Association of Cholesterol-rich Lipoproteins with Coronary Artery Disease in Subjects Who Referred to Yazd Cardiovascular Research Center for Coronary Angiography

1B. A. Jalali-khanabadi, 2H. Mozaffari-khosravi, 3M. Rafiei, 4S. M. Ghoreishian and 5F. Darabi
1,2Department of Biochemistry, School of Medicine, 3Department of Health Service, School of Health,
4Cardiovascular Research Center, 5Department of Pathobiology, School of Medicine,
Shahid Sadoughi University of Medical Sciences and Health Services, Yazd, Iran

Abstract: Coronary Artery Disease (CAD) is the leading cause of death in many populations, including Iranians. The best way to control CAD, is to identify and modify more effective local risk factors. The aim of this study was to determine and comparison of lipids, lipoproteins and lipoprotein (a) [Lp (a)] in patients with CAD and control subject who referred to cardiovascular research center. One hundred patients (37 females, 63 males) with CAD and 92 controls (58 females, 34 males) were investigated. The fasting plasma Total-cholesterol (TC), triglycerides (TG) and high-density lipoprotein cholesterol (HDL-C), were determined by routine laboratory methods. Lp (a), apo-A1 and apo-B100 were determined by immunoneusasay method. Statistical test included, t-test for comparison of lipids and U-test for comparison of Lp (a) in two groups. TC and Low-density Lipoprotein Cholesterol (LDL-C) in patients (227±35 and 147±40 mg dL⁻¹, respectively) were higher than controls (208±54 and 127±39 mg dL⁻¹). There were not any significant differences in TG, HDL-C and apo-A1 between two groups, but apo-B100 was higher in patients (1.25±0.4 g L⁻¹) than controls (1.13±0.36 g L⁻¹). Lp (a) was higher in patients (25±27 mg dL⁻¹) than control (18.8±19.5), but was not statistically significant (p = 0.07). We concluded that high levels of cholesterol and cholesterol-rich lipoproteins are more associated with CAD. Lp (a) is more associated with CAD in women and TG is more effective risk factor for MI in our study population. These lipids and lipoproteins may be more effective local risk factor for incidence of CAD in some Iranian populations.

Key words: Lipids, lipoproteins, apolipoproteins, lipoprotein (a), coronary artery disease

INTRODUCTION

Coronary artery disease (CAD) is the leading cause of death in many populations, including Iranians (Sarraf-Zadegan et al., 1999a). The best way to control CAD is to identify and modify the more effective and modifiable local risk factors. There are several groups of risk factors for atherosclerosis and cardiovascular disease (Acevedo et al., 2001). During the last decades, considerable interest has been directed towards the investigation of plasma lipids and related compounds in healthy and diseased individuals, as important CAD risk factors (Lada and Rudel, 2004; Grundy, 1986; Massaieli and Pieris, 1995; Anderson et al., 1987; Castelli, 1986). The frequency of abnormality of lipids, lipoproteins and apolipoproteins varies between different populations (Webber et al., 1992). The plasma lipid levels are affected by age, gender, lifestyle, dietary habits, physical activity, obesity, smoking, endocrine disorder, contraceptive use and certain genetic predisposing factors (Quivers et al., 1992; Carlson and Bottiger, 1985; Schiekm, 1992; Tenkate et al., 1982). Some reports indicated a relatively high rate of CAD incidence in some region from Iran (Sarraf-Zadegan et al., 1999b). There are various groups of Iranian populations with different nutritional habits and lifestyle. So the aim of this study was to determination and evaluation of lipids, lipoproteins, apolipoproteins and lipoprotein (a) [Lp (a)] in a group of patients with CAD and control subjects who referred to Yazd Cardiovascular research center in Iran, for coronary angiography.

MATERIALS AND METHODS

One hundred patients (37 females, 63 males) with CAD, documented by coronary angiography and 92 controls (58 females, 34 males) with normal coronary
angiogram were investigated. Early morning blood sample was collected after a 12 h overnight fast. Serum Total Cholesterol (TC) and triglycerides (TG) concentration were determined by enzymatic methods, using commercially available test kits on Technicon RA-1000 analyzer. High Density Lipoprotein-cholesterol (HDL-C) concentration was determined with dextran-sulfate-magnesium precipitation, followed by the same enzymatic method for TC. Low Density Lipoprotein-cholesterol (LDL-C) was calculated using Friedewald formula, when the TG concentration was less than 300 mg dL$^{-1}$ (Friedewald et al., 1972). Apo-AI was determined by immunoturbidimetry method (Rieponen et al., 1987). Apo-B100 and Lp (a) were determined by the method of electrommunocassay (Winfried, 1983). For statistical analysis SPSS (V.11.5) was used. Statistical test included, t-test for comparison of lipids, lipoproteins and apolipoproteins and U-test for comparison of Lp (a) in two groups.

RESULTS

TC and low-density lipoprotein cholesterol in patients were higher than controls. Table 1 shows the lipids, lipoproteins and apolipoproteins in patients and control group.

Lipids, lipoproteins and apolipoproteins profile also compared between 56 subjects with history of previous Myocardial Infarction (MI) and 110 subjects without history of previous MI. Comparison of lipids profile in subjects with history of MI and subjects without MI is indicated in Table 2.

There were no any significant differences between plasma Lp(a) levels in males with CAD and controls, but plasma Lp(a) levels was significantly higher in women with CAD than controls. Table 3 shows comparison of lipids, lipoproteins and apolipoproteins in two groups by sexes.

DISCUSSION

The results of the present study indicated the association between the higher levels of TC, LDL-C and apo-B100 with CAD. These factors collectively related to plasma cholesterol levels and transport. Lp(a), another cholesterol-rich lipoprotein also was higher in patients than controls, but this differences was not significant in all subjects, but it was significant in females. Apo B previously reported as the best predictor of CAD in a group of Iranians who referring to cardiovascular research center in Tehran and were candidate for coronary angiography (Haidari et al., 2001). Azizi et al. (2003) also reported relatively higher levels of TC, LDL-C and TG in a healthy Iranian group of adults in comparison to most other populations. In our control subjects, TC and LDL-C plasma levels are similar, but plasma TG was relatively higher than those reported by Azizi. This may be due to different lifestyle and dietary habits in two populations. In addition our population was subjects who candidate for coronary angiography and therefore they were more attended for plasma lipids control.

On the other hand, in patients with history of previous MI in addition to TC and LDL-C, plasma levels of TG was significantly higher than subjects without MI. HDL-C and apoAI are not any significant differences between patients with MI and without MI. However some reports have been attended to more importance of apolipoproteins, particularly apo-B as a risk factor and predictor of CAD in some Iranian populations.
(Haidari et al., 2001; Rahmani et al., 2002). Results of this study have been shown relatively more importance of cholesterol than apo-B and apo-A1. Apo-A1 did not show any significant differences between either CAD patients and control, nor MI and without MI subjects. Apo-B was higher significantly in CAD patients than controls, but it was not any significant differences between MI and without MI subjects. In the basis of Tehran lipids and glucose study results, have been reported that high levels of plasma cholesterol and low levels of HDL-C are the most frequent cardiovascular risk factors in Tehran urban population (Azizi et al., 2002).

Another noticeable finding in this study was higher levels of plasma Lp (a) in female patients than female control. Lp (a) is an atherothrombogenic cardiovascular risk factor, that its plasma levels and its atherogenicity is vary between different ethnic groups (Lip and Jones, 1995). So, it seems that Lp (a) have been a more effective cardiovascular risk factor for females in our study population. Sex-specific association of Lp (a) with coronary artery disease reported in some other populations (Frohlich et al., 2004; Onta et al., 2005). In another study, Cassedy et al. (2004) have been shown a sex-specific association of Lp (a) with coronary artery calcification in an asymptomatic population. They evaluated 661 (285 men, 376 women) asymptomatic, while individuals and concluded that, Lp (a) alone may be an independent risk factor for coronary atherosclerosis in women, while in men, Lp (a) may confer higher risk conditional on the presence and level of other risk factors. Therefore, Lp (a) may be more effective cardiovascular risk factor in women than men in some situations.

We concluded that high levels of cholesterol and cholesterol-rich lipoproteins, are more associated with CAD in our study population. Lp (a) is more associated with CAD in women and TG is a more effective risk factor for MI in present study population conditions. These lipids and lipoproteins may be more effective local risk factor for incidence of CAD and MI in some Iranian populations.

ACKNOWLEDGMENTS

This study was done in the Biochemistry Department and Cardiovascular research Center in Yazd and supported by the Yazd University of Medical Sciences. The authors thank Mr Azzizolah Sadeghi (Medical technologist of Shahid Rahnemoun Hospital) for his help in blood sampling and lipid analysis.

REFERENCES


