

EPIDEMIOLOGY AND PREVENTION

Cardiovascular Disease Epidemiology and Risk Factors in Primary Care

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Introduction and objectives. To study the prevalence of and risk factors for cardiovascular disease in primary care.

Patients and method. A cross-sectional study was carried out at an urban health center in Barcelona, Spain. In total, 2248 patients ≥ 15 years old were selected randomly from medical records. The study investigated cardiovascular diseases such as ischemic heart disease, cerebrovascular disease and peripheral arterial disease, and cardiovascular risk factors such as age, sex, smoking, high blood pressure, hypercholesterolemia, hypertriglyceridemia, and diabetes mellitus.

Results. The patients' mean age was 49.1 (18.9) years and 53.5% were male. Cardiovascular risk factor prevalences were: smoking, 35.2%; high blood pressure, 33.7%; hypercholesterolemia, 21.9%; hypertriglyceridemia, 12.7%; and diabetes mellitus, 15.8%. Overall, 57.9% of patients had at least 1 cardiovascular risk factor. Significantly more males presented with each risk factor ($P < .05$), apart from high blood pressure. The prevalence of all risk factors, except smoking, increased with age until 74 years and then stabilized, except high blood pressure, which continued to increase. Around 10% had cardiovascular disease, with myocardial ischemia in 5.5%, cerebrovascular disease in 3.7%, and peripheral arterial disease in 2.4%. All except cerebrovascular disease were significantly more common in males ($P < .05$). The prevalence of cardiovascular disease was low in individuals < 55 years old, particularly women, and increased with age for all forms of disease. Some 68.3% were ≥ 65 years old.

Conclusions. The high prevalence of cardiovascular risk factors was confirmed. Cardiovascular disease was more common in males and the elderly.

Key words: Cardiovascular disease. Epidemiology. Risk factors. Myocardial ischemia. Cerebrovascular disease. Peripheral arterial disease.

Epidemiología de las enfermedades cardiovasculares y factores de riesgo en atención primaria

Introducción y objetivos. Estudiar la prevalencia de las enfermedades cardiovasculares y sus factores de riesgo en atención primaria.

Pacientes y método. Estudio descriptivo transversal realizado en un centro de salud urbano de Barcelona (España). Se incluyó a 2.248 pacientes ≥ 15 años, seleccionados mediante muestreo aleatorio simple del archivo de historias clínicas. Se estudiaron las siguientes enfermedades cardiovasculares: cardiopatía isquémica, enfermedad cerebrovascular y arteriopatía periférica de extremidades inferiores, y los siguientes factores de riesgo cardiovascular: edad, sexo, tabaquismo, hipertensión arterial, hipercolesterolemia, hipertrigliceridemia y diabetes mellitus.

Resultados. La edad media fue de $49,1 \pm 18,9$ años y un 53,5% era mujer. La prevalencia de los factores de riesgo cardiovascular fue: tabaquismo, 35,2%; hipertensión arterial, 33,7%; hipercolesterolemia, 21,9%; hipertrigliceridemia, 12,7%, y diabetes melitus, 15,8%. El 57,9% presentó al menos 1 factor de riesgo. Los varones presentaron una proporción superior ($p < 0,05$) excepto en la hipertensión arterial. Su prevalencia aumentó con la edad (excepto en el tabaquismo) hasta los 74 años, en que se estabilizó, excepto en la hipertensión, que siguió aumentando. Tenían alguna enfermedad cardiovascular el 10,0% de los pacientes: cardiopatía isquémica el 5,5%; enfermedad cerebrovascular el 3,7% y arteriopatía periférica de extremidades inferiores el 2,4%. Fueron más frecuentes en varones ($p < 0,05$), excepto la enfermedad cerebrovascular. Su prevalencia fue baja en < 55 años (especialmente en mujeres) y aumentó con la edad en todas las enfermedades cardiovasculares, correspondiendo el 68,3% a pacientes de ≥ 65 años.

Conclusiones. Se confirma la elevada prevalencia de los factores de riesgo cardiovascular en nuestro medio.

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ABBREVIATIONS

CVD: cardiovascular disease.
CVRF: cardiovascular risk factor.
CD: cerebrovascular disease.
DM: diabetes mellitus.
CR: clinical record.
SD: standard deviation.

Las enfermedades cardiovasculares son especialmente frecuentes en varones y ancianos.

Palabras clave: *Enfermedades cardiovasculares. Epidemiología. Factores de riesgo. Isquemia miocárdica. Enfermedades cerebrovasculares. Enfermedad arterial periférica.*

INTRODUCTION

Although mortality from cardiovascular diseases (CVD) has shown a tendency to decrease in developed countries, including Spain,¹ CVD nevertheless remains the main cause of death, especially ischemic heart disease and cerebrovascular disease (CD).¹⁻³ The origin of these diseases is multifactorial, but cardiovascular risk factors (CVRF) represent some of the most important causes. Of importance among CVRF are age and sex, as unmodifiable CVRF, and smoking, high blood pressure, hypercholesterolemia, and diabetes mellitus (DM) as modifiable CVRF.⁴ Recently, other CVRF, such as hypertriglyceridemia,⁵ have also been shown to play an important role. The impact of the different CVRF on the onset of CVD, however, differs among countries with similar levels of development.^{6,7} This can be seen in the Mediterranean basin, for instance, where rates of ischemic heart disease are much lower than in countries in the north of Europe, which have a similar, or even better, CVRF profile.^{6,7} This phenomenon has also been confirmed in Spain.⁸

Study of the epidemiology of CVRF in our setting suffers from several limitations. Firstly, few studies have been undertaken in persons older than 65 years of age, which is the fastest growing segment of the population and which has the highest number of CVD. Secondly, recent demographic, cultural, and lifestyle changes are modifying the prevalence of these CVRF, a clear example of which is the pattern of smoking according to sex. Thirdly, CVRF are often not stratified by age and sex, and only a few studies have used sampling techniques. Finally, up-to-date studies are required which make use of the new diagnostic criteria, as in DM. Similar limitations surround the epidemio-

logy of CVD, although added to these are the low number of studies of patients with CD and, especially, peripheral artery disease. Accordingly, the purpose of this study was to examine the epidemiology of the main CVRF and CVD using a cross-sectional descriptive design in an urban health care center.

PATIENTS AND METHODS

Study Type and Patient Selection

We undertook a descriptive, cross-sectional study in an urban health care center located in a suburb of Barcelona, Spain. This suburb has a reasonably heterogeneous population regarding social and economic status, a high rate of patient visits and a total of 35 275 clinical histories (CH). The patients were selected by simple random sampling of the CH files and were included if they were older than 15 years of age and had at least 5 visits recorded in the CH, with at least 3 over the previous 2 years. If the CH failed to fulfil these conditions, then the next consecutive CH was chosen.

Data Collection

Data were collected according to a standardized protocol which included age (in years) and sex as non-modifiable CVRF, as well as various modifiable CVRF and CVD. A pilot study was carried out with 20 cases in order to detect any errors in design, to train the 12 physicians who were to review the CH and to verify the degree of concordance between the survey takers and a reference pattern (consensus review). The data were collected between June 1998 and May 1999. To reduce the proportion of lack of responses we contacted the physicians responsible for those patients whose CH failed to include all CVRF and telephoned the patients whose CH failed to record details about smoking habits (a minimum of three calls at different times of day and at least one call on a Saturday or Sunday).

Modifiable Cardiovascular Risk Factors

1. Smoking. This variable was coded dichotomously as either smoker or nonsmoker/ex-smoker (more than 12 months without smoking) if the smoking habit during the previous 2 years was reflected in the CH.⁹

2. High blood pressure. Patients were classified as having hypertension, if they took antihypertensive drugs or they had 3 blood pressure recordings $\geq 140/90$ mm Hg at 3 consecutive visits, or as not having hypertension, taking into consideration their blood pressure recordings over the previous four years if they were aged 15-40 years and the previous 2 years if they were aged over 40 years.¹⁰ The last blood pressure reading was also recorded.

3. Hypercholesterolemia. This was coded as a dichotomous variable (yes/no) depending on a cut-off point of 250 mg/dL on at least 2 occasions, which were considered valid if they were recorded in the CH during the previous 6 years.¹⁰ The last value in the CH was also recorded.

4. Hypertriglyceridemia. This was coded according to a cut-off point of 200 mg/dL (2 measurements, considered valid if they were included in the CH over the previous 6 years).¹⁰ The last value in the CH was also recorded.

5. Diabetes mellitus. The criteria used were those of the American Diabetes Association and the World Health Organization, adopted¹¹ by the Spanish Society of Family and Community Medicine: characteristic clinical features plus a random blood glucose reading >200 mg/dL, 2 baseline plasma blood glucose readings \geq 126 mg/dL or a 2-hour oral glucose tolerance test \geq 200 mg/dL. Persons already diagnosed with diabetes or who were receiving treatment with insulin or oral antidiabetic agents were also included. Baseline blood glucose levels were only taken into account for the previous 3 years¹¹ and the last value in the CH was also recorded.

Cardiovascular Diseases

1. Ischemic heart disease: clinical diagnosis, confirmed from the hospital discharge report, of acute myocardial infarction (AMI) obtained by enzyme measurements, or angina diagnosed by a compatible clinical picture plus electrocardiogram, exercise stress test, scintigraphy, or coronary angiography.

2. Cerebrovascular disease: clinical diagnosis, confirmed from the hospital discharge report, of transient ischemic attack (with computerized tomography [CT] or normal magnetic resonance imaging [MRI]) or established stroke confirmed by CT or MRI.

3. Peripheral artery disease: explicit clinical diagnosis in the CH or hospital reports of intermittent claudication, gangrene or ischemic ulcers, or diagnostic arteriography or Doppler ultrasound.

Statistical Analysis

Statistical analysis was done with SPSS. The concordance of the pilot study was studied by kappa statistics (values >0.80 were considered to represent good concordance). The sample size needed to estimate the prevalence of CVRF and CVD was calculated using the GRANMO program,¹² with a 2-sided alpha of 5%, a precision of 2% and the maximum possible uncertainty ($P=.5$). The prevalence of the CVRF and CVD studied was stratified by sex and age into 10-year groups, except above the age of 75 years, which was considered as a single category. For the quantitative variables blood pressure, cholesterol, triglycerides, and baseline

glycemia the results were stratified in age groups of 25-74 years and 35-64 years as the mean and standard deviation (SD), to facilitate comparison with other studies. Proportions were compared by χ^2 test, means by the Student *t* test for independent data or by the corresponding nonparametric test. An alpha <.05 was used as the level of statistical significance in all cases.

RESULTS

The concordance study carried out among those taking the survey produced values >0.80 for all the variables. The study included a total of 2248 patients, with a mean age of 49.1 \pm 18.9 years and 53.5% women. Table 1 shows the distribution by age and sex in 10-year strata.

The type of modifiable CVRF and the non-response rate are shown in Table 2. Most patients (57.9%) had at least 1 modifiable CVRF. A total of 803 patients (35.7%) had 1 modifiable CVRF, 338 (15.0%) had 2, 115 (5.2%) had 3, and 46 (2.0%) had more than 3 risk factors.

Table 3 shows the distribution by sex. Men had a significantly higher proportion of modifiable CVRF ($P<.05$), except for high blood pressure, for which no significant differences were observed.

In the 25-74 year age group, the mean systolic and diastolic BP were 128.4 \pm 18.7 and 78.4 \pm 10.7 mm Hg, respectively; the mean level of cholesterol was 212.9 \pm 41.3 mg/dL, of triglycerides 127.4 \pm 78.7 mg/dL and glycemia 105.6 \pm 38.6 mg/dL. In the 35-64 year age group, the mean systolic and diastolic BP were

TABLE 1. Distribution According to Age

Age, Years	Total (n=2248), n (%)	Men (n=1049), n (%)	Women (n=1199), n (%)
15-24	250 (11.1)	128 (12.2)	122 (10.2)
25-34	390 (17.4)	179 (17.1)	211 (17.6)
35-44	337 (15.0)	158 (15.0)	179 (14.9)
45-54	331 (14.7)	155 (14.8)	176 (14.7)
55-64	354 (15.7)	175 (16.7)	179 (14.9)
65-74	396 (17.6)	185 (17.6)	211 (17.6)
>74	190 (8.5)	69 (6.6)	121 (10.1)

TABLE 2. Modifiable Cardiovascular Risk Factors in the 2248 Study Patients

	Yes, n (%)	No, n (%)	No Answer, n (%)
Smoking	570 (35.2)	1.050 (64.8)	628 (27.9)
High blood pressure	620 (33.7)	1.219 (66.3)	409 (18.2)
Hypercholesterolemia	379 (21.9)	1.352 (78.1)	517 (23.0)
Hypertriglyceridemia	182 (12.7)	1.253 (87.3)	813 (36.2)
Diabetes mellitus	265 (15.8)	1.412 (84.2)	571 (25.4)

TABLE 3. Distribution of the Modifiable Cardiovascular Risk Factors Studied According to Sex

Risk Factor	Men, n (%)	Women, n (%)
Smoking*	355 (45.3)	215 (25.7)
High blood pressure	267 (32.7)	353 (34.5)
Hypercholesterolemia*	150 (19.4)	229 (23.9)
Hypertriglyceridemia*	112 (17.3)	70 (8.9)
Diabetes mellitus*	132 (17.5)	133 (14.0)

P*<.05.TABLE 5. Distribution of the Cardiovascular Diseases Studied According to Sex***

Risk Factor	Men, n (%)	Women, n (%)
Some CVD†	128 (12.2)	96 (8.0)
Ischemic heart disease†	73 (7.0)	50 (4.2)
Cerebrovascular disease	42 (4.0)	42 (3.5)
Peripheral artery disease†	38 (3.6)	17 (1.4)

*CVD indicates cardiovascular disease.

†*P*<.05.

127.5±17.2 and 79.4±10.5 mm Hg, respectively, the mean level of cholesterol was 217.5±39.3 mg/dL, of triglycerides 128.9±81.5 mg/dL, and glycemia 103.8±36.0 mg/dL.

Table 4 shows the distribution of the modifiable CVRF according to age and sex. Of note are the following aspects: *a*) the important proportion of women younger than 45 years of age who smoked; *b*) the increase in the prevalence of hypertension in both sexes with age, such that most of the older patients had hypertension; *c*) the progressive increase in the prevalence of hypercholesterolemia with age, although it tended to fall with effect from the age of 74 years; *d*) the similar pattern of hypertriglyceridemia to that of cholesterol in the women, although the rising curve was not so evident in the men, with a high prevalence among those 35-44 years of age, and *e*) the high prevalence of DM (15.8%), which also rose with age, with almost 30% of persons older than 65 years of age having diabetes, although in the men aged 35-45 years the prevalence of diabetes was already 8.3%.

The proportions in the 25-74 year age group were as follows: smoking: 36.1% (46.2% in men and 26.6% in women), high blood pressure: 32.2% (32.2% in men and 32.1% in women), hypercholesterolemia: 22.5% (21.0% in men and 23.8% in women), hypertriglyceridemia: 13.8% (19.1% in men and 9.2% in women) and diabetes mellitus: 15.5% (18.3% in men and 13.2% in women). The proportions in the 35-64 year age group were smoking: 38.5% (49.1% in men and 28.3% in women), high blood pressure: 28.5% (29.1% in men and 27.5% in women), hypercholesterolemia: 22.3% (22.7% in men and 21.9% in women), hyper-

TABLE 4. Distribution of the Modifiable Cardiovascular Risk Factors Studied According to Age and Sex*

Risk Factor	Total, n (%)	Men, n (%)	Women, n (%)
Smoking			
15-24	51 (43.6)	31 (49.2)	20 (37.0)
25-34	138 (55.4)	70 (63.6)	68 (48.9)
35-44	149 (59.1)	80 (66.7)	69 (52.3)
45-54	97 (35.8)	60 (46.2)	37 (26.2)
55-64	75 (24.1)	60 (38.2)	15 (9.7)
65-74	49 (15.0)	43 (26.9)	6 (3.6)
>74	11 (11.7)	11 (25.6)	0 (0)
High blood pressure			
15-24	4 (2.6)	2 (2.7)	2 (2.4)
25-34	7 (2.7)	6 (5.6)	1 (0.7)
35-44	31 (12.7)	21 (19.8)	10 (7.2)
45-54	71 (25.0)	35 (27.6)	36 (22.9)
55-64	142 (42.3)	59 (36.4)	83 (47.7)
65-74	232 (60.9)	98 (55.4)	134 (65.7)
>74	133 (73.5)	46 (71.9)	87 (74.4)
Hypercholesterolemia			
15-24	3 (2.6)	2 (4.0)	1 (1.5)
25-34	9 (3.6)	3 (2.8)	6 (4.1)
35-44	28 (12.2)	18 (17.8)	10 (7.8)
45-54	53 (19.0)	28 (21.5)	25 (16.8)
55-64	104 (32.3)	41 (27.0)	63 (37.1)
65-74	132 (36.4)	48 (28.6)	84 (43.1)
>74	50 (29.8)	10 (15.6)	40 (38.5)
Hypertriglyceridemia			
15-24	0 (0)	0 (0)	0 (0)
25-34	6 (3.3)	5 (6.5)	1 (1.1)
35-44	20 (10.8)	19 (22.4)	1 (1.1)
45-54	32 (13.7)	21 (18.8)	11 (9.1)
55-64	46 (15.8)	32 (23.7)	14 (9.0)
65-74	63 (19.0)	30 (20)	33 (18.1)
>74	15 (9.8)	5 (8.5)	10 (10.6)
Diabetes mellitus			
15-24	0 (0)	0 (0)	0 (0)
25-34	5 (2.1)	5 (5.2)	0 (0)
35-44	3 (4.0)	8 (8.3)	1 (0.8)
45-54	31 (11.7)	18 (14.9)	13 (9.0)
55-64	60 (18.8)	30 (19.6)	30 (18.1)
65-74	111 (29.8)	54 (31.6)	57 (28.2)
>74	49 (29.0)	17 (26.6)	32 (30.5)

*The proportions in the 25-74 year age range were: smoking: 36.1% (46.2% in men and 26.6% in women), high blood pressure: 32.2% (32.2% in men and 32.1% in women), hypercholesterolemia: 22.5% (21.0% in men and 23.8% in women), hypertriglyceridemia: 13.8% (19.1% in men and 9.2% in women), and diabetes mellitus: 15.5% (18.3% in men and 13.2% in women). The proportions in the 35-64 year age range were: smoking: 38.5% (49.1% in men and 28.3% in women), high blood pressure: 28.5% (29.1% in men and 27.5% in women), hypercholesterolemia: 22.3% (22.7% in men and 21.9% in women), hypertriglyceridemia: 13.8% (21.7% in men and 6.9% in women), and diabetes mellitus: 12.6% (15.5% in men and 10.2% in women).

triglyceridemia: 13.8% (21.7% in men and 6.9% in women) and diabetes mellitus: 12.6% (15.5% in men and 10.2% in women).

A total of 224 patients (10.0%) had CVD. Ischemic heart disease was present in 123 patients (5.5%), CD

TABLE 6. Distribution of the Cardiovascular Diseases Studied According to Age and Sex*

Risk Factor	Total, n (%)	Men, n (%)	Women, n (%)
Any cardiovascular event			
15-24	0 (0)	0 (0)	0 (0)
25-34	5 (1.3)	5 (3.2)	0 (0)
35-44	7 (2.1)	7 (4.4)	0 (0)
45-54	11 (3.3)	6 (3.9)	5 (2.8)
55-64	48 (13.6)	32 (18.3)	16 (8.9)
65-74	87 (22.0)	46 (24.9)	41 (19.4)
>74	66 (34.7)	33 (47.8)	33 (27.3)
Ischemic heart disease			
15-24	0 (0)	0 (0)	0 (0)
25-34	2 (0.5)	2 (1.1)	0 (0)
35-44	5 (1.5)	5 (3.2)	0 (0)
45-54	5 (1.5)	2 (1.3)	3 (1.7)
55-64	23 (6.5)	15 (8.6)	8 (4.5)
65-74	57 (14.4)	33 (17.8)	24 (11.4)
>74	31 (16.3)	16 (23.2)	15 (12.4)
Cerebrovascular disease			
15-24	0 (0)	0 (0)	0 (0)
25-34	0 (0)	0 (0)	0 (0)
35-44	0 (0)	0 (0)	0 (0)
45-54	5 (1.5)	4 (2.6)	1 (0.6)
55-64	18 (5.1)	13 (7.4)	5 (2.8)
65-74	27 (6.8)	13 (7.0)	14 (6.6)
>74	34 (17.9)	12 (17.4)	22 (18.2)
Peripheral artery disease			
15-24	0 (0)	0 (0)	0 (0)
25-34	1 (0.3)	1 (0.6)	0 (0)
35-44	3 (0.9)	3 (1.9)	0 (0)
45-54	5 (1.5)	3 (1.9)	2 (1.1)
55-64	13 (3.7)	9 (5.1)	4 (2.2)
65-74	18 (4.5)	12 (6.5)	6 (2.8)
>74	15 (7.9)	11 (15.9)	7 (3.3)

*The proportions in the 25-74 year age range were: any cardiovascular event: 8.7% (11.1% in men and 6.6% in women), ischemic heart disease: 5.1% (6.7% in men and 3.7% in women), cerebrovascular disease: 2.8% (3.5% in men and 2.1% in women), and peripheral artery disease: 2.2% (3.2% in men and 1.4% in women).

The proportions in the 35-64 year age range were: any cardiovascular event: 6.4% (9.2% in men and 3.9% in women), ischemic heart disease: 3.2% (4.5% in men and 2.1% in women), cerebrovascular disease: 2.2% (3.3% in men and 1.1% in women), and peripheral artery disease: 2.1% (3.1% in men and 1.1% in women).

in 84 (3.7%), and peripheral artery disease in 55 (2.4%). Most of the patients had just one recorded CVD (192 cases, i.e., 8.5%), whereas 28 patients (1.3%) had 2 CVD and 4 had 3 CVD (0.2%).

Table 5 shows the distribution of the CVD according to sex. The men had a higher proportion (12.2%) of these events than the women (8%), the difference being statistically significant ($P < .05$) except for CD. Finally, Table 6 shows the CVD stratified by age groups and sex. Of note was the low proportion of patients younger than 55 years with a CVD, especially in the women, and the progressive increase with age. Age is a very relevant CVRF, with almost one in 3 patients

older than 74 years of age having at least 1 CVD. The men had a higher risk of having CVD in almost all the age groups, and most cases of ischemic heart disease involved patients older than 65 years. This tendency was more marked in CD (especially among those older than 74 years). Peripheral artery disease mainly affected men older than 55 years of age.

DISCUSSION

The results of this study show a high prevalence of modifiable CVRF in our area. The prevalence was greater in men and tended to increase with age. Of special note was the situation in patients with DM. Although reducing the cut-off point to 126 mg/dL might slightly increase the diagnostic prevalence of the disease,¹³ the prevalence of this CVRF may be increasing as a result of the increasing overall life expectancy and the rise in obesity and unhealthy lifestyles. The low prevalence of CVD in men <55 years and women <60 years was notable.

We shall now comment on our results in comparison with other studies undertaken in our area using some sort of sampling technique among adult persons, irrespective of sex, and which include patients up to at least 74 years of age.

With regard to smoking, men smoked more than women and the number of smokers tended to decrease with age, similarly to the trend reported in other studies.¹⁴⁻²³ However, the difference between sexes was much less in persons younger than 45 years of age, as can be seen in Table 4. In our study the men smoked less and the women more than the corresponding data reported in the National Health Survey,¹⁴ which confirms that the patterns of smoking habits are changing,¹⁴⁻²³ with a reduction in men and an increase in women.

With regard to high blood pressure, the results are similar (Table 4) to those of other studies,^{15,18,23-29} although the older studies show a lower prevalence.²⁶ The prevalence of hypertension may also be increasing, as a consequence of the aging of the population and the increase in unhealthy lifestyles.

Similar considerations can be made regarding studies of dyslipidemia,^{15,17,18,23,25,30-32} although in this case comparisons are more difficult owing to the variation in cut-off points between the different studies. The greater consumption of alcohol, especially among young and middle-aged persons, may account for the different distribution according to age and sex (Table 4).

Special consideration should be given to DM, which is the CVRF whose prevalence has increased most in recent years. Studies of DM undertaken a decade ago^{33,34} showed a prevalence of around 6%. More recent studies,^{13,15,17,35-39} however, generally show a higher prevalence, varying from 6.7% to 18.3%, although

the different diagnostic criteria used and the inclusion criteria by age hinder comparison of the results. The aging of the population, unhealthy lifestyles and obesity are all raising the prevalence of DM⁴⁰; as a consequence, this phenomenon may be classified as the epidemic of the 21st century.

Fewer epidemiologic studies concerning the prevalence of CVD have been undertaken in our area. Most studies of ischemic heart disease have been done from hospital records. Nevertheless, the REGICOR⁴¹ group examined the incidence of AMI and the PANES⁴² study, which analyzed the prevalence of angina in different autonomous regions of Spain, reported a prevalence of 7.5% in the population aged 45-74 years. A recent study⁴³ suggested that the demand for health care due to ischemic heart disease is tending to increase. Regarding CD, most studies have also been undertaken in a hospital setting. Caicoya et al⁴⁴ studied the incidence of CD in Asturias and López Pousa et al⁴⁵ studied the prevalence in persons older than 64 years of age, giving a figure (4%) lower than that seen in our results, although their study was undertaken in a rural setting. A large hospital series of patients with peripheral artery disease⁴⁶ coincides with the results of our study in the high proportion of men (80%) and older age. The use of mainly clinical diagnostic criteria may have led to a lower prevalence of peripheral artery disease than expected, especially in older persons.

One of the limitations of the study may involve a selection bias. The large population covered by the health center (the number of CH is greater than the population census) and selection by random sampling tend to guarantee their absence. Information bias may also have occurred. However, in an attempt to avoid this we undertook a pilot study to train the survey takers and confirm the inter-observer concordance, with excellent results on the kappa index. Likewise, strict criteria were used for the cut-off points of the quantitative variables, the period during which the information was considered valid and the definition of the variables. Moreover, we attempted to minimize loss of information by contact with the physicians and by telephone contact with the patients in the case of smoking habits. The main problem in cross-sectional descriptive studies is usually related to lack of responses, which in the present study was increased owing to the strict criteria used. The high prevalence of some risk factors, such as smoking or diabetes, may thus be an overestimate.

CONCLUSIONS

The results of this study show a high prevalence of modifiable CVRF, which was greater in men and in older patients. Of note was the low prevalence of CVD in men and women younger than 55 and 60 years of age,

respectively. The increase in life expectancy might possibly raise the prevalence of CVD, which is still the main cause of death in Spain.¹⁻³ These diseases are closely related with CVRF, which have an accumulative, additive and progressive effect on the incidence of CVD. An overall strategy is required to prevent CVD by means of the prevention, control and treatment of CVRF, in order to reduce the incidence of CVD.

REFERENCES

- Villar Álvarez F, Banegas Banegas JR, Rodríguez Artalejo F, del Rey Calero J. Mortalidad cardiovascular en España y sus comunidades autónomas (1975-1992). *Med Clin (Barc)*. 1998;110:321-7.
- Ministerio de Sanidad y Consumo, Sociedad Española de Cardiología y Sociedad Española de Arteriosclerosis. Control de la colesterolesmia en España, 2000. Un instrumento para la prevención cardiovascular. *Rev Esp Salud Pública*. 2000;74:215-53.
- Olalla MT, Medrano MJ, Sierra MJ, Almázan J. Time trends, cohort effect and spatial distribution of cerebrovascular disease mortality in Spain. *Eur J Epidemiol*. 1999;15:331-9.
- Anderson KM, Wilson PWF, Odell PM, Kannel WB. An updated coronary risk profile. A Statement for health professionals. *Circulation*. 1991;83:356-62.
- Jeppesen J, Hein HO, Suadicani P, Gyntelberg F. Triglycerides concentrations and ischemic heart disease: an eight-year follow-up in the Copenhagen Male Study. *Circulation*. 1998;97:1029-36.
- Sans S, Kestelot H, Kromhout D, on behalf of the Task Force. The burden of cardiovascular diseases mortality in Europe. Task Force of the European Society of Cardiology on cardiovascular mortality and morbidity statistics in Europe. *Eur Heart J*. 1997;18:536-43.
- Tunstall-Pedoe H, Kuulasmaa K, Mahönen M, Tolonen H, Ruo-kokoski E, Amouyel P, for the WHO MONICA project. Contribution of trends in survival and coronary-event rates to changes in coronary heart disease mortality: 10-year results from 37 WHO MONICA Project populations. *Lancet*. 1999;353:1547-57.
- Masia R, Pena A, Marrugat J, Sala J, Vila J, Pavesi M. High prevalence of cardiovascular risk factors in Gerona, Spain, a province with low myocardial infarction incidence. REGICOR Investigators. *J Epidemiol Community Health*. 1998;52:707-15.
- Córdoba García R, Ortega Sánchez-Pinilla R, Cabezas Peña C, Forés García D, Nebot Adell M. Recomendaciones sobre el estilo de vida. *Aten Primaria*. 1999;24 Supl 1:118-32.
- Programa de actividades preventivas y de promoción de la salud. Guía de Prevención Cardiovascular. Madrid: Sociedad Española de Medicina Familiar y Comunitaria; 1996. p. 18-36.
- Programas básicos de salud. Diabetes mellitus. Sociedad Española de Medicina Familiar y Comunitaria. Madrid: Doyma; 1998. p. 24-5.
- Marrugat J, Vila J, Pavesi P, Sanz F. Estimación del tamaño de la muestra en la investigación clínica y epidemiológica. *Med Clin (Barc)*. 1998;111:267-76.
- Baena Díez JM, Oller Colom M, Martín Peñacoba R, Nicolau Sabaté M, Altes Boronat A, Iglesias Serrano C. Impacto de los nuevos criterios diagnósticos propuestos por la Asociación Americana de Diabetes (ADA-97) sobre la prevalencia diagnóstica de diabetes mellitus tipo 2. *Aten Primaria*. 1999;24:97-100.
- Fernández A, Schiaffino A, García M, Salto E, Villalbí JR, Borrás JM. Prevalencia del consumo de tabaco en España entre 1945 y 1995. Reconstrucción a partir de las Encuestas Nacionales de Salud. *Med Clin (Barc)*. 2003;120:14-6.
- Pineda Cuenca M, Custardoy Olavarrieta J, Andreu Ortiz MT, Ortiz Arroniz JM, Cano Montoso JG, Medina Ferrer E, et al. Estudio de prevalencia de factores de riesgo cardiovascular en un área de salud. *Aten Primaria*. 2002;30:207-13.

16. Bellido Casado J, Martín Escudero JC, Dueñas Laita A, Mena Martí FJ, Arzua Mouronte D, Simal Blanco F. Hábito tabáquico en una población general: descripción de la prevalencia, grado de consolidación y fase de abandono. *Arch Bronconeumol*. 2001;37:75-80.
17. Poley García JJ, Costa Ferrer A, Conget Donlo I. Prevalencia y distribución de los factores de riesgo cardiovascular en la población de un área metropolitana. *Rev Clin Esp*. 2000;200:543-7.
18. Segura Frago A, Rius Mey G. Factores de riesgo cardiovascular en una población rural de Castilla-La Mancha. *Rev Esp Cardiol*. 1999;52:577-8.
19. Nebot M, Borrell C, Ballestín M, Villalbí JR. Prevalencia y características asociadas al consumo de tabaco en población general en Barcelona entre 1983 y 1992. *Rev Clin Esp*. 1996;196:359-64.
20. Alcántara Muñoz PA, Aroca García MD, Menarguez Puche JF, Alcalá Martínez J, Herranz Valera JJ. El tabaco: factor de riesgo en una zona de salud. *Aten Primaria*. 1995;16:43-7.
21. Esteve Cabanillas A, Ramos Cuadra AM, Rodríguez Tapioles R, Pérez Huertas MA, Gálvez Vargas R. Hábito tabáquico de la población de la provincia de Granada. *Gac Sanit*. 1993;7:221-7.
22. Pons Sureda O, Benito Oliver E, Catalán Fernández G, Roca Salom P, Proenza Arenas A, Garau Llinas I, et al. Prevalencia del consumo de tabaco en Mallorca. *Gac Sanit*. 1992;6:25-9.
23. Subirats Bayego E, Vila Ballester L, Vila Subirana T, Vallescar Pinana R. Prevalencia de factores de riesgo cardiovascular en una población rural del norte de Cataluña: La Cerdaña. *An Med Interna*. 1997;14:220-5.
24. Compan Barco L, Vioque J, Quiles J, Hernández-Aguado I, Borrás F. Prevalencia y control de la hipertensión arterial en la población adulta de la Comunidad Valenciana, 1994. *Med Clin (Barc)*. 1998;110:328-33.
25. Altallaa Rached A, Estrada Saiz RV, Jaber Ismael A. Estudio epidemiológico de los factores de riesgo cardiovascular en Alcalá de Henares (Madrid). *An Med Interna*. 1997;14:226-30.
26. Armario García P, Hernández del Rey R, Gasulla Roso JM, Alonso Fresneda A, Tresserras R, Pardell Alenta H. Obesidad e hipertensión arterial. Estudio transversal de prevalencia en la población de L'Hospitalet de Llobregat. *Med Clin (Barc)*. 1990;94:570-5.
27. Torner Soler M, Pardell Alenta H, Martínez Amenós A, Ocón Pujades A, Roca-Cusachs Coll A, Tovar Méndez JI, et al. Prevalencia de hipertensión arterial en la población rural de Cataluña. *Rev Clin Esp*. 1989;185:253-6.
28. Custodi J, Llor JL, Farrus M, Ribas E, Vilaseca J, Zaera JL, et al. La hipertensión arterial en la comarca del Baix Ebre (Tarragona). *Aten Primaria*. 1989;6:151-8.
29. Puras A, Sanchos C, Artigao LM, Divison JA. Prevalence, awareness, treatment, and control of hipertensión in a Spanish population. *Eur J Epidemiol*. 1998;14:31-6.
30. Navarro Rodríguez MC, Laínez Sevillano P, Ribas Barba L, Serra Majem L. Valores antropométricos y factores de riesgo cardiovascular en las Islas Canarias (1997-98). *Arch Latinoam Nutr*. 2000;50:34-42.
31. Márquez Contreras E, Casado JJ, Sánchez Ramos JL. Epidemiología de las dislipemias en población general adulta de la zona básica de salud La Orden de Huelva. *Aten Primaria*. 1993;12:319-24.
32. García Closas R, Serra Majem L, Chacón Castro P, Olmos Castellvell M, Ribas Barba L, Salleras Sanmartí L, et al. Distribución de la concentración de lípidos séricos en una muestra representativa de la población de Cataluña. *Med Clin (Barc)*. 1999;113:6-12.
33. Bayo J, Sola C, García F, Latorre PM, Vázquez A. Prevalencia de la diabetes mellitus no dependiente de la insulina en Lejona (Vizcaya). *Med Clin (Barc)*. 1993;101:609-12.
34. Franch Nadal J, Álvarez Torices JC, Álvarez Guisasaola F, Diego Domínguez F, Hernández Mejía R, Cueto Espinar A. Epidemiología de la diabetes mellitus en la provincia de León. *Med Clin (Barc)*. 1992;98:607-11.
35. Botas Cervero P, Delgado Álvarez E, Castaño Fernández G, Díaz de Greñu C, Prieto Santiago J, Díaz Cadorniga FJ. Prevalencia de diabetes mellitus e intolerancia a la glucosa en población entre 30 y 75 años en Asturias, España. *Rev Clin Esp*. 2002;202:421-9.
36. Monclús Benet JF, Álvarez Vera JI, Arasa Fava MJ, Aguilar Martín M, Viñas Naranjo J, Curto Romeo C. Los criterios ADA-97, la prevalencia de diabetes mellitus y las comarcas más meridionales de Cataluña. *Aten Primaria*. 2001;27:178-82.
37. Pulgar Suárez M, Gómez Guedes P, Aguado Díaz M, Menéndez Álvarez S, García Garaboa A, Rodríguez González I, et al. Validez de los nuevos criterios diagnósticos de la diabetes mellitus tipo 2. Impacto de su aplicación en un área de salud. *Aten Primaria*. 2001;27:111-5.
38. Rodríguez Paños B, Sanchis C, García Gosálvez F, Divison JA, Artig LM, López Abril J, et al. Prevalencia de diabetes mellitus y su asociación a otros factores de riesgo cardiovascular en la provincia de Albacete. Grupo de Enfermedades Vasculares de Albacete (GEVA). *Aten Primaria*. 2000;25:166-71.
39. Masia R, Sala J, Rohlfis I, Piulats R, Manresa JM, Marrugat J, en nombre de los investigadores del estudio REGICOR. Prevalencia de diabetes mellitus en la provincia de Girona, España: el estudio REGICOR. *Rev Esp Cardiol*. 2004;57:261-4.
40. Mokdad AH, Bowman BA, Ford ES, Vinicor F, Marks JS, Koplan JP. The continuing epidemics of obesity and diabetes in the United States. *JAMA*. 2001;286:1195-200.
41. Pérez G, Pena A, Sala J, Roset P, Masía R, Marrugat J. Acute myocardial infarction case fatality, incidence and mortality rates in a population registry in Gerona, Spain, 1990-1992. REGICOR Investigators. *Int J Epidemiol*. 1998;27:599-604.
42. Lopez Bescós L, Cosin J, Elosua R, Cabades A, de los Reyes M, Aros Diago JL, et al. Prevalencia de angina y factores de riesgo cardiovascular en las diferentes comunidades autónomas de España: estudio PANES. *Rev Esp Cardiol*. 1999;52:1057-9.
43. Marrugat J, Elosua R, Martí H. Epidemiología de la cardiopatía isquémica en España: estimación del número de casos y de las tendencias entre 1997 y 2005. *Rev Esp Cardiol*. 2002;55:337-46.
44. Caicoya M, Rodríguez T, Lasheras C, Cuello R, Corales C, Blázquez R. Incidencia del accidente cerebrovascular en Asturias: 1990-1991. *Rev Neurol*. 1996;24:806-11.
45. López Pousa S, Vilalta J, Llinas J. Incidencia de la enfermedad vascular cerebral en España: estudio en una zona rural de Girona. *Rev Neurol*. 1995;23:1081-6.
46. Marín R, Fernández Vega F, Escalada P, Estevan JM, Barreiro A, Álvarez J. Factores de riesgo cardiovascular en la enfermedad arterial periférica. Estudio de 403 casos. *Rev Clin Esp*. 1993;193:357-62.