

Blood lipid associations in 18 year-old men

Associações de lipoproteínas plasmáticas em homens de 18 anos de idade

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POLETTO, L. et al. Blood lipid associations in 18 year-old men. *Rev. Saúde públ., S. Paulo, 26*: 316-20, 1992. The association of cigarette smoking, physical activity at work, and social class with total cholesterol and with high and low density lipoprotein cholesterol were examined in a random sample of 238 males, of 18 years of age, of Rosario, Argentina. The mean (mg/dl) total serum cholesterol of the whole sample was 174.7, the high density lipoprotein cholesterol 52.8, and the low density lipoprotein cholesterol 121.5. Black tobacco consumers, evenly distributed by social class, had higher levels of total and low density lipoprotein cholesterol. Total cholesterol was higher in the high social class, differently from what smokers' distribution by social class. would lead one to expect. While a highly negative association was found between social class and physical activity at work, there were no significant differences in lipoprotein levels between manual and non-manual workers. It is possible that the nutritional differences by social class still prevail over the smoking habit in their influence on the lipoprotein levels in these subjects.

Keywords: Lipoproteins, blood. Smoking, epidemiology. Occupations. Exertion. Social class.

Introduction

Cigarette smoking is considered a strong and independent risk factor for coronary heart disease²⁰.

One possible mechanism is suggested by the association of cigarette use with lowered levels of high density lipoprotein cholesterol and increased levels of low density lipoprotein and total cholesterol^{3,11,21}. High density lipoprotein cholesterol level is also associated with physical activity^{17,22}. Furthermore, the proportion of energy intake derived from saturated fat and animal protein is an important determinant of differences in blood cholesterol level among populations⁵.

The vast majority of the studies on the distribution of and features associated with coronary heart disease have been carried out on adults in Anglo-Saxon or Northern European countries, and a few in countries of Latin ancestry. They are scarce in South American countries and no study done in Argentina was found. Argentina is a developing country with some features not shared by other Latin-American countries, thus the highest percentage of the

population is of Latin descent, notably Italian and Hispanic, with few and small native Indian groups, and consequently with different sociocultural and nutritional patterns.

Rosario is the second major urban concentration in the country, with 975,623 inhabitants⁴. It is a relatively old population with a birth rate of 20%. The city serves as the commercial center and port for a large agricultural and cattle-rearing area. The climate is temperate (latitude 32°56'S).

An adjusted mortality rate of coronary heart disease for males of 98.4 per 100,000 was found in Rosario⁴, in agreement with the rate of 93.8 per 100,000 found in La Plata (Argentina), in a study done in selected cities of North and South America¹².

The present study was designed to investigate the putative effect of cigarette smoking, physical activity at work, and social class as the main determinant of nutritional patterns, on serum total cholesterol and cholesterol in the various lipoprotein fractions, in young men, as possible risk factors for the development of coronary heart disease.

Material and Methods

The association of cigarette smoking, physical activity at work, and social class

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with total cholesterol, high density lipoprotein cholesterol and low density lipoprotein cholesterol levels was investigated in a simple random sample of 238 males, of 18 years of age. These subjects had a thorough obligatory medical exam in October-November 1989, prior to compulsory military service. Sample size was determined to achieve a power of 90% for detecting significant differences.

Blood samples were collected in the morning, after an overnight fast. Serum cholesterol was determined by an enzymatic method¹⁹. High density lipoprotein cholesterol was measured after isolation by selective precipitation with dextran sulphate 500,000 Mg Cl₂⁹. Low density lipoprotein cholesterol was calculated according to Assmann's formula¹.

Participants were grouped into the following categories regarding their smoking habits: non-smoker, ex-smoker and smoker. Current smokers were subclassified as light (1 to 10 cigarettes/day) or heavy (> 10 cigarettes/day). Their ages at starting and stopping were recorded, as also the duration of the habit: < 3 years, 3-5 years, and > 5 years, as well as the type of tobacco smoked (black or blond) and the type of cigarette (with or without filter).

Information on occupation was asked of each subject in order to assess his physical activity at work, employing a two-category system: non-manual and manual workers. The latter includes heavy manual work plus work involving much walking and lifting.

To determine social class their parents' occupation and education were classified as belonging to one of the three social classes:

high, middle, and low².

Statistical tests of significance were Chi-square for qualitative data or one way analysis of variance for quantitative data, after examination of the underlying statistical assumptions. Tests of statistical significance were based on the pertinent F ratios. If there was only one degree of freedom, Student's t test was used when the two population variances were the same. Otherwise, Cochran's approximation of the t test was applied¹³.

Results

The mean \pm SE (mg/dl) total serum cholesterol level in the whole sample was 174.7 \pm 2.2, the high density lipoprotein cholesterol 52.8 \pm 0.7 and the low density lipoprotein cholesterol 121.5 \pm 1.6. Thirty-four per cent of the total sample were current smokers, and 6% were ex-smokers. Table 1 presents the total cholesterol, high density and low density lipoprotein cholesterol levels according to smoking status. As values were similar for non-smokers and ex-smokers, the pooled results are presented. Smokers had somewhat higher total plasma and low density lipoprotein cholesterol levels, and lower high density lipoprotein cholesterol levels, but the differences were not statistically significant. Furthermore, these differences were not significant within the current smoker categories, neither for the intensity nor for the duration of the habit. Both types of cigarettes were used, but there were no significant differences in the

Table 1. Mean (Standard error from the mean) total cholesterol, high density lipoprotein cholesterol and low density lipoprotein cholesterol in 18 year old men according to their smoking habits.

Smoking habit	Total cholesterol X(SE) mg/dl	HDL-cholesterol* X(SE) mg/dl	LDL-cholesterol** X(SE) mg/dl
Non-smokers*** n=157	172.3 (2.6)	53.3 (0.8)	118.8 (2.7)
Smokers 1-10 cigarettes/day n=49	175.9 (4.9)	52.1 (1.7)	122.7 (4.7)
>10 cigarettes/day n=32	184.8 (7.8)	51.8 (1.8)	132.6 (7.9)

* High density lipoprotein cholesterol.

** Low density lipoprotein cholesterol.

*** Values in non-smokers and ex-smokers were pooled.

Table 2. Mean (Standard error from the mean) total cholesterol, high density lipoprotein cholesterol and low density lipoprotein cholesterol in 18 year old male smokers according to the type of tobacco consumed.

Type of tobacco	Total cholesterol \bar{X} (SE) mg/dl	HDL-cholesterol* \bar{X} (SE) mg/dl	LDL-cholesterol** \bar{X} (SE) mg/dl***
Blond n=59	173.8 (4.1)	52.2 (1.5)	121.0 (4.2)
Black n=22	195.1 (10.5)	51.1 (2.2)	141.6 (10.1)

* High density lipoprotein cholesterol.

** Low density lipoprotein cholesterol.

*** $p < 0,05$.

lipoprotein levels for the 11% of nonfilter cigarette consumers.

In Rosario both black and blond tobacco are smoked. Twenty-seven per cent of the smokers were current black tobacco consumers. Table 2 shows the analysis of the types of tobacco used. While high density lipoprotein levels are almost similar in both groups, total cholesterol and low density lipoprotein levels are higher in black cigarette users, with a significant difference only for low density lipoprotein cholesterol ($t_c=1.89$; $p < 0.05$).

No significant differences were observed in the distribution of black tobacco and non-filter cigarette users according to social class. A highly significant negative association was found between social class and physical activity at work (Chi-square=47.6; $p < 0.0001$), but there were no statistically significant differences in lipoprotein levels between manual and non-manual workers.

Table 3 shows the plasma lipoprotein levels in the three social classes. While total cholesterol level was significantly higher in the high social class ($F=5.98$; $p < 0.005$), high density and low density lipoprotein cholesterol levels did not differ

in the three social classes. These results contrast with the smokers distribution by social class: 8% of whom are high class, 33% middle and 59% lower (Chi-square=10.5; $p < 0.05$).

Discussion

The prevalence of cigarette smoking in these subjects has been documented and it is of interest to observe the influence this habit has in early life on some possible risk factors for coronary heart disease.

Plasma levels of total and low density lipoprotein cholesterol were higher, and high density lipoprotein cholesterol were lower, but no statistically significant in smokers, independent of the age at which they began to smoke, or the number of cigarettes consumed. These results could be due to the short period of time these subjects had been smoking.

Frequently, social class is a starting point for providing clues about many etiological agents. While social class presented negative associations with the prevalence of smokers and physical activity at work it showed a positive association

Table 3. Mean (Standard error from the mean) total cholesterol, high density lipoprotein cholesterol and low density lipoprotein cholesterol in 18 year old men according to their social class.

Social class	Total cholesterol \bar{X} (SE) mg/dl***	HDL-cholesterol* \bar{X} (SE) mg/dl	LDL-cholesterol** \bar{X} (SE) mg/dl
High n=25	194.9 (8.4)	51.9 (1.8)	136.2 (7.7)
Middle n=104	174.1 (2.8)	54.1 (1.0)	118.9 (2.8)
Low n=109	169.6 (3.3)	51.8 (1.0)	119.6 (3.5)

* High density lipoprotein cholesterol.

** Low density lipoprotein cholesterol.

*** $p < 0,005$

with total cholesterol levels. For cholesterol levels, a non-significant positive association with the intensity of the smoking habit and with the use of black tobacco was found. Furthermore, black tobacco consumption was not associated with social class. Saturated fat intake, animal protein, and energy balance are important determinants of serum cholesterol levels^{6,14,18}. Although no nutritional studies have been carried out in this community, it is well known that high daily amounts of beef and fat intakes characterize the average diet of middle and high social classes. These nutritional characteristics should be taken into account while looking at the difference found in the average high density lipoprotein cholesterol level (52.8 mg/dl) from that observed (47.3 mg/dl) in a comparable sample in a large Italian study¹⁵, in spite of the important Italian genetic and cultural background of this population.

The consistency of the results of some cross-sectional^{3,11,21} and longitudinal^{7,16} studies would seem to make the existence of a causal link between cigarette smoking and high density lipoprotein cholesterol level highly likely; however, no significant associations were found in this study.

It has been suggested^{4,8,10} that smoking the black type of tobacco is more deleterious than smoking the blond variety. Whilst this idea has mainly been applied to cancer etiology, these young smokers of black tobacco had higher levels of total and low density lipoprotein cholesterol than blond tobacco consumers.

While at the present age of these subjects, lipoprotein values are not modified yet to any great extent by smoking habits, we believe that the differential risks by type of tobacco require further exploration, preferably in communities like Rosario, where the discrepancy between proportions of blond and black tobacco users is not extreme.

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POLETTO, L. et al. Associações de lipoproteínas plasmáticas em homens de 18 anos de idade. *Rev.*

Saúde públ., S. Paulo, 26: 316-20, 1992. Estudou-se a associação de níveis plasmáticos de colesterol total, high density lipoprotein (HDL) e low density lipoprotein (LDL), com o hábito de fumar cigarros, atividade física no trabalho e classe social em amostra aleatória de 238 homens de 18 anos de idade, de Rosario, Argentina. Os fumantes de tabaco negro, que se estavam igualmente representados nas diferentes classes sociais, apresentaram maiores níveis de colesterol total e LDL. O nível de colesterol total foi maior na classe social mais alta, o que se contrapõe com a distribuição dos fumantes por classes sociais. A associação entre atividade física no trabalho e classe social foi negativa e altamente significativa. Contrariamente não se encontraram diferenças significativas nos níveis de lipoproteínas entre os trabalhadores manuais e não manuais. É possível que as diferenças na alimentação por classes sociais ainda prevaleçam sobre o hábito de fumar quanto sua influência sobre os níveis de lipoproteínas em homens jovens.

Descritores: Colesterol, sangue. Lipoproteínas do HDL. Colesterol, sangue. Lipoproteínas do LDL. Colesterol, sangue. Fumo, efeitos adversos.

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