors which affect triglyceride levels and monocyte count. Triglyceride levels may be affected by diet, physical activity, and uncontrolled drug consumption history in this research.¹³

A factor that can affect monocytes count is a way of calculating the monocytes count. The method of calculation at Ulin General Hospital Banjarmasin is done by using the hematology-analyzer 5 diff tool. This calculation technique allows the change of blood morphology and lysis of monocyte because it is calculated by using a tool; therefore, the monocytes can not be calculated by objective. According to Lantis et al, clinical hematology laboratory can use manual method as validation for service to patient optimally.¹⁴

In addition, other factors that can affect monocytes are the properties of monocytes themselves. According to Mestas and Klaus, monocytes often stick to injured blood vessels.¹⁵ This means not all monocyte cells aspirated when blood test is performed.

When atherosclerosis occurs, the monocytes in the circulation will enter the tissues and differentiate into macrophages. It is also a factor that affects the monocytes count. Therefore, in this

research, the calculated monocytes may be monocytes that have not been differentiated into macrophages.¹⁶ Researchers have not been able to calculate the monocytes count before differentiating into macrophages.

Another factor that can affect the monocyte count is oxidative stress. Oxidative stress is a state of imbalance between free radicals and antioxidants. Free radicals in body can accelerate the incidence of degenerative diseases such as CHD.¹⁷ Nitric oxide (NO) levels can also affect the monocyte count. The function of NO is to inhibit platelet adhesion and monocyte in the endothelium and has a proliferative effect and vasodilation in blood vessel muscle. High levels of NO in blood will prevent atherosclerosis.¹⁸

CONCLUSIONS

Based on research result that has been done, it can be concluded that there is a correlation that weak, significant and positive between triglyceride levels with monocytes count in CHD patients at Ulin General Hospital Banjarmasin period August 2014-August 2015.

The suggestions for further research are using more sample quantities than the sample of this research; controlling the factors that may affect triglyceride levels and monocyte counts; and can be continued by calculating the levels of ox-LDL, NO, and free radicals whenever possible.

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