Changes of Acylating Stimulating Protein (ASP) and Blood Lipid in Patients with Acute Myocardial Infarction

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Abstract: **Objective:** To study the changes of acylating stimulating protein (ASP) and blood lipid in patients with acute myocardial infarction. **Method:** There were three groups,25 cases of acute myocardial infarction patients (acute myocardial infarction group), 32 cases of coronary heart disease patients without myocardial infarction (CHD group) and 30 cases of healthy people (control group). They respectively detected the ASP, low density lipoprotein cholesterol (LDL-C), triglyceride (TG), total cholesterol (TC) and high-density lipoprotein cholesterol (HDL-C), and analyzed the correlation between them. **Results:** (1) ASP, TG, TC and LDL-C of acute myocardial infarction group and coronary heart disease group were significantly higher than those of control group, while HDL-C was lower than control group, the difference was statistically significant ($P < 0.05$). (2) TG in coronary heart disease group was higher than that in acute myocardial infarction group, while ASP, TC, LDL-C and HDL-C had no significant difference. **Conclusion:** ASP and blood lipid are risk factors of CHD, ASP can be used as risk index of CHD. There was no significant difference in plasma ASP between patients with acute myocardial infarction and patients with coronary heart disease without myocardial infarction. ASP cannot be used as a surrogate marker of acute myocardial infarction.

Keywords*:* Acute Myocardial Infarction; Acylating Stimulating Protein; Blood Lipid

Introduction

Acylation Stimulating Protein (ASP) is a fatty hormone produced by fat cells, which increases glucose transport, fatty acid esterification, and triglyceride (TG) synthesis. Acylating stimulating protein is produced in the alternative pathway of complement system activation. In the process of tissue injury, complement C3 interacts with lipase to produce C3a, which is rapidly cleaved by plasma carboxypeptidase to produce acylating stimulating protein [1]. Acylating protein is positively correlated with dyslipidemia, insulin resistance, obesity and coronary heart disease [2]. A number of studies have shown that multiple complement bodies, including C3, C4, C5B-9, etc. after acute myocardial infarction are much higher than those of normal people. It suggests that myocardial infarction may be closely related to the activation of complement system [3]. Some studies have shown that the changes of ASP are positively correlated with troponin I in patients with acute myocardial infarction and ASP can be used as a substitute marker for patients with acute myocardial infarction [4]. Although at present the pathogenesis of coronary heart disease have different studies and theories, but lipid metabolic abnormalities is still the most main risk factor for coronary heart disease. Whether it is low density lipoprotein cholesterol (LDL - C) which is the most focused in clinic at present, or triglyceride (TG), total cholesterol (TC), high-density lipoprotein cholesterol (HDL - C), they all play an important role in the occurrence and development of coronary heart disease. Studies have shown that patients with different types of coronary heart disease have certain differences in abnormal lipid metabolism [5]. In this study, the correlation between ASP and blood lipid among patients with acute myocardial infarction, patients with non-myocardial infarction coronary heart disease and healthy people were analyzed to explore the relationship between ASP, blood lipid and

acute myocardial infarction and the influence of ASP on the occurrence and development of coronary heart disease.

1. Objects and Methods

1.1 Objects

A total of 57 patients were selected from cardiology of Shandong second provincial general hospital in January 2020 - July 2021. They were divided into two groups,25 cases of acute myocardial infarction group, 32 cases of coronary heart disease group. All the 25 patients in the acute myocardial infarction group met the diagnostic criteria of the Guidelines for the Diagnosis and Treatment of acute myocardial infarction, including 16 males and 9 females, with an average age of (61.67±10.30) years. The patients of coronary heart disease group were all done coronary arteriography.There was at least a 50% or greater narrowed coronary arteries, including 27 cases of unstable angina, 4 cases of chronic stable angina, 1 case of latent coronary artery disease,but ruled out in patients with acute myocardial infarction.This group was including 20 males and 12 females, with an average age of (66.45-13.27) years. Other exclusion criteria for both groups were valvular heart disease, malignancy, infectious disease, autoimmune disease, and severe hepatic and renal insufficiency. In addition, 30 healthy volunteers were selected as the control group, including 18 males and 12 females, with an average age of (62.55±9.40) years. All subjects had no history of taking lipid-regulating drugs within 6 months. There was no significant difference in age, gender and other general information among the three groups, which was comparable.

1.2 Methods

All subjects were fasted at night and venous blood was taken the next morning. In the acute myocardial infarction group, the onset time was different at admission, but venous blood was taken within 72 hours after the onset. Serum ASP was determined by enzyme-linked immunosorbent assay (ELISA), and TG, TC, HDL-C and LDL-C were determined by enzyme-conjugate method.

1.3 Statistical analysis

Data were analyzed by SPSS 22.0 statistical software, and measurement data were expressed as $\bar{x} \pm s$. Differences between groups were compared by independent sample T test, and $P < 0.05$ was considered statistically significant.

2. Result

It was found that ASP, TG, TC and LDL-C in acute myocardial infarction and coronary heart disease groups were significantly higher than those in control group, while HDL-C was lower than those in control group. There was no significant difference in ASP between acute myocardial infarction group and coronary heart disease group. TG in CHD group was higher than that in AMI group, TC, LDL-C and HDL-C had no significant difference. See table 1.

Table 1 Comparison of ASP and blood lipid among three groups

	AMI (n=25)	CHD (n=32)	Control (n=30)
ASP（ng/ml）	57.50±22.63*	61.67±19.72*	43.81±14.05
TG（mmol/L）	2.15±0.99*#	2.93±1.23*	1.43±0.64
TC（mmol/L）	4.29±1.00*	4.37±1.20*	3.85±0.42
LDL-C（mmol/L）	3.14±0.78*	3.30±1.04*	2.49±0.51
HDL-C（mmol/L）	1.16±0.31*	1.22±0.33*	1.37±0.27

*vs control group，$P<0.05$；#vs CHD group，$P<0.05$

3. Discussion

The relationship between dyslipidemia and coronary heart disease has been well proved, and the increase of triglyceride is one of the independent risk factors of coronary heart disease. Acylating stimulating protein can activate phosphodiesterase of adipocytes, stimulate adipocytes to store triglycerides and inhibit lipolysis, so serum acylating stimulating protein is strongly correlated with triglyceride level and weakly correlated with low density lipoprotein cholesterol [6]. In this study, ASP, TG, TC and LDL-C were significantly increased and HDL-C was decreased in both acute myocardial infarction and coronary heart disease groups,suggesting that dyslipidemia is correlated with abnormal ASP, which are all risk indicators of coronary heart disease. The study of Sivakumar K et al. [7] showed that ASP receptor dysfunction led to delayed clearance of triglycerides in the body and resulted in hypertriglyceridemia and low HDL-C, which led to the increase of TG/HDL-C and further affected the change of LDL-C, ultimately led to the occurrence of coronary heart disease.

A number of studies have confirmed that in the early stage of acute myocardial infarction, blood lipids will decline and gradually recover with the evolution of the disease [8-10]. This study did not follow up and observe the changes of blood lipid in patients with acute myocardial infarction, but in the comparison of blood lipid between the coronary heart disease group and the acute myocardial infarction group, it was found that the TG of the coronary heart disease group was significantly higher than that of the acute myocardial infarction group, which supported the viewpoint of decreased blood lipid in patients with acute myocardial infarction.

Some studies have shown that ASP can be used as a substitute marker for acute myocardial infarction [3], but this study did not reach the same point of view. ASP is closely related to lipid metabolism. From the perspective of the mechanism of action, the increase of ASP can accelerate the storage of triglyceride, reduce serum triglyceride concentration, and has the greatest influence on the change of triglyceride. In this study, triglyceride in the acute myocardial infarction group was significantly lower than that in the coronary heart disease group, but ASP concentration did not increase to the same extent, indicating that the change of triglyceride in patients with acute myocardial infarction was not directly related to ASP.

The close relationship between ASP and lipid metabolism determines the role of ASP in the pathogenesis and development of CHD. Further research will help to reveal the mechanism of abnormal lipid metabolism and provide new ideas for the prevention and treatment of CHD.

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