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Original article

Risk Factor Treatment and Control in Relation to Coronary Disease Risk in the Spanish Population of the DARIOS Study

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ABSTRACT

Introduction and objectives: The treatment and control of cardiovascular risk factors both play key roles in primary prevention. The aim of the present study is to analyze the proportion of primary prevention patients aged 35-74 years being treated and controlled in relation to their level of coronary risk.

Methods: Pooled analysis with individual data from 11 studies conducted in the first decade of the 21st century. We used standardized questionnaires and blood pressure measures, glycohemoglobin and lipid profiles. We defined optimal risk factor control as blood pressure <140/90 mmHg and glycohemoglobin <7%. In hypercholesterolemia, we applied both the European Societies and Health Prevention and Promotion Activities Programme criteria.

Results: We enrolled 27 903 participants (54% women). Drug treatments were being administered to 68% of men and 73% of women with a history of hypertension ($P < .001$), 66% and 69% respectively, of patients with diabetes ($P = .03$), and 39% and 42% respectively, of those with hypercholesterolemia ($P < .001$). Control was good in 34% of men and 42% of women with hypertension ($P < .001$); 65% and 63% respectively, of those with diabetes ($P = .626$); 2% and 3% respectively, of patients with hypercholesterolemia according to European Societies criteria ($P = .092$) and 46% and 52% respectively, of those with hypercholesterolemia according to Health Prevention and Promotion Activities Programme criteria ($P < .001$). The proportion of uncontrolled participants increased with coronary risk ($P < .001$), except in men with diabetes. Lipid-lowering treatments were more often administered to women with ≥10% coronary risk than to men (59% vs. 50%, $P < .024$).

Conclusions: The proportion of well-controlled participants was 65% at best. The European Societies criteria for hypercholesterolemia were vaguely reached. Lipid-lowering treatment is not prioritized in patients at high coronary risk.

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Tratamiento y control de los factores de riesgo según el riesgo coronario en la población española del estudio DARIOS

Palabras clave:
Factores de riesgo
Hipercolesterolemia
Hipertensión
Diabetes mellitus
Tratamiento farmacológico
Control

RESUMEN

Introducción y objetivos: Tratar y controlar los factores de riesgo cardiovascular es una estrategia fundamental de prevención primaria. El objetivo es analizar la proporción de población de prevención primaria de 35-74 años tratada y controlada, según niveles de riesgo coronario.
Métodos: Análisis agrupado con datos individualizados de 11 estudios poblacionales de la primera década del siglo XXI. Se utilizaron cuestionarios estandarizados y medidas de presión arterial, glucohemoglobina y perfil lipídico. Se consideró buen control con presión arterial < 140/90 mmHg, glucohemoglobina < 7% y en la hipercolesterolemia con dos criterios: Sociedades Europeas y Programa de Actividades Preventivas y Promoción de la Salud.
Resultados: Se incluyó a 27.903 participantes (el 54% mujeres). Recibían tratamiento farmacológico el 68 y el 73% de los varones y las mujeres con antecedentes de hipertensión, respectivamente ($p < 0{,}001$), el 66 y el 69% de los diabéticos ($p = 0{,}03$) y el 39 y el 42% de los hipercolesterolémicos ($p < 0{,}001$). Tenían buen control el 34 y el 42% de los varones y las mujeres con hipertensión ($p < 0{,}001$), el 65 y el 63% de los diabéticos ($p = 0{,}626$), el 2 y el 3% de los hipercolesterolémicos según Sociedades Europeas ($p = 0{,}092$) y el 46 y el 52% según Programa de Actividades Preventivas y Promoción de la Salud ($p < 0{,}001$). La proporción de participantes no controlados aumentó con el riesgo coronario (todos, $p < 0{,}001$), excepto en los varones diabéticos. Las mujeres con riesgo coronario ≥ 10% recibían más tratamiento hipolipemiante que los varones (el 59 frente al 50%; $p < 0{,}024$).
Conclusiones: La proporción de personas con buen control es del 65% en el mejor de los casos. Los criterios de control de la hipercolesterolemia de las Sociedades Europeas apenas se alcanzan. El tratamiento hipolipemiante no se prioriza en personas de riesgo coronario alto.

Abbreviations

CR: coronary risk
CVR: cardiovascular risk
DM: diabetes mellitus
HDLc: high-density lipoprotein cholesterol
HT: hypertension
LDLc: low-density lipoprotein cholesterol

INTRODUCTION

Cardiovascular disease remains the principle cause of death in the Spanish population.[1] It is closely linked to non-modifiable cardiovascular risk (CVR) factors–such as age and sex–and modifiable factors–such as smoking, hypertension (HT), hypercholesterolemia and diabetes mellitus (DM). These are often concomitant[2] and a combined approach to treatment, with separate control of each, is preferable.[3] Consequently, mathematic functions that estimate CVR or coronary risk (CR) — usually at 10 years — have been developed.[3]

One essential preventative strategy is the achievement of the levels of CVR factor control proposed in clinical practice guidelines.[3] Given that HT must be treated unless it is controlled through hygienic-dietary measures, the CVR functions are particularly useful when prescribing lipid-lowering drugs, which should be prioritized in patients with high CVR.[3] In patients with high and very high CR, drug treatment should reduce total cholesterol and low density lipoprotein cholesterol (LDLc) concentrations, leading to their being classified in a lower risk category. This is a cost-effective strategy.[4] However, women appear to receive statins more frequently than men[5] despite their lower CVR levels and the fact that statins are less efficient in women, especially in primary prevention.[6]

The DARIOS study (Dyslipidemia, atherosclerotic risk, increased high-sensitivity C-reactive protein, and inflammatory and oxidative status in the Spanish population) has made a pooled data analysis of 11 population-based studies conducted in Spain in the first decade of the 21st century.[7] The primary objective of the present study is to analyze the degree of control achieved for the principle modifiable CVR factors in the general 35-74 year-old population in relation to CR category. The secondary objective is to analyze the pattern of lipid-lowering drug prescription as a function of CR.

METHODS

Type of Study and Population

The DARIOS study is a pooled analysis of individual data from 11 population-based studies conducted since 2000 in 10 of Spain's autonomous communities, all of which applied a similar method (standardized World Health Organization questionnaires). The studies that make up DARIOS[7] are: ARTPER *(Cataluña-Barcelona)*, CDC-Canarias *(Canarias)*, CORSAIB *(Islas Baleares)*, DINO *(Región de Murcia)*, DRECA-2 *(Andalucía)*, HERMEX *(Extremadura)*, PREDIMERC *(Comunidad de Madrid)*, RECCyL *(Castilla y León)*, REGICOR *(Cataluña-Girona)*, RIVANA *(Comunidad Foral de Navarra)* and TALAVERA *(Castilla-La Mancha)*. All the studies were approved by local ethics committees. Participants were selected from the census or the primary care population at random. In the present study, we excluded patients with a history of ischemic heart disease (acute myocardial infarction, angina).

Variables Studied

We gathered data on variables using a standardized method described in detail previously.[7] Moreover, we included a concordance study of total cholesterol and high density lipoprotein cholesterol (HDLc) that corrected the original values if deviation was >5%.[7] The variables analyzed in the present study were:

1. Age in years and sex.
2. HT: participants were considered hypertensive if they had previously been diagnosed as such, took antihypertensive drugs,

were being treated with hygienic-dietary measures, or presented systolic blood pressure (SBP) ≥140 mmHg or diastolic blood pressure (DBP) ≥90 mmHg. We defined controlled HT as SBP <140 mmHg and DBP <90 mmHg in participants reporting a history of HT.

3. DM: patients with diabetes were defined as those previously diagnosed as such, receiving insulin treatment, oral antidiabetes drugs, following hygienic-dietary measures, or presenting a fasting glucose level of ≥126 mg/dl. Controlled DM was defined as glycohemoglobin <7% in patients with a history of DM. These data were available in 4 of the studies (HERMEX, ARTPER, DINO and PREDIMERC, 7896 patients).
4. Hypercholesterolemia: patients with hypercholesterolemia were defined as those previously diagnosed as such, taking lipid-lowering drugs, or receiving hygienic-dietary treatment. We also studied LDLc and HDLc concentrations. Well-controlled hypercholesterolemia was defined in patients with a clinical record of the condition who fulfilled two criteria: *a)* European Societies (ES) criteria:[8] LDLc <100 mg/dl in patients with diabetes and those with high-very high CR, or LDLc <115 mg/dl in other patients (low-moderate CR), and *b)* Health Prevention and Promotion Activities Programme (HPPAP) — updated in 2005, 2007 and 2009 — including LDLc as a control criterion:[9] LDLc <100 mg/dl in patients with diabetes, LDLc <130 mg/dl in patients at moderate, high-very high CR, and LDLc <160 mg/dl in those with low CR. This was a necessary assumption because HPPAP does not include specific control objectives in low-risk patients;[9] it is in line with the National Cholesterol Education Program.[10]
5. 10-year CR: measured with the calibrated REGICOR — the only function validated in Spain.[11] We also studied tobacco use and defined as smokers those participants who consumed tobacco daily or had been ex-smokers for <1 year. After excluding patients with a history of ischemic heart disease, we classified the remainder in four risk categories defined following recent recommendations: low, <5%; moderate, 5%-9.9%; high, 10%-14.9%; and very high, ≥15%.[12]

Statistical Analysis

We compared proportions using χ^2 and assuming an alpha value of 5% in all cases. Sample size was calculated as a function of 3% precision assuming maximum uncertainty (50% well-controlled) and two-sided alpha risk of 5%: 1056 participants of each sex were sufficient. We estimated prevalence of CVR factors stratified by sex and the aforementioned CR categories, standardized for the European population.

Patients who reported a clinical history in the survey were classified in 4 CVR factor categories: treated with drugs and controlled; treated with drugs and uncontrolled; not treated with drugs and controlled; and not treated with drugs and uncontrolled.

We stratified patients receiving lipid-lowering drugs by sex, CR (low-moderate and high-very high), LDLc concentration (cutoff point 130 mg/dl), and HDLc concentration (cutoff points 40 mg/dl in men and 50 mg/dl in women). Given that lipid-lowering drug treatment can reduce CR, we estimated baseline values leading to treatment, assuming that it reduced LDLc by an average 26% and increased HDLc by 3%.[6]

Data analysis was with R 2.11.1 (R Foundation for Statistical Computing; Vienna, Austria).

RESULTS

Baseline characteristics of participants are shown in Table 1. We included 27 903 participants from 10 autonomous communities that represent 70% of the Spanish population aged 35-74 years, after excluding 3.4% of patients with a history of ischemic heart disease from the initial study.[7]

Table 2 details standardized prevalence of low, moderate, high and very high CR in the European population according to the calibrated REGICOR function for total cases and each component study, stratified by sex. Eleven percent of men and 2.3% of women presented high-very high CR. Mean risk presented non-significant variation (4.4%-7.1% in men and 2.5%-3.9% in women).

The proportions of participants with HT, DM, smoking habit and hypercholesterolemia in each CR stratum appear in Figure 1. In men, prevalence of these CVR factors gradually increased as CR rose. Results for women were similar but, interestingly, among those with high or very high CR, ≥90% had DM and HT, and 80% had hypercholesterolemia. In both sexes, the increased prevalence of all CVR factors was statistically significant ($P < .001$).

Figure 2 shows the level of control of HT, DM and hypercholesterolemia by sex. Most participants with HT received drug treatment (68% of men and 73% of women; $P < .001$). Some 34% of men and 42% of women were well-controlled ($P < .001$ between sexes); most were receiving drug treatment. The proportion of participants with uncontrolled HT increased with CR (P for trend $< .001$ in both sexes).

Most patients with DM received drug treatment (66% of men and 69% of women; $P = .03$). The proportion of well-controlled

Table 1
General Characteristics of the DARIOS Study, of the Total and of Each Component Study

	ARTPER[a]	CDC	CORSAIB	DINO	DRECA-2	HERMEX	PREDIMERC	RECCyL	REGICOR	RIVANA	TALAVERA	Total
Participants	3011 (11)	4715 (17)	1669 (6)	945 (3)	1521 (5)	2141 (8)	1799 (6)	2353 (8)	5496 (20)	3743 (13)	510 (2)	27 903 (100)
Age (years)	62 ± 7	49 ± 9	54 ± 11	53 ± 12	52 ± 11	52 ± 11	52 ± 12	54 ± 12	54 ± 11	52 ± 11	56 ± 12	53 ± 11
Men	45	44	48	47	45	47	49	48	46	45	44	46
HT	1348 (45)	1337 (28)	428 (26)	235 (27)	444 (29)	609 (28)	554 (31)	505 (22)	1698 (31)	865 (23)	157 (31)	8180 (29)
DM	664 (22)	640 (14)	246 (15)	136 (14)	210 (14)	306 (14)	187 (10)	231 (10)	719 (13)	381 (10)	73 (15)	3793 (14)
Dyslipidemia	1693 (57)	1652 (35)	424 (26)	266 (32)	446 (30)	618 (29)	553 (34)	584 (25)	1750 (32)	1177 (32)	172 (34)	9335 (34)
Age groups												
35-44 years	—	1772 (38)	442 (26)	304 (32)	486 (32)	669 (31)	621 (35)	695 (30)	1341 (24)	1186 (32)	104 (20)	7620 (27)
45-54 years	547 (18)	1424 (30)	442 (26)	239 (25)	410 (27)	609 (28)	394 (22)	545 (23)	1547 (28)	1108 (30)	122 (24)	7387 (26)
55-64 years	1388 (46)	1347 (29)	425 (25)	200 (21)	361 (24)	484 (23)	397 (22)	557 (24)	1448 (26)	840 (22)	116 (23)	7563 (27)
65-74 years	1076 (36)	172 (4)	360 (22)	202 (21)	264 (17)	379 (18)	387 (22)	556 (24)	1160 (21)	609 (16)	168 (33)	5333 (19)

DM, diabetes mellitus; HT, hypertension.
Data are expressed as no. (%) or mean ± standar deviation.
[a] 45–74 years.

Table 2
Low, Moderate, High and Very High 10-Year Coronary Risk According to the Calibrated REGICOR Function Standardized for the European Population by Component Study and Overall

Study	Low, <5% (95% CI)	Moderate, 5%-9.9% (95% CI)	High, 10%-14.9% (95% CI)	Very high, ≥15% (95% CI)	Mean risk (95% CI)
Men					
ARTPER	39 (37-42)	41 (38-44)	14 (12-16)	6 (5-7)	7.1 (6.9-7.3)
CDC	64 (62-66)	26 (24-28)	7 (5-8)	3 (2-4)	4.9 (4.7-5.1)
CORSAIB	59 (56-62)	29 (26-32)	7 (6-9)	4 (3-5)	5.4 (5.2-5.6)
DINO	63 (59-67)	26 (23-30)	8 (5-10)	3 (2-4)	5 (4.7-5.3)
DRECA-2	69 (66-72)	24 (21-27)	6 (4-7)	2 (1-3)	4.4 (4.2-4.6)
HERMEX	64 (61-66)	26 (23-28)	7 (5-8)	4 (3-5)	5 (4.8-5.2)
PREDIMERC	61 (59-64)	26 (23-29)	8 (6-10)	5 (3-6)	5.3 (5.1-5.6)
RECCyL	68 (66-70)	22 (20-25)	7 (6-9)	2 (1-3)	4.6 (4.4-4.8)
REGICOR	65 (63-66)	26 (24-27)	7 (6-7)	3 (2-4)	4.8 (4.7-4.9)
RIVANA	63 (61-64)	26 (24-28)	8 (7-9)	3 (2-4)	5.1 (4.9-5.2)
TALAVERA	66 (62-71)	25 (20-30)	6 (3-9)	2 (1-4)	4.7 (4.4-5)
Total*	62 (58-66)	27 (24-30)	8 (7-9)	3 (3-4)	5.1 (4.7-5.5)
Women					
ARTPER	77 (75-79)	20 (18-22)	3 (2-3)	0.3 (0.1-0.6)	3.9 (3.8-4)
CDC	80 (78-82)	17 (15-19)	2 (2-3)	0.6 (0.2-0.9)	3.1 (3-3.2)
CORSAIB	84 (82-86)	13 (11-15)	3 (2-4)	0.4 (0-0.8)	2.9 (2.8-3)
DINO	88 (85-90)	10 (8-13)	2 (1-3)	0.2 (0-0.7)	2.5 (2.4-2.7)
DRECA-2	89 (87-91)	10 (8-11)	1 (1-2)	0.3 (0-0.7)	2.5 (2.4-2.6)
HERMEX	88 (86-89)	10 (9-12)	2 (1-2)	0.3 (0-0.7)	2.6 (2.4-2.7)
PREDIMERC	87 (85-89)	12 (10-14)	1 (1-2)	0.3 (0-0.7)	2.7 (2.6-2.8)
RECCyL	88 (86-90)	10 (9-12)	2 (1-2)	0.1 (0-0.4)	2.7 (2.6-2.8)
REGICOR	88 (87-89)	10 (9-11)	1 (1-2)	0.3 (0.1-0.5)	2.5 (2.5-2.6)
RIVANA	89 (88-91)	9 (8-10)	1 (1-2)	0.2 (0-0.5)	2.5 (2.4-2.6)
TALAVERA	86 (82-90)	13 (9-17)	1 (0-2)	0.4 (0-1.2)	2.7 (2.4-2.9)
Total*	86 (83-88)	12 (10-14)	2 (1-2)	0.3 (0.2-0.4)	2.8 (2.5-3)

CI, confidence interval.
* Calculated by combining the individual results using the DerSimonian-Laird method for random-effects models.

participants was higher (65% of men and 63% of women; $P = .626$). In relation to CR, the proportion of patients with uncontrolled DM increased significantly among women ($P < .001$), and marginally among men ($P = .08$).

Drug treatment was being administered to 39% of men and 42% of women ($P < .001$) with hypercholesterolemia. Using ES criteria, the proportion of controlled participants was very low among both sexes (<3%; $P = .092$ between sexes) and, again, the proportion of uncontrolled participants increased with CR in both sexes ($P < .001$), although clinically this had little relevance. Using HPPAP criteria, the proportion of well-controlled participants improved markedly (46% of men and 52% of women; $P < .001$) and the proportion of uncontrolled participants also increased with CR ($P < .001$ in both sexes).

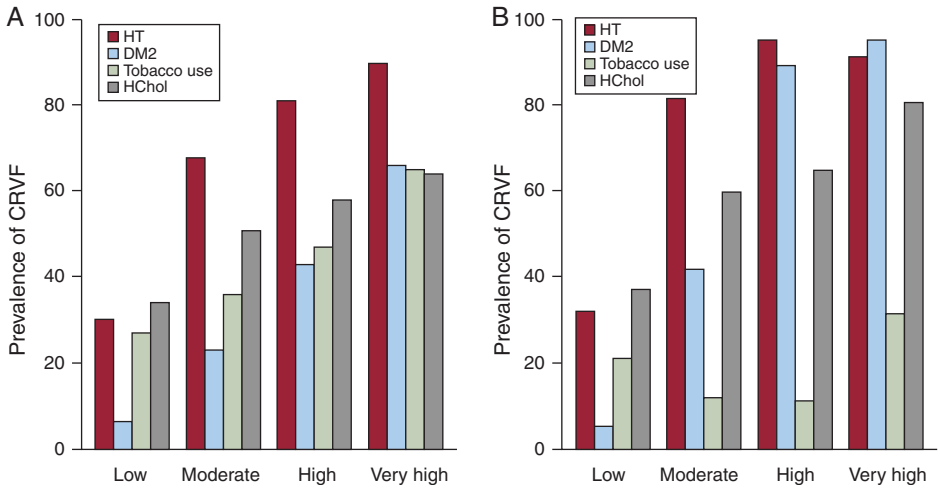

Figure 1. Prevalence of cardiovascular risk factors in relation with coronary risk (low, moderate, high and very high), by sex. A, men; B, women; CVRF, cardiovascular risk factors; DM2, type 2 diabetes mellitus; HChol, hypercholesterolemia; HT, hypertension.

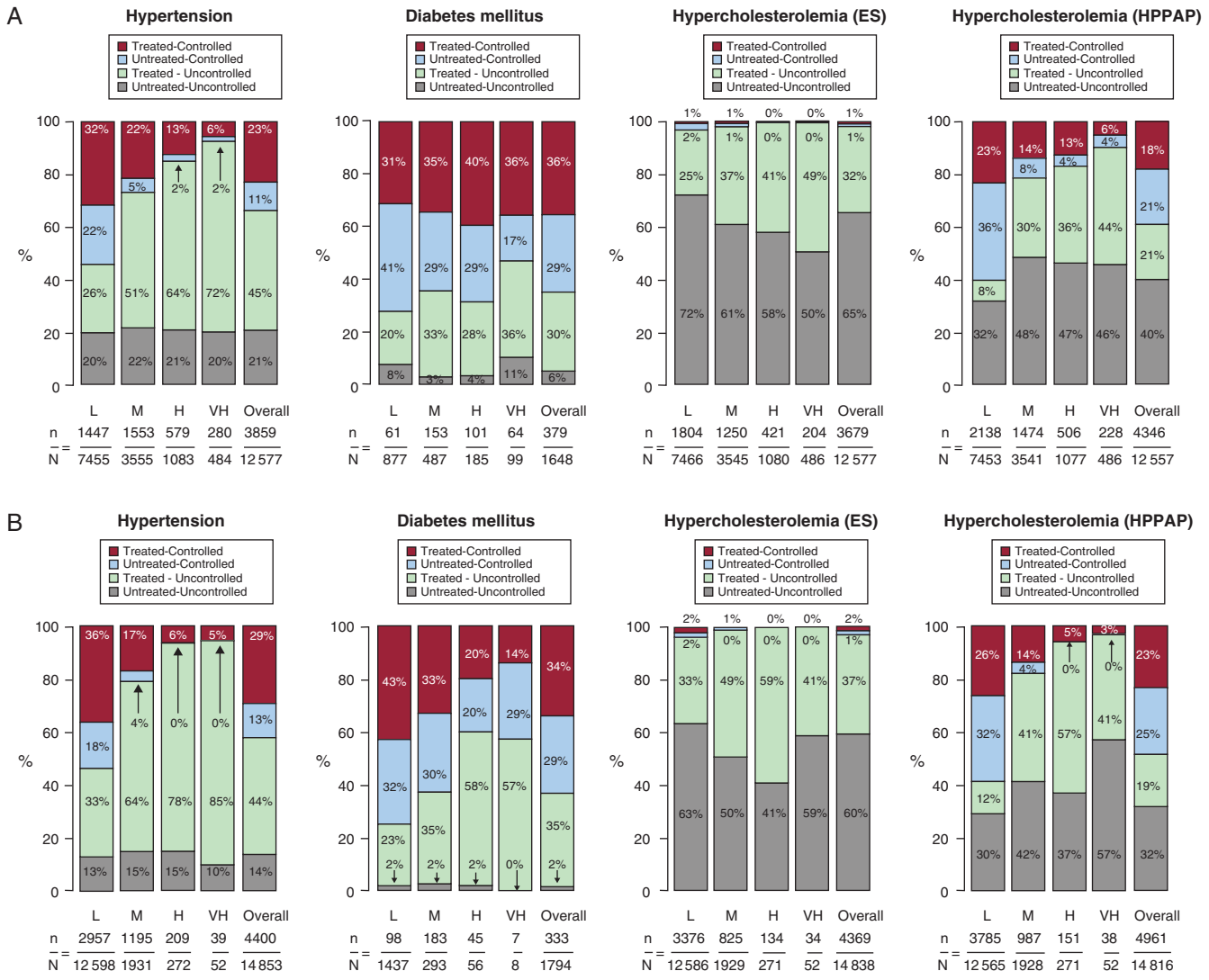

Figure 2. Prevalence of treatment and control of cardiovascular risk factors in relation to coronary risk (low, moderate, high and very high), by sex. Panel A, men; Panel B, women. ES, European Societies; H, high; HPPAP, Health Prevention and Promotion Activities Programme; L, low; M, moderate; n, number of patients with the characteristic; N, population; VH, very high.

Note that in the low-moderate and–especially–the high-very high CR categories, women were prescribed drugs for hypercholesterolemia significantly ($P < .05$) more often than men (Fig. 3).

Figure 4 shows the pattern of drug treatment for hypercholesterolemia in relation with levels of CR, HDLc and LDLc, by sex. In both sexes, most treatments were apparently concentrated in patients with low-moderate risk and baseline HDLc levels of >40 mg/dl (men) and >50 mg/dl (women), and LDLc levels of < 130 mg/dl (Figs. 4A and C). Figures 4B and D—in which baseline LDLc and HDLc levels have been corrected according to the expected effect of the lipid-lowering treatment,[6]—show that most patients initially treated have LDLc levels of >130 mg/dl (in many cases considerably more), but HDLc levels were above recommended values, except in high-very high risk women. Furthermore, the lower right quadrant—corresponding to those receiving more appropriate treatment—does not reflect the treatment most frequently administered (except in high-very high risk women). Note that among women with low-moderate CR, many of those with very high HDLc (>75 mg/dl) were receiving drug treatment. Practically all women with high-very high CR had low levels of HDLc; most had initially high LDLc.

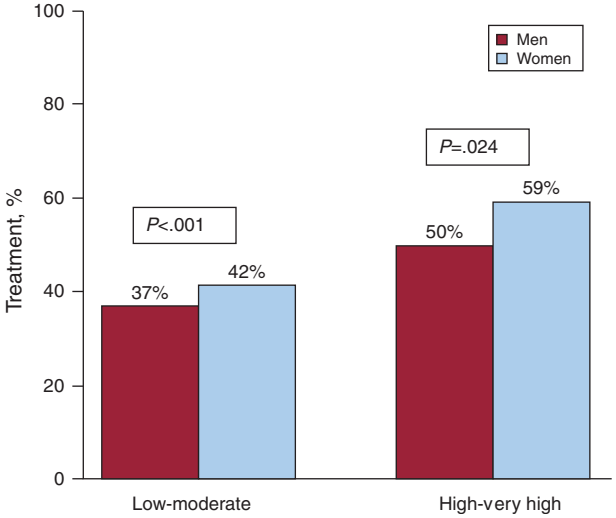

Figure 3. Treatment of hypercholesterolemia by sex and coronary risk (low-moderate and high-very high).

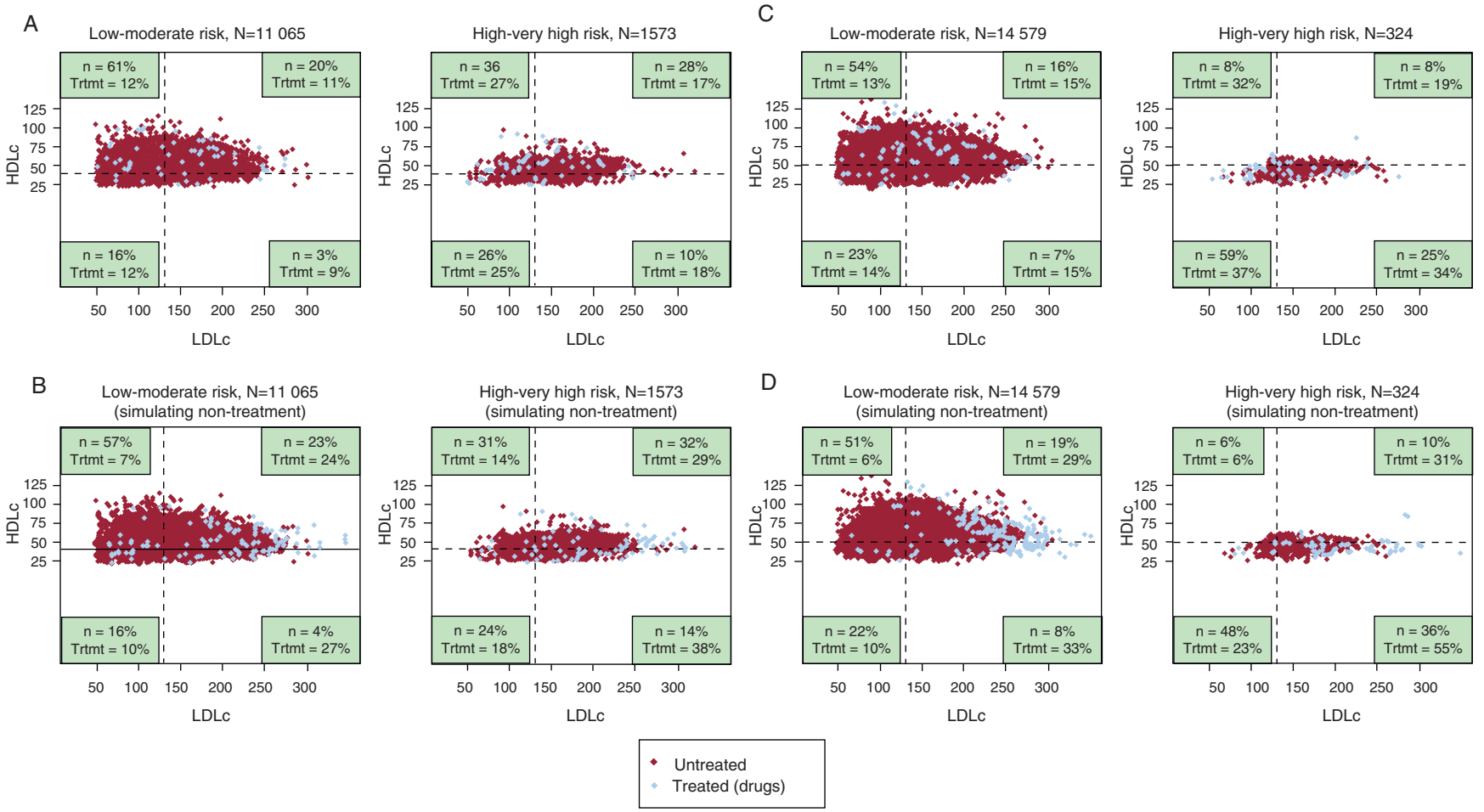

Figure 4. Lipid-lowering treatment in relation to coronary risk (low-moderate and high-very high), high density lipoprotein figures (cutoff points 40 mg/dl in men and 50 mg/dl in women), and low density lipoprotein figures (cutoff point 130 mg/dl), by sex. A and C, original values (men and women respectively); B and D, estimation of baseline values leading to treatment (men and women respectively). HDLc, high density lipoprotein cholesterol; LDLc, low density lipoprotein cholesterol; n, patients in each quadrant; Trtmt, proportion of patients treated with respect to those diagnosed.

DISCUSSION

Despite the fact that DM is the best controlled CVR factor, <65% of patients were, in fact, controlled. Virtually none of the participants with hypercholesterolemia were controlled according to the strict ES criteria,[8] although figures were considerably better when HPPAP criteria[9] were applied. Lipid-lowering drugs are frequently prescribed in the low CR population and women receive them more often than men, even though the evidence in favor of primary prevention treatment[6] is less clear than in HT or DM.

The manner in which CVR factors increasingly group together as CR increases is remarkable, especially in men. However, to be classified as being at high-very high CR using the REGICOR function, almost all women present HT, DM and hypercholesterolemia, possibly due to the lower prevalence of smoking. The worst-controlled CVR factor is HT (if we leave aside hypercholesterolemia control when measured using ES criteria), despite being by far the condition most often treated with drugs (>70%).This confirms the difficulty HT management entails.[13] Control of DM has been better than that of HT. This may be influenced by the glycohemoglobin cut-off point used.

Clinical practice guidelines[14] suggest treatment of hypercholesterolemia should focus on patients with high-very high CR, for whom it is cost-effective.[4] However, proportionately fewer men received drug treatment than women — which is consistent with other studies[5,14] — and differences were even greater in high-very high risk patients. Apparently, in primary prevention in Spain, lipid-lowering treatment is not prioritized in the population that most needs it (men and high-very high risk patients). This coincides with a study showing that statin prescription depends on cholesterol level more than on CR.[14] Estimating levels prior to treating LDLc and HDLc has shown that in men, the HDLc level should be given more importance, especially in patients with low-moderate CR risk. Similarly, many women with very high HDLc and low-moderate CR are treated. This trend appears to be repeated with other CVR factors and we need to focus on a CVR-centered treatment strategy.

By comparison with other studies, in Spain, the proportion of patients with controlled HT[15] is <40%, and in those aged >65 years it is <33.5%.[16] By and large, this coincides with the present study, indicating we need to improve the figures, especially in patients with high-very high CR. Controlling HT is important, but to do so we need to use more than one drug.[13] Our results coincide with another study conducted in patients with dyslipidemia, in whom control worsened as CR increased.[17]

In a nonrandom selected study of DM,[18] 50.6% of patients were controlled (glycohemoglobin <7%), which is similar to the present study. In patients with DM and one CVR factor, the figure was similar[19] with the same 7% cutoff point (46.8% well-controlled). Recent studies[20] confirm the 7% therapeutic objective is more adequate than the traditional 6.5% objective; which has also been confirmed in Spain.[21]

In hypercholesterolemia, comparisons are difficult as few population-based studies have been conducted and definitions of "well-controlled" differ. The LIPICAP study[17] reported 32.3% were well-controlled but their criteria cannot be compared with those of the present study since CVR was calculated as a function of the number of CVR factors (without using risk functions) and defined as LDLc <160 mg/dl in patients with low CVR, <130 mg/dl in those with moderate CVR and <100 mg/dl in those with high CVR. Notwithstanding, bad control in primary prevention has been reported[22] and secondary prevention figures are better.[23]

With regard to its strengths and limitations, the DARIOS study includes 11 population-based studies from 10 autonomous communities. They used random selection, similar methods, quality control of analytic data, and were representative of the Spanish population aged 35-74 years; the sample size was substantial, thus permitting us to obtain conclusive results.[7]

Logically, participants with worse CVR factors are at greater CR, but we believe it important to analyze this relationship as it is in high-very high risk patients that treatment should be intensified, especially with lipid-lowering drugs. We cannot completely exclude the presence of bias in selection and data collection, although participation was high.[7] Glycohemoglobin was not available in all studies, although sample size was adequate. To estimate the proportion of well-controlled participants, we used the patient's previously reported clinical history as the denominator, which is highly reliable.[24] Criteria for the control of hypercholesterolemia have been modified in the last decade but HPPAP criteria[9] remain unchanged since 2005. The HPPAP criteria do not specifically include control objectives for low risk patients so, in line with other authors,[10,17] we established well-controlled LDLc as <160 mg/dl. In our view, using the same control objective for low and high risk patients lacks coherence.

The contrasting results obtained with ES and HPPAP control criteria for hypercholesterolemia indicate Spanish physicians tend to be conservative in daily clinical practice and seek accessible objectives although they are imprecise in selecting the population that most benefits from treatment.

Control of HT — especially — and control of DM can be improved. It is difficult to strike a balance between the therapeutic effort (often various drugs will be needed in patients who are already following several regimens due to comorbidities) and the benefit obtained in the patient. It would be idealistic to think in terms of a 100% objective since this depends on factors such as strict compliance with therapy or the persistence of unfavorable lifestyles. In patients with high-very high CR, there remains a substantial margin for improving the percentage of controlled patients. The aspect of treatment most susceptible to improvement is lipid-lowering drug therapy given that prescribing it is not apparently conditioned by Spanish healthcare authorities' clinical practice guideline recommendations[25] to prioritize their use in men and patients with >10% 10-year CR. We find it difficult to understand why lipid-lowering treatment is more often prescribed in women than in men, since five-times fewer women have >10% 10-year CR.

CONCLUSIONS

The proportion of patients with well-controlled CVR factors in the Spanish population aged 35-74 years is 64% (men with DM) at best and 34% at worst (men with HT). With HPPAP criteria, control of hypercholesterolemia stands at around 50%; if strict ES criteria are used, virtually no patients are controlled. Therapeutic efforts should be concentrated on high CVR categories. Lipid-lowering treatment is not prioritized in relation to CR level and HDLc is hardly considered, especially in women.

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CONFLICTS OF INTERESTS

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