

ASSOCIATION OF TUMOR NECROTISATION FACTOR ALPHA WITH MULTIVESSEL CORONARY DISEASE IN PATIENTS WITH ACUTE CORONARY SYNDROME

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ABSTRACT

Acute coronary syndrome (ACS) represents a clinical syndrome, which could manifest with or without changes in the electrocardiogram and with or without elevated cardiac biomarkers. ACS comprises of unstable angina and myocardial infarction with or without ST segment elevation. Depending on the presence of these signs, the treatment method for these patients is planned. In addition to the well-established cardiac biomarker troponin, tumor necrosis factor alpha can also be included in the diagnosis, as independent or in combination with the former for better diagnosis and creating a treatment plan in future cardiac events. In our study, we aimed to demonstrate the association between serum TNF- α levels and angiographic prevalence of atherosclerosis in patients with acute myocardial infarction undergoing coronary angiography and subsequent percutaneous coronary intervention. According to the results of our study, it can be seen that serum levels of TNF- α are correlated with the occurrence of acute myocardial infarction and higher values of TNF- α suggest greater involvement of the coronary arteries by atherosclerosis.

keywords: acute coronary syndrome, cardiac biomarkers, multivessel coronary disease, tumor necrosis factor alpha, cardiac troponin

INTRODUCTION

Acute coronary syndrome includes a spectrum of conditions in patients who present with recent changes in the clinical picture, with or without changes in the 12-lead electrocardiogram, and with or without acute elevated values of cardiac biomarkers, mainly cardiac troponin [1]. Patients suspected of having acute coronary syndrome (ACS) may have a clinical diagnosis of acute myocardial infarction (which may be with or without ST segment elevation) or unstable angina. The diagnosis

of acute myocardial infarction (AMI) is associated with cardiomyocyte necrosis and elevated serum cardiac troponin levels. Unstable angina (UA) is defined as myocardial ischemia at rest or with minimal physical exertion in the absence of acute injury or necrosis of cardiomyocytes. It is characterized by specific clinical signs such as prolonged angina (> 20 minutes), the appearance of new angina of a more severe degree, or angina after a previous episode of myocardial infarction [2].

Acute coronary syndrome is associated with a wide range of clinical presentations, from patients who are asymptomatic on examination to patients with prolonged chest discomfort, cardiac arrest, electrophysiological or hemodynamic instability, or cardiogenic shock [1,2]. Patients with acute coronary syndrome are further classified based on changes in the electrocardiogram and serum cardiac troponin values at examination. The indicated changes have great importance in risk stratification of patients and guide the initial treatment strategy [3].

Tumor necrosis factor alpha (TNF- α) is a pro-inflammatory cytokine that plays a critical and complex role in myocardial infarction and subsequent heart failure [4]. Elevated serum levels of TNF- α are associated with adverse cardiac remodeling, impaired pump function, and increased mortality [4,5]. TNF- α promotes atherosclerosis, impairs endothelial function, and contributes to inflammatory damage to the heart [4,5]. There are studies that confirm the role and predictive power of TNF- α in acute coronary syndrome and the occurrence of major adverse cardiac events after an episode of acute myocardial infarction [6].

MATERIAL AND METHODS

Our study was designed as an observational cohort study that included 50 patients hospitalized for acute myocardial infarction in Department of Cardiology at Clinical Hospital Stip in the period from March 2023 to June 2023.

Inclusion criteria: patients with acute coronary syndrome, hospitalized during the aforementioned period and agreeing to participate in the study and providing signed informed consent.

Exclusion criteria: patients who did not consent to participate in the study, patients who had in-hospital mortality, patients with a previous episode of acute coronary syndrome.

Demographic data, risk factors for cardiovascular disease, comorbidities, ECG signs of myocardial injury and necrosis, cardiac biomarkers, heart function data via transthoracic echocardiography, data on angiographic disposition of the disease through coronary angiography and eventual percutaneous coronary intervention and intrahospital outcome in the early period of hospitalization, were collected from the study population.

STATISTICAL ANALYSIS

IBM SPSS statistical software, version 27, was used for statistical analysis. Comparative and descriptive statistical methods such as Chi-square test for variables with dichotomous distribution, T-test and ANOVA for continuous variables with two or more defined categories, risk ratio with 95% confidence interval, ROC curves for predictive power were used. In addition to these, correlation, univariate and multivariate linear and logistic regression analyses were used to identify significantly associated variables. Significance was determined at a level of <0.05.

RESULTS

A total of 50 patients with acute myocardial infarction (AMI) who underwent successful percutaneous coronary intervention (PCI) were included in the study. Their demographic characteristics, clinical features of the disease and echocardiographic parameters of the study population are shown in the following tables.

Table 1. Descriptive statistics and demographics

Characteristic	Total (H/%) 50 (100%)
Gender	(p<0,0000)
Female	22 (44%)
Male	28 (56%)
Age (years)	61.2±9.5
HTA	40 (89%)
Diabetes mellitus	16 (32%)
Smoking	33 (66%)
HLP	35 (70%)
Obesity (BMI >30)	13 (26%)
AMI	50 (100%)
NSTEMI	20 (40%)
STEMI	30 (60%)
Biochemical characteristics	
hscTn (mean)	7289.0±9810.4
TNF- α (mean)	13.9±2.1
Stress glycemia	8.18±3.02

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Legend: HTA - arterial hypertension; HLP - hyperlipidemia; AMI - acute myocardial infarction; NSTEMI - myocardial infarction without ST segment elevation; STEMI - myocardial infarction with ST segment elevation hscTn - troponin; TNF- α - tumor necrotizing factor alpha

Table 2. Functional parameters of the left ventricle during the index event obtained by transthoracic echocardiography

LVEDd (mm)	52.3±5.0
LVESd (mm)	38.3±4.2
EF (%)	53.2±4.7
EF<40%	8 (16%)
Mid-range EF 41-49%	17 (34%)
EF>50%	25 (50%)
Diastolic dysfunction	18 (36%)

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Legend: LVEDd - left ventricular end diastolic diameter; LVESd - left ventricular end systolic diameter; EF - ejection fraction

The following table presents the angiographic disposition of the disease as shown by coronary angiography, i.e. whether there is involvement of one or more coronary arteries in the studied population.

Table 3. Angiographic staging of disease by coronary angiography

Coronary arteries in AMI	Total (H/%)
	50 (100%)
MonoVD	40 (80%)
MVD	10 (20%)

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Legend: AMI - acute myocardial infarction; MonoVD - monovessel disease; MVD - multivessel disease

The following table presents the mean value of TNF- α in the two subclasses of patients with acute myocardial infarction.

Table 4. TNF- α values in relation to angiographic disease disposition

Biochemical characteristics	Total (H/%)
	50 (100%)
TNF- α at MonoVD	12.5±2.2
TNF- α at MVD	14.3±1.9

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Legend: TNF-a - tumor necrotizing factor alpha, MonoVD - monovessel disease; MVD -multivessel disease

DISCUSSION

Our research identified the following risk factors for the occurrence of acute myocardial infarction: age, hyperlipidemia, arterial hypertension, and diabetes mellitus. In one study, it was proven that patients who

have one or more of these comorbidities have a much higher risk of developing acute myocardial infarction with a more severe clinical picture and greater anatomical localization of atherosclerosis [7].

This study showed that the majority of patients with acute myocardial infarction have a left ventricular ejection fraction >50%. This represents a good basis for monitoring these patients for possible future occurrence of cardiac adverse events, primarily the occurrence of heart failure after an episode of acute myocardial infarction, which is a common complication in this patient population. TNF- α has been shown to be an important prognostic factor in these patients [8].

Regarding the geographical distribution of atherosclerosis in the studied patient population, it was shown that in 10% more than one coronary artery was affected. In the same population, mean TNF- α levels are higher than in patients with single coronary artery disease. Several studies have reported results that support this claim [9,10].

CONCLUSION

The serum value of TNF- α alone and/or in combination with previously proven cardiac biomarkers, as well as clinical and paraclinical methods for the diagnosis of acute myocardial infarction, can be used to optimize the therapy of patients with AMI, also to improve the prevention of adverse cardiac events after an episode of acute coronary syndrome.

LITERATURE

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