

THE CORRELATION OF CKMB AND TROPONIN I WITH SHOCK INDEX IN HEART ATTACK

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Abstract

Background: Heart attack is the first deadly disease in the world. This condition characterized by the secretion of myocardial isoenzymes CKMB and Troponin I. The amount of enzyme secreted by the heart describes the number of heart muscle cells that are dying which will affect the stroke volume. Stroke volume changes influence the blood pressure, which affect the value of Shock Index (SI). The aim of this study is to know the correlation between SI with CKMB and Troponin I.

Method: We used data from previous studies, “Profil Enzim Jantung CKMB dan Troponin I pada Kejadian Infark Miokard Akut (AMI): Kajian pada Penduduk Indonesia” funded by DRPM Kemenristekdikti. The data taken included Shock Index, CKMB, and Troponin I. Data were analyzed by Pearson correlation test using Medcalc software.

Result: Total participants of this study was 36 subjects. The result of correlation test between CKMB to SI is $r = -0.1636$ ($p = 0.3478$) while Troponin I against SI is $r = -0.04149$ ($p = 0.8129$).

Conclusion: There was no significant correlation between Shock Index and CKMB Enzyme nor Troponin I Enzyme.

Keywords: CKMB, Troponin I, Heart Attack, Acute Myocard Infarct

Introduction

Heart Disease is the “Top 4 Deadly Disease non-Communicable” according to WHO and heart attack is the number 1 cause of death in the world. This heart disease can attack both men and women. In 2009 it was noted that half of men’s death rates were caused by heart disease^[1]. This heart attack can be caused by abnormalities in the heart organ such as myocardial

infarct. When a person is exposed to AMI disease, it will interfere rather than integrity between heart cell membranes. This will cause the substances contained in the cell to come out into the extracellular fluid. Troponin I and CKMB are biomarkers commonly used in diagnosis of AMI disease.^[2]

Troponin I is one of the protein subunits that play a role in the regulation of heart muscle contraction^[3]. Troponin I will be present in serum in people affected by cardiac infarction^[2,3]. Troponin I will be present in serum in people affected by cardiac infarction

CKMB (Creatine Kinase-MB) is a protein found in the heart muscle and skeletal muscle. This provides an explanation that when an increase in CKMB in the circulatory system can be caused by the Myocard Infarction or any damage to the skeletal muscle^[2].

The prognosis of a patient can be done with several predictors one of which is the Shock Index. This method was first introduced in 1996 as a marker for patients with significant injury trauma^[6]. The Shock Index indicator is also good for knowing the severity of bleeding in severe trauma patients^[5]. This method is mostly done at the Emergency Department to predict the risk of death in a critical patient^[4].

The amount of enzyme secreted by the heart describes the number of heart muscle cells that die^[7]. Deaths in heart cells will affect the work of cardiac contractility so that Stroke Volume (SV) which is the constant calculation of human blood pressure. When SV changes it will cause changes also in blood pressure. Based on the previous explanation, this will affect rather than the value of Shock Index (SI). The higher the enzyme levels secreted by the heart, the higher the Shock Index. At this writing to know how the relationship between Shock Index with Enzymes CKMB and Troponin I.

Method

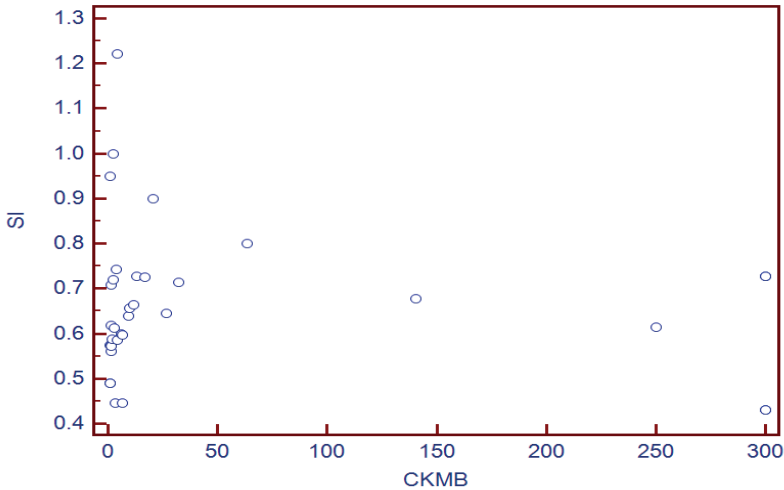
Data Collection: In this study we use cross-section method. We used data from previous studies, "Profil Enzim Jantung CKMB dan Troponin I pada Kejadian Infark Miokard Akut (AMI):Kajian pada Penduduk Indonesia " funded by Kemenristekdikti DRPM..

Variables : We take data Systolic Blood Pressure and Heart Rate which is the component of Shock Index calculation.

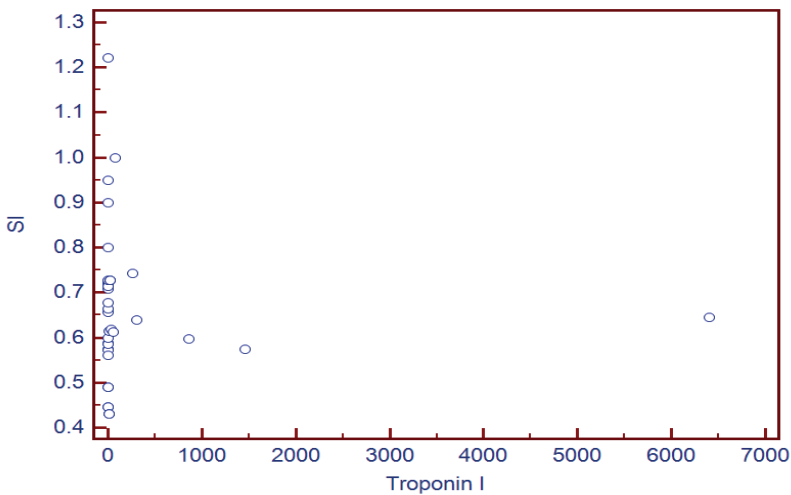
Statistical Analysis: The data taken were analyzed with Medcalc with significance taken was $p < 0.005$.

Result

A total of 36 subjects were included in the study.



After analysis, the result of correlation test between CKMB to SI is $r = -0.1636$ ($p = 0.3478$)



In the correlation analysis between Troponin I and SI obtained $r = -0.04149$ ($p = 0.8129$).

Based on the data above shows the insignificant value between the shock index value with AMI biomarker enzymes both Troponin I and CKMB.

Discussion

People with Acute Myocardial Infarct (AMI) disease will show a concentration of Troponin I and CKMB this is due to membrane disintegration and cardiac muscle degradation^[8]. AMI can cause complications of rupture of the ventricular sinister wall (0.52%), m. papillary (0.26%), and ventricular septum (0.17%)^[9]. This will affect the Blood Pressure value of a person^[10]. Biomarkers appear on the circulation system with different tempos, so it can serve as a reference when AMI attacks occur^[11].

Indicator Shock Index is obtained from the quotient between Heart Rate with Systolic Blood Pressure^[4]. In some previous studies indicated that this indicator can be used as a basis in determining the prognosis of a patient. In some previous studies indicated that this indicator can be used as a basis in determining the prognosis of a patient. The use of the Shock Index as a predictor of patient prognosis in the Emergency Department has not been done before. The results of this study show that the index can not be used as an indicator of the prognosis of patients with Acute Myocardial Infarct.

Conclusion

There is no significant relationship between Shock Index with CKMB and Troponin I Enzyme.

References :

1. (<https://www.cdc.gov/heartdisease/facts.htm>, <http://www.who.int/dg/speeches/2017/town-hall-meeting/en/>)
2. Athamneh, H., Basnawi, A., Angela, S.F. 2013. CKMB and acute myocardial infarction in the emergency department. *Letter to the editor*
3. Shah, K.S., Maisel, A.S., Fonnarow, G.C. 2017. *Troponin in Heart Failure*. Los Angeles: University of California
4. Rady, M.Y., Rivers, E.P., Nowak, R.M. 1996. Resuscitation of the Critically Ill in the ED : responses of blood pressure, heart rate, shock index, central venous oxygen saturation, and lactate. *American Journal of Emergency Medicine* 14(2).
5. Terceros-Almanza, L.J., Garcia-Fuentes, C., Bermejo-Aznaves, S., Portillo, I.J.P.d., Mudarra-Reche, C., Fuente, S.d.l., Chico-Fernandez, M. 2016. Prediction of massive bleeding, shock index and modified shock index. *Original Article*. 2173-5727.
6. King RW, Plewa MC, Buderer NMF, Knotts FB. Shock index as a marker for significant injury in trauma patients. *Acad Emerg Med*. 1996;3(11):1041-5.

7. Jaffe, A.S., Babuin, L., Apple, F.S. 2006. Biomarkers in acute cardiac disease. *Journal of the American College of Cardiology* 48(1).
8. Wu, A.H.B. 2017. Frontiers in laboratory medicine: Release of cardiac troponin from healthy and damaged myocardium. *Article in Press*. United States : University of California
9. Kutty, R.S., Jones, N.J., Moorjani, N. 2013. *Mechanical Complications of Acute Myocardial Infarction*. Cambridge: University of Cambridge
10. <https://basicmedicalkey.com/cardiovascular-system-disorders/>
11. Namer, D.M., Skali, H. 2016. *Cardiac Troponin Myocardial Infarction and More*. USA: Harvard Medical School.

