

Relationship Between Serum Albumin Levels and Troponin I Levels as Markers Of Myocardial Infarction in Heart Patients at RSUD Patut Patuh Patju

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ABSTRACT

Troponin I serves as a highly specific biomarker for assessing myocardial damage, whereas serum albumin levels reflect the nutritional, inflammatory, and systemic condition of patients. A decline in serum albumin concentrations is known to correlate with increased severity of cardiovascular disease. This study aimed to investigate the relationship between serum albumin levels and Troponin I levels as markers of myocardial infarction in cardiac patients at RSUD Patut Patuh Patju. An analytical observational study with a cross-sectional design was conducted. Sampling was executed using a purposive sampling technique, analyzing 75 medical records of heart disease patients who underwent serum albumin and Troponin I testing at RSUD Patut Patuh Patju between 2022 and 2025. Data analysis was performed using the Spearman Rank correlation test at a significance level of $\alpha = 0.05$. The mean serum albumin level was 3.56 g/dL with a minimum value of 1.9 g/dL and a maximum of 5.0 g/dL. The mean Troponin I level was 0.984 ng/mL with a range from 0.01 ng/mL to 13.356 ng/mL. The Spearman Rank correlation test yielded a probability value of $p = 0.000$ ($p < 0.05$). There is a statistically significant relationship between serum albumin levels and Troponin I levels as a marker of myocardial infarction in heart disease patients at RSUD Patut Patuh Patju.

INTRODUCTION

Acute myocardial infarction is a clinical syndrome characterized by the death of heart muscle cells due to reduced coronary blood flow, so the heart's oxygen needs are not met. This condition is caused by blockage of the coronary artery due to the rupture of an atherosclerotic plaque that triggers the formation of a thrombus (Purba et al., 2023).

According to WHO data (2021), around 17.9 million or 32% are caused by cardiovascular diseases. Ischemic heart disease accounts for 8.9 million, ranking first among global causes of death. In Indonesia, the prevalence of heart disease based on Riskesdas data (2018) reaches 1.5% (Paratama, 2024). Meanwhile, in West Nusa Tenggara Province, it is 0.49%, about 17,522 patients (Trihono, 2023).

Troponin I is a heart-specific protein biomarker that plays a role in the myocardial contraction process. Troponin I levels are not only a diagnostic marker for heart attacks but can also reflect the extent of heart muscle damage, where higher levels indicate more severe heart injury and increase the risk of cardiovascular complications (Oktabelia & Anggraini, 2022).

Serum albumin reflects nutritional status, inflammatory response, and systemic stress that occur during the disease process. Hypoalbuminemia is often found in cardiovascular diseases (Chao et al., 2022). Previous research by Yoshioka et al. (2020) indicated that serum

albumin not only reflects nutritional status but can also be used as a prognostic indicator in patients with heart disease.

Research that specifically evaluates the relationship between serum albumin levels and troponin I as a marker of myocardial damage is still limited. Therefore, this study needs to be conducted to provide scientific information about the connection between serum albumin levels and troponin I in heart patients.

MATERIALS/METHOD

This study employed an observational method with a cross-sectional design. It was conducted between May and June 2026 using medical records from Patut Patuh Patju Regional General Hospital (RSUD). The study population consisted of medical records from cardiac patients who underwent serum albumin and troponin I level testing at the hospital between 2022 and 2025. The required sample size was calculated based on correlation analysis, yielding an initial 62 samples; a 20% margin was then added to account for incomplete data, resulting in a final total sample of 75. Purposive sampling was used, meaning the samples were selected based on criteria previously considered and established by the researchers (Ani et al., 2021).

RESEARCH FINDING AND DISCUSSION

The study on the relationship between serum albumin levels and troponin I levels as a marker of myocardial infarction in heart patients at Patut Patuh patju regional hospital was conducted in May 2026 and June 2026. The study used secondary data, with at Patut Patuh patju regional hospital. The study used secondary data, with 75 sampel taken. Data collection was carried out through medical records of heart patients who had undergone examination of serum albumin and troponin I level as a marker of myocardial infarction in 2022-2025. Furthermore, data from heart patients who underwent examination of serum albumin and troponin I level as a marker of myocardial infarction were recorded and entered into a research results table and data analysis was carried out using IBM SPSS statistics.

RESEARCH RESULTS

The results of laboratory tests on serum albumin levels and Troponin I levels as markers of myocardial infarction in the study subjects are presented in detail in the following Table 1.

	Category	Quantity (n)	Percentage (%)
Age (Years)	39-54	25	33,3
	55-69	36	48,0
	70-88	14	18,7
Gender	Male	46	61,3
	Women	29	38,7
Serum Albumin Levels	Normal (3,5-5,0 g/dL)	49	65,3
	Low (<3.5 g/dL)	26	34,7
	Height (>5.0)	0	0
Average	3,56 g/dL	75	100
Up to Troponin I	Normal (<0.03 ng/mL)	5	6,7
	Height (>0.03 ng/mL)	70	93,3

Average	0,984 ng/mL	75	100
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Based on the data presented in Table 1, the descriptive analysis of 75 medical records of heart disease patients from 2022 to 2025 shows that the most common age group is 55 to 69 years, with 36 patients (48.0%), followed by the 39 to 54 years group with 25 patients (33.3%), and the 70 to 88 years group with 14 patients (18.7%). Looking at gender, male patients make up a larger proportion with 46 people (61.3%), compared to female patients who total 29 people (38.7%).

For the serum albumin level variable, 49 patients (65.3%) were within the normal range (3.5 to 5.0 g/dL), while 26 patients (34.7%) were identified as having decreased albumin levels or hypoalbuminemia (<3.5 g/dL). The data shows that no patients fell into the high albumin category (>5.0 g/dL). The average serum albumin level among 75 subjects was 3.56 g/dL, ranging from a minimum of 1.9 g/dL to a maximum of 5.0 g/dL. These results indicate that the overall average albumin level of patients is still within the normal range, although some respondents have experienced hypoalbuminemia.

Meanwhile, regarding Troponin I levels, most patients were in the high-level category (≥ 0.03 ng/mL), with 70 patients (93.3%), while the remaining 5 patients (6.7%) fell within the normal range (<0.03 ng/mL). The average Troponin I level was recorded at 0.984 ng/mL, with the lowest value being 0.01 ng/mL and the highest 13.356 ng/mL. This average confirms that Troponin I concentrations generally exceeded the reference threshold, reflecting a high occurrence of increased Troponin I levels in most of the study samples.

Table 2 Frequency distribution of serum albumin levels and troponin I levels as markers of myocardial infarction

Category	Frequency (n)	Percentage (%)
Low Albumin Levels (<3.5 g/dL)	26	34.7%
Up to Albumin normal (3.5-5.0 g/dL)	49	65.3%
Low Troponin I levels (<0.03 ng/mL)	5	6.7%
Troponin I Levels Increased (>0.03ng/mL)	70	93.3%

Based on Table 2, the frequency distribution results for 75 medical records of heart patients from 2022-2025 show that 26 patients (34.7%) experienced hypoalbuminemia (<3.5 g/dL), while 49 patients (65.3%) had serum albumin concentrations within the normal reference range (3.5–5.0 g/dL). Regarding troponin I levels, 70 patients (93.3%) had troponin I levels above the normal value (≥ 0.03 ng/mL), whereas 5 patients (6.7%) had troponin I levels within the normal range (<0.03 ng/mL).

Table 3 Results of Spearman's Rank Correlation Non-Parametric Statistical Test

Spearman's rho	Albumin serum	Correlation Coefficient	Albumin Serum	Troponin I
			1.000	-.675**
		Sig. (2-tailed)	-	.000
		N	75	75
	Troponin I	Correlation Coefficient	-.675**	1.000
		Sig. (2-tailed)	.000	-
		N	75	75

The results of hypothesis testing using the Spearman Rank correlation test identified a significance probability value (2-tailed) of $p=0.000$. Since the p-value is below the significance level $\alpha=0.05$, it is concluded that there is a statistically significant relationship between serum albumin levels and Troponin I levels in heart disease patients. The obtained correlation coefficient (r_s) of -0.675 confirms that the relationship between the variables has a strong correlation strength with a negative or inverse direction. This finding means that an

increase in Troponin I concentration in the blood will be followed by a decrease in serum albumin levels in an inverse manner, and vice versa.

DISCUSSION

This study was carried out with the aim of analyzing the relationship between serum albumin levels and Troponin I levels as a marker of myocardial infarction in heart disease patients at Patut Patuh Patju Hospital. Based on the evaluation of 75 patient medical record data for the period 2022 to 2025, the average serum albumin level was 3.56 g/dL with a concentration range from 1.9 g/dL to 5.0 g/dL. Meanwhile, the average level of Troponin I was recorded at 0.984 ng/mL with the lowest value of 0.01 ng/mL and the highest value of 13.356 ng/mL. Judging from the distribution of biochemical frequencies, as many as 26 patients (34.7%) were identified as having hypoalbuminemia. This data shows that the majority of the study sample experienced an increase in Troponin I biomarkers, while about one-third of the population experienced a decrease in serum albumin levels. The variability of albumin status and the degree of myocardial damage are affected in a complex way by the severity of cardiovascular pathology, the cascade of systemic inflammatory responses, nutritional status, and the clinical condition of each individual.

Physiologically, albumin is the main protein of blood circulation that plays a vital role in maintaining vascular oncotic pressure, transporting endogenous and exogenous substances, and having antioxidant and anti-inflammatory activities (Asyifa Adinda, 2024). In cardiovascular disease populations, a decrease in serum albumin concentration is generally triggered by suppression of liver synthesis due to increased systemic inflammatory response, escalation of oxidative stress, malnutrition status, and severe degree of tissue damage. This phenomenon of hypoalbuminemia has been shown to be closely related to the increase in morbidity and mortality rates of heart patients (Zhu et al., 2020). On the other hand, Troponin I is a cardio biomarker with high specificity to measure the degree of necrosis of myocardial cells, where the level will be excreted into the blood circulation during cardiac muscle injury (Nuraini et al., 2026).

The proof of the relationship between variables was tested using Rank Spearman's non-parametric correlation analysis. The test results produced a correlation coefficient value (r_s) equal to the significance number (p). The acquisition of this statistic confirms the existence of a quantitatively significant relationship between serum albumin levels and Troponin I levels in heart disease patients. The coefficient value indicates that the level of correlation strength is in the strong category with a negative relationship direction. This negative relationship pattern means that the lower the serum albumin level in the blood, the higher the measured Troponin I level. Thus, the research hypothesis that postulates the relationship between serum albumin levels and Troponin I as an indicator of myocardial infarction is officially accepted $r_s = -0,675$ $p = 0,000$ $p < 0,05 = 0,675$.

The negative relationship between serum albumin levels and troponin I levels can be explained through pathophysiological mechanisms in myocardial infarction. Myocardial damage provokes a systemic inflammatory response characterized by increased production of inflammatory cytokines. Increased inflammatory mediators can inhibit decreased albumin production by the liver, albumin inflammation is a negative acute phase protein. In addition, increased vascular permeability due to inflammatory processes causes the transfer of albumin from the intravascular compartment to the interstitial compartment, resulting in a decrease in serum albumin concentration. (Chen et al., 2020).

At the same time, the damage and death of myocardial cells causes troponin I to be released into the blood, resulting in an increase in the concentration of troponin I in the blood. The more severe the heart damage that occurs, the more troponin I is released into the

blood (Adista, 2025). Therefore, patients with a more severe degree of myocardial damage tend to show higher levels of troponin I accompanied by lower serum albumin levels. This mechanism supports the results of studies that show an inverse association of high correlation between serum albumin concentration and troponin I levels in heart patients.

Decreased albumin levels can also worsen the condition of the heart and blood vessels considering that albumin has antioxidant activity that plays a role in neutralizing free radicals and helping to suppress oxidative stress. Decreased albumin levels cause the body's ability to prevent oxidative damage to decrease, thereby aggravating the process of damage to endothelial and heart muscle tissue. As a result, patients with low albumin levels tend to show worse clinical conditions than patients with normal albumin levels (Pan & Chen, 2024).

The findings in this study reinforce and are in line with the results of a study published by Yoshioka et al. (2020), which prove that hypoalbuminemia is closely related to an increased risk of cardiovascular events, an escalation of pathological severity, and a high rate of *poor clinical outcomes* in patients with acute coronary syndrome and myocardial infarction. Decreased serum albumin levels have been reported as factors related to increased inflammatory responses, oxidative stress, and endothelial dysfunction that contribute to the progression of myocardial damage. On the other hand, increased levels of troponin I reflect the occurrence of more widespread myocardial injury or necrosis. Therefore, the negative relationship between serum albumin levels and troponin I levels found in this study suggests that decreased serum albumin levels tend to be accompanied by an increase in the degree of myocardial damage. Based on the results of statistical analysis, it shows a statistically significant relationship between serum albumin levels and troponin I levels as a marker of myocardial infarction in heart disease patients

CONCLUSIONS

Based on the results of a study analyzing the relationship between serum albumin concentration and Troponin I levels as markers of myocardial infarction in the population of heart disease patients at Patut Patuh Patju General Hospital from 2022 to 2025, it can be concluded that the dynamics of these two biochemical biomarkers show a relationship that is meaningful both clinically and statistically, it can be concluded that:

1. The average serum albumin level in 75 heart patients was 3.56 g/dL.
2. The average troponin I level in 75 heart patients was 0.984 ng/mL.
3. There is a statistically significant relationship between serum albumin levels and Troponin I levels as a marker of myocardial infarction in heart disease patients. This was shown based on the Spearman Rank correlation test, which gave a significance probability value of $p=0.000$, meaning this value is below the critical threshold of $\alpha=0.05$.

REFERENCE

- Adista, G. (2025). *Hubungan Troponin I Dengan Blood Urea Nitrogen (Bun) Pada Pasien Penyakit Infark Miokard Akut Di Rumah Sakit Advent Bandar Lampung*. Poltekkes Kemenkes Tanjung Karang. uri:%09<http://repository.poltekkes-tjk.ac.id/id/eprint/8389>
- Ani, J., Lumanauw, B., Tampenawas, J. L. A., Merek, P. C., Dan, P., Layanan, K., Pembelian, K., Pada, K., Ani, J., Lumanauw, B., & Ratulangi, U. S. (2021). *Tokopedia Di Kota Manado The Influence Of Brand Image , Promotion And Service Quality On Consumer Purchase Decisions On Tokopedia E-Commerce In Manado City Oleh : Fakultas Ekonomi dan Bisnis Jurusan Manajemen Jurnal EMBA Vol . 9 No . 2 April 2021 , Hal . . 9(2), 663–674. <https://doi.org/DOI:https://doi.org/10.35794/emba.v10i1.38284>*

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- Asyifa Adinda, P. (2024). *Analisis Hubungan Apache Ii Score Dengan Kenaikan Tingkat Kadar Albumin Dalam Penggunaan Infus Albumin Pada Pasien Di Ruang Intensive Care Unit (Icu) Rsud Dr. H. Abdul Moeloek Provinsi Lampung*. <http://digilib.unila.ac.id/id/eprint/84724>
- Chao, P., Cui, X., Wang, S., Zhang, L., Ma, Q., & Zhang, X. (2022). Serum albumin and the short-term mortality in individuals with congestive heart failure in intensive care unit: an analysis of MIMIC. *Scientific Reports*, 12(1), 1–8. <https://doi.org/10.1038/s41598-022-20600-1>
- Chen, Q.-J., Qu, H.-J., Li, D.-Z., Li, X.-M., Zhu, J.-J., Xiang, Y., Li, L., Ma, Y.-T., & Yang, Y.-N. (2020). Prognostic nutritional index predicts clinical outcome in patients with acute ST-segment elevation myocardial infarction undergoing primary percutaneous coronary intervention. *Scientific Reports*, 7(1), 3285.
- Jiwantoro, D. A. (2023). *Metodologi Penelitian dan Statistik Kesehatan (Untuk Jurusan Teknik Laboratorium Medis)*. Jakarta: TIM.
- Nuraini, B., Graharti, R., & Rakhman, F. (2026). Penggunaan High-Sensitivity Troponin dalam Diagnosis Dini Infark Miokard. *Medical Profession Journal of Lampung*, 16(1), 128–133.
- Oktabelia, L., & Anggraini, D. (2022). Hubungan Kadar Glukosa Darah Puasa Dengan Troponin I Pada Pasien Infark Miokard Akut. *An-Nadaa: Jurnal Kesehatan Masyarakat (e-Journal)*, 9(2), 215–221.
- Pan, D., & Chen, H. (2024). Relationship between serum albumin level and hospitalization duration following percutaneous coronary intervention for acute coronary syndrome. *Scientific Reports*, 14(1), 23883.
- Paratam, D. A. pertama. (2024). Faktor-Faktor yang Memengaruhi Kualitas Hidup Pasien Gagal Jantung Kronik Fraksi Ejeksi Terjaga (HFpEF) Rawat Jalan di RSUPN Dr. Cipto Mangunkusumo. *Jurnal Penyakit Dalam Indonesia*, 11(1). <https://doi.org/10.7454/jpdi.v11i1.1553>
- Purba, K. J., Tjiptaningrum, A., & Mustofa, S. (2023). Gambaran profil lipid pasien infark miokardium akut di RSUD DR. H. Abdul Moeloek Lampung tahun 2021. *Medical Profession Journal of Lampung*, 13(1), 151–157. <https://doi.org/DOI:https://doi.org/10.53089/medula.v13i1.573>
- Trihono, M. K. (2023). Survei Kesehatan Indonesia (SKI). In *Survei Kesehatan Indonesia (SKI)* (pp. 1–68). <https://www.badankebijakan.kemkes.go.id/hasil-ski-2023/>
- World Health Organization. *Cardiovascular diseases (CVDs)*. (2021). [https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds))
- Yoshioka, G., Tanaka, A., Nishihira, K., Shibata, Y., & Node, K. (2020). Prognostic impact of serum albumin for developing heart failure remotely after acute myocardial infarction. *Nutrients*, 12(9), 2637.
- Zhu, L., Chen, M., & Lin, X. (2020). Serum albumin level for prediction of all-cause mortality in acute coronary syndrome patients: a meta-analysis. *Bioscience Reports*, 40(1), BSR20190881.