Effects of Personality Traits and Serum Lipid Levels on Myocardial Enzyme of Angina Patients

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【Abstract】 Objective: To examine the effects of personality traits and serum lipid levels on myocardial enzyme of angina patients. Methods: Total 155 subjects including 45 unstable angina patients, 60 stable angina patients and 50 healthy individuals were enrolled in the study. Type A personality, type D personality were assessed. Blood samples were taken to assess levels of serum lipid and myocardial enzyme including troponin I(CTNI), creatine kinase isoenzyme(CKMB), lactate dehydrogenase(LDH) and lactate dehydrogenase1(LDH_1). Results: Unstable angina patients had lower level of serum high-density lipoprotein(HDL), higher sub-dimensions scores of type A and type D, and higher level of serum myocardial enzyme than stable angina patients and the healthy control. HDL was negatively correlated with LDH_1, Time Hurry was positively correlated with LDH and LDH_1, Competitive and Hostility were positively correlated with LDH. There was no significant association between type D personality and serum myocardial enzyme level. The η^2 of HDL and those personality traits on serum myocardial enzyme ranged from 0.125 to 0.039, indicating both HDL and personality traits had medium or small size effects on serum myocardial enzyme levels. Conclusion: Lower level of serum HDL, Time Hurry and Hostility of type A personality may contribute to myocardial injury in CHD.

【Key words】 Personality trait; Myocardial enzymes; Lipid

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人格特征与血脂水平对心绞痛患者心肌酶的影响

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【摘要】 **目的：**探讨人格特征和血脂水平对心绞痛患者心肌酶的影响。**方法：**采用调查法对45例不稳定型心绞痛患者、60例稳定型心绞痛患者和50例健康人进行A型和D型人格问卷检测，同时检测血脂、肌钙蛋白I(CTNI)、肌酸激酶同工酶(CKMB)、乳酸脱氢酶(LDH)及乳酸脱氢酶1(LDH_1)水平。**结果：**与稳定型心绞痛和健康对照组比较，不稳定型心绞痛患者血清高密度脂蛋白水平显著降低；A型人格和D型人格得分、血清心肌酶水平显著升高。血清高密度脂蛋白水平与LDH_1显著负相关，时间紧迫感与血清LDH、LDH_1水平显著正相关，竞争和敌意与血清LDH水平显著正相关；D型人格特征与血清心肌酶水平无显著相关。高密度脂蛋白、时间紧迫感、竞争和敌意对心肌酶的效应值分布在0.125-0.039之间，为中等和较小效应值。**结论：**血清高密度脂蛋白、时间紧迫感和敌意与冠心病心肌损伤密切相关。

【关键词】 人格特征；心肌酶；血脂

1 Introduction

There is a growing interest in the role of personality as a contributing factor to the increased risk of cardiovascular disease(CVD) progress and mortality[1, 2]. Type A personality is characterized by a chronic struggle to achieve goals. Studies had yielded a relationship between Type A personality and CVD[2]. However, others had failed to show a contribution of Type A personality to CVD[3, 4]. Type D personality, being characterized by negative affectivity and social inhibition, was thought to have a prognostic relevance of CVD[1]. But, one study pointed out that Type D personality was only a strong predictor of persistent depressive symptoms of CVD[5]. Given the inconsistent findings in the relevant

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literature, it is important to include objective markers when studying the influence of personality on CVD.

Early evidence suggested that Type A personality was an independent risk factor for left ventricular hypertrophy in male patients[6,7]. Recent literature indicated that competitive and hostility were the basic destroying factors in Type A personality because they were strongly associated with dysfunction of autonomic nervous system and disturbance of metabolism such as higher heart rate and blood lipid level[8-10]. In addition, one study showed that the incidence of coronary artery ischemia in Type A personality group was higher than that in Non-Type A personality group, the ischemic change of ECG ST-T in Type A personality group was associated with the changes of coronary angiographic ischemia[11]. These studies suggested that it is more beneficial to analyze the relationship between biomarkers of CVD and type A personality.

Many studies documented that Type D personality could partially account for prognosis of CVD[1]. CVD patients with Type D personality have higher cardiovascular and endocrine reactivity under acute stress[12-14]. A five year follow-up study reported that CVD patients with Type D personality had an increased risk of death as compared to patients with non-Type D personality [15]. Another study pointed out Type D personality negatively affects the health status of heart failure patients [16]. However, the mechanism that links Type D personality with poor clinical outcomes of CVD patients is not clear.

In addition to personality traits, blood lipid is clearly regarded as central dangerous factor of poor clinical outcomes of CVD patients[17]. Lower level of serum high-density lipoprotein and higher level of serum low-density lipoprotein could predicate onset and progression of heart ischemia in patients with CVD[18]. Serum myocardial enzymes level is considered to be a biomarker of myocardial injury after heart ischemia[19-21]. Angina, often marked as severe pain in the chest due to lacking of myocardial oxygen, is the major symptom of CVD. Patients with CVD may have stable angina or unstable angina according to the degree of myocardial ischemia. To date, limited number of studies examined the relationship between personality traits, serum lipid levels and myocardial enzyme levels of angina patients. The aim of this study is to compare the scores of type A and D personality traits between patients with stable angina, unstable angina and control group, to examine the associations between type A and D personality traits, serum lipid and serum myocardial enzymes levels and the effects of personality traits and serum lipid on serum myocardial enzymes of patients.

2 Methods

2.1 Participants

Total 155 participants(60 stable angina patients, 45 unstable angina patients and 50 healthy individuals) were recruited in this study. Patients were recruited from an affiliated hospital of university in China. Patients were newly diagnosed with coronary heart disease, either as unstable angina patients, or stable angina patients, according to 2007 European American Society of Cardiology diagnosis standards and coronary angiography. 50 healthy individuals without prior history of CHD according to self-report indication were also recruited from the general population to match the demographic characteristics of the patient groups. Exclusion criteria included ①presence of other life-threatening co-morbidities, ②insufficient knowledge of written or spoken Chinese language, ③cognitive impairment, and ④chronic severe psychiatric condition(except for depression or anxiety). Ethical approval for the study was obtained from the Institutional Ethics Committee of the Medical School of Shandong University and written consent was obtained from each subject.

2.2 Measures

2.2.1 Demographic and general clinical variables Demographic variables including gender, age, educational level, and employment state were assessed. General clinical variables consisting of height, weight, systolic blood pressure, diastolic blood pressure were obtained from the patients' medical records.

2.2.2 Type D personality Type D personality was assessed by means of the type D scale Chinese version (DS14-CV)[22], a 14-item questionnaire consisting of two subscales: Social Inhibition(SI) and Negative Affect (NA), each comprising 7 items. Items are answered on a 5-point Likert scale. Cronbach's α of negative affec-

tivity and social inhibition are 0.92 and 0.79.

2.2.3 Type A personality The Chinese version of the Type A Behavior Questionnaire(TABQ) was used to determine patients' behavior type[23]. TABQ contains 60 items divided into 2 subscales: Time Hurry(TH) and Competitive and Hostility(CH). The Cronbach's α of time urgency and hostility are 0.63 and 0.70.

2.2.4 Serum lipid and myocardial enzyme measurement Blood samples from the subjects were collected in the morning the day after admission. Serum lipid including cholesterol(Cho), triglycerides(TG), high-density lipoprotein(HDL), and low-density lipoprotein(LDL) was measured using enzyme method. Cardiac markers troponin I(CTNI) was measured using the immune chemistry method(Beckman coulter AceessII, Beckman coulter, USA). Creatine kinase isoenzyme(CKMB), lactate dehydrogenase(LDH) and lactate dehydrogenase1 (LDH_1) were determined by the immune chemistry method using the Roche Hitachi-7600 automatic biochemical analyzer(Japan).

2.3 Statistical analysis

All data were analyzed using SPSS 18.0 for Windows. The Chi-square test was used for dichotomous variables and one-way ANOVA and LSD-test were used for continuous variables. The Pearson correlation coefficient was used to determine the correlation between personality traits, serum lipid and serum myocardial enzymes. Effect sizes of personality traits and serum lipid on myocardial enzymes were examined using linear regression analysis. $P<0.05$ was regarded as statistically significant.

3 Results

3.1 The comparison of demographic and general clinical characteristics among the three groups

No significant differences emerged for demographic and clinical characteristics among the three groups (Table 1).

Table 1 Demographic and clinical characteristics of participants(n=155)

variables	control group(n=50) count(%)	stable angina(n=60) count(%)	unstable angina(n=45) count(%)	χ^2	P
gender				0.331	0.718
male	29(58%)	34(56.7%)	27(51%)		
female	21(42%)	26(43.3%)	18(49%)		
education				1.694	0.186
high school graduate	18(36.0%)	22(36.7%)	16(35.6%)		
college graduated	19(38.0%)	25(41.7%)	19(38.0%)		
post graduated	13(26.0%)	13(21.7%)	10(22.2%)		
employment				1.561	0.214
employed	28(56.0%)	34(56.7%)	27(60.0%)		
retired	22(44.0%)	26(43.3%)	18(40.0%)		
	Mean±SD	Mean±SD	Mean±SD	F	P
age(years)	57.30±9.63	59.85±10.39	53.63±9.34	2.092	0.128
height(cm)	166.60±6.57	166.53±6.95	167.67±6.59	0.381	0.684
weight(kg)	72.86±9.19	73.59±11.43	73.73±12.31	0.058	0.944
systolic blood pressure(mmHg)	130.60±16.56	137.02±18.66	131.13±19.39	1.546	0.217
diastolic blood pressure(mmHg)	75.63±12.37	75.84±11.61	75.77±12.32	0.003	0.997

3.2 The comparison of serum lipid levels among the three groups

The unstable angina patient group had a lower serum HDL level than the stable angina and control groups. No significant differences in Cho, TG and LDL were found among the three groups(Table 2).

3.3 The comparison of Type A and Type D personality traits among the groups

Unstable angina patients had higher scores of the Type D subscales(NA and SI) and Type A personality subscales(TH and CH) than those of control group. Compared with the stable angina patients, unstable angina patients scored higher SI and NA, and higher CH. There were no significant differences of type A and type D personality between stable angina patients group healthy control(Table 3).

Table 2 Comparison of serum lipid levels among the groups(mean±SD)

variables (mmol/L)	control group (n=50)	stable angina (n=60)	unstable angina (n=45)	*F*	*P*
Cho	4.46±0.95	4.86±1.26	4.87±1.19	1.352	0.263
TG	1.51±0.95	1.73±0.76	1.85±0.87	1.427	0.244
HDL	1.22±0.23	1.20±0.36	1.03±0.25**##	5.222	0.007
LDL	2.41±0.82	2.77±0.91	2.71±0.76	1.903	0.154

**P<0.01 compared with control group; ##P<0.01 compared with stable angina group. Cho means cholesterol; TG means triglycerides; HDL means high-density lipoprotein; LDL means low-density lipoprotein.

Table 3 Comparison of personality traits between groups(mean±SD)

variables	control group (n=50)	stable angina (n=60)	unstable angina (n=45)	*F*	*P*
SI	8.53±3.92	9.06±5.05	12.02±5.31**##	5.87	0.004
NA	6.05±4.74	6.21±4.04	11.74±5.91**##	17.74	<0.001
TH	13.22±4.84	15.74±3.66	17.34±3.90**	9.40	<0.001
CH	12.54±3.76	13.71±3.58	15.46±4.03**#	5.78	0.004

**P<0.01 compared with control group; ##P<0.01, #P<0.05 compared with stable angina group. SI means social inhibition; NA means negative affect; TH means time hurry; CH means competitive and hostility.

3.4 The comparison of serum myocardial enzymes levels among the groups

Unstable angina patient group had a higher level of serum CTNI, CKMB, LDH and LDH_1 compared with the stable angina and control groups. There was no significant difference of serum myocardial enzyme between the stable angina group and control group(table 4).

Table 4 Comparison of serum myocardial enzymes levels among the groups(mean±SD)

variables (ng/l)	control group (n=50)	stable angina (n=60)	unstable angina (n=45)	*F*	*P*
CTNI	0.01±0.01	0.01±0.01	0.69±1.76*#	6.08	0.003
CKMB	12.40±4.22	12.35±4.88	16.50±10.41*##	4.46	0.014
LDH	171.83±54.72	163.80±0.47	213.46±67.18*##	11.12	<0.001
LDH_1	52.37±7.01	45.85±0.34	77.12±37.46*##	8.74	<0.001

*P<0.05 compared with control group; ##P<0 .01, #P<0 .05 compared with stable angina group. CTNI means cardiac markers troponin I; CKMB means creatine kinase isoenzyme; LDH means lactate dehyrogenase; LDH_1 means lactate dehyrogenase1.

3.5 The correlation between personality traits, HDL and myocardial enzyme levels

HDL was negatively related with LDH_1. TH and CH were positively related with LDH, and CH was positively related with LDH_1. Both SI and NA had no association with myocardial enzyme(Table 5).

Table 5 Correlation between personality traits, HDL and myocardial enzyme(n=105)

variables	CKMB	CTNI	LDH	LDH_1
HDL	−0.160	−0.036	−0.132	−0.199*
SI	0.177	0.094	0.065	−0.008
NA	0.059	0.089	0.026	0.153
TH	0.072	0.123	0.354**	0.228**
CH	0.062	0.062	0.263**	0.151

**P<0.01; *P<0.05.

3.6 The effects of high-density lipoprotein and personality traits on myocardial enzyme levels

Using linear regression analysis, we tested the effects of HDL and personality traits on myocardial enzymes levels in patients. The results showed that both HDL and A type personality traits had small or medium size effect on myocardial enzymes levels: the η^2 of HDL on LDH_1 was 0.039, the η^2 of TH on LDH_1 and LDH were 0.052 and 0.125; the η^2 of CH on LDH was 0.069.

4 Discussion

The current study found unstable angina patients had lower serum HDL level, more Type D and Type A personality traits, as well as higher myocardial enzyme level compared with stable angina patients and healthy control. Further, a negative association between HDL and LDH_1, a positive association between TH and serum levels LDH and LDH_1, as well as positive correlation between CH and LDH were observed. The present study contributes to the literature, as few studies have explored the effect of serum lipid and type A and type D traits on serum myocardial enzyme levels.

This study had showed that the prevalence of Type D personality among patients with CVD ranged from 18.24% to 27%[24, 25], and a significantly higher incidence of Type A personality(61%) in patients with CVD compared with general population[5, 25]. Our results are consistent with those findings that unstable angina patients scored higher on Type D personality and A personality compared to the control group and unstable angina patients scored higher than stable angina patients on Type D personality and CH of Type A personality. These data provide the evidence that unstable angina patients had more Type D and Type A traits. Moreover, unstable angina patients had higher scores in

competitive and hostility but no higher scores in time hurry compared with stable angina patients. These data supports the conclusion that competitive and hostility is the key risk factor in morbidity of CVD. Inconsistent with our previous hypothesis, the stable angina patients did not differ from the control group in personality trait. The reason may be related to the patients enrolled in this study. For example, one seminal study found that heart attack patients with Type D personality traits had an increased risk of mortality[26]. In contrast, another study using a sample of heart failure patients yielded null findings[27]. Given unstable angina is a more severe form of angina, our finding that stable angina and unstable angina patients differed in Type D personality trait implicated that Type D personality traits may be related with serious outcomes of patients with unstable angina[5].

The study showed that both lipid level and Type A personality traits were related to myocardial injury and had small and medium size effects on serum myocardial enzymes level. Specifically, HDL was negatively related with LDH_1, TH was positively related with LDH and LDH_1 and CH was positively related with LDH. HDL, TH and CH had small size effects on LDH_1, TH had medium size effect on LDH. These data support the conclusion that there was significant relationship between hostility and impatient and the presence of CVD[19, 20, 25]. Moreover, present study found that serum HDL level had a small size effect on serum LDH_1 level, this indicated serum lipid is key factor influencing on progression of CVD. Consistently, one recent study also indicated that serum myocardial enzyme levels are more closely correlated with morbidity than with diagnoses[28]. In all, present study provides clue for the validity of using myocardial enzymes, lipid and personality for predicating morbidity of CHD.

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