

Prevalence of Cardiovascular Risk Factors in the Balearic Islands (CORSAIB Study)

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Introduction and objectives. Indices of cardiovascular morbidity and mortality in the Balearic Islands in Spain are poor. We decided to investigate the prevalence of the main cardiovascular risk factors (CRFs) and of different cardiovascular diseases in inhabitants of these islands aged 35-74 years.

Subjects and method. A population-based descriptive cross-sectional study was used. The Balearic Islands were divided into 14 sectors, each with three or four participating general practitioners (GPs). A random selection of 40 patients registered with each GP was made. Patients were contacted in the surgery or by mail or telephone. Each GP administered a questionnaire on the patients' family and personal history of cardiovascular disease and CRFs such as levels of smoking and physical activity, carried out anthropometric and blood pressure measurements, and requested blood glucose, cholesterol, and cholesterol fraction measurements.

Results. The study included 1685 individuals. Some 27% smoked (men 36.9%, women 18.7%), 47.8% had high blood pressure (men 52.3%, women 43.4%), 24.2% had hypercholesterolemia (men 24.4%, women 24.1%), 11.7% had diabetes mellitus (men 15.3%, women 8.4%), 27% were obese (men 24.8%, women 29%), 40.1% were overweight (men 48.3%, women 33.4%), and 43.1% of men and 45.6% of women were sedentary. Two or more CRFs were observed in 58.4%, and 9.8% had a diagnosed cardiovascular disease. The Framingham method

gave a higher estimate of cardiovascular risk in all age groups than the REGICOR method.

Conclusions. The prevalence of the main CRFs in the Balearic Islands is high, implying a high risk profile. Dietary and lifestyle interventions, and preventive measures are recommended.

Key words: *Cardiovascular risk factors. Prevalence. Cardiovascular epidemiology.*

Prevalencia de factores de riesgo cardiovascular en las Islas Baleares (estudio CORSAIB)

Introducción y objetivos. Baleares presenta indicadores desfavorables de morbimortalidad cardiovascular. Por ello se planteó estimar la prevalencia de los principales factores de riesgo cardiovascular (FRC) y de la enfermedad cardiovascular diagnosticada entre la población de 35 a 74 años de las islas.

Sujetos y método. Se realizó un diseño descriptivo transversal de base poblacional. Se dividió la comunidad en 14 sectores y participaron 3 o 4 médicos de familia por sector (50 en total). Se seleccionó aleatoriamente a 40 personas entre las adscritas a cada médico, que se captaron en la consulta, por carta y por teléfono. Cada médico administró un cuestionario de antecedentes personales y familiares de enfermedades del aparato cardiovascular y de FRC, hábito tabáquico, ejercicio físico, exploración física de medidas antropométricas y presión arterial, y solicitó una determinación de las concentraciones de glucemia, colesterol y sus fracciones.

Resultados. Se incluyó a 1.685 personas. Las prevalencias estimadas fueron: tabaquismo del 27% (el 36,9% en varones y el 18,7% en mujeres); hipertensión del 47,8% (el 52,3% en varones y el 43,4% en mujeres); hipercolesterolemia del 24,2% (el 24,4% en varones y el 24,1% en mujeres); diabetes del 11,7% (el 15,3% en varones y el 8,4% en mujeres); obesidad del 27% (el 24,8% en varones y el 29% en mujeres), sobrepeso del 40,1% (el 48,3 en varones y el 33,4% en mujeres), y sedentarismo (el 43,1% en varones y el 45,6% en mujeres). El 58,4% tenía 2 o más FRC. El 9,8% tenía una enfermedad

The appendix contains a list of the participating researchers and hospitals in the CORSAIB (COR SA a les Illes Balears) study.

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ABBREVIATIONS

CRF: cardiovascular risk factor.
AHT: arterial hypertension.
CI: confidence interval.
BMI: body mass index.
GP: general practitioner.
SAP: systolic arterial pressure.
DAP: diastolic arterial pressure.
HDL-C: high-density lipoprotein cholesterol.

cardiovascular diagnosticada. El riesgo cardiovascular individual fue superior al calcularlo con la ecuación de Framingham que con la de REGICOR en todos los grupos de edad.

Conclusiones. Los principales FRC tienen una alta prevalencia en Baleares, lo que supone un elevado perfil de riesgo. Es recomendable la intervención en los hábitos dietéticos y los estilos de vida, así como la adopción de medidas de prevención.

Palabras clave: Factores de riesgo cardiovascular. Prevalencia. Epidemiología cardiovascular.

INTRODUCTION

Since the 1970s, a reduction in cardiovascular mortality has been observed in the Western World. While France is the only European country with a lower cardiovascular mortality than Spain, cardiovascular disease continues to be the largest cause of death in the Spanish population.^{1,2}

Substantial regional differences exist in mortality and in the reduction of mortality rates. The annual reduction from 1975 to 1992 varied from 3.3% in Navarra to 1.7% in the Autonomous Community of Murcia.²

The Balearic Islands has been considered one of the regions with the highest rates of cardiovascular mortality^{3,4}; it was considered to have one of the highest rates of potential years of life lost and had the second lowest reduction in cardiovascular mortality compared with other autonomous communities in Spain.² Recently, the IBERICA study showed that the indices are not, in fact, so bad and should be corrected, since the figures included patients who died in the Balearic Islands but whose residence was elsewhere.⁵ Furthermore, the growth of the population in recent years has been much higher than the national average and the population projections used to calculate regional mortality rates in between-census periods. Similar findings have been reported for another tourist area, the Canary Islands.⁶

It is particularly important to determine the prevalence of the main cardiovascular risk factors (CRFs) in order to develop prevention plans to reduce cardiovascular morbidity and mortality. Therefore we have addressed the prevalence of the main CRFs and of diagnosed cardiovascular disease in the Balearic Islands population aged between 35 and 74 years.

SUBJECTS AND METHOD

Design

A population-based descriptive cross-sectional study was undertaken in a representative sample of the adult population between 35 and 74 years of age resident in the Balearic Islands in 1998 (340 675 individuals out of a total of 796 438 inhabitants of the islands, according to the Instituto Balear de Estadística, the office of statistics for the Balearic Islands). A sample of 1824 individuals was calculated to be necessary in order to estimate the prevalence of CRFs with a 95% confidence interval (CI) and a relative accuracy of within 20% of the estimated prevalence for any given CRF.

To ensure that the sample was representative, the Balearic Islands were divided into 14 geographic sectors of between 45 000 and 53 000 inhabitants. Each sector corresponded to between 2 and 4 healthcare regions. General practitioners (GPs) were invited to participate and the involvement of 3 to 4 doctors per sector was obtained.

The database used for the sample was the record of individual health cards, which at that time covered 94% of the censored population of the Balearic Islands. For each geographic sector, the population structure was calculated according to decades and sex. A simple random sample was obtained from the population assigned to each doctor and it was confirmed to be proportional to the age and sex of the sector.

Thus, 64 individuals were randomly selected from the patients assigned to each of the 50 recruited doctors, 40 patients to achieve a sample of 2000 and 24 patients as reserves to substitute individuals who did not respond or were not eligible. Each individual was sent a letter on 2 consecutive occasions asking them to attend an appointment with their doctor. If they did not attend, attempts were made to establish contact by telephone. If the selected individual visited the doctor for other reasons, the doctor, having previously identified the medical history of each of the selected patients, arranged a specific appointment and obtained signed consent. Patients who refused to participate or could not be contacted were substituted by one of the 24 reserves from the same age and sex group.

The ethical committee for clinical research in the Balearic Islands (*Comité Ético de Investigación*

Clinica de Baleares) approved the project, including the informed consent documents for participation in the study and the storage and use of biological samples.

The fieldwork was performed in 2000.

Clinical and Analytic Measurements

At the appointment, the doctor administered a questionnaire that included sex, age, education, employment status, history of myocardial infarction, cerebrovascular disease, peripheral artery disease, arterial hypertension (AHT), diabetes, dyslipidemia, medication, smoking, physical exercise in work and free time, and family history of cardiovascular disease. The data were compared with the patient's medical history at the health center.

The physical examination included weight, height, waist size, blood pressure, and heart rate. Blood pressure was assessed in both arms at the beginning of the appointment, after at least 5 minutes rest, and at the end of the appointment, around 20 minutes later (assessing blood pressure in the arm that had showed the highest values). If the second measurement differed from the first by more than 5 mm Hg or the pulse showed arrhythmias, the measurement was repeated and the mean of the 2 latter measurements recorded. Measurements were made using Omron 711 blood pressure monitors, which have been validated previously.⁷ Calibration was certified by the manufacturer and was checked twice during the study. Patients were considered hypertensive if they were taking antihypertensive medication or if the mean blood pressure from the 2 measurements performed in the same arm was greater than or equal to 140 mm Hg for the systolic arterial pressure (SAP) or greater than or equal to 90 mm Hg for the diastolic arterial pressure (DAP).

The day after the initial appointment, a blood sample was obtained following a 12 hour nocturnal fast to determine the concentrations of glucose (hexokinase method; DAX 72 analyzer, Bayer Diagnostics), total cholesterol (cholesterol esterase enzymatic method; DAX 72 analyzer), high-density lipoprotein cholesterol (HDL-C) (direct method using catalase; DAX 72 analyzer), and triglycerides (Trinder method; DAX 72 analyzer). Measurements were performed in the laboratories of the following hospitals: Hospital de Can Misses (Ibiza), Hospital de la Verge del Toro (Menorca), Hospital de Manacor (Mallorca), and El Carme (Hospital Universitario Son Dureta de Palma), which acted as the coordinating laboratory and was responsible for quality control.

Patients were considered to be diabetic if they received treatment with insulin or oral antidiabetic drugs, or if their fasting glucose level was greater than or equal to 126 mg/dL; they were considered smokers if they reported having smoked in the last 6 months; hypercholesterolemic if their total cholesterol was at

least 250 mg/dL; obese if they had a body mass index (BMI) of at least 30; and overweight if their BMI was between 25 and 30. The questionnaire from the 1997 National Health Survey was used to assess whether individuals were sedentary according to whether they themselves declared that to be the case or that they did not undertake regular exercise in their free time.

All participating doctors received an instruction manual and attended training workshops to ensure homogeneity of patient interviews and examinations. To this end, a video prepared by the Mallorca Health Communication Group (*Comunicación y Salud de Mallorca*) was used. Participating doctors were accredited as field researchers with a signed agreement to follow the protocol.

Statistical Analysis

The mean (SD) was calculated for quantitative variables, since they were considered to fit a normal distribution. Point estimation of the prevalence of the different CRFs was calculated using the 95% confidence interval (CI). Individual coronary risk at 10 years was calculated using the original Framingham formula⁸ and calibrated for the Spanish population.⁹ The results presented were obtained following weighted adjustment to the true population. However, the small deviations made very little difference to the results. Statistical analysis was performed using SPSS for Windows version 8 and Epiinfo version 6.

RESULTS

The number of participants was 1685, 92.5% of the sample calculated to be necessary. Of the patients who were included in the study, 77.4% were preselected and the rest were reserves. Patients were contacted by letter or telephone in 72% of cases; the rest were contacted in the health centers. Of the 554 individuals who did not participate, 42% were not eligible (census errors, deaths, absences, changes of address, etc) and 6% refused permission for a blood sample to be taken; the remainder refused to participate without indicating their reasons.

TABLE 1. Distribution of the Sample (1685 Subjects) Compared With That of the Population of the Balearic Islands According to the Census of 1996

	Men			Women		
	Sample, %	Census, %	Difference, %	Sample, %	Census, %	Difference, %
35-44 years	26.3	33.0	-6.7	26.1	31.8	-5.7
45-54 years	24.8	28.0	-3.2	27.9	26.4	1.5
55-64 years	25.5	22.1	3.4	24.7	21.5	3.2
65-74 years	23.3	17.3	6.0	21.2	20.2	1.0

TABLE 2. Means and Standard Deviations of Quantitative Variables, Total Results, and Results According to Sex*

	Men		Women		Total	
	Number	Mean±SD	Number	Mean±SD	Number	Mean±SD
Weight, kg	812	79±13	865	68±12	1677	73±14
Height, cm	812	169±7	864	156±7	1676	162±9
BMI	812	28±4	863	28±5	1675	28±5
AC, cm	809	98±12	865	87±13	1674	92±13
SAP, mm Hg	814	137±19	870	132±22	1684	134±21
DAP, mm Hg	814	84±10	870	81±10	1684	82±11
Heart rate, beats/min	807	73±12	855	75±11	1662	74±12
Total cholesterol, mg/dL	813	216±41	867	217±41	1680	217±41
HDL-C, mg/dL	812	48±13	863	57±12	1675	53±13
LDL-C, mg/dL	754	139±35	821	138±36	1575	138±36
Triglycerides, mg/dL	814	154±114	868	110±61	1682	131±93
Glucose level, mg/dL	814	107±33	868	100±28	1682	103±31

*BMI indicates body mass index; AC, abdomen circumference; SAP, systolic arterial pressure; DAP, diastolic arterial pressure; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol.

TABLE 3. Cardiovascular Risk Factors. Overall Prevalence (%) According to Age, Sex, and Total*

	Smoking		Hypertension		Hypercholesterolemia		Diabetes		Obesity	
Men										
35-44 years	49.3	(42.7-56.0)	30.4	(24.5-36.8)	19.3	(14.4-25.0)	8.4	(5.1-12.8)	15.9	(11.4-21.4)
45-54 years	40.9	(34.1-47.9)	46.2	(39.2-53.2)	31.3	(25.0-38.0)	12.0	(8.3-17.7)	28.2	(22.2-34.9)
55-64 years	33.3	(26.9-40.3)	64.7	(57.6-71.3)	21.5	(16.0-27.8)	16.0	(11.6-22.3)	30.3	(24.1-37.2)
>65 years	21.1	(15.4-27.8)	73.3	(66.2-79.6)	26.3	(19.9-33.3)	26.0	(19.9-33.2)	25.8	(19.6-32.9)
Total	36.9	(33.6-40.3)	52.3	(48.8-55.8)	24.4	(21.5-27.5)	15.0	(12.9-17.9)	24.8	(21.9-27.9)
Women										
35-44 years	36.6	(30.6-43.0)	15.2	(10.9-20.4)	11.9	(8.1-16.7)	1.7	(0.5-4.2)	16.7	(12.2-22.0)
45-54 years	22.1	(16.9-27.9)	30.9	(25.1-37.3)	17.1	(12.5-22.5)	5.1	(2.7-8.7)	24.9	(19.5-31.0)
5-64 years	7.1	(4.0-11.5)	58.1	(51.1-64.8)	36.0	(29.5-42.9)	12.0	(7.9-17.1)	31.7	(25.5-38.5)
>65 years	3.9	(1.6-7.8)	80.3	(73.8-85.8)	35.4	(28.4-42.8)	18.0	(12.3-23.8)	47.3	(39.8-54.8)
Total	18.7	(16.2-21.5)	43.4	(40.1-46.8)	24.1	(21.2-27.0)	8.4	(6.6-10.4)	29.0	(26.0-32.1)
Total	27.5	(25.4-29.7)	47.8	(45.4-50.2)	24.2	(22.2-26.3)	11.7	(10.2-13.4)	27.0	(24.8-29.1)

*Figures shown in parenthesis correspond to 95% confidence intervals.

The sample contained 52% women. Table 1 shows the distribution of the groups according to age and sex of the sample and the study population. The sample contained 52% of individuals in active employment, 21% were retired, and 17.2% undertook household responsibilities.

Table 2 shows the results for quantitative variables (biochemical data and physical examination).

Table 3 shows the estimated prevalence of CRFs according to age and sex.

Smoking was more common in men (36.9%) than in women (18.7%). In men, 21.7% were nonsmokers (95% CI, 18.9-24.7) and 41.4% were ex smokers (95% CI, 37.9-44.8), while in women, 68.2% were nonsmokers (95% CI, 64.9-71.2) and 13.1% were ex smokers (95% CI, 10.9-15.5).

The prevalence of AHT was 47.8%, with large differences according to age in both sexes (Table 3).

AHT occurred without the patient's knowledge in 22.7% (Figure 1) and increased with age in men from 8.5% between 35 and 44 years to 16.2% between 65 and 75 years; in women, the increase was from 4.2% in the youngest group to 16.9% in the oldest.

The prevalence of hypercholesterolemia in men was 24.4% and in women it was 24.1%; the prevalence of previously unidentified hypercholesterolemia was 10.2% (Figure 1).

The prevalence of diabetes was 11.7%: 8.4% in women and 15.3% in men (Table 3). The prevalence of abnormal baseline glucose levels was 9.5% (95% CI, 8.2-11.1): 11% in men (95% CI, 8.9-13.4) and 8.2% in women (95% CI, 6.4-10.2).

The prevalence of obesity was 27.0%, with marked differences according to age and sex (Table 3). The prevalence of overweight was 40.1% (95% CI, 38.3-

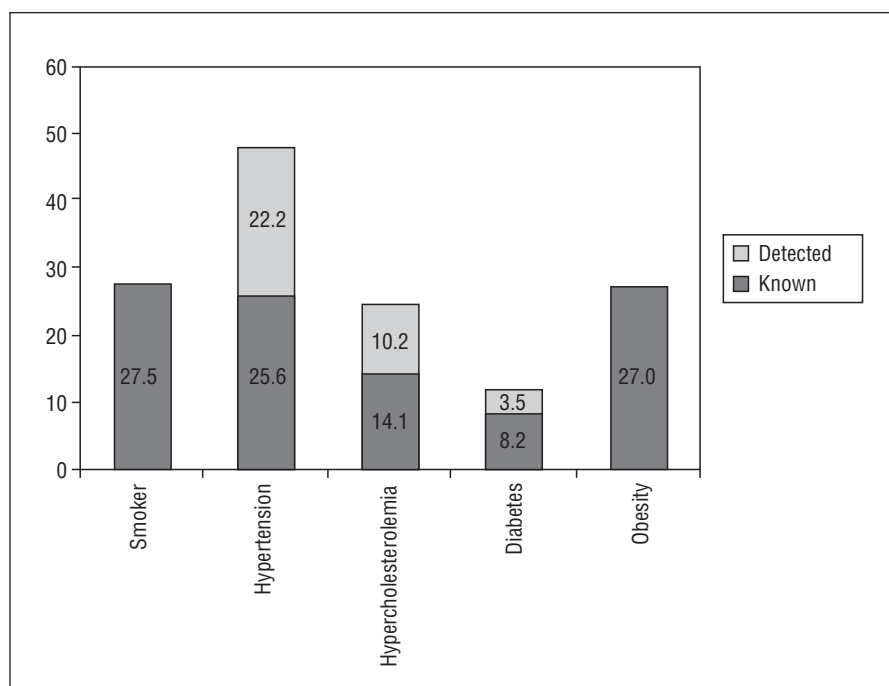


Figure 1. Cardiovascular risk factors: prevalence (%), known or detected for the first time in this study.

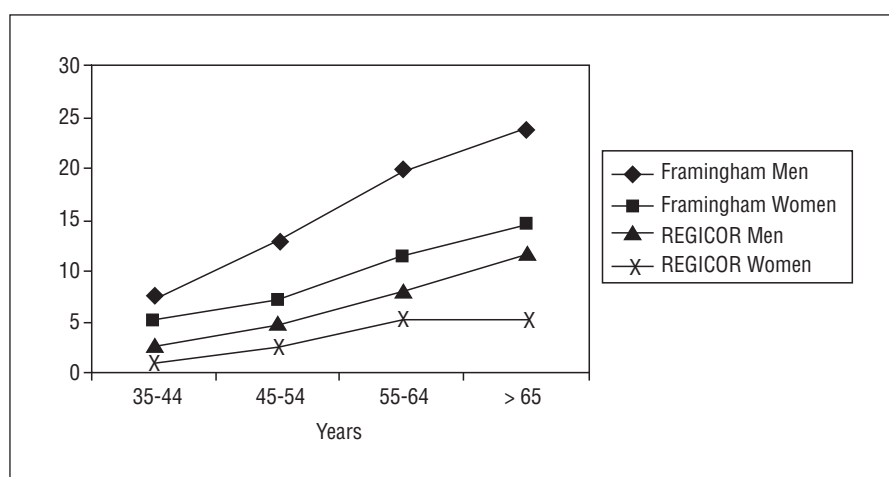


Figure 2. Risk of a cardiovascular event at 10 years shown as mean individual percentage for each age and sex group calculated using the Framingham or REGICOR methods.

43.0); 48.3% in men (95% CI, 44.8-51.8) and 33.4% in women (95% CI, 30.2-36.6).

The prevalence of a sedentary lifestyle was 43.1% in men (95% CI, 39.7-46.5) and 45.6% in women (95% CI, 42.3-49.0). Regular physical activity was undertaken by 22.6% of men (95% CI, 19.8-25.6) and 23.1% of women (95% CI, 20.3-26.0).

In 9.8% of men (95% CI, 7.9-11.8) no risk factors were identified, while in women this figure was 21.8% (95% CI, 19.1-24.7). Two or more risk factors were present in 58.4% of men (95% CI, 55.0-61.8) and 36.8% of women (95% CI, 33.6-40.1).

The prevalence of diagnosed cardiovascular disease was 9.8% (95% CI, 8.3-11.2). That figure included coronary artery disease in 10.5% of men (95% CI, 8.5-

12.8) and 3.4% of women (95% CI, 2.3-4.8), cerebrovascular disease in 5% of men (95% CI, 3.6-6.7) and 2.2% of women (95% CI, 1.3-3.4), and peripheral artery disease in 3.6% of men (95% CI, 2.4-5.1) and 1.7% of women (95% CI, 0.9-2.8).

The individual risk of a coronary event in the next 10 years is shown in Figure 2.

DISCUSSION

Comparison of the prevalence of CRFs is made difficult by differences in the methods used, the age groups included, standardization of the population, the factors studied, and the limits considered pathological for each factor.

TABLE 4. Prevalence of Smoking Between 35 and 64 Years Expressed as Percentages Found in Different Population-Based Studies Undertaken in Spain

	Study Region, Year, and Reference					
	Balearic Islands, 2004	National (Spain), 1993 ¹⁰	Murcia, 1993 ¹⁵	Lanzarote, 1993 ¹⁶	Gerona, 1998 ¹³	Castile-La Mancha, 1999 ¹¹
Men						
Smoker	41.5	49.4	49.9	53.0	34.4	42.9
Ex smoker	36.3	24.9	15.7	26.0	48	31.6
Nonsmoker	22.2	25.7	34.4	21.0	17.6	25.5
Women						
Smoker	22.6	16.7	15.9	15.0	15.9	15.9
Ex smoker	14.8	5.0	3.1	10.0	8.6	6.4
Nonsmoker	62.6	78.3	81.0	75.0	75.5	77.7

Before discussing the results, it should be pointed out that this study differs from other population-based studies. The study was proposed by scientific societies in the field of primary care. The study population was based on individual health cards, allowing a database to be obtained from within the health-care service itself. Only 1 in 20 patients resident in the Balearic Islands did not have an individual health card, meaning that in terms of CRFs, it can be considered to be a study of the general population. The number of participants obtained was very good, demonstrating the efficiency of patient capture through the primary care system. Most studies increase the number of subjects selected in order to compensate for those who cannot be located, do not respond, or do not agree to participate.¹⁰⁻¹²

In our study, access to individual health cards meant that we were able to leave substitutes for those who were not eligible or did not respond. Those reserve subjects represented 21.6% of the sample, a percentage that is similar to the 20% classified as not eligible in a study undertaken in Gerona.¹³

Only 1 in every 4 subjects was contacted when attending a doctor's appointment, suggesting that prevalences have not been overestimated.

More than half of the sample was made up of individuals who were in active employment, a proportion that is similar to that found for these age and sex groups in the Balearic Islands population. There was a slightly lower participation of young people and a slightly higher participation for older men than the reference population (Table 1); however, the estimations of prevalence provided were weighted.

Current trends in smoking habit were confirmed, namely, feminization of the smoking population and increasing numbers of ex smokers.¹⁴ Table 4 shows the prevalence of smoking observed in our study, limited to the population aged between 35 and 64 years, along with the prevalence observed in studies of other Spanish populations for the same age groups.^{10,11,13,15,16} As can be seen in Table 4, our study found a lower

prevalence of smokers than the national study, in which there was a lower percentage of ex smokers.¹⁰

The temporal trend in prevalence of smoking found in the MONICA study was towards a 5% increase in women and a 5% decrease in men.¹⁷ The most similar results in terms of smoking prevalence in men to those found in our study are seen in Castile-La Mancha¹¹ and Alicante,¹² and for women, also in Alicante¹² (Table 4). Smoking is mainly concentrated in younger subjects. Thus, the prevalence of smoking in the 35 to 45-year age group is 10 times higher than between 65 and 74 years. The proportion of ex smokers was also higher than that found in the national study¹⁰ performed 10 years earlier, representing a tendency that is similar to that seen in Southern and Eastern Europe.¹⁸

Following Cooper et al,¹⁹ an automatic apparatus was used for blood pressure measurements in order to avoid intraobserver and interobserver variation, which can reach 25 mm Hg.^{20,21}

The high prevalence of AHT may be explained by the use of new assessment criteria^{22,23} and the inclusion of patients receiving antihypertensive treatment. This high prevalence is similar to that of other studies. Thus, in a study of the Spanish population aged between 35 and 64 years, the recalculated prevalence using the new criteria was 45%²⁴; in the Gerona study (population, 25-74 years) it was 39.5%¹³; in the south of Alicante (population, 20-80 years) it was 50.1%¹²; and in Castile-La Mancha (population, 25-74 years) it was 41.4%.¹¹ These figures for prevalence differ from those obtained up to the beginning of the 1990s, situated around 20%,^{10,14,15} if criteria for SAP and DAP are set at above 160 mm Hg and above 95 mm Hg, respectively.

The prevalence increases with age, especially in women, in whom the figure is lower than in men below 65, but becomes higher between 65 and 74 years, as observed in other studies.^{11,13}

Awareness of AHT in our study was similar to that found in Alicante¹² but higher than that found

nationally.²⁴ Three out of 4 hypertensive patients received treatment, a proportion that is similar to that found in the national study¹⁰ but higher than that found in Alicante¹² and Gerona.¹³ Blood pressure was controlled in one third of treated patients, a proportion that is similar to that found in other studies.^{10,11,13,25}

The concentrations of total plasma cholesterol were lower in men than those found in other studies of Spanish populations^{11,13,26} but similar in women, with the exception of a study performed in Talavera, in which the figures were lower.¹¹ The values for HDL-C were similar to those of the Talavera¹¹ and Gerona¹³ studies.

The prevalence of cholesterol levels above 250 mg/dL (cutoff point proposed by consensus for analysis of cholesterol levels in Spain²⁷) or treatment with cholesterol-reducing drugs was similar to that found in the Alicante study¹² but higher than the national prevalence.¹⁰

The estimated prevalence of diabetes is approximate, since the oral glucose tolerance test was not performed. Almost 1 in every 3 cases was previously unidentified or was detected during the study. The results for prevalence of diabetes in other population-based studies that did not use the oral glucose tolerance test are much lower than those obtained in our study.^{15,10,28} This may be explained by the fact that the cutoff point for glucose concentration used in those studies was 140 mg/dL, whereas our study used the criteria of the American Diabetes Association from 1997 (≥ 126 mg/dL).²⁹ The prevalence found in our study was closest to that found in the Alicante study,¹² in which the same cutoff point was used but which reported a slightly lower degree of previously undiagnosed diabetes. In studies performed in 5 Spanish provinces using the oral glucose tolerance test with pre-1997 criteria²⁹ the prevalence of unrecognized diabetes was 3.5% while the figure for diagnosed diabetes was 4.1%.³⁰

In addition to hyperglycemia as a risk factor, we must also consider abnormal baseline glucose (110-125 mg/dL), which in our study represented 9.5% of the population, since prediabetic stages carry increased risk of cardiovascular events.^{31,32} Those subjects, along with subjects who have a high HOMA index³³ alongside normal glucose levels as an indication of insulin resistance, have a higher cardiovascular risk.

Use of the BMI as an indicator of body fat has been recommended for the adult population between 20 and 69 years.³⁴ Obesity is accepted as corresponding to a BMI ≥ 30 , according to World Health Organization criteria.³⁵ The use of the waist-hip ratio was ruled out, since there is increasing evidence that it is not a good measure of abdominal visceral obesity. Instead, abdominal circumference was used as a good indicator of abdominal fat accumulation, which has also been considered to be a cardiovascular risk factor.^{36,37}

The prevalence of obesity in our study was higher than that seen nationally¹⁰ or in the Gerona study,¹³ and lower than seen in the Alicante study.¹² A finding confirmed in all studies is that obesity increases with age.

Those data contrast with data from studies of prevalence performed by the SEEDO group and published in 2000, looking at 8 autonomous communities in Spain, in which a prevalence of 14.5% for the population between 25 and 60 was reported, with a higher prevalence in women (15.7%).³⁴ This marked difference in prevalence may be partly explained by the fact that subjects over 60 years of age were not included, when in our study this corresponded to the age group with the highest prevalence. Our results for the prevalence of overweight were most similar to those from the national¹⁰ and SEEDO³⁴ studies.

In our study it is not really possible to talk about sedentary lifestyle since the perception of the subjects was obtained through a questionnaire without confirmation by measurement of calorie expenditure. However, comparison was possible between declaration of exercise undertaken outside of work (which is related to cardiovascular risk³⁸) and the national health survey of 2001,³⁹ since we used the same questionnaire, although not the same age range. In the national health survey, a similar proportion of respondents reported being sedentary in their free time as in our study, representing an additional problem to excess weight (70% of the population) that is added to the fact that only one third of our population reported exercising regularly. This represents a major public health problem that needs to be addressed with combined strategies of promoting healthy eating and healthy lifestyle.⁴⁰

The prevalence of diagnosed cardiovascular disease, determined by interview and confirmed through the patient's medical history, has not been reported in any other population-based study of Spanish CRFs. Data are available from a primary care study that are similar to those reported here.⁴¹ Data from the Gerona study relate to the prevalence of angina and were collected using a specific questionnaire.¹³

According to our results, 1 in every 10 individuals has known cardiovascular disease. Knowledge of the prevalence of coronary, cerebrovascular, and peripheral vascular diseases allows the volume of patients to be identified for the purposes of secondary prevention.⁴²

Figure 2 shows that individual cardiovascular risk is higher when calculated using the Framingham formula⁸ than when this formula has been adapted to the Spanish population⁹; in both cases, the risk increases with age and is higher in men than women.

Finally, in this study we have shown a high prevalence of CRFs in a community with a relatively low incidence of cardiovascular disease and with low mortality rates compared with other industrialized countries,⁵ a finding that supports the theory of the Southern European paradox.⁴³

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