Cardiovascular secondary prevention: patients' knowledge of cardiovascular risk factors and their attitude to reduce the risk burden, and the practice of family doctors. The "Help Your Heart Stay Young" study

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Coronary artery disease; Epidemiology; National Health System; Risk factors.

Background. **Whether the practice of family doctors of assessing the global cardiovascular risk profile improves the knowledge of cardiovascular risk factors and the attitude to lifestyle change in patients' secondary cardiovascular prevention is unknown.**

Methods. **We evaluated subjects who visited their family doctors and those with self-reported cardiovascular disease in the urban area of Naples, Italy. Patients self-administered a simple standard questionnaire to evaluate their knowledge of cardiovascular risk factors and of simple lifestyle modifications to reduce the cardiovascular risk burden. For each participant, family doctors, blinded to the information provided by patients, had to provide a global coronary risk based on the risk factors recorded in their electronic database, or report the missing information.**

Results. **The study sample comprised 560 subjects, 61% male, with mean age 60 ± 9 years. Angina pectoris (49%) and myocardial infarction (40.9%) were the most frequently self-reported cardiovascular diseases in the study sample. The self-reported data revealed that 46% of the sample was overweight and an additional 20% overtly obese. Among those who self-reported arterial hypertension, approximately 11% admitted that they were unaware of their blood pressure, and 26% believed that they were normotensive but reported a recently detected blood pressure > 140/90 mmHg. Approximately 8% were not aware of whether they had high cholesterol levels, and among those who declared having normal cholesterol levels, 9% referred levels > 200 mg/dl. Of the sample, 22% self-reported diabetes, but 7% did not know whether they were diabetic or not. Thirty percent of the sample were smokers and among these, 40% smoked > 20 cigarettes/day. A low level of education was reported in 66% of the study sample. Women were more frequently obese, more often reported high cholesterol levels, had a low level of education and achieved a lower score from the questionnaire on knowledge of cardiovascular risk factors than men. Patients > 55 years more often reported an elevated blood pressure among those who defined themselves as normotensive, and achieved a lower score from the questionnaire on knowledge of cardiovascular risk factors than younger patients.**

Conclusions. **With regard to secondary cardiovascular prevention, the study population was found to have insufficient knowledge of cardiovascular risk factors and of the correct approach to reduce their global risk despite the fact that the attitude of their family doctors in detecting and recording risk factors was above average.**

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Fighting cardiovascular disease (CVD) risk factors is one of the critical aspects of CVD prevention[1]. American and European Scientific Societies and Health Organizations[2-4] have developed recommendations and guidelines for CVD prevention, which should be used in clinical practice. Unfortunately, there is evidence that CVD secondary prevention does not achieve the expected targets[5]. The level of patients' knowledge of their CVD risk factors is likely to be one of the factors that may significantly influence the outcome in secondary CVD. However, it is conceivable that subjects' knowledge of CVD risk factors may be influenced by their interaction with the Health System and medical doctors. Italy has a State-based Health System in which citizens refer to general practitioners (family doctors-FDs) free of charge for the first

level of health management, from prevention to diagnosis, therapy, and prescriptions. Therefore, in theory, patients with established CVD have almost no restraints in obtaining medical advice for the management of CVD risk. Recently, in a large Italian survey, it was highlighted that general practitioners have a poor attitude in recording risk factors and therefore have a quantitative approach to cardiovascular risk management[6]. However, little information exists on the level of knowledge of CVD risk factors in patients who may benefit from secondary CVD prevention and on their adherence to recommended lifestyle modifications. Therefore, the Department of Clinical and Experimental Medicine of the "Federico II" University School of Medicine in Naples and the Naples-Chapter of the Italian Society of General Practitioners organized a survey named "*Core Napulitano - Aiuta il tuo cuore a rimanere giovane*" ("Help Your Heart Stay Young" study) whose aim was to evaluate the level of patients' knowledge of CVD risk factors, and their adherence to a non-pharmacological approach to the reduction of the CVD risk burden.

Methods

Subjects. The "Help Your Heart Stay Young" study was launched in September 2001, targeting individuals of both genders aged 40-65 years, both in primary and secondary CVD prevention[7]. Individuals were recruited through a pool of FDs, affiliates of the Italian Society of General Practitioners, who were contacted by our Department and accepted to join the project. The pool comprised 51 FDs who had an electronic database of the medical history and risk factors of their patients. FDs are general practitioners who work for the National Health System. All Italian residents are entitled to choose a FD for general medical care. Participants were required to give their informed consent at the time of entry into the study. A simple self-administered questionnaire on risk factors was available for the participants while in the waiting room[7]. FDs contributed to generating the questionnaire in order to make it fully comprehensible independent of the social and educational levels of the patients. Subjects were consecutively recruited during a continuous time frame of 3 months. FDs were blind to the results of the patients' questionnaires. All FDs joining the project participated in a training session aimed at explaining and standardizing data collection procedures, and received a written memorandum and a software to calculate the global individual CVD risk[8]. The global CVD risk calculation was based on the following variables: age, sex, blood pressure, total cholesterol level, diabetes, and smoking habit. Quantitative data assessed within 6 months prior to the enrolment visit were allowed. FDs were asked to provide the CVD risk score for each participant, and when unable to so, they were requested to indicate the information that was missing in their database.

In the questionnaire, participants were asked to provide information on their socio-economic status (education, occupation), lifestyle (tobacco and alcohol use, physical activity), personal and family history of CVD and risk factors[7]. In addition, 11 questions focused on the level of knowledge of the major CVD risk factors. The present report is based on subjects who referred previous CVD.

Statistical analysis. Data in the tables are reported as percent or mean and standard error of the mean, in parenthesis. The unpaired Student's t-test was used to test between-gender and between-age strata differences in continuous variables, whereas the χ^2 statistic, corrected for 2 by 2 cross-tables, was used to test differences in proportions. In all cases, a two-tailed p value < 0.05 was used to reject the null hypothesis.

Results

The study cohort comprised 560 subjects, who referred previous CVD (myocardial infarction, stroke, cerebral transient ischemic attack, stable angina) (Table I). Angina pectoris (49%) and myocardial infarction (40.9%) were the main CVD events detected. Of the study sample, 61% were male and 15.6% (n = 87) referred more than one CVD event.

The proportions of overweight subjects and of those who were overtly obese were significantly elevated, and were both slightly higher in females than in males. Hypertension was reported in approximately half of the study sample, and among hypertensives, approximately 10% of the patients did not know their blood pressure values. Moreover, approximately half of the study sample declared having a normal blood pressure. However, within the latter subgroup, 26% actually referred blood pressure values that were in the range of overt hypertension, with a slightly, not statistically significant higher proportion among females.

An elevated cholesterol level was reported in approximately 41% of the study sample, and more often in females than in males; contrariwise, 43% declared having normal cholesterol levels, but 9% of them, without any differences between sexes, actually reported levels which were in the range of overt hypercholesterolemia. In addition, 8% did not know their cholesterol levels despite the fact that they were participating in secondary prevention programs.

Diabetes was reported in approximately 22% of the study sample; however, 7% of the participants did not know whether they were diabetic. There were no differences between sexes.

Thirty percent of the study sample admitted smoking, more often males than females. In particular, the majority of males smoked > 20 cigarettes/day. Approximately one third of the study sample were ex smokers, with a preponderance of males.

Table I. Characteristics of participants stratified by gender.

Variables	Male (n=339)	Female (n=221)	Overall (n=560)	p
Age (years)	60 ± 8	60 ± 9	60 ± 9	NS
BMI (kg/m^2)	27 ± 3.2	27 ± 4.4	27.1 ± 3.8	NS
Overweight (BMI 25-30 kg/m^2)	172 (53.6%)	84 (40.4%)	256 (45.7%)	< 0.002
Obesity (BMI ≥ 30 kg/m^2)	53 (16.5%)	54 (26%)	107 (19.1%)	< 0.006
Self-reported hypertension	154 (46.1%)	116 (52.7%)	270 (48.2%)	NS
Unaware of blood pressure values	22 (14.3%)	9 (7.8%)	31 (11.5%)	NS
Self-reported normal blood pressure	172 (51.5%)	99 (45%)	271 (48.4%)	NS
Blood pressure ≥ 140/90 mmHg	42 (29%)	28 (40.6%)	70 (25.8%)	0.06
Unaware whether hypertensive or not	8 (2.4%)	5 (2.3%)	13 (2.3%)	NS
Self-reported high cholesterol level	117 (47.4%)	154 (58.6%)	271 (41.2%)	< 0.007
Self-reported normal cholesterol level	141 (45.3%)	100 (49.8%)	241 (43%)	NS
Cholesterol level > 200 mg/dl	12 (10.5%)	10 (17.9%)	22 (9.1%)	NS
Unaware whether hypercholesterolemic or not	27 (8.0%)	20 (9.1%)	47 (8.4%)	NS
Self-reported diabetes	66 (19.5%)	56 (25.6%)	122 (21.8%)	NS
Unaware whether diabetic or not	23 (6.8%)	18 (8.2%)	41 (7.3%)	NS
Self-reported current smokers	115 (34.8%)	55 (25.3%)	170 (30.4%)	< 0.02
Smoking < 10 cigarettes/day	23 (20.2%)	18 (32.7%)	41 (24.1%)	NS
Smoking 10-20 cigarettes/day	40 (35.1%)	19 (34.5%)	59 (34.7%)	NS
Smoking ≥ 20 cigarettes/day	51 (44.7%)	18 (32.7%)	69 (40.6%)	NS
Self-reported ex-smokers	151 (45.8%)	36 (16.6%)	187 (33.4%)	< 0.000
Physical inactivity	143 (47.5%)	118 (60.5%)	261 (46.6%)	< 0.003
Low level of education	207 (64.5%)	164 (80.0%)	371 (66.3%)	< 0.000
Evaluation of the knowledge on CV risk factors: % of correct answers	61 ± 20	59 ± 22	60 ± 21	NS
Missing CV risk assessment by family doctors				
Cholesterol	35 (10.3%)	21 (9.5%)	56 (10.0%)	NS
Smoking	17 (5.0%)	9 (4.1%)	26 (4.6%)	NS
Blood pressure	14 (4.1%)	5 (2.3%)	19 (3.4%)	NS
Diabetes	7 (2.1%)	5 (2.3%)	12 (2.1%)	NS

BMI = body mass index; CV = cardiovascular.

Physical inactivity was reported in approximately half of the study sample, and more often by females than by males.

A low level of education was referred by two thirds of the study sample, a proportion that was significantly higher for females than for males. With regard to the results from a specific questionnaire on knowledge of CVD risk factors, women achieved a lower global score of correct answers than men. For instance, as shown in figure 1, approximately 30% of the patients either did not know that regular physical activity helps decrease blood pressure and cholesterol and glucose levels, or considered it useless. Moreover, approximately 55% of the participants rely on pharmacological therapy for cardiovascular prevention and appear not to give significant relevance to lifestyle modifications (Fig. 2).

All FDs declared that they knew the medical history of their patients. In a minority of cases, they did not have information on CVD risk factors recorded in their electronic database. The most frequently missing datum, without any differences between sexes, was on cholesterol levels (10%), followed by information regarding smoking, blood pressure, and history of diabetes (Table I).

Findings stratified by age. In a subanalysis, we stratified the study population by age (< 55 vs ≥ 55 years) (Table II). The proportions of males, of overweight subjects and of those who were overtly obese did not differ between groups. The proportion of subjects who self-reported hypertension was higher in the older age group, whereas the proportion of those among hypertensives who were unaware of their blood pressure levels did not differ between groups. In contrast, more subjects < 55 years declared having a normal blood pressure than those who were ≥ 55 years. However, among those who declared having a normal blood pressure, older subjects more frequently reported blood pressure values in the range of overt hypertension. The proportion of subjects who declared being unaware of whether they were hypertensive or not did not differ between the two groups. An elevated cholesterol level was more often reported by older subjects. Among subjects who reported normal cholesterol levels, those who actually reported overtly elevated cholesterol levels were in similar proportion between the two age strata. The proportion of subjects who did not know whether they had elevated cholesterol levels did not differ between the two groups. While the proportion of self-reported diabetes was higher in the older age group, the propor-

Figure 1. *Participants' answers to the question: "Does physical activity help to reduce blood pressure, cholesterol levels and glycemia?". Answers are reported in percent* (vertical axis) *separately for blood pressure, cholesterol levels and glycemia. Approximately 30% of the participants underestimate the beneficial effect of physical activity on blood pressure, cholesterolemia and glycemia.*

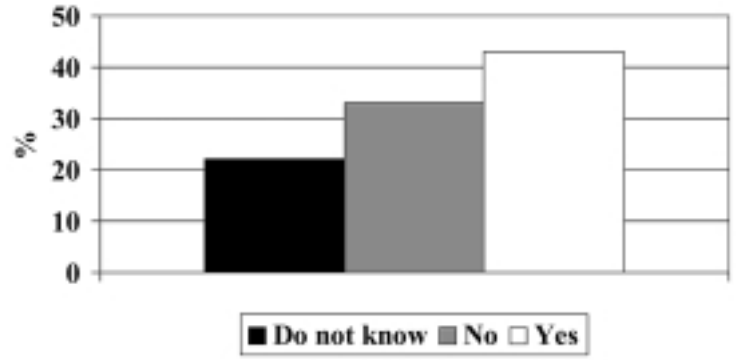

Figure 2. *Participants' answers to the question: "Can pharmacological therapy fully replace lifestyle modifications in cardiovascular prevention?". Answers are reported in percent* (vertical axis). *Approximately 55% of the participants rely on pharmacological therapy for cardiovascular prevention and appear not to give significant relevance to lifestyle modifications.*

tion of subjects who did not know whether they were diabetic or not was actually higher in the younger age groups. Younger participants more often admitted being current smokers. No between-group differences were found in terms of the number of cigarettes smoked per day, with approximately half of the current smokers in both groups declaring that they smoked > 20 cigarettes/day. The proportion of ex-smokers was similar in both age strata. A similar proportion of subjects in both age groups declared physical inactivity, as well as a low educational level. The score from the questionnaire was slightly lower in the older age group.

Discussion

We analyzed a cohort of 560 subjects with a history of CVD among those who visited their FDs, and found the patients' knowledge of CVD risk factors and of basic lifestyle modifications, which are required to reach the target of secondary CVD prevention, to be inadequate. In fact, in our study sample, almost half of the subjects were overweight, and approximately one fifth was overtly obese; a relevant proportion of the participants were currently heavy smokers, more often males than females, and more often younger than older patients; almost half of the study sample declared physical inactivity, especially females. Approximately 1/10 of the study sample was unaware of his/her blood pressure values, and most importantly 26% of those who declared being normotensive, actually reported blood pressure values in the range of overt arterial hypertension. This was especially true for females and older subjects. In addition, while 43% of the study sample self-reported normal cholesterol levels, 9% of these actually reported cholesterol levels > 200 mg/dl, with no gender and age effect on this finding. An additional 8% of the patients did not know their cholesterol levels or did not know whether they had diabetes, the latter more frequently among younger participants. In addition, a relevant proportion of the participants appeared to underestimate the role of the non-pharmacological approach to CVD risk management; as shown in figure 1, approximately 30% of the patients were unaware that physical activity may help to reduce high blood cholesterol, blood pressure and glucose levels. A misperception of the correct approach to CVD risk reduction in our cohort was also highlighted by the fact that 44% of

Table II. Characteristics of participants stratified by age*.

Variables	Age		p
	< 55 years (n=144)	≥ 55 years (n=414)	
Male gender	84 (58.3%)	253 (61.1%)	NS
BMI (kg/m^2)	27.4 ± 4.1	27 ± 3.6	NS
Overweight (BMI 25-30 kg/m^2)	61 (43.9%)	193 (49.7%)	NS
Obesity (BMI ≥ 30 kg/m^2)	35 (25.2%)	72 (18.6%)	NS
Self-reported hypertension	54 (37.8%)	216 (52.8%)	< 0.002
Unaware of blood pressure values	9 (17.6%)	22 (10.4%)	NS
Self-reported normal blood pressure	84 (58.7%)	185 (45.2%)	< 0.002
Blood pressure ≥ 140/90 mmHg	10 (16.7%)	58 (38.2%)	< 0.002
Unaware whether hypertensive or not	5 (3.5%)	8 (2.0%)	NS
Self-reported high cholesterol level	58 (40.3%)	209 (50.6%)	< 0.051
Self-reported normal cholesterol level	69 (48.0%)	174 (42.1%)	< 0.051
Cholesterol level > 200 mg/dl	5 (7.5%)	17 (9.8%)	NS
Unaware whether hypercholesterolemic or not	17 (11.7%)	30 (7.3%)	NS
Self-reported diabetes	17 (12.0%)	105 (25.4%)	0.001
Unaware whether diabetic or not	17 (12.0%)	24 (5.8%)	0.015
Self-reported current smokers	53 (37.3%)	116 (28.8%)	< 0.027
Smoking < 10 cigarettes/day	11 (20.8%)	30 (25.9%)	NS
Smoking 10-20 cigarettes/day	19 (35.8%)	40 (34.5%)	NS
Smoking ≥ 20 cigarettes/day	23 (43.4%)	46 (59.7%)	NS
Self-reported ex-smokers	47 (33.1%)	138 (34.2%)	NS
Physical inactivity	70 (53.8%)	191 (52.5%)	NS
Low level of education	94 (69.6%)	275 (70.7%)	NS
Evaluation of the knowledge on CV risk factors:			
% of correct answers	63 ± 20	59 ± 24	< 0.023
Missing CV risk assessment by family doctors			
Cholesterol	18 (10.4%)	41 (9.9%)	NS
Smoking	4 (2.8%)	22 (5.3%)	NS
Blood pressure	4 (2.8%)	15 (3.6%)	NS
Diabetes	6 (4.2%)	6 (1.4%)	0.06

BMI = body mass index; CV = cardiovascular. * the total number of participants is 588 due to 2 missing by age.

participants considered pharmacological therapy more important than lifestyle modifications (Fig. 2).

The clinical implications of these data are important in terms of public health. A recent analysis demonstrated that the decline in coronary heart disease mortality in England and Wales between 1981-2000 could be achieved by smoking cessation and blood cholesterol reduction[9]; nevertheless, the increase in the prevalence of obesity, diabetes and physical inactivity almost canceled out two decades of improvement in blood cholesterol levels, and substantially contributed to the mortality in that population[9]. Of note, the increase in the number of coexisting CVD risk factors is associated with a higher likelihood of CVD target organ damage[10,11], which is in turn a powerful predictor of CVD events[12,13], potentially through its association with prothrombotic factors[14]. Indeed, observational studies in different populations indicated that the normalization of blood pressure and cholesterol levels, body weight reduction, smoking cessation and regular exercise are associated with a decrease in total CVD mortality ranging from 20 to 30%[15]. The failure of global CVD risk prevention emerging from our study may be related to the patients' inadequate knowledge of CVD risk factors and to the poor adherence to suggested lifestyle modifications. We[7] and others[16] reported a low perception of CVD risk factors among subjects participating in primary prevention programs. However, our findings in the present study are especially relevant since they focused on subjects participating in secondary prevention programs. Based on a recent report on general practitioners[6], it might be hypothesized that FDs do not sufficiently stress the importance of CVD risk factor control with their patients participating in secondary prevention programs. Some data suggest that FDs may not be fully compliant with CVD prevention guidelines[5] due to a number of factors including: physicians receive very insufficient education on CVD prevention[17]; lack of motivation[18]; lack of familiarity with guidelines[19]. However, as in a previous report[7], FDs who joined our study represent a well-motivated group very prone to CVD risk factor management. In fact, they had an electronic record of their patients, participated in meetings on CVD risk management and guideline implementation and all contributed to the elaboration of and distributed simple educational material to their pa-

tients to encourage them to seek advice on CVD risk management. These characteristics are indicative of a remarkable approach to quantitative and qualitative CVD risk management. Indeed, only a few data concerning CVD risk calculation were missing in the FDs' databases. Overall, the FDs' data are well above the average reported in other studies[6,17,20,21]. Nevertheless, improvement in the patient-doctor relationship may be important specifically with regard to more thorough information on CVD risk factors and to increase patient adherence to CVD risk reduction programs. Moreover, it may be important to help patients better understand the risk associated with the persistence of CVD risk factors, such as smoking or obesity despite having had a CVD event. However, the experience of disease and the awareness of the risk of recurrent events may represent a relevant psychological burden.

Study limitations. Our study comprised consecutive subjects recruited among those attending their FD's offices in a time window of 3 months. Therefore, our study sample might not represent patients participating in secondary prevention programs and selected from the general population. However, in our secondary prevention population study, the prevalence of traditional CVD risk factors was similar to that in population-based studies, such as the EUROASPIRE I/II[22-24]. The frequency of smoking was significantly higher in our population than that reported in the EUROASPIRE. However, the prevalence of smokers in our study population was comparable to that reported in the Italian Cardiovascular Disease Registry[21].

Even though all efforts were made to render the questions fully comprehensible independent of the participants' social and educational levels, we did not directly and specifically assess whether participants actually felt fully comfortable filling out the questionnaires. This notwithstanding, the section of the questionnaire dedicated to the participants' knowledge of risk factors and lifestyle characteristics was found to be complete.

In the present study we mainly focused on the participants' knowledge of CVD risk factors and their attitude toward implementing lifestyle modifications in order to reduce their CVD risk. However, a direct measure of the efficacy of counseling by the FDs on CVD risk factor modification cannot be derived from our data. Such a target requires additional and specific investigation.

In conclusion, despite the fact that the attitude of FDs in identifying and recording risk factors was above average, participants of secondary CVD prevention programs showed insufficient knowledge of CVD risk factors and of the correct approach to reduce their global CVD risk. Therefore, a medical practice for CVD risk factor management that does not take into account patients' understanding and knowledge of CVD risk factors and their adherence to CVD risk reduction programs is likely to fail the target.

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