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Age- and sex-related difference in lipid profiles of patients hospitalized with acute myocardial infarction in East China

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BACKGROUND: It was not understood whether age- and sex-related differences were apparent in lipid profiles among acute myocardial infarction (AMI) patients in China.

OBJECTIVES: To investigate lipid abnormalities in such AMI patients.

METHODS: A retrospective analysis of 1213 patients hospitalized with a first AMI between May 2007 and July 2011.

RESULTS: Our data indicated that, compared with the elderly, the nonelderly tended to have higher low-density lipoprotein cholesterol (LDL), total cholesterol (TC), and non–high-density lipoprotein cholesterol (N-HDL) for both males and females. There was significant difference in LDL among various age groups ($P < .001$): LDL levels in the 50–59 and 60–69 year age groups were higher than those in 70–79 and 80–89 year age groups. Compared with males, females tended to have higher LDL in both the 50–59 and 60–69 year age groups. There was no difference in HDL among various age groups for female AMI patients, but there was significance for males. Compared with males, females had higher HDL in 40–49, 50–59, 60–69, and 70–79 year age groups, respectively. Among various age groups, there was significant difference in triglycerides (TG) for male AMI patients, but no difference in TG for females. The levels of TG were higher in 40–49, 50–59, and 60–69 year age groups than those in 70–79, 80–89, and ≥90 year age groups, respectively, for males. Isolated low HDL (low HDL + normal LDL + normal TG) was the most common type of combined dyslipidemia for male elderly (31.4%), male nonelderly (22.9%), and female elderly (19.2%) patients.

CONCLUSION: We concluded that there was age- and sex-related difference in lipid profiles among AMI patients, with more prevalent dyslipidemia in the nonelderly than the elderly. Perimenopausal women were prone to higher LDL, and low HDL was prevalent among AMI patients in East China.

Cardiovascular disease is the second leading cause of death in Chinese adults, with a rising incidence and mortality because of the aging population. It has been shown that certain factors, including dyslipidemia, hypertension, advanced age, menopause for women, smoking, and diabetes, play a critical role in the development of

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coronary heart disease (CHD).[1] In particular, the causal link between lipid disorders and CHD is well established. Total cholesterol (TC) and low-density lipoprotein cholesterol (LDL) are closely associated with CHD, and large-scale clinical trials indicated that reducing TC and LDL levels could significantly reduce ischemia events in CHD patients.[2] Elevated triglyceride (TG) and reduced high-density lipoprotein cholesterol (HDL) were also thought to be key determinants of CHD risk.[3,4]

Previously reported studies on dyslipidemia in Chinese patients with acute myocardial infarction (AMI) were not well designed or performed, involving small sample sizes, simplistic comparison of the elderly with the nonelderly, or comparisons of lipid levels between different genders regardless of the age difference or among different age groups regardless of the gender difference. Patterns of lipid abnormality among AMI patients in China have not been well characterized. Because the elderly have a slow metabolism, with multiple risk factors for cardiovascular disease and a variety of underlying diseases, it is hypothesized that the elderly and the nonelderly might differ in their lipid profiles. The current study was performed to investigate lipid abnormalities in Chinese AMI patients to understand the characteristics of dyslipidemia and provide guidance for lipid control in such patients.

Methods

Subjects and study procedures

This study was conducted in accordance with the Helsinki Declaration and it was approved by the ethics commission of the institutional review board of Shanghai Songjiang Central Hospital, Shanghai, China. This was a retrospective cohort study involving 1213 patients with a first AMI. All eligible subjects were hospitalized with a first AMI between May 2007 and July 2011 in Shanghai First People's Hospital and Shanghai Songjiang Central Hospital.

Subjects enrolled were diagnosed with a first AMI, as established by meeting at least 2 of the following three criteria: (1) characteristic chest pain lasting more than 30 minutes and sublingual nitroglycerin invalid; (2) electrocardiogram showing ST-segment elevation >2 mm in ≥ 2 precordial leads or >1 mm in ≥ 2 limb lead or the onset of left bundle branch block; or (3) concomitant elevation of serum creatine kinase and positive cardiac troponin I. The exclusion criteria were as follows: (1) previous AMI; (2) currently receiving lipid-lowering treatment or drugs; (3) presence of underlying diseases that could alter lipid metabolism such as hypothyroidism, liver disorders, myeloma, nephrotic syndrome, anorexia nervosa, or glycogen storage disease; and (4) lipid profiles obtained over 24 hours after admission. Eligible patients were required to meet the inclusion criteria, without meeting any of the exclusion criteria.

On admission, a medical history, physical examination, laboratory data, and standard 18-lead electrocardiogram were acquired in all patients. Fasting lipid profiles were obtained within 24 hours of admission. All blood samples were tested by a Cobas 6000 analyzer series and kits (Roche Diagnostics, Basel, Switzerland). Non-HDL (N-HDL) was defined as TC minus HDL (N-HDL = TC − HDL). TC/HDL represented the ratio of TC to HDL. LDL/HDL represented the ratio of LDL to HDL.

Data analysis

All statistical analyses were performed using SPSS13.0 software. For continuous variables, expressed as mean ± standard deviation, differences among groups were evaluated by analysis of variance or an unpaired *t*-test. Discrete variables, expressed as counts and percentages, were analyzed by a chi-square or Fisher exact test. $P < .05$ was considered statistically significant.

Results

Clinical characteristics of enrolled subjects

A total of 1213 AMI patients were enrolled, including 494 nonelderly (<65 years of age) and 719 elderly (≥65 years of age). The age of all participants ranged from 27 to 95 years (mean ± standard, 67 ± 13 years of age). Clinical characteristics of the enrolled subjects are presented in Table 1. Compared with the nonelderly, the elderly tended to have lower levels of LDL, TC, and N-HDL for both males and females. Generally compared with males, females were inclined to higher levels of TC, LDL, HDL, and N-HDL for both the nonelderly and the elderly.

Age- and sex-related difference in LDL for AMI patients

For male patients, there was significant difference in LDL among various age groups ($P < .001$) and LDL levels in 50–59 and 60–69 year age groups were higher than those in 70–79 and 80–89 year age groups. And such as for female patients (Fig. 1). Compared with males, females tended to have higher LDL in both 50–59 (males vs females, 2.89 ± 1.05 vs 3.73 ± 1.35, $P = .005$) and 60–69 (males vs females, 2.83 ± 0.83 vs 3.18 ± 0.89, $P = .009$) year age groups (Fig. 1). AMI patients who had LDL levels <2.07 mmol/L (80 mg/dL), 2.07–4.15 mmol/L (80∼160 mg/dL), and >4.15 mmol/L (160 mg/dL), accounted for 22%, 72%, and 6%, respectively (Fig. 2).

Age- and sex-related difference in HDL for AMI patients

Analysis of variance indicated no difference in HDL among various age groups for female AMI patients, but it