Lipoprotein(a) Concentrations in Healthy Subjects in the Dominican Republic
Comparison with Japanese

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SUMMARY

Previous studies have shown that serum concentrations of lipoprotein(a) [Lp(a)] are markedly different among different ethnic groups. We examined the serum levels of total cholesterol, high density lipoprotein (HDL) cholesterol and Lp(a) in apparently healthy subjects aged 20–69 years in Japan (n = 865) and the Dominican Republic (n = 1,893). Dominicans had significantly lower levels of total cholesterol and HDL cholesterol than Japanese. The distribution of Lp(a) concentrations were markedly skewed towards low levels in both Japanese and Dominicans. However, the mean Lp (a) concentration in Dominicans was approximately 2 times higher than in Japanese (21.7 ± 23.7 vs 12.3 ± 15.9 mg/dl, p < 0.001). This is possibly because the majority of Dominicans are of mixed Negroid and European blood. (Jpn Heart J 1999; 40: 65–70)

Key words: Total cholesterol, HDL cholesterol, Negroids, Europeans, Coronary risk factors

Lipoprotein(a) [Lp(a)] is a macromolecular complex in human plasma that is assembled from a low density lipoprotein and apolipoprotein(a). Elevated serum Lp(a) concentrations have been shown to be associated with coronary artery disease. Average Lp(a) levels and the shape of Lp(a) distribution are dramatically different among different ethnic groups. Lp(a) levels are much higher in Negroid populations than in European and Asian populations.

Recently, we examined the prevalence of risk factors for coronary heart disease in the Dominican Republic and found that the serum levels of total

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cholesterol and high density lipoprotein (HDL) cholesterol in Dominicans are lower than in Japanese and Americans. The Dominican Republic is an island country situated in a subtropical zone of Central America and the majority of the inhabitants are of mixed Negroid and European blood. Although prevalence data on Lp(a) are available in European and Negroid populations, to our knowledge, there has been no such data for the population of mixed Negroid and European blood. In this study, serum Lp(a) concentrations of Dominicans were examined and contrasted with those in Japanese.

METHODS

Subjects and blood sampling: Apparently healthy subjects aged 20–69 years in Japan (n = 865) and the Dominican Republic (n = 1,893) were evaluated for Lp(a), total cholesterol and HDL cholesterol. The Japanese blood samples were collected from employees of Oita Medical University who participated in annual medical examinations in November, 1994, and were stored at −70°C at the Clinical Laboratory Center of Oita Medical University Hospital. The methods to collect Dominican blood samples have been described previously. In brief, the blood samples were taken from subjects living in the 6 districts of the Dominican Republic (Santo Domingo, Bani, Monte Plata, La Vega, Samana, and San Pedro de Marcos) during the period of November to December, 1993. These samples were stored at −70°C at the Center of Gastroenterological Diseases, Luis E. Aybar Hospital, Santo Domingo, for 1–3 months. The blood samples were then transported by air, on dry ice, to the Clinical Laboratory Center of Oita Medical University Hospital and were stored there at −70°C. Blood was obtained from all subjects after an overnight fast.

Lipid analysis: Analyses of serum lipids and Lp(a) were performed within 3–6 months after blood sampling at the Clinical Laboratory Center of Oita Medical University Hospital. Total cholesterol and HDL cholesterol were measured using commercial kits (T-CHO HQ Liquid, Nissui Pharmaceutical Co., Tokyo, Japan and Determiner L HDL-L, Kyowa Medex, Shizuoka, Japan, respectively). Lp(a) was measured using an immunoturbidimetric assay kit (Lp(a) Auto, Daiichi Pure Chemicals, Tokyo).

Statistical analyses: Results are reported as mean ± SD, unless otherwise specified. Continuous variables, except for Lp(a), were analysed by Student’s t test. Lp(a) values were markedly skewed and analysed by Wilcoxon rank sum test. The dichotomous variables were compared by χ² test. P < 0.05 was considered significant. Comparison of age-adjusted Lp(a) levels was made by covariance analysis.
RESULTS

Age and serum levels of lipids and Lp(a) in the Japanese and Dominicans are shown in the Table. In both the Japanese and Dominicans, the age in men

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<tr>
<th>Table. Serum lipid and Lp(a) levels in Dominicans and Japanese</th>
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<tbody>
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<tr>
<td>Dominicans</td>
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<tr>
<td>Men (n = 739)</td>
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<tr>
<td>Women (n = 1134)</td>
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<td>All (n = 1893)</td>
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<td>Significance</td>
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<td>men vs women</td>
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<td>Japanese</td>
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<td>Men (n = 360)</td>
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<tr>
<td>Women (n = 505)</td>
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<tr>
<td>All (n = 865)</td>
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<td>men vs women</td>
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<td>Significance</td>
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<td>Dominicans vs Japanese</td>
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Values are means ± SD; median. NS = not significant.

![Figure. Frequency distribution of Lp(a) serum concentrations in Japanese (open bars) and Dominicans (closed bars).](image-url)
was significantly higher than in women. Japanese men had higher total cholesterol and lower HDL cholesterol than Japanese women. In the Dominicans, HDL cholesterol was higher in women than in men, but total cholesterol showed no significant sex difference. In both the Japanese and Dominicans, the mean Lp(a) concentration in women was slightly higher than in men, but the difference was significant only in the Japanese. Age was significantly lower in the Japanese than in the Dominicans. The Japanese had significantly higher levels of total cholesterol and HDL cholesterol and significantly lower Lp(a) levels than in the Dominicans. In both the Japanese and Dominicans, the distributions of Lp(a) concentrations were broad and skewed towards lower levels (Figure). The incidence of subjects with Lp(a) ≥ 30 mg/dl was significantly higher in the Dominicans than in the Japanese (483 of 1893 Dominicans, 25.5% vs 63 of 865 Japanese, 7.3%, p < 0.0001). After controlling for age, the Lp(a) level was still significantly higher in the Dominicans than those in the Japanese (24.9 ± 25.0 vs 14.5 ± 17.2 for men, p < 0.01; 26.6 ± 23.5 vs 13.7 ± 15.6 for women, p < 0.01).

DISCUSSION

This study showed that Dominicans have significantly lower serum concentrations of total cholesterol and HDL cholesterol than Japanese. These results are consistent with the findings in our previous study. Furthermore, this study compared the serum Lp(a) concentrations in Japanese and Dominicans. We found that the distribution of Lp(a) concentrations was highly skewed towards low concentration levels in both populations, and that the mean Lp(a) concentration in Dominicans was approximately 2 times higher than in Japanese (21.7 vs 12.3 mg/dl). Prior studies have shown marked differences in average Lp(a) levels and the shape of Lp(a) distributions among different ethnic groups. In contrast to the highly skewed distribution towards lower concentrations in Europeans and Asians, Negroids have a distribution close to Gaussian with a markedly high mean value of Lp(a). The mean Lp(a) concentration of the Japanese reported here is similar to the values reported previously for Japanese and Europeans. On the other hand, the mean Lp(a) concentrations in Negroid populations have been reported to be about 30–45 mg/dl. Thus, the mean Lp(a) concentration in Dominicans seems to be intermediate between those in Negroids and Europeans. This finding may possibly be because the majority of Dominicans are of mixed Negroid and European blood. More studies should be done to determine whether high Lp(a) levels play an atherogenic role in Dominicans. One limitation of this study was that the Japanese blood samples were obtained from the employees of Oita Medical University. If samples were obtained nation-wide, the Japanese data might be different from those in the
present study. However, when the age-adjusted lipid levels were compared, the
means of total cholesterol and HDL-cholesterol in the present Japanese popula-
tion (198 and 47 mg/dl for men and 185 and 61 mg/dl for women, respectively)
were slightly, but insignificantly, lower than the values obtained from the Japa-
nese national nutritional surveys in 1995 and 1996.\textsuperscript{17,18}

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