Pisco Med Publishing

The Correlated of Serum Neutrophil Gelatinase Associated Lipid Transport Protein Levels and the Acute Coronary Syndrome

Li Yan

Shaanxi Provincial People's Hospital, Xi'an 710004, China.

Abstract: Objectives: To study the serum neutrophil gelatinase associated lipid transport protein levels and coronary heart disease. **Methods:** 39 enrolled patients were divided into acute coronary syndrome (ACS) group (20 cases) and stable angina pectoris (control) group (19cases) according to the clinical manifestation and angiographic results. High-density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C), alanine aminotransferase (ALT), glutamic oxalacetic transaminase (AST), serum creatinine (Cr), Serum neutrophil gelatinase associated lipid transport protein (NGAL) were measured by Elisa test. And calculated the Genisi score of every patient. The association of NGAL with severity of coronary heart disease was studied. **Results:** that there were no significant differences in age, gender, BMI, smoking, hypertension, diabetes, ALT, TG, LDL-C and Cr between the control group and ACS group(P>0.05). The difference of Gensini score, NGAL, AST were statistically significant(P>0.01). The ordered Logistics regression analysis showed that the NGAL was an independent risk factor for coronary heart disease. **Conclusion**: NGAL may serve as an independent risk factor of CHD.

Keywords: Serum Neutrophil Gelatinase Associated Lipid Transport Protein; Coronary Heart Disease; Gensini Score

Introduction

Acute coronary syndrome is still a threat to national health, which is one of the most common cardiovascular disease [1]. The main pathogenesis is that the unstable plaque ruptured causing thrombosis. While the plaque formation is closed related to inflammation [2]. The Serum neutrophil gelatinase associated lipid transport protein (NGAL) was isolated from the neutrophils, and NGAL was related with the inflammation [3-4]. A mount of research found that NGAL was related to atherosclerosis, and the death rate of acute coronary syndrome [5]. Therefore, this article will discuss the relationship between the NGAL and coronary heart disease. To provide a theoretical basis for its clinical application.

Method

Study population

39 randomized controlled patients were admitted to the cardiovascular department of Shaanxi Provincial People's Hospital, and were diagnosed with acute coronary syndrome. 20 patients had acute coronary syndrome, 19 patients performed coronary angiography and the narrowing of coronary vessels was between 50%-75%. ACS diagnostic criteria follow the newest guildlines [6].

Gensini scoring was used to assess the severity of coronary stenosis. The results of the coronary angiography were evaluated by two cardiologists. The specific judgments were as follows: the stenosis degree of each coronary artery was quantitatively assessed. First, the basic score was determined according to the severity of coronary artery stenosis. The narrowing of coronary lumen was rated 1 point for 25% stenosis, 2 points for 25%-50%, 4 points for 50%-75%, 8 points for 75%-90%, 16 points for 90%-99%, 32 points for 99%-100%. And then the corresponding coefficients are determined according to different

coronary branches respectively left main (LM) lesion× 5; Left anterior descending artery (LAD) lesions proximal×2.5, middle×1.5, distal×1; Diagonal branch lesions D1×1, D2×0.5; Left circumflex branch (LCX) lesions proximal segment×2.5, middle×1, distal segment×1; Right coronary artery (RCA) lesions: proximal, middle, distal and posterior descending branch ×1. Coronary stenosis basic score× lesion coefficient=the vascular score, and the sum of the scores of all diseased vessels was the total score.

Blood samples

All the patients were fasted for 8-10 h, and the peripheral venous blood was collected the next morning. The levels of high-density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C), alanine aminotransferase, glutamic oxalacetic transaminase, serum creatinine, Serum neutrophil gelatinase associated lipid transport protein were measured by Elisa test.

Statistical analysis

SPSS 26.0 statistical software Processed the data. Continuous data were expressed in terms of mean ±SD, categorical data were expressed as percentage values. The differences in measurement data were compared with the T test. Calculators information used a chi-square test. The ordered Logistics regression analysis was used to study the correlation between severity of coronary heart disease and data. P<0.05 were considered statistically significant.

Result

Comparison of general clinical data between the two groups showed that there was no significant difference in age, gender, BMI, smoking, hypertension, diabetes, alanine aminotransferase (ALT), triglyceride (TG), LDL cholesterol (LDL-C) and Creatinine (Cr) between control group and ACS group(P>0.05). The difference of Gensini score, neutrophil gelatinase associated lipid transport protein (NGAL), glutamic oxalacetic transaminase (AST) were statistically significant(P>0.01). as shown in Table1.

Table1.The Baseline characteristics and biochemical and hematological data

	Control Group	ACS Group	T or χ^2	P
Age	65.68±10.53	59±10.98	-1.938	0.06
Men (%)	7(36.8%)	12(60%)	1.261	0.260
BMI	25.91±3.9	25.23±3.17	-0.692	0.494
Hepertension, n (%)	15（78.9%）	13（65%）	0.374	0.541
Diabetes mellitus, n (%)	3(15.8%)	8(40%)	1.751	0.186
Smoking, n (%)	4(21%)	3(15%)	0.006	0.94
ALT	24.68±18.46	28.4±12.96	0.731	0.470
AST	23.52±10.77	67.29±53.46	3.496	0.001
TG	1.82±0.89	2.11±1.13	0.877	0.386
LDL-C	2.27±0.79	2.58±1.12	0.987	0.330
Creatinine, umol/l	66.78±24.27	65.4±19.63	-0.196	0.846
NGAL	201.7±63.2	132±47.1	3.889	0.000

Gensini score	9.18±5.80	81.87±30.54	10.195	0.000

The ordered Logistics regression analysis of the correlation between the severity of coronary heart disease and other factors. Coronary heart diseases were divided into miles, moderate and severe according to the Gensini score. The degree of coronary heart disease was as dependent variables and the gender, BMI, smoking, hypertension, diabetes, ALT, AST, TG, LDL-C, NGAL, Cr as self-variable. The results showed that the NGAL was an independent risk factor for coronary heart disease. as shown in Table2.

Table2. The ordered Logistics regression analysis of coronary heart disease

	β	SE	Wald	P	OR	95% CI
BMI	-0.733	0.748	0.96	0.327	1.99	-2.199 ~ 0.733
ALT	-0.262	0.188	1.95	0.163	0.712	-0.629 ~ 0.106
AST	-0.001	0.037	0.001	0.969	0.0027	-0.074 ~ 0.071
TG	-1.121	2.558	0.192	0.661	3.047	-6.134 ~ 3.892
LDL	1.043	2.807	0.138	0.71	2.835	-4.458 ~ 6.544
NGAL	0.402	0.149	7.254	0.007	1.093	0.11 ~ 0.695
CR	0.081	0.122	0.445	0.505	0.22	-0.157 ~ 0.32
Gender	6.526	7.71	0.716	0.397	17.74	-8.586 ~ 21.638
Hypertension	2.843	5.294	0.288	0.591	7.728	-7.534 ~ 13.22
Diabetes	6.577	6.682	0.969	0.325	17.878	-6.52 ~ 19.674
Smoke	7.534	4.601	2.681	0.102	20.48	-1.484 ~ 16.552

Discussion

NGAL is normally expressed in human neutrophils liver parenchyma cells, renal tubular epithelial cells and vascular endothelial cells in the cardiovascular system. NGAL can regulate inflammatory response, affect matrix metalloproteinase activity, regulate cell energy metabolism, and influence the occurrence and development of CHD and other cardiovascular diseases [7]. Study showed that NGAL was a predictor and independent risk factor of all-cause death from cardiovascular disease and combined endpoints [8].

In our study we found that NGAL, AST and Gensini scores in the ACS group were higher than the control group(P<0.05). The difference was statistically significant, which were closely related to the severity of the coronary heart disease. We divided Gensini score into three groups: 0-30 mild, 31-60 moderate, >60 severe. Taken the severity of coronary heart disease as the dependent variable, gender, BMI, smoking, hypertension, diabetes, alanine aminotransferase, glutamic oxalacetic transaminase, triglyceride, LDL cholesterol, NGAL, Creatinine as self-variable, orderly logistics regression showed that NGAL was the independent risk factor of the severity of coronary heart disease.

An increase in NGAL concentration was associated with atherosclerotic plaque instability and inflammation [9-10]. By binding to MMP-9, NGAL affects the instability of atherosclerotic plaque [11-12]. Continuously increased NGAL and MMP-9, resulted in lots of instability atherosclerotic plaque, which generate ACS events. Although more mechanisms remain unclear, we need to further study.

In conclusion, NGAL was an independent risk factor with the coronary heart disease, and related to the severity of it, can predict coronary artery severity. Provide new ideas for clinical practice.

References

[1] Eisen A, Giugliano R P, Braunwald E. Updates on acute coronary syndrome: a review[J]. JAMA cardiol, 2016, 1(6):718-730.

[2] Budzianowski J,Pieszko K Burchardt P,et al. The role of hematological indices in patients with acute coronary syndrome [J]. Dis Markers, 2017.
[3] Kjeldsen L, Johnsen AH, Sengelov H, Borregaard N. Isolation and primary structure of NGAL, a novel protein associated with human neutrophil gelatinase. J Biol Chem 1993; 268: 10425-32.
[4] Gouweleeuw L, Naudé PJ, R ots M, et al. The role of neutrophil gelatinase associated lipocalin (NGAL) as biological constituent linking depression and cardiovascular disease [J]. Brain Behav Immun, 2015, 46: 23－32.
[5] Nymo SH, Hartford M, Ueland T, et al. Serum neutrophil gelatinase-associated lipocalin (NGAL) concentration is independently associated with mortality in patients with acute coronary syndrome. Int J Cardiol. 2018; 262:79-84.
[6] Barstow C, Rice M, McDivitt JD. Acute Coronary Syndrome: Diagnostic Evaluation. Am Fam Physician. 2017;95(3):170-177.
[7] SOYLU K, NARG, AKSAN G, et al. Serum neutrophil gelatinase-
associated lipocalin levels and aortic stiffness in noncritical coronary artery disease [J]. Cardiorenal Med,2014,4 (3 /4): 147.
[8] Daniels LB, Barrett-Connor E, Clopton P, et al. Plasma neutrophil gelatinaseas sociated lipocalin is independently associated with cardiovascular disease and mortality in community-dwelling older adults: The Rancho Bernardo Study[J]. J Am Coll Cardiol,2012,59(12):1101-1109.
[9] Hemdahl AL, Gabrielsen A, Zhu C, et al. Expression of neutrophil gelatinase-associated lipocalin in athero sclerosis and myocardial infarction [J]. Arterioscler Thromb Vasc Biol, 2006, 26 (1): 136-142.
[10] Galis ZS, Khatri JJ. Matrix metalloproteinases in vascular remodeling and atherogenesis: the good, the bad, and the ugly [J]. Circ R es, 2002, 90(3): 251 -262.
[11] Sahinarslan A, Kocaman SA, Bas D, et al. Plasma neutrophil gelatinase-associated lipocalin levels in acute my ocardial infarction and stable coronary artery disease [J]. Coron Artery Dis,2011,22(5): 333 － 338.
[12] Helanova K,Spinar J, Parenica J. Diagnostic and prognostic utility of neutrophil gelatinase-associated lipocalin (NGAL) in patients with cardiovascular diseases—review [J]. Kidney Blood Press R es, 2014, 39(6): 623 -629.