CLINICAL STUDY

Assessment of Risk Factors in Coronary Patients Being Followed by Cardiologists: Control of Risk Factors in Coronary Patients

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Control of risk factors for coronary heart disease secondary prevention is still very unsatisfactory. This study assessed 104 patients referred by cardiologists to discover how carefully National Cholesterol Education Program II recommendations were being followed. Average age of the cohort was 60.9±10.8 years, and 67.3% were men. A total of 57(54.8%) experienced a previous myocardial infarction and 83 (80.3%) a revascularization procedure. They saw their doctors 4.4±2.9 times a year and had blood tests 2.8±1.7 times a year. Blood pressure was ≥140/90 mm Hg in 57.8%, body mass index ≥25 kg/m² in 62.5%, and the weight-to-hip ratio ≥0.95 in 42.9% of men, and ≥0.85 in 47.0% of women. Total, low-density lipoprotein, and high-density lipoprotein cholesterol and triglyceride values were 222.9±47.3 mg/dL, 144.9 mg/dL, 44.8±11.5 mg/dL, and 176±119.41 mg/dL, respectively. Low-density lipoprotein cholesterol was <100 mg/dL in 8.1%, and <130 mg/dL in 47.1%; the total cholesterol/high-density lipoprotein cholesterol ratio was 5.1±1.5 (≥5 in 51%). In these patients, the control of major risk factors like high blood pressure, overweight, and high low-density lipoprotein cholesterol was poor. (Prev Cardiol. 2003;6:122–127)

Recent studies have demonstrated that the control of risk factors in patients with coronary heart disease (CHD) is very unsatisfactory. In a survey carried out within the European Community, the European Action on Secondary Prevention Through Intervention to Reduce Events (EUROASPIRE), the results of the British and Italian subgroups have shown a high prevalence of uncontrolled dyslipidemia, hypertension, diabetes, and obesity.[1] In Brazil, 100 patients with CHD confirmed by coronary angiography had a mean low-density lipoprotein cholesterol (LDL-C) of 151 mg/dL, far above the 100 mg/dL level recommended by the 1993 National Cholesterol Education Program (NCEP II) guidelines and the 27th Bethesda Conference.[2] In another similar study including patients from four different Brazilian regions, the prevalence of LDL-C ≥160 mg/dL was 41.1%.[3]

Among US physicians, cardiologists included, a low compliance with the 1993 NCEP II guidelines has been reported as an important factor for the unsatisfactory control of cardiovascular risk factors in coronary patients.[4–6] We have shown a similar situation among cardiologists practicing in the state of Bahia, Brazil, one of the largest in the territory and the fourth in economic power.[7] The opinion of 177 cardiologists was obtained through a telephone-based interview, representing 73.1% of the clinical cardiologists in practice. The study showed that a lower priority was given for the control of risk factors like stress (61%), obesity (59%), glucose intolerance (42%), and menopause (38%). Only one in three (33.9%) of those surveyed would control risk factors for all CHD clinical manifestations, while 18.1% would do it only for stable angina, 14.1% for postmyocardial infarction, and 13.0% for revascularized patients. Diet therapy for LDL-C in the 100–129 mg/dL range was indicated by 26% only, and 26.5% still would start drug therapy only if LDL-C failed to fall below 160 mg/dL with diet therapy. In addition, a score system evaluating the degree of agreement between cardiologists' own guidelines for the treatment of dyslipidemia with those of the NCEP II document showed 13.5% of full agreement, 65.0% of partial agreement, and 21.5% of disagreement. However, when the same comparison was done with the 1989 NCEP guidelines,[8] the percentage of full agreement rose to 53.1%, that of partial agreement decreased to 36.2%, and that of disagreement to 10.7%.

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The attitude of these cardiologists regarding the recommendations for CHD secondary prevention certainly must strongly influence the clinical and laboratory data of their patients. The purpose of this paper is to report the second stage of this study, which assessed the results of preventive measures in coronary patients referred by these cardiologists.

METHODS

Between October, 1995 and January, 1997, 104 patients with the diagnosis of CHD by their referral cardiologists were evaluated. Eighty-seven (83.7%) of these 104 patients were referred by 36 (25%) of the 144 cardiologists practicing in the capital of the state (Salvador, 2,262,731 inhabitants), while 17 (16.3%) were referred by eight (57%) of the 14 cardiologists in practice in the second largest city of the state (Feira de Santana, 443,497 inhabitants, and 100 km from Salvador by paved road).[7]

Recruitment and Selection

The interviewed cardiologists were asked by letter to refer four to eight patients for a brief risk factor evaluation. All patients required at least 3 months of follow-up with at least one of the following conditions: stable angina or a past history of acute myocardial infarction, unstable angina, or myocardial revascularization.

Sixteen interviewed cardiologists practicing in four other cities were excluded from the mailing list because of the long distance from Salvador.

Risk Factors Assessment

The assessment included: 1) knowledge about CHD risk factors and their control, the degree of adherence to the preventive recommendations, drugs used, frequency of visits to the cardiologist, and of lipid profile determination; 2) personal history of diabetes, hypertension, tobacco smoking, and family history of premature atherosclerosis (atherosclerotic disease before 55 years of age for men and 65 years for women in a first degree relative), and/or dyslipidemia; 3) physical examination with measurement of resting heart rate, blood pressure, weight, height, and waist and hip circumferences; 4) calculation of the body mass index (BMI) and the waist-to-hip (W/H) ratio; 5) measurements of total cholesterol, LDL-C, high-density lipoprotein cholesterol (HDL-C), and triglycerides; 6) classification of total cholesterol, HDL-C, LDL-C, and triglyceride values according to the NCEP II guidelines.[9]

The patient interview and risk factor assessment were performed by the first author. Blood pressure was measured in the right arm (or in the left arm if the right brachial artery had been catheterized), in the sitting position, using a calibrated mercury sphygmomanometer after 5 minutes of rest. Readings were taken to the nearest 2 mm Hg, and the final readings represented the mean of three measurements taken 1 minute apart; for the diastolic pressure, the fifth-phase Korotkoff sound was assessed. Hypertension was defined as a systolic pressure of ≥140 mm Hg, a diastolic pressure of ≥90 mm Hg, or both.[10]

BMI was calculated by the ratio of the weight in kilograms and the height in meters (kg/m^2). Excessive weight was defined as a BMI ≥25, and obesity as a BMI ≥30. Waist and hip circumferences were measured in centimeters, according to Reeder et al.[11] The waist was measured at the umbilicus or at the narrowest region below the ribs (visible waist). For hip measurement the reference points were the pubic symphysis and the most prominent area of the buttocks. In men the W/H ratio was corrected according to Larsson et al.[12] by the formula ($-0.02265 + 1.00459 \times$ W/H). Central obesity was defined as W/H ratio of ≥0.95 for men and ≥0.85 for women.[13]

The lipid profile was determined in venous blood after a 12 hour fast. Total cholesterol and triglycerides were determined by enzymatic methods and HDL-C by precipitation. LDL-C was calculated by the Friedewald formula up to a triglyceride value of 400 mg/dL.[14] All determinations were performed in the same laboratory used as a reference laboratory, and qualified by the Brazilian Society of Clinical Pathology.[15]

Data Analysis and Statistics

Anthropometric and lipid values were expressed as means with the respective standard deviations. The nonpaired Student *t* test was used for comparison between means. For variables with a skewed distribution, the nonparametric Mann-Whitney test was used, and percentages were compared by the chi-squared test. All tests were two-tailed and the significance level was 5%.

RESULTS

Clinical data are presented in Table I. There were 70 (67.3%) men, age 59.2±10.1 years, and 34 (32.7%) women, age 61.9±10.7 years; 55 (52.9%) were Caucasian. Only 11 (10.6%) patients had a university degree, and 50 (48.1%) completed high school. A previous acute myocardial infarction was cited by 57 (54.8%) patients, with a predominance of males (44 [77.2%] vs. 13 [22.8%]; $p<0.0001$), and a revascularization procedure by 83 (80.3%) patients. Seventy (67.3%) patients noted a personal history of high blood pressure. This was more frequent in men (47 [67.1%] vs. 23 [32.9%]; $p<0.023$). Twenty-one (20.2%) patients had diabetes, predominant in women (14 [66.7%] vs. 7 [33.3%]; $p<0.034$). The interval between the interview and the first coronary event, the interview and the last visit to the cardiologist, and the interview and the last laboratory evaluation were 3.3±3.5 years, 2.3±2.2 months, and 2.8±1.7 months, respectively. The mean frequency of visits to the cardiologist was 4.4±2.9 per year and of laboratory evaluations was 2.8±1.7 per year. Men tended to have a higher number of laboratory evaluations than women, but the difference was not significant (4.1±6.3 vs. 2.5±1.8 times per year). On

physical examination, mean blood pressure was in the high normal range (139.7±18.5/86.4±11.1 mm Hg) and mean BMI was slightly elevated (26.1±3.5 kg/m^2); there were no gender differences.

The distribution of patients classified according to blood pressure, BMI, and W/H ratio is presented in Table II. Blood pressure was high (≥140 and/or ≥90 mm Hg) in 60 (57.8%) with 54 (51.9%) having a high systolic pressure (18 [17.3%] ≥160 mm Hg), and 47 (45.2%) an elevated diastolic pressure (5 [4.8%] ≥110 mm Hg); 41 (39.4%) of these patients had elevation of both pressures. An elevated BMI was found in 65 (62.5%) patients. The W/H ratio was elevated in 30 (42.9%) men and in 16 (47.0%) women.

Lipid values are presented in Table III. The mean total and LDL-C values of 222.9±47.3 mg/dL and 144.9 mg/dL, were above the upper limits of <200 mg/dL and <100 mg/dL, respectively, recommended by the 1994 NCEP II, while the mean HDL-C and mean triglyceride values were in the normal range.[9]

The distribution of patients according to the lipid values is depicted in Figures 1 and 2. Figure 1

Table I. Demographic and Clinical Characteristics of Study Group (N=104)

	N	%	MEAN	SD	RANGE
Age (years)			60.9	10.3	31–81
Gender					
Women	34	32.7			
Men	70	67.3			
Race					
White	55	52.9			
Mulatto	38	36.5			
Black	11	10.6			
Educational level					
University degree	11	10.6			
High school	50	48.1			
Primary school	43	41.3			
Coronary heart disease (CHD)					
Post-MI	57	54.8			
Post-CABG	43	41.3			
PTCA	40	38.5			
Stable angina	13	12.5			
Unstable angina	12	11.5			
Family history of premature CHD	26	25.0			
Event-interview interval					
Coronary event (years)			3.3	3.5	0.3–18
Last clinical visit (months)			2.3	2.2	1–12
Last laboratory assessment (months)			2.8	1.7	0–11
Assessments/year					
Clinical visits			4.4	2.9	1–20
Laboratory assessments			2.8	1.7	0–11
Comorbidity					
Hypertension	70	67.3			
Diabetes	21	20.2			
Stroke	8	7.7			
None	28	26.9			
Physical Examination					
Pulse rate (beats/min)			66.8	7.9	45–90
Systolic pressure (mm Hg)			139.7	18.5	100–200
Diastolic pressure (mm Hg)			86.4	11.1	66–123
BMI (kg/m^2)			26.1	3.5	18.6–35.9
W/H ratio			0.9	0.8	0.7–1.1

MI=myocardial infarction; CABG=coronary artery bypass graft; PTCA=percutaneous transluminal coronary angioplasty; BMI=body mass index; W/H=waist/hip

Table II. Frequency Distribution of Clinical Variables (N=104)

	N	%
Blood pressure (mm Hg)		
Systolic pressure		
<140	50	48.0
≥140–<160	36	34.6
≥160	18	17.3
Diastolic pressure		
<90	57	54.8
≥90–<110	42	40.3
≥110	5	4.8
Body mass index (kg/m^2)		
<25	39	37.5
≥25–<30	50	48.0
≥30	15	14.4
Waist/hip ratio		
Women (n=34)		
<0.85	17	50.0
≥0.85	16	47.0
Not measurable	1	0.3
Men (n=70)		
<0.95	40	57.1
≥0.95	30	42.9

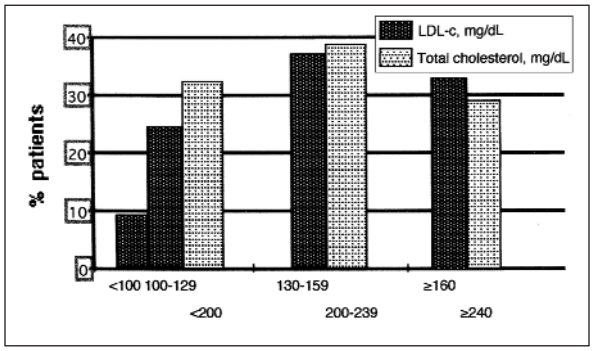

Figure 1. Percent distribution of total cholesterol and low-density lipoprotein cholesterol (LDL-C) values in 104 patients with coronary heart disease

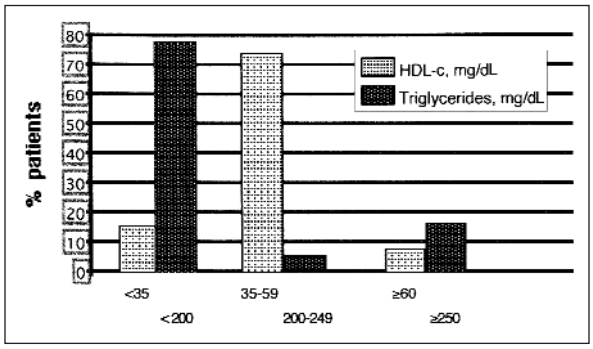

Figure 2. Percent distribution of high-density lipoprotein cholesterol (HDL-C) and triglyceride values in 104 patients with coronary heart disease

shows that 71 (68.2%) patients had a high total cholesterol (≥200 mg/dL), with 41 (39.4%) in the 200–239 mg/dL borderline high range and 30 (28.8%) in the ≥240 mg/dL high-risk cholesterol range. Only 8 (8.1%) patients had a LDL-C value below 100 mg/dL; almost one in three (33.3%) patients had LDL-C values ≥160 mg/dL. As shown in Figure 2, low HDL-C values were present in 16 (15.4%) patients and high values (≥60 mg/dL) in eight (7.7%). High triglycerides (≥200 mg/dL) occurred in 19 patients (22.2%), with 17 (16.3%) showing values ≥250 mg/dL (Figure 2). The total cholesterol/HDL-C ratio was 5.1±1.5, with 53 (51%) patients having values ≥5.

Table IV depicts the knowledge and adherence of the patients to risk factor control measures as a result of the recommendations of their cardiologists. More than 90% were aware of the importance of a low-lipid, low-cholesterol, low-sodium diet, and more than 80% were aware of the benefit of quitting smoking, controlling high blood pressure and psychological stress, and of regular aerobic exercise. However, the importance of control of diabetes mellitus was indicated by only 55.7%. When asked about their level of adherence to these recommendations, more than 80% had a positive attitude concerning a low-lipid, low-cholesterol, low-sodium diet, quitting smoking, and blood pressure control. However, less than 60% showed the same attitude toward regular physical exercise, use of hypolipemic drugs, and measures to control excessive psychological stress and diabetes. This latter showed the lowest percentage (26.0%). In contrast to these percentages, when four risk factors (hypercholesterolemia, high blood pressure, high BMI, and high W/H ratio) were considered, only 12 (11.5%) patients had all four under control.

Patients who had an invasive procedure tended to have a higher total cholesterol value than those on medical treatment (227.9±48.8 mg/dL vs. 206.3±39.8 mg/dL; $p<0.07$). When the NCEP target lipid levels for secondary prevention were compared between these two groups, the invasive approach group tended to show a lower percentage of patients within the recommended values: total cholesterol <200 mg/dL (26.0% vs. 48.0%; $p=0.07$), and LDL-C <100 mg/dL (5.4% vs. 16.0%; $p=0.10$). No difference was observed among the HDL-C levels.

Drugs used by the patients are listed in Table V, with aspirin most frequently cited (74%). Other drugs were used by less than 50% of the patients, with β blockers by 42 (40.4%) and statins by 27 (25.9%). Thirty (88.2%) of the 34 women studied were aged 50 years or older and only four (11.8%) were on estrogen replacement therapy.

DISCUSSION

Both sexes are well represented in this sample of patients with CHD. Only a minority had a university

Table III. Serum Lipid Profile of Patients With Coronary Heart Disease (N=104)

	MEAN	SD	RANGE
Total cholesterol (mg/dL)	222.9	47.3	142–386
HDL-cholesterol (mg/dL)	44.8	11.5	27–81
LDL-cholesterol (mg/dL)*	144.9	40.9	61–306
Triglycerides (mg/dL)	176.4	119.41	59–841

HDL=high-density lipoprotein; LDL=low-density lipoprotein; *n=99, calculated by the Friedewald formula (five patients with triglycerides >400 mg/dL)

Table IV. Knowledge of and Adherence to Preventive Measures for Coronary Heart Disease (N=104)

	KNOWLEDGE		ADHERENCE	
PREVENTIVE MEASURE	N	%	N	%
Low-fat diet	102	98.0	97	93.0
Low-sodium diet	97	93.0	89	85.6
No smoking	93	89.4	92	88.4
Blood pressure control	92	88.4	90	86.5
Stress control	87	83.6	48	46.2
Physical exercise	86	82.6	56	54.0
Weight control	76	73.0	70	67.3
Hypolipemic drugs	72	69.0	55	52.9
Diabetes control	58	55.7	27	26.0

degree, precluding assessment of the influence of higher education on control of risk factors. The great majority of the patients had either a previous acute ischemic event (66.3%) or a myocardial revascularization procedure (80.3%). In addition, a family history of premature CHD was elicited in 25%, a personal history of hypertension in 67.3%, and of diabetes mellitus in 20.2%, characterizing a high-risk coronary population (Table I).

The mean of 4.4 annual visits to the cardiologist appears satisfactory and 2.8 laboratory evaluations is reasonable. However, the standard deviations are large, indicating great variation in these intervals, from 1–20 visits and from 0–11 laboratory evaluations per year. This irregularity in frequency of medical supervision may have been an important factor in the unsatisfactory control of lipid and nonlipid risk factors observed in these patients. The prevalence of high blood pressure (57.7%), excessive body weight (62.5%), with obesity in 14.4%, and of central obesity, in men (42.3%) and women (47.0%), is very high.

The control of lipid risk factors is also very unsatisfactory. Only 8.1% of the patients had LDL-C levels below the 100 mg/dL goal recommended by the NCEP II,[9] 27th Bethesda Conference,[16] and Second Brazilian Consensus Conference in Dyslipidemia.[17] Even when one considers the older goal of <130 mg/dL, only 32.3% had LDL-C values below this cut point.[8] Worrisome also is a similar proportion (33.3%) of patients with LDL-C ≥160 mg/dL. The proportion of patients with triglyceride levels ≥200 mg/dL was relatively small, characterizing a population with a predominant IIa phenotype of hypercholesterolemia.

These findings are at variance with patients' knowledge about a low-lipid, low-cholesterol, low-sodium diet, and control of high blood pressure and weight (Table IV). Several factors may have played a role in these findings. From the cardiologists' side, it should be considered that training usually emphasizes invasive procedures leading to the common belief that medical treatment of CHD must be reserved for patients who decline or are not candidates for an invasive procedure. Thus, training to manage hypercholesterolemia, hypertension, diabetes, and obesity, as well as basic knowledge in nutrition and exercise is often secondary to an emphasis on revascularization procedures as the primary treatment. The alleged shortage of time for consultation, and lack of backup by a well trained allied health professional team to help implement recommendations for risk factor control also contribute to this situation. On the patients' side, important factors are inadequate educational community programs and population-based strategies to avoid or control risk factors.

An important and expected finding was the better control of lipids in medically-treated patients compared with those receiving revascularization procedures. As previously reported, in the United States 75% of revascularized patients, either by coronary artery bypass grafting or percutaneous transluminal angioplasty were discharged without receiving proper recommendations for risk factor control.[18] More recently, this failure by some American cardiologists has been confirmed after coronary artery bypass grafting, even when the attending physicians were provided with patient-specific risk assessment and treatment recommendations based on national guidelines.[19]

The distribution of drugs used is similar to that of other series, with aspirin leading the list (74.0%), β blockers being used in less than 50% (40.4%) of patients, and statins in a minority (25.9%). Estrogen replacement therapy was infrequently used. This reflects the lack of support for this approach at the time the interviews were performed. Presently, with the results of the randomized trial Heart and Estrogen plus Progestin Replacement Study (HERS)[20] for secondary prevention of coronary heart disease in postmenopausal women and the Women's Health Initiative (WHI) randomized controlled trial[21] showing no evidence of benefits of estrogen replacement in women with CHD, the attitude of cardiologists and clinicians certainly will be of more concern about this type of treatment.

Table V. Drugs Used by Patients With Coronary Heart Disease (N=104)

Drugs	Patients N	Patients %
Aspirin	77	74.0
Nitrates	50	48.0
Calcium antagonists	44	42.3
β Blockers	42	40.4
ACE inhibitors	32	30.7
Statins	27	25.9
Diuretics	13	12.5
Digitalis	11	10.6
Antiarrhythmics	8	7.7
Antiplatelet agents	8	7.7
None	3	2.9

ACE=angiotensin converting enzyme

The results of this relatively small series are consistent with those of the EUROASPIRE, which included 3569 patients.[1] It appears that the best policy for rectifying this global problem is to organize and carry on an effective international prevention program with proper adaptations for different regions of the world.

CONCLUSIONS

The control of CHD risk factors is still very unsatisfactory even in high-risk patients such as those studied here. Nevertheless, this is a worldwide phenomenon as reported in the European and North American literature. This problem probably represents the consequence of multiple factors, including the need for improved training of physicians and allied health professionals, improved teaching programs by scientific societies, changes in medical care delivery systems, and better community education. Thus, there is an urgent need for further work in this area, to identify and correct the main barriers to effective management of risk factors.

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