Lipid Profile and Cardiovascular Risk in Two Amazonian Populations

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Objective - *To compare the lipid profiles and coronary heart disease risks of 2 Brazilian Amazonian populations as follows: a riverside population (village of Vigia) and an urban population (city of Belém in the state of Pará).*

Methods - *Fifty individuals controlled for age and sex were assessed in each region, and the major risk factors for coronary heart disease were analyzed.*

Results - *According to the National Cholesterol Education Program (NCEP III) and using the Framingham score, both populations had the same absolute risk of events (Vigia = 5.4 ± 1 vs Belém = 5.7 ± 1), although the population of Vigia had a lower consumption of saturated fat (P<0.0001), a greater consumption of mono- and polyunsaturated fat (P<0.03), in addition to lower values for body mass index (25.4± 0.6 vs 27.6 ± 0.7 kg/m², P<0.02), of biceps skin fold (18.6 ± 1.1 vs 27.5 ± 1.3 mm, P<0.0001), of triceps skin fold (28.7 ± 1.2 vs 37.3 ± 1.7 mm, P<0.002), and of total cholesterol (205 ± 5 vs 223 ± 6 mg/dL, P< 0.03) and triglycerides (119 ± 9 vs 177 ± 18 mg/dL, P<0.005). Both populations did not differ in regard to HDL-C (46 ± 1 vs 46 ± 1 mg/dL), LDL-C (135 ± 4 vs 144 ± 5 mg/dL) and blood pressure (SBP 124 ± 3 vs 128 ± 3 mmHg; DBP 80 ± 2 vs 82 ± 2 mmHg).*

Conclusion - *The riverside and urban populations of Amazonia had similar cardiovascular risks. However, the marked difference in the variables studied suggests that different strategies of prevention should be applied.*

Key words: lipids, risk factors, nutrition

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English version by Stela Maris C. e Gandour
Received: 10/15/02
Accepted: 5/5/03

Atherosclerotic cardiovascular disease is the major cause of death in our country and occurs at earlier ages than that observed in the United States of America [1,2].

The initial results of the Framingham Study have associated serum cholesterol level, smoking, and arterial hypertension with ischemic heart disease [3]. More recently, the National Cholesterol Education Program (NCEP III, USA) [4] published the recommendations for estimating absolute coronary risk, considering the total cholesterol level, age, HDL-C level, values of systolic and diastolic blood pressure, and smoking habit, with different scores for men and women.

In the past decade, several studies suggested that a more active lifestyle and higher consumption of fish could be beneficial, because they resulted in a lower incidence of cardiovascular events, a better lipid profile, and a reduction in blood pressure and in thrombotic risk [5-8].

Among the Eskimos in Greenland and the Japanese of Kohama Island, lower levels of total cholesterol and triglycerides and an extremely low incidence of coronary heart disease were observed as compared with those in the populations living on the continent [9-11].

In Brazil, epidemiological data of the Ministry of Health for the City of Belém, in the State of Pará [12], showed that mortality due to cardiovascular disease was the major cause of death in that city despite the proximity to rivers and forests, and the high consumption of fish and typical fruits in that region.

This study aimed at comparing the cardiovascular risk of the urban population of Belém in the State of Pará with that of an Amazonian riverside population (village of Vigia) living mainly on fish and with very scarce contact with large urban centers.

Methods

The study sample comprised 100 individuals of both sexes with no personal antecedents of heart disease or diabetes, whose ages ranged from 35 to 65 years, 50 in each municipality. They signed a written consent required by the

Committee on Ethics in Research of the Federal University of Pará. The sample was estimated with a power of 80% and an alpha risk of 5% to differentiate the lipid variables based on differences obtained for these variables in a previous study, comparing different regions of the country [13]. Table I shows the major characteristics of the populations.

In the village of Vigia, the fishermen and their families were included in the study because their nutritional intake was mainly fish. The population selected underwent clinical examination and answered, during anamnesis, a questionnaire [14,15] about profession, dietary habits, and personal and familial antecedents. During a physical examination, blood pressure was measured according to the IV Brazilian Consensus on Systemic Hypertension [16], and the body mass index (weight/height^2) was determined, as were the biceps and triceps skin folds with the Lange pachymeter [17,18]. The lipid variables were obtained after a 12-hour fasting period through an automated enzymatic method, and the LDL-C fraction was estimated according to the Friedewald formula[19]. General biochemical tests were performed. For the analysis of the data obtained in the food questionnaire, a score was established for each food according to the recommendations of Block et al [14,15] used for analyzing the data of the National Health and Nutrition Examination Survey (NHANES II) on food frequency.

The absolute risk of coronary events in 10 years was estimated with the score proposed by the NCEP III [4]. This score was based on the Framingham Study recently validated for other distinct populations, such as white and black individuals, North American Indians, and North Americans of Japanese or Hispanic descent [20]. The absolute risk of coronary events estimated with that score in 10 years was classified as low (< 10%), intermediate (10 – 20%), or high (> 20%) [4]. That score does not compute the diabetic patients, because they are considered at high risk independently of other variables.

All data are shown as mean ± SEM. The nonpaired *t* test was used for continuous variables, and the chi-square test was used for categorical variables. The significance level adopted for all tests was P<0.05.

Results

The population in the village of Vigia consumed a lower amount of saturated fat and a higher amount of mono- and polyunsaturated fat. They also had lower values for body mass index and biceps and triceps skin folds (tab. II).

The population in the village of Vigia had lower total cholesterol values (205 ± 5 vs 223 ± 6 mg/dL, P<0.03) and triglycerides (119 ± 9 vs 177 ± 18 mg/dL, P < 0.005) compared with those of the population in the city of Belém. On the other hand, the values obtained for HDL-C (46 ± 1 vs 46 ± 1 mg/dL) and LDL-C (135 ± 4 vs 144 ± 5 mg/dL) did not differ between the 2 populations (fig. 1).

All variables composing the Framingham score (NCEP III) were analyzed and their distribution is shown in figure 2, but only the smoking habit differentiated the 2 populations. The greatest score belonged to the population of Vigia as compared with that of the City of Belém (tab. II and fig. 3).

Discussion

Our study found that the 2 populations, the riverside (Vigia) and the urban (Belém), had low cardiovascular risk for coronary events. However, important differences were observed in the lipid and anthropometric parameters, which were more favorable to the population from Vigia. On the other hand, excessive smoking was observed in this same population.

Table I - Major characteristics of the populations in Vigia and Belém

Parameters	Vigia	Belém	P
Age (years)	48 ± 1	49 ± 1	0.71
Sex			0.54
Male (%)	23 (46)	20 (40)	
Female (%)	27 (54)	30 (60)	
Systolic blood pressure (mmHg)	124 ± 3	128 ± 3	0.34
Diastolic blood pressure (mmHg)	80 ± 2	82 ± 2	0.27
Smoking (%)	15 (30)*	10 (20)	0.04

* Greatest smoking score (NCEP III), chi-square test. The diabetic patients in both populations were excluded. Age and blood pressure expressed as mean±SEM.

Table II - Nutritional parameters obtained for the populations of Vigia and Belém

Parameters	Vigia	Belém	P
Saturated fat score (%)*			0.0001
> 27	0 (0)	1 (2)	
25 – 27	1 (2)	1 (2)	
22 – 24	1 (2)	3 (6)	
18 – 21	0 (0)	17 (34)	
< 18	48 (96)	28 (56)	
Mono/polyunsaturated fat score (%)*			0.03
> 29	15 (30)	7 (14)	
20 – 29	35 (70)	39 (78)	
< 20	0 (0)	4 (8)	
BMI (kg/m^2)	25.4 ± 0.6	27.6 ± 0.7	0.02
Biceps skin fold (mm)	18.6 ± 1.1	27.5 ± 1.3	0.0001
Triceps skin fold (mm)	28.7 ± 1.2	37.3 ± 1.7	0.002

* Values obtained based on the score by Block et al [14,15]; BMI- body mass index. Anthropometric values expressed as mean ± SEM.

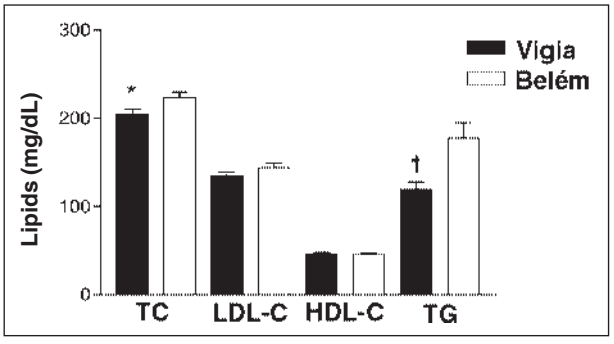

Fig. 1 - Lipid variables expressed as mean ± SEM. * Total cholesterol (TC) Vigia < total cholesterol (TC) Belém, P=0.02 (nonpaired *t* test); †triglycerides (TG) Vigia<triglycerides (TG) Belém, P= 0.004 (nonpaired *t* test).

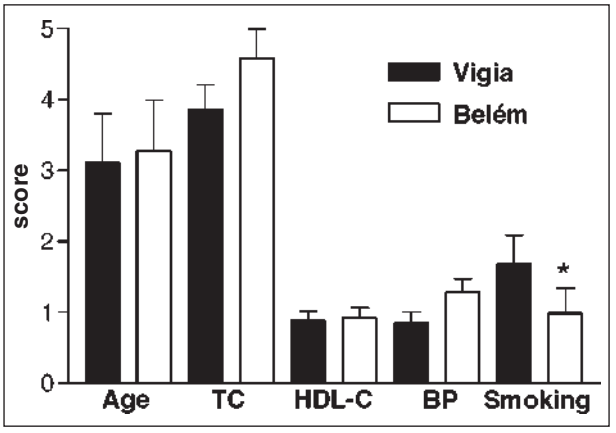

Fig. 2 - Variables of cardiovascular risk used to calculate the absolute risk of events (NCEP III). TC- total cholesterol; BP- systolic or diastolic blood pressure*; greater smoking score for the population of Vigia (P<0.04, chi-square test).

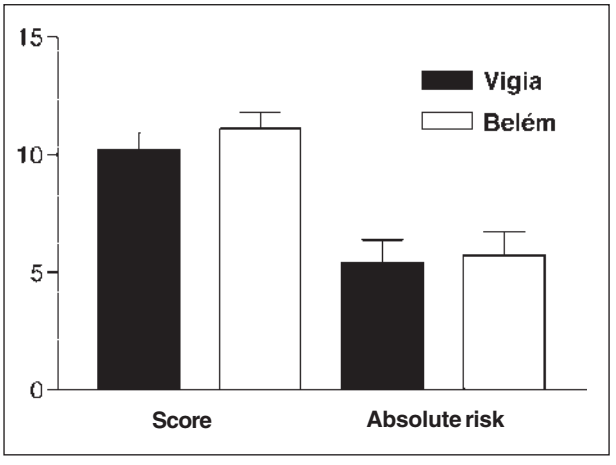

Fig. 3 - Score and absolute risk of coronary events in 10 years according to the NCEP III.

The better lipid profile in the riverside community seems to be associated with a healthier diet rich in mono- and polyunsaturated fat.

Lower values for body mass index and biceps and triceps skin folds may also have contributed for this better lipid profile, which may have been associated with greater physical activity as compared with that of the urban population of Belém. The latter had a greater prevalence of sedentary lifestyle and obesity, which are findings classically related to an unfavorable lipid profile [21,22].

In fact, the values of total cholesterol and triglycerides obtained in Vigia are in accordance with the findings by Kagawa et al [9] in Japanese on Kohama Island, where those lipids were also reduced compared with those of the other Japanese in the country.

The greater frequency of smoking in Vigia and of a sedentary lifestyle in Belém may be associated with the similar levels of HDL-C found in the 2 populations. Smoking causes lower activity in LCAT [23], reduces reverse cholesterol transport, and causes a reduction in the HDL-C level. This could attenuate the HDL-C level increased by the greater physical activity of the population in Vigia [24,25].

In regard to the LDL-C level, no differences were observed between the 2 populations, suggesting that this variable is less influenced by lifestyle. In fact, data from the Framingham Study have shown that the LDL-C level, especially for the lowest values of its distribution, does not allow differentiation between coronary and noncoronary populations [26].

Although lower values of blood pressure were reported for communities with a high intake of fish [10], our study showed no difference between the populations studied. The community in Vigia, especially the fishermen, spent most of their time at sea, and alcoholism was a frequent association. Although alcoholism was not assessed in the present study, the greater alcohol consumption in the population of Vigia may have contributed to a greater elevation in blood pressure, attenuating the possible benefit of a healthier diet and greater physical activity [27,28].

Based on NCEP III, and assessing the entire set of the variables in that score, both populations had the same absolute risk of events, which was low (< 10%). However, aiming at an additional reduction in the cardiovascular risk, the study identified the need for greater attention to smoking and possibly to alcoholism and stress in riverside populations of Amazonia.

These findings seem even more relevant when populations considered at low cardiovascular risk, but exposed to inadequate habits of modern society, reached an alarming prevalence of smoking, obesity, and sedentary lifestyle [29,30].

In fact, considering the values obtained for blood pressure, total cholesterol, and nutritional status in populations of 3 continents (Italian urban population, African populations of Tanzania and Uganda, and Amazonian population of Brazil), the African diet poor in salt and rich in fish and vegetables was associated with lower levels of blood pressure, total cholesterol, and body mass index compared not only with those of the Italian population, but also with those of the Brazilian population, which differed from the African diet in regard to the greater consumption of salt and meat [31]. Another study in Tanzania, confirmed the substantial increase in cardiovascular risk as compared with that obtained 10 years before [32].

Pavan et al [33], comparing an isolated population in Amazonia with 2 progressively more urbanized ones (in Poland and Italy, respectively), reported that the Brazilian population had normal values for blood pressure, which did not increase with age, the systolic pressure being < 100mmHg in 46% of the cases. In addition, all individuals had normal values of cholesterol (< 200 mg/dL), and 90% had glycemia < 80 mg/dL.

All these studies show that the transition from a rural lifestyle to an urban lifestyle causes an increase in cardiovascular risk, suggesting that the environment plays a crucial role in the cardiovascular risk of populations.

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