

RELATIONSHIP OF CK-MB LEVELS WITH TROPONIN T IN PATIENT WITH CORONARY HEART DISEASE AT SILOAM HOSPITAL JAMBI

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ABSTRACT

Background: Coronary heart disease (CHD) is one of the cardiovascular diseases which is the highest cause of death in the world. CHD occurs due to the build-up of cholesterol plaque which causes narrowing of the arteries. CHD is characterized by an increase in biomarkers, especially cardiac troponin and Creatine Kinase enzyme activity. The aim of this research is to determine the relationship between CK-MB and Troponin T in CHD patients.

Method: The type of this research is descriptive study with a cross sectional approach. The population of this study was all patients who had been clinically diagnosed with CHD by doctors at Siloam Jambi Hospital according to their medical records. The sampling technique used was a total sample technique that met the inclusion and exclusion criteria. To analyze the relationship between variables, a parametric statistical test is used, namely the Pearson correlation test.

Result: The results of the study show the average value of CK-MB activity = 46.12 IU/L and Troponin T = 359.53 ng/L. The Pearson correlation test analysis showed that there was a significant relationship between CK-MB and Troponin T ($p < 0.00001$), and the correlation coefficient (r) is 0.636.

Conclusion: The activity of the CK-MB enzyme and the levels of Troponin T enzymes have a strong relationship in CHD patients at Siloam Hospital Jambi.

Keyword: Coronary heart disease (CHD), CKMB enzyme, Troponin

INTRODUCTION

Coronary heart disease (CHD) is one of the cardiovascular diseases which is the highest cause of death in the world. Coronary heart disease occurs due to the buildup of cholesterol plaque which causes narrowing of the arteries. WHO (2020) states that as many as 1.8 million deaths are caused by coronary heart disease and this figure is expected to continue to increase to reach 23.3 million deaths in 2030 (WHO, 2021).

Many sufferers of coronary heart disease come from older age groups, as in a study conducted by Imam Maburri, et al (2015) which states that CHD is often found in elderly men, aged 51-60 years. However, it does not rule out the possibility that this disease can also attack women and those

aged <50 years. According to the National Riskesdas Report (2018), the prevalence rate in Indonesia is 1.5% or approximately 15 out of 1000 Indonesians diagnosed with CHD. Riskesdas Jambi Province (2018) shows that the highest number of coronary heart disease sufferers is female with a figure of 0.89% in the age range 66-74 years. This shows that anyone suffering from coronary heart disease can occur (Ministry of Health, 2019).

Medical record data at Siloam Jambi Hospital (2022) states that the death rate is 12 out of 217 patients who have been diagnosed with CHD who are in the inpatient ward. This figure makes patients with a diagnosis of CHD one of the disease diagnoses with the most frequent deaths that occur at Siloam Hospital Jambi every year (Medical Records of Siloam Hospital

Jambi). Even though CHD is the main killer, very few people still know about CHD and its risk factors. In epidemiology, if the risk factors for a disease are known, it will be easier to take preventive measures. Because after all prevention is better than cure (Adib, 2009).

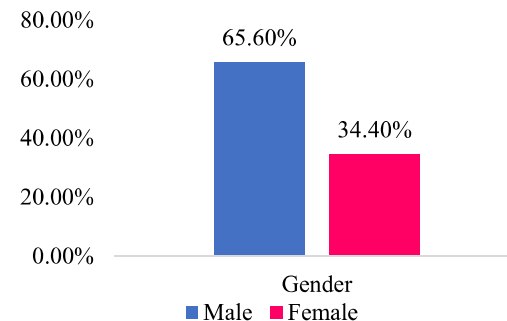
CHD is usually characterized by an increase in biomarkers, especially cardiac troponin. CHD can be prevented by doing regular exercise, regulating food intake and having regular health checks at a health facility or clinic such as checking the lipid profile (Total Cholesterol, LDL-Cholesterol, HDL-Cholesterol, and Triglycerides) in the blood, which aims to monitor and be aware of the risk of fatty plaque buildup in the vessels. Arterial blood is the main cause of CHD. Other supporting examinations such as ECG (Electrocardiography) can be used as an initial marker or determinant of a presumptive diagnosis for CHD if the sufferer experiences clinical symptoms such as shortness of breath, chest pain and so on. Further markers that serve to strengthen the diagnosis of CHD by carrying out laboratory tests include checking the levels of the cardiac enzyme CK-MB (Creatine Kinase-Myocardial Band) and Troponin T. This examination is widely used in several hospitals because these two chemical markers are almost specific and very sensitive in detecting AMI (Acute Myocardial Infarction) in coronary heart patients (Ujiani, 2014).

METHODS

This research used a descriptive analytical research method with a cross sectional approach. The study population is all patients treated at Siloam Jambi Hospital in the period July - December 2022. The research was conducted in the Clinical Pathology Laboratory at Siloam Hospital Jambi in April 2023 used secondary data by

withdrawing medical record data from patients with a diagnosis of coronary heart disease using LIS including data on examination results of CK-MB and Troponin T levels in the period June-December 2022. The sampling technique used is total sampling which is taken from the total number of populations that meet the criteria. All data is recorded in a research table. Next, editing, coding, entry and cleaning were carried out on the computer using the Statistical Program for Social Science 16.0 (SPSS).

Research data is collected in a research form that has been provided, then arranged in a master table. And the data obtained will be analyzed bivariately. To see data on the results of CK-MB and Troponin T levels, univariate analysis was carried out in the form of data on the average value and SD value (standard deviation), p value and r value. To analyze the relationship between CK-MB levels and Troponin T, a parametric statistical test was carried out, namely the Pearson correlation test.



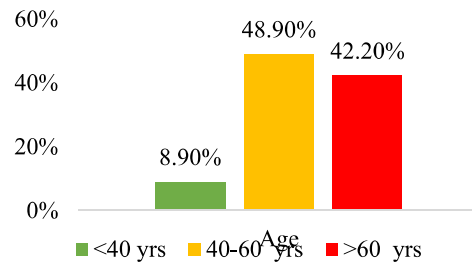
RESULTS AND DISCUSSION

The research was conducted in the Clinical Pathology Laboratory at Siloam Hospital Jambi in April 2023 used secondary data by withdrawing medical record data from patients with a diagnosis of coronary heart disease using LIS including data on examination results of CK-MB and Troponin T levels in the period June-December 2022. From the results of data collection using LIS, medical records at Siloam Jambi Hospital were obtained The number of coronary heart disease patients

treated in the period July - December 2017 was 124 patients. From 124 patients, as many data/samples were obtained 90 patients from the entire population who met the inclusion criteria.

1. General Characteristics of Research Subjects

Following General distribution of 90 samples of CHD patients at Siloam Jambi Hospital will be explained in full in the figure 1 and 2.



2. Description of CK-MB and Troponin T Examination Results

The following is an overview of the results of CK-MB and Troponin T examinations from 90 respondents with a diagnosis of coronary heart disease, which will be explained in the following diagram:

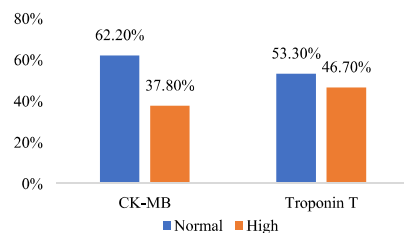


Figure 3. Distribution of CK-MB and Troponin T results

Based on figure 3. The results obtained were that most of the results from CK-MB and Troponin T examinations had more normal values than results with high (abnormal) values. CK-MB from 34 patients had high (abnormal) results, the highest results were obtained with male gender at 73.5%. Likewise, the results of the Troponin T examination obtained the highest results with male 74.4%. These results strengthen that male patient have a higher risk of

developing coronary heart disease.

3. Relationship between CK-MB and Troponin T Levels

The following table of results shows that there is a relationship between examination of CK-MB and Troponin T levels in patients with coronary heart disease at Siloam Hospital Jambi:

Table 1. Relationship between CK-MB and Troponin T Levels

| Variable | n | \bar{x} | SD | r | p-value |
|------------|----|-----------|---------|-------|----------|
| CK-MB | 90 | 46.12 | 64,540 | 0.636 | <0.00001 |
| Troponin T | 90 | 359.52 | 637,974 | | |

Based on table 1, the results were obtained from statistical analysis using the Pearson correlation test with r of 0.636. This means there is a meaningful relationship between CK-MB and Troponin T levels in CHD patients at Siloam Jambi Hospital with a strong relationship. Apart from that, the correlation results of CK-MB and Troponin T levels in CHD patients have a positive correlation, which means that the higher the CK-MB enzyme examination, the higher the Troponin T levels.

From all of patients with a diagnosis of CHD in this study, 46.7% of research subjects experienced an increase in Troponin T levels >40 ng/L and 53.3% of research subjects did not show an increase in Troponin T levels, so that the diagnosis of CHD was determined based on the results obtained. Normal is still confirmed by looking at other clinical parameters. An increase in Troponin T levels indicates heart muscle injury in CHD patients. Troponin T levels will increase within 2-8 hours after myocardial damage and reach peak levels 18-24 hours after myocardial infarction.

Apart from Troponin T, another biomarker that can be used to help diagnose CHD is CK-MB. 37.8% patients diagnosed with CHD experienced abnormalities (high) in CK-MB levels and 62.2% of patients

diagnosed with CHD showed normal CK-MB levels. An increase in CK-MB levels is an important indicator of myocardial necrosis, however CK-MB is not cardiospecific, because levels can also increase in muscle trauma and is not sensitive enough to predict AMI 0-4 hours after complaints of chest pain. CK-MB does not detect injury in patients with a long onset of myocardial infarction or small lesions who are at high risk for a person experiencing myocardial infarction and sudden cardiac death (Ibanez, 2018, Omran, 2022).

Based on the results of the correlation test analysis in Table 3.3, it was found that there was a significant relationship between Troponin T and CK-MB levels with a $p\text{-value} = <0.00001$ and a correlation coefficient (r) of 0.636. This shows that there is a significant relationship between examination of CK-MB and Troponin T levels in CHD patients with a strong level of correlation.

The results of this study are in line with research conducted by Dewi, et al (2018) which also stated that there was a significant relationship between Troponin T levels and CK-MB in Acute Myocardial Infarction patients. There is a significant relationship (positive correlation) between CK-MB and Troponin T levels with a strong level of closeness.

Troponin T and CK-MB as cardiac biomarkers are intracellular macromolecules that are released into the blood vessel circulation due to myocardial injury. This causes Troponin T levels tend to increase earlier and last longer compared to CK-MB. However, increased TnT can also occur in other clinical conditions, such as pulmonary embolism, acute heart failure, and acute peromyocarditis so that if you find an increase in Troponin T levels, this must always be interpreted according to the

context of the patient's clinical situation (Jacob, 2018).

The same thing will also happen to CK-MB which is one of the three CK isoenzymes. After the onset of myocardial infarction, CK-MB levels will increase 10-20 times the normal value. In general, CK-MB will be detected in the blood circulation within 4-6 hours after an AMI event and levels will fall again within 2-3 days. Although CK-MB measurement has been the gold standard in helping identify myocardial injuries for more than 2 decades since 1960, there is also often an increase in CK-MB levels due to non-cardiac causes such as muscle trauma. For this reason, until now examination of these two biomarkers is still often carried out on patients because they are considered effective in helping diagnose CHD if the initial myocardial damage is not known. (Nawawi, et al. 2006).

CONCLUSION

Based on the results of research conducted on Coronary Heart Disease patients at Siloam Jambi Hospital for the period July – December 2022, it can be concluded that the results showed a strong relationship between CK-MB and Troponin T levels in Coronary Heart Disease patients, with a positive correlation pattern. The higher CK-MB levels, the higher the Troponin T levels.

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CONFLICT OF INTEREST

There is no potential conflict of interest in this research.

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