



**HAL**  
open science

## Prevalence of cardiovascular risk factors in an urban adult population from southern Spain. IMAP Study (Multidisciplinary Intervention in Primary Care)

Ricardo Gomez-Huelgas, Jose Mancera-Romero, Rosa Bernal-Lopez, Sergio Jansen-Chaparro, Antonio Baca-Osorio, Estefania Toledo, Rita Perez-Gonzalez, Ricardo Guijarro, Francisco J Tinahones, Miguel A Martínez-González

### ► To cite this version:

Ricardo Gomez-Huelgas, Jose Mancera-Romero, Rosa Bernal-Lopez, Sergio Jansen-Chaparro, Antonio Baca-Osorio, et al.. Prevalence of cardiovascular risk factors in an urban adult population from southern Spain. IMAP Study (Multidisciplinary Intervention in Primary Care). International Journal of Clinical Practice, 2010, 65 (1), pp.35. 10.1111/j.1742-1241.2010.02543.x . hal-00613817

**HAL Id: hal-00613817**

**<https://hal.science/hal-00613817v1>**

Submitted on 6 Aug 2011

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

**Prevalence of cardiovascular risk factors in an urban adult population from southern Spain. IMAP Study (Multidisciplinary Intervention in Primary Care)**

Journal:	<i>International Journal of Clinical Practice</i>
Manuscript ID:	IJCP-05-10-0284.FT10.R2
Wiley - Manuscript type:	Short Report
Date Submitted by the Author:	19-Aug-2010
Complete List of Authors:	Gomez-Huelgas, Ricardo; Carlos Haya Hospital, Internal Medicine Department Mancera-Romero, Jose Bernal-Lopez, Rosa; Hospital Universitario Virgen de la Victoria, Biomedical Research Laboratory Jansen-Chaparro, Sergio Baca-Osorio, Antonio Toledo, Estefania Perez-Gonzalez, Rita Guijarro, Ricardo; Carlos Haya Hospital, Internal Medicine Department Tinahones, Francisco J Martínez-González, Miguel A
Specialty area:	

SCHOLARONE™  
 Manuscripts

1  
2  
3 **Prevalence of cardiovascular risk factors in an urban adult population from**  
4 **southern Spain. IMAP Study (Multidisciplinary Intervention in Primary Care).**  
5  
6  
7  
8

9  
10 **Ricardo Gomez-Huelgas<sup>1,4</sup>, Jose Mancera-Romero<sup>2</sup>, M. Rosa Bernal-Lopez<sup>3,4</sup>, Sergio**  
11 **Jansen-Chaparro<sup>1</sup>, Antonio J. Baca-Osorio<sup>2</sup>, Estefania Toledo<sup>5</sup>, Rita Perez-Gonzalez<sup>6</sup>,**  
12 **Ricardo Guijarro-Merino<sup>1</sup>, Francisco J. Tinahones<sup>3,4</sup>, Miguel A. Martínez-Gonzalez<sup>5</sup>.**  
13  
14  
15  
16

17  
18  
19 <sup>1</sup>Internal Medicine Department, Carlos Haya Hospital, Malaga, Spain; <sup>2</sup>Health Centre "Ciudad  
20 Jardin", Malaga, Spain <sup>3</sup>Biomedical Research Laboratory, Endocrinology Department, Virgen de la  
21 Victoria Hospital, Malaga, Spain; <sup>4</sup>CIBER Fisiopatología de la Obesidad y la Nutrición (CB06/003);  
22 <sup>5</sup>Department of Preventive Medicine and Public Health, University of Navarra, Pamplona.  
23 <sup>6</sup>Fundación Imabis.  
24  
25  
26  
27  
28  
29  
30  
31  
32

33 Short title: **Cardiovascular risk factors in southern Europe**  
34  
35  
36  
37  
38  
39

40 ***Corresponding author:***

41 ***M. Rosa Bernal-Lopez:*** Biomedical Research Laboratory (CiberObn), Hospital Virgen de  
42 la Victoria, Campus de Teatinos s/n, 29010 Málaga, Spain. Tel.:+34 951290346 Fax: +34  
43 951290302. E-mail address: rbernallopez@yahoo.es  
44  
45  
46  
47

48 Abstract: 212 words  
49

50 Manuscript: 2694 words  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**ABSTRACT**

**AIMS:** To study the prevalence of cardiovascular risk factors in an urban population of Malaga, Spain and its relationship with educational level.

**METHODS:** A cross-sectional study was performed with a random representative sample of 2,270 individuals from the adult population (18-80 years) from a specific Health-Care Centre in Malaga City. All participants underwent a clinical interview, including social-demographic information, and a physical examination. A blood sample was also drawn.

**RESULTS:** The mean age of the participants was  $43.6 \pm 15.6$  years, and 57.6% had a low educational level. The prevalence of cardiovascular risk factors was: smoking 27.7%, hypertension 33.1%, diabetes 7.1% and dyslipidaemia 65.4%. Over 60% were either overweight or obese, and 76.7% had a sedentary lifestyle. Except for smoking and a low HDL cholesterol, the prevalence of the other cardiovascular risk factors increased with age. A low educational level was associated with a higher prevalence of cardiovascular risk factors, and this association was significant with regard to smoking, obesity, abdominal obesity and hypertriglyceridaemia.

**CONCLUSIONS:** The population studied presents a high prevalence of cardiovascular risk factors, especially dyslipidaemia and obesity. A low academic level was associated with an increased prevalence of smoking, obesity and dyslipidaemia. People with a lower socio-cultural level are a priority target for introducing policies to prevent and control cardiovascular disease.

**Keywords:** Risk factors. Educational level. Epidemiology. Population.

## INTRODUCTION

Cardiovascular diseases (CVD) are the main cause of mortality in Spain, accounting for 33% of all deaths. In terms of years of potential life lost, CVD are in third position, behind tumours and external causes of mortality [1]. The health costs due to CVD in our country were close to seven billion euros in 2003 [2]. Furthermore, the prevalence of obesity, diabetes, hypertension and hypercholesterolaemia in Spain have all risen over the past 20 years at an alarming rate [3]; this is likely to be reflected in a future increase in cardiovascular morbidity and mortality. Consequently, due to the high social and economic impact of CVD, these disorders represent one of the main priorities of health care policies.

Prevention strategies should be based on evidence from the understanding and control of classic cardiovascular risk factors (CVRF). Given the magnitude of the problem, studies in local populations are still justified to improve our overall information in this field and to define priorities for action in specific populations. In Spain, two recent papers [4,5] have brought together different cross-sectional studies in different Spanish geographical areas to provide an overview of the epidemiology of CVRF in our country. The distribution of cardiovascular morbidity and mortality is not uniform throughout Spain and Malaga is among the Spanish provinces with higher rates of cardiovascular morbidity and mortality [6]. Socioeconomic and cultural factors have been suggested to play a decisive role in the geographical differences in health indicators [7].

Despite the high impact of CVD in the regions of southern Spain, like Andalusia, the few cross-sectional studies examining the overall frequency of exposure to CVRF in Andalusia were published over a decade ago [8,9], with more recent studies being local and focusing on the rural population [10] or older people [11]. The aim of this study was to determine the prevalence of several CVRF in the general adult population belonging to the urban area of Malaga (Spain).

## MATERIAL AND METHODS

The IMAP study (Multidisciplinary Intervention in Primary Care) is a population-based study designed with two aims: to establish the prevalence of the metabolic syndrome (MS) in the urban population of Malaga and to study the effectiveness of three years of a multidisciplinary intervention on diet and physical activity conducted in primary care to reduce the prevalence of MS. To study the prevalence of MS, we designed a cross-sectional epidemiological and analytical study in a representative random sample of the adult population (18-80 years) assigned to the "Ciudad Jardin" Health Centre in Malaga (29,818 persons). The methodology of this study has recently been published [12].

The education level was stratified into two categories: low (illiterate or primary education) and high (secondary or university studies). We considered sedentary subjects to be those who, in their free time, did not do any exercise equivalent to walking at a moderate pace no more than 150 minutes weekly. Subjects were considered to be smokers if they smoked or had smoked any type or amount of tobacco in the previous 6 months, ex-smokers subjects who had quit smoking at least six months before the study and non-smokers if they had never smoked.

The samples were analyzed in the reference hospital laboratory and biochemical determinations were obtained by routine methods. Low density lipoprotein cholesterol (LDL-c) was calculated using the Friedewald formula.

Abdominal obesity was diagnosed when the waist circumference was  $\geq 94$  cm in men or  $\geq 80$  cm in women. Obesity was defined as mild, moderate-severe or morbid when the BMI was 30-34.9 kg/m<sup>2</sup>, 35-39.9 kg/m<sup>2</sup> or  $\geq 40$  kg/m<sup>2</sup>, respectively. Blood pressure was defined as optimal, normal and normal-high when the SBP and DBP were <120 and <80 mmHg, between 120-129 and / or 80-84 mmHg, and between 130-139 mmHg and/or 85-89 mmHg, respectively.

Subjects were considered to be diabetic if they had a previous diagnosis of diabetes, if they were on pharmacological treatment for diabetes, or their fasting blood glucose was  $\geq 126$ mg/dL (7.0 mmol/L). Impaired fasting glucose (IFG) was defined as a

1  
2  
3 fasting glucose of 100-125 mg/dL (5.6-6.9 mmol/L), both inclusive. Dysglycaemia was  
4  
5 defined as the presence of IFG or diabetes.  
6

7  
8 Dyslipidaemia was considered to be present if there was a prior diagnosis of this  
9  
10 process, if the patient was taking lipid-lowering drugs, or if the analytical concentrations of  
11  
12 total cholesterol  $\geq$  200 mg/dL (5.2 mmol/L), LDL-c  $\geq$  160 mg/dL (4.1 mmol/L), high density  
13  
14 lipoprotein cholesterol (HDL-c)  $<$ 40 mg/dL (1.0 mmol/L) in men or  $<$ 50 mg/dL (1.3 mmol/L)  
15  
16 in women, or the triglycerides  $\geq$  200 mg/dL (2.3 mmol/L).  
17

18  
19 Cardiovascular disease was considered to be a previous history of ischaemic heart  
20  
21 disease (myocardial infarction, acute coronary syndrome, angina, or coronary  
22  
23 revascularization), cerebrovascular disease (stroke, transient ischaemic attack) or  
24  
25 peripheral arterial disease (intermittent claudication, revascularization or lower limb  
26  
27 amputation, or abdominal aortic aneurysm).  
28

### 29 30 **Statistical Analysis**

31  
32 Normality of quantitative variables was verified by the Kolmogorov-Smirnov test.  
33  
34 Qualitative variables are expressed as a percentage with a confidence interval of 95%. The  
35  
36 quantitative variables are shown as the mean and standard deviation or the median and the  
37  
38 25 and 75 quartiles in the case of a non-normal distribution. We used the Mann-Whitney  
39  
40 nonparametric test for comparison of quantitative variables in two independent groups. For  
41  
42 qualitative variables we used the Chi-square test, and 2x2 tables Fisher's exact test. In  
43  
44 order to evaluate the relationship between several CVRF (dependent variables) and level of  
45  
46 studies we applied a multivariate logistic regression model for sex and age range, adjusting  
47  
48 for confounding variables. We used SPSS version 12.0.  
49  
50

### 51 52 **RESULTS**

53  
54 Of the total sample of 2,492 subjects, 154 (6.17%) were excluded for failing to fulfil  
55  
56 the inclusion criteria, 56 (2.24%) could not be located and 12 (0.48%) refused to participate  
57  
58 in the study. Thus, the final analysis comprised 2,270 persons.  
59

60 The characteristics of the sample, overall and by sex, are shown in [Table 1](#).

1  
2  
3 A low educational level was present in 57.6% of the sample. Only 23.3% of the  
4 subjects performed a heart-healthy physical activity (walking at least 150 minutes weekly).  
5  
6 The prevalence of smoking was 27.7%.  
7  
8

9  
10 The mean BMI was in the range of overweight ( $26.9 \pm 5.1 \text{ kg/m}^2$ ) and was higher in  
11 men; 61.2% of the sample were overweight (38.3%) or obese (22.9%), and 2% had morbid  
12 obesity. The prevalence of abdominal obesity was 55.8%.  
13  
14

15  
16 Only 25.9% had optimal blood pressure. The population rate of hypertension was  
17 33.1%, and 14.1% of the population had previously unknown hypertension.  
18  
19

20  
21 The prevalence of dyslipidaemia was 65.4%; 47.2% of the patients had a total  
22 cholesterol  $\geq 200 \text{ mg/dL}$  ( $5.2 \text{ mmol/L}$ ) (11.2% of the population  $\geq 250 \text{ mg/dL}$  ( $6.5 \text{ mmol/L}$ )),  
23 16.4% had LDL-c  $\geq 160 \text{ mg/dL}$  ( $4.1 \text{ mmol/L}$ ) (41.3% had LDL-c  $\geq 130 \text{ mg/dL}$  ( $3.4 \text{ mmol/L}$ )),  
24 7.1% had hypertriglyceridaemia  $\geq 200 \text{ mg/dL}$  ( $2.3 \text{ mmol/L}$ ) (18.4% had  
25 hypertriglyceridaemia  $\geq 150 \text{ mg/dL}$  ( $1.7 \text{ mmol/L}$ )) and 25.3% had low HDL-c ( $<40 \text{ mg/dL}$  ( $1.0$   
26  $\text{mmol/L}$ ) in men or  $<50 \text{ mg/dL}$  ( $1.3 \text{ mmol/L}$ ) in women).  
27  
28  
29  
30  
31  
32

33 The prevalence of diabetes was 7.1% and of IFG it was 15.4%.  
34

35  
36 **Analysis of the clustering of modifiable CVRF (hypertension, dyslipidaemia,**  
37 **diabetes, abdominal obesity, smoking and sedentarism), showed that the percentage**  
38 **of subjects with 0, 1, 2, 3, 4, 5 and 6 risk factors was 8.1%, 28.1%, 34.1%, 20.7%, 7.2%,**  
39 **1.6% and 0.2%, respectively.** The population prevalence of CVD was 4.1%.  
40  
41  
42

43  
44 The men had a higher prevalence of smoking, hypertension, hypertriglyceridaemia  
45 and IFG, while the women had a higher frequency of physical inactivity and abdominal  
46 obesity ( $p < 0.001$ ).  
47  
48  
49

50  
51  
52 The prevalence of all CVRF increased with age, with the exception of smoking  
53 which was predominant in men younger than 60 years and women younger than 50 years  
54 of age ( $p < 0.001$ ). The highest rate of smoking was among men aged 40-59 years (**41.2%**).  
55  
56 In all age groups, smoking was more prevalent in men, except in the 30-39 year age group,  
57 where it was higher in women (**24.6% vs 25.3%**;  $p < 0.001$ ).  
58  
59  
60



1  
2  
3  
4  
5 Above the age of 50 years, 82.4% of the population had abdominal obesity and  
6  
7 84.1% were overweight or obese. The prevalence of hypertension, dysglycaemia and  
8  
9 hypercholesterolaemia was 66.2%, 47.1% and 83%, respectively. In men the prevalence of  
10  
11 hypercholesterolaemia and low HDL-c was lower after the ages of 60 and 70 years,  
12  
13 respectively ( $p<0.005$ ). The prevalence of hypertriglyceridaemia was reduced with effect  
14  
15 from the age of 70 years in both sexes ( $p<0.001$ ).  
16  
17

18  
19 Analysis of the prevalence of different CVRF by educational level showed that a low  
20  
21 level of studies was associated with a higher prevalence of CVRF ( $p<0.001$ ), with the  
22  
23 exception of smoking and low HDL-c. When we adjusted for sex and age, a low level of  
24  
25 studies was associated with smoking, obesity and hypertriglyceridaemia, with odds ratios  
26  
27 (OR) (95% CI) of 1.6 (1.3-1.9), 1.4 (1.1-1.8) and 1.7 (1.1-2.6), respectively. The prescription  
28  
29 of cardiovascular drugs (antihypertensive, lipid-lowering, antidiabetic, antiaggregant) was  
30  
31 also higher in subjects with a low educational level ( $p<0.001$ ).  
32  
33  
34  
35

## 36 DISCUSSION

37  
38 **We found a high prevalence of CVRF in our study: 29.7% of the subjects had**  
39  
40 **three or more modifiable CVRF (hypertension, dyslipidaemia, diabetes, abdominal**  
41  
42 **obesity, smoking and/or sedentarism).**  
43  
44

45 It is noteworthy that over 60% of the adults studied were overweight or obese, and  
46  
47 56% had abdominal obesity. These data are consistent with other studies performed in our  
48  
49 environment [10,11, 13, 14] and confirm that Andalusia has one of the highest obesity rates  
50  
51 as compared with the remaining regions of Spain [15]. Over recent decades Spain has  
52  
53 suffered a continuous increase in the prevalence of obesity [16] and has the highest child  
54  
55 and adolescent obesity rates in Europe [17]. In our study, a worrying fact is that 35.5% of  
56  
57 the population subgroup aged 18-29 years was overweight or obese.  
58  
59  
60

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

Clearly, behavioural patterns, largely determined by socioeconomic and cultural factors, are critical in health indicators [7]. Consequently, the low level of studies in our population should be a decisive factor in the elevated prevalence of overweight and obesity, already highlighted by other Spanish authors [18].

The inactivity rate in our population, about 80%, was almost twice the Spanish mean [19], with a particularly striking high percentage found among women. In Spain there is significant geographic variation in the percentage of physically inactive persons, ranging from 70% in Andalusia to 40% in the Basque Country [20], with the figures coinciding with the distribution of obesity by Spanish Autonomous Communities. As with obesity, physical inactivity during free time presents a clear social gradient [20], increasing with a decrease in the educational level, a fact that we also noted in our environment.

About a quarter of the Spanish adult population smokes [19] and 16% of coronary and cerebrovascular deaths in Spain are attributable to smoking [21]. Fortunately, recent years have seen a reduction in the consumption of tobacco [22], but preventive measures appear to be less effective in young women [20]. We found a higher rate of smoking in younger subjects, and among those aged 30-39 years consumption was higher in women. High smoking levels in young women have been highlighted in other studies in Spain [20,22].

Mean levels of serum lipids (except HDL-c) are tending to increase in the general Spanish population [3]. Our study agrees with others showing that the Andalusian population has the highest levels of total cholesterol and LDL-c in Spain [3,4].

The rate of hypercholesterolaemia increases with age [3]. Thus, the lower rate of hypercholesterolaemia (defined by the presence of LDL-c  $\geq 160$  mg/dL (4.1 mmol/L) or the use of lipid-lowering drugs) found in men above the age of 60 years could be explained by a survivor bias or the lower indication for lipid-lowering drugs in advanced age [23]. A reduction in the prevalence of hypertriglyceridaemia after the age of 70 years was also observed, probably due to the lower rate of obesity in these age groups. Like other studies [24], we found no age pattern in the prevalence of low HDL-c. Nor did we find any gender

1  
2  
3 differences in the prevalence of the components of dyslipidaemia, except for  
4  
5 hypertriglyceridaemia, which was more common in men [11].  
6

7  
8 The prevalence of hypertension in Spain shows a tendency for a small increase in  
9  
10 relation to population aging and the obesity epidemic and at present is nearly 35% in the  
11  
12 adult Spanish population [3-5], reaching almost 70% in those aged 60-65 years [25]. Our  
13  
14 results are consistent with these data.

15  
16 It has been estimated that 20% of deaths attributable to blood pressure in Spain  
17  
18 occur in subjects with normal or high-normal blood pressure [26]. In our population, only  
19  
20 38.7% of the adult population maintained optimal blood pressure. Although considerable  
21  
22 progress has been made over recent decades in the detection and control of hypertension  
23  
24 in Spain [27], we still found that 14.1% of the population had unknown hypertension.

25  
26 The prevalence of diabetes in our population (7.1%) was lower than that reported in  
27  
28 other studies in Spain [28], which can be attributed to differences in methodology and  
29  
30 diagnostic criteria.  
31

32  
33 Overall, we found that the prevalence of CVRF increases with age, with the  
34  
35 exception of smoking, which was more frequent in those younger than 50 years, and low  
36  
37 HDL-c concentrations, which were not correlated with age. The rates of  
38  
39 hypercholesterolaemia (in men) and hypertriglyceridaemia were reduced from the age of 60  
40  
41 and 70 years, respectively.  
42

43  
44 A low educational level was associated, after adjustment for sex and age, with a  
45  
46 higher prevalence of CVRF (including smoking, obesity, abdominal obesity and  
47  
48 hypertriglyceridaemia), and a higher consumption of cardiovascular drugs. Our data are  
49  
50 consistent with other studies indicating the association between low socio-cultural status, a  
51  
52 key factor in determining behavioural patterns [7], and obesity [18], smoking [29], and other  
53  
54 risk factors such as dyslipidaemia [30].  
55

56  
57 Our study has certain limitations. The characteristics of our population (urban,  
58  
59 lower-middle socioeconomic status) do not permit the results to be extrapolated to other  
60  
populations. However, the fact that the study involved a large random sample of the

1  
2  
3 general population and the high participation rate both contribute strength to the results.  
4  
5 Nor does the local nature of the study diminish the significance of the results. Among the  
6  
7 methodological limitations, we should note that we did not use a validated interview to  
8  
9 categorize physical activity. The relationship of CVRF with the level of studies is limited by  
10  
11 the existence of only two educational groups and the absence of other socioeconomic  
12  
13 variables. The prevalence of previously unknown hypertension was calculated based on  
14  
15 repeated measures of blood pressure made on a single day, which does not comply with  
16  
17 the recommended diagnostic protocol. The prevalence of diabetes, calculated from an  
18  
19 isolated fasting measurement of glucose and a personal history of a diagnosis of diabetes  
20  
21 or the use of antidiabetic medication, may be underestimated because we did not perform  
22  
23 an active search for cases by means of an oral glucose tolerance test. Furthermore, since  
24  
25 there is a large short-term intraindividual variability in fasting plasma glucose, studies like  
26  
27 ours that make a single determination of blood sugar tend to overestimate the prevalence  
28  
29 of type 2 diabetes [31], which can be attenuated by the underestimation of the real  
30  
31 prevalence of diabetes. Finally, methodological heterogeneity in diagnostic criteria and age  
32  
33 groups hinder comparison of our results with other epidemiological studies.  
34  
35  
36  
37

38 In summary, we found a high prevalence of obesity, dyslipidaemia and hypertension  
39  
40 in our environment. The high rates of smoking and a sedentary lifestyle in young women  
41  
42 raise fears for a large increase in cardiovascular morbidity and mortality in this subgroup in  
43  
44 the near future. The low educational level was associated with a higher prevalence of  
45  
46 CVRF, especially smoking, obesity and dyslipidaemia. The high prevalence of classical  
47  
48 CVRF or risk factors linked to obesity and its inadequate control represents a challenge for  
49  
50 the health care system and requires implementation without delay of training programs and  
51  
52 preventive measures, as well as active public health counselling, which should focus  
53  
54 especially on the population with a lower socio-cultural level.  
55  
56  
57  
58  
59  
60

**Acknowledgments.** We thank the doctors and nurses of the Ciudad Jardin Health Centre for their cooperation in the IMAP study: Anton Cortés M, Fernandez Tapia ML, Ginel

1  
2  
3 Mendoza L, Kuhn Gonzalez M, Linares Castro L, Martos Cerezuela I, Mestre Reoyo G,  
4  
5 Muñoz Villalba JC, Paniagua Gomez F, Perez Juncosa F, Reyes Alcazar P, Rodríguez  
6  
7 Lago JA, Rodriguez Rivera MR, Sanchez Perez R, Sacristan Visquert E, Taboada  
8  
9 Gonzalez F.  
10

11  
12  
13  
14 **Funding.** This study was undertaken with finance from the Consejería de Salud Junta de  
15  
16 Andalucía (nº exp. 283/06) (IMAP study)  
17

18  
19  
20 **Conflict of interest:** None declared  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## REFERENCES

1. Instituto Nacional de Estadística. INEbase [consultado en diciembre de 2009]. Disponible en: <http://www.ine.es/inebase/>.
2. Leal J, Luengo-Fernández R, Gray A, Petersen S, Rayner M. Economic burden of cardiovascular disease in the enlarged European Union. *Eur Heart J*. 2006; 27: 1610-1619.
3. Basterra-Gortari FJ, Bes-Rastrollo M, Seguí-Gómez M, Forga L, Alfredo-Martínez J, Martínez-González MA. Tendencias de la obesidad, diabetes mellitus, hipertensión e hipercolesterolemia en España (1997-2003). *Med Clin (Barc)*. 2007; 129: 405-408.
4. Medrano JM, Cerrato E, Boix R, Delgado-Rodríguez M. Factores de riesgo cardiovascular en la población española: metaanálisis de estudios transversales. *Med Clin (Barc)*. 2005; 124: 606-612.
5. Gabriel R, Alonso M, Segura A, Tormo MJ, Artigao LM, Banegas JR, et al. Grupo Cooperativo ERICE. Prevalencia, distribución y variabilidad geográfica de los principales factores de riesgo cardiovascular en España. Análisis agrupado de datos individuales de estudios epidemiológicos poblacionales: estudio ERICE. *Rev Esp Cardiol*. 2008; 61: 1030-1040.
6. Boix R, Aragonés N, Medrano MJ. Tendencias en la mortalidad por cardiopatía isquémica en 50 provincias españolas. *Rev Esp Cardiol*. 2003; 56: 850-856.
7. Lantz PM, House JS, Lepkowski JM, Williams DR, Mero RP, Chen J. Socioeconomic factors, health behaviors, and mortality. Results from a nationally representative prospective study of US adults. *JAMA*. 1998; 279: 1703-1708.
8. Estudio epidemiológico andaluz sobre factores de riesgo vascular. Estudio Al-Andalus 90. Grupo colaborativo andaluz de estudios sobre factores de riesgo vascular. Sevilla: Servicio Andaluz de Salud. Consejería de Salud. Junta de Andalucía; 1993.

- 1  
2  
3 9. Estudio DRECA. Dieta y riesgo de enfermedades cardiovasculares en Andalucía.  
4  
5 Sevilla: Servicio Andaluz de Salud. Consejería de Salud. Junta de Andalucía; 1999.  
6
- 7  
8 10. Soriguer F, Rojo-Martínez G, Esteva de Antonio I, Ruiz de Adana MS, Catalá M,  
9  
10 Merelo MJ, et al. Prevalence of obesity in south-east Spain and its relation with  
11  
12 social and health factors. *Eur J Epidemiol.* 2004; 19: 33-40.  
13
- 14 11. López-Suárez A, Elvira J, Beltrán M, Alwakil M, Saucedo JM, Bascuñana A, et al.  
15  
16 Prevalencia de obesidad, diabetes, hipertensión, hipercolesterolemia y síndrome  
17  
18 metabólico en adultos mayores de 50 años de Sanlúcar de Barrameda. *Rev Esp*  
19  
20 *Cardiol.* 2008; 61: 1150-1158.  
21
- 22 12. Gomez-Huelgas R, Bernal-Lopez MR , Villalobos A, Mancera-Romero J, Baca-  
23  
24 Osorio AJ, Jansen S, Guijarro R, Salgado F, Tinahones FJ, Serrano-Ríos M.  
25  
26 Hypertriglyceridemic waist: an alternative to the metabolic syndrome? Results of the  
27  
28 IMAP Study (Multidisciplinary Intervention in Primary Care). *International J Obesity.*  
29  
30 2010. [Epub ahead of print].  
31  
32
- 33 13. [http://www.seedo.es/portals/seedo/obesidadysalud/Dossier-prensa-XIII-dia-persona](http://www.seedo.es/portals/seedo/obesidadysalud/Dossier-prensa-XIII-dia-persona-obesa.pdf)  
34  
35 [-obesa.pdf.](http://www.seedo.es/portals/seedo/obesidadysalud/Dossier-prensa-XIII-dia-persona-obesa.pdf)  
36  
37
- 38 14. Gutiérrez-Fisac JL, López-García E, Banegas JL, Graciani Pérez-Regadera A,  
39  
40 Rodríguez-Artalejo F. Prevalence of overweight and obesity in Spain: crosssectional  
41  
42 study of a national sample of persons aged 60 and over. *Obes Res.* 2004; 12: 710-  
43  
44 715.  
45
- 46 15. Aranceta-Bartrina J, Serra-Majem L, Foz-Sala M, Moreno-Esteban B, y Grupo  
47  
48 Colaborativo SEEDO. Prevalencia de obesidad en España. *Med Clin (Barc).* 2005;  
49  
50 125: 460-466.  
51
- 52 16. Gutiérrez-Fisac JL, Regidor E, Banegas JR, Rodríguez-Artalejo F. Prevalencia de  
53  
54 obesidad en la población adulta española: 14 años de incremento continuado. *Med*  
55  
56 *Clin (Barc).* 2005; 124: 196-197.  
57
- 58 17. Yusuf S, Hawken S, Ôunpuu S, Bautista L, Franzosi MG, Commerford P, Lang CC,  
59  
60 Rumboldt Z, Onen CL, Lisheng L, Tanomsup S, Wangai P Jr, Razak F, Sharma AM,

- 1  
2  
3 Anand SS; INTERHEART Study Investigators. Obesity and the risk of myocardial  
4 infarction in 27000 participants from 52 countries: a case-control study. Lancet.  
5 2005; 366: 1640-1649.  
6  
7  
8  
9  
10 18. Regidor E, Gutiérrez-Fisac JL, Banegas JR, Domínguez V, Rodríguez-Artalejo F.  
11 Influencia a lo largo de la vida de las circunstancias socioeconómicas, de la  
12 inactividad física y de la obesidad sobre la prevalencia de síndrome metabólico.  
13 Rev Esp Salud Pública. 2007; 81: 25-31.  
14  
15  
16  
17  
18 19. Encuesta Nacional de Salud 2006. Resultados preliminares (marzo 2007).  
19 Ministerio de Sanidad y Consumo. Gobierno de España. Disponible en:  
20 [www.msc.es/estadEstudios/estadisticas/encuesta-Nacional/encuestaNac2006/](http://www.msc.es/estadEstudios/estadisticas/encuesta-Nacional/encuestaNac2006/)  
21 (última consulta, 30 de diciembre de 2009).  
22  
23  
24  
25  
26  
27 20. Regidor E, Gutiérrez-Fisac JL. La salud de la población española en el contexto  
28 europeo y del Sistema Nacional de Salud. Indicadores de Salud. Madrid: Ministerio  
29 de Sanidad y Consumo; 2005.  
30  
31  
32  
33 21. Banegas JR, Díez L, González J, Villar F, Rodríguez-Artalejo F. La mortalidad  
34 atribuible al tabaquismo comienza a descender en España. Med Clin (Barc).  
35 2005;124: 769-771.  
36  
37  
38  
39  
40 22. Villalbí JR, Rodríguez-Sanz M, Villegas R, Borrell C. Cambios en el patrón de  
41 tabaquismo de la población: Barcelona, 1983–2006. Med Clin (Barc). 2009; 132:  
42 414-419.  
43  
44  
45  
46  
47 23. Jacobson TA. Overcoming 'ageism' bias in the treatment of hypercholesterolaemia.  
48 A review of safety issues with statins in the elderly. Drug Safety. 2006; 29:421-448.  
49  
50  
51 24. Cabrera de León A, Rodríguez-Pérez MC, Almeida-González D, Domínguez-Coello  
52 S, Aguirre-Jaime A, Brito-Díaz B, et al. Presentación de la cohorte "CDC Canarias":  
53 objetivos, diseño y resultados preliminares. Rev Esp Salud Pública. 2008; 82:519-  
54 534.  
55  
56  
57  
58  
59  
60



- 1  
2  
3 25. Banegas JR, Rodríguez-Artalejo F, Ruilope LM, Graciani A, Luque M, Cruz JJ, et al.  
4  
5 Hypertension magnitude and management in the elderly population of Spain. *J*  
6  
7 Hypertens. 2002; 20: 2157-2164.  
8  
9  
10 26. Banegas JR, Rodríguez-Artalejo F, Cruz JJ, de Andrés B, Rey J. Mortalidad  
11  
12 relacionada con la presión arterial y la hipertensión en España. *Med Clin (Barc)*.  
13  
14 1999; 112: 489-494.  
15  
16 27. Gutiérrez-Fisac JL, Regidor E, Banegas JR, Rodríguez-Artalejo F, Cruz JJ, Guallar  
17  
18 P, Rey J. Blood pressure in Spain: distribution, awareness, control, and benefits of a  
19  
20 reduction in average pressure. *Hypertension*. 1998; 32: 998-1002.  
21  
22 28. Valdés S, Rojo-Martínez G, Soriguer F. Evolución de la prevalencia de la diabetes  
23  
24 tipo 2 en población adulta española. *Med Clin*. 2007; 129: 352-355.  
25  
26 29. Businelle MS, Kendzor DE, Reitzel LR, Costello TJ, Cofta-Woerpel L, Li Y, Mazas  
27  
28 CA, Vidrine JI, Cinciripini PM, Greisinger AJ, Wetter DW. Mechanisms linking  
29  
30 socioeconomic status to smoking cessation: a structural equation modeling  
31  
32 approach. *Health Psychol*. 2010; 29: 262-273.  
33  
34 30. Kanjilal S, Gregg EW, Cheng YJ, Zhang P, Nelson DE, Mensah G, Beckles GL.  
35  
36 Socioeconomic status and trends in disparities in 4 major risk factors for  
37  
38 cardiovascular disease among US adults, 1971-2002. *Arch Intern Med*. 2006; 166:  
39  
40 2348-2355.  
41  
42 31. Selvin E, Crainiceanu CM, Brancati FL, Coresh J. Short-term variability in measures  
43  
44 of glycemia and implications for the classification of diabetes. *Arch Intern Med*.  
45  
46 2007; 167: 1545-1551.  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**Table 1.** Characteristics of the study population overall and by gender.

	Total	Male	Female	P
N (%)	2270 (100)	1129 (49.7)	1141 (50.3)	NS
Age (years)	43.6 ± 15.6	43.2 ± 15.3	44.1 ± 16.0	NS
Educational level				
Illiterate / Primary studies	57.6 (55.6-59.7)	55.6 (52.7-58.6)	59.6 (56.7-62.5)	0.001
Secondary / University studies	42.4 (40.3-44.4)	44.4 (41.4-47.3)	40.4 (37.5-43.3)	
Smoking				
Smoker	27.7 (25.8-29.5)	33 (30.2-35.8)	22.4 (19.9-24.8)	<0.001
Non-smoker	12.4 (11-13.8)	14.4 (12.3-16.4)	10.4(8.6-12.2)	
Sedentarism	76.7 (74.9-78.5)	69.2 (66.4-71.9)	84.1 (82-86.3)	<0.001
BMI (kg/m <sup>2</sup> )	26.9 ± 5.1	27.3 ± 4.3	26.6 ± 5.8	0.002
Overweight	38.3 (36.3-40.3)	47.2 (44.2-50.2)	29.5 (26.8-32.1)	<0.001
Obesity	22.9 (21.2-24.7)	22.1 (19.6-24.5)	23.8 (21.2-26.3)	NS
Grades				
Grade 1	15.8 (14.2-17.3)	17.1 (14.9-19.3)	14.5 (12.4-16.5)	<0.001
Grade 2	5.1 (4.2-6)	3.9 (2.7-5.1)	6.3 (4.9-7.8)	
Grade 3	2.0(1.4-2.6)	1.1 (0.4-1.7)	3 (2-4)	
Waist circumference (cm)	90.0 ± 13.7	95 ± 12	86 ± 14	<0.001
Abdominal obesity	55.8 (53.7-57.9)	51.3 (48.3-54.2)	60.3 (57.4-63.2)	<0.001
Systolic blood pressure (mmHg)	125 (115-135)	130 (120-137)	120 (110-131)	<0.001
Diastolic blood pressure (mmHg)	73 (69-80)	74 (70-81)	72 (65-80)	<0.001
Blood pressure				
Optimal	25.9 (24-27.7)	17.7 (15.4-20)	33.9 (31.1-36.7)	<0.001
Normal	21.2 (19.5-22.9)	19.8 (17.5-22.2)	22.5 (20-25)	
Normal – High	19.8 (18.2-21.5)	25.7 (23.1-28.3)	14 (12-16)	
Hypertension	33.1 (31.2-35.1)	36.8 (33.9-39.6)	29.5 (26.8-32.2)	
Total cholesterol. mg/dL (mmol/L)	199±41 (5.2±1.1)	197±41 (5.1±1.1)	202±40 (5.2 ± 1.1)	0.001
LDL-c mg/dL. mg/dL (mmol/L)	124±35 (3.2±0.9)	126±35 (3.3±0.9)	123±35 (3.2±0.9)	0.05
HDL-c. mg/dL (mmol/L)	53±14 (1.4±0.4)	48±12 (1.2±0.3)	58±13 (1.5±0.3)	<0.001
Triglycerides. mg/dL (mmol/L)	89 (62-132) (1.0 (0.7-1.5))	97 (68-147) 1.1 (0.8-1.7)	82 (58-117.5) 0.9 (0.7-1.3)	<0.001
Dyslipidaemia	65.4 (63.4-67.4)	64.7 (61.8-67.5)	66.1 (63.3-68.9)	NS
Total cholesterol ≥ 200 mg/dL (5.2 mmol/L)	47.2 (45.1-49.3)	45.4 (42.4-48.3)	49.1 (46.1-52)	NS
LDL-c ≥ 160 mg/dL (4.1 mmol/L)	16.4 (14.8-17.9)	17.1 (14.9-19.3)	15.7 (13.5-17.8)	NS
Low HDL-c	25.3 (23.5-27.1)	24 (21.5-26.5)	26.6 (24-29.2)	NS
Triglycerides ≥200 mg/dL (2.3 mmol/L)	7.1 (6-8.2)	9.5 (7.7-11.2)	4.7 (3.5-6)	<0.001
Glycaemia mg/dL (mmol/L)	93±25 (5.2±1.4)	96±28 (5.3±1.6)	91±21 (5.1±1.2)	<0.001
Impaired fasting glycaemia	15.4(13.9-16.9)	18 (15.7-20.3)	12.8 (10.8-14.8)	0.001
Diabetes Mellitus	7.1 (6.1-8.3)	7.3 (5.7-8.8)	7 (5.5-8.5)	NS
Cardiovascular diseases	4.1 (3.3-4.9)	5 (3.6-6.3)	3.2 (2.2-4.3)	0.03

BMI: body mass index. LDL-c: low-density lipoprotein cholesterol. HDL-c: high-density lipoprotein cholesterol. Values are expressed as absolute frequency (and percentage) or mean ± standard deviation (SD).