

EPIDEMIOLOGY AND PREVENTION

Control of Hypertension in Elderly Patients Receiving Primary Care in Spain

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Introduction and objectives. Little information is available about the control of arterial hypertension in the elderly population. The aim of this study was to investigate hypertension control, factors associated with poor control, and general practitioners' responses to poor control in a large sample of hypertensive patients aged 65 years or older receiving primary care in Spain.

Patients and method. A cross-sectional study of elderly hypertensive patients taking antihypertensives was carried out. Blood pressure was measured in the standard manner. Blood pressure control was regarded as optimum if pressure averaged less than 140/90 mm Hg or, in diabetics, less than 130/85 mm Hg.

Results. The study included 5970 patients (mean age, 72.4 years; 62.8% women). Both systolic and diastolic blood pressures were well controlled in 33.5% of patients, systolic blood pressure alone in 35.5%, and diastolic blood pressure alone in 76.2%. Blood pressure control was found to be good more frequently when it was assessed in the evening (39.8%; $P < .001$), and when patients had taken treatment on the day of assessment (35.1%;

$P < .001$). Some 12.9% of diabetics had pressures less than 130/85 mmHg and 9.7% had pressures less than 130/80 mm Hg. General practitioners modified their therapeutic approach with only 17.2% of poorly controlled patients.

Conclusions. Arterial blood pressure control was optimum in only three out of 10 Spanish hypertensive patients aged 65 years or older. Blood pressure control assessment was significantly influenced by surgery hours and by the timing of antihypertensive intake. General practitioners' therapeutic responses to poor control were too conservative.

Key words: Hypertension. Control. Elderly. Primary care.

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The study involved 2785 family physicians working in primary care settings in all 17 autonomous regions in Spain. The members of the HTA/SEMERGEN Group are listed at the end of the article.

Almirall, S.A. sponsored the infrastructure of this study.

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Control de la hipertensión arterial en la población española \geq 65 años asistida en atención primaria

Introducción y objetivos. Se dispone de escasa información sobre el control de la hipertensión arterial en la población de mayor edad. El objetivo de este estudio fue analizar el grado de control de la hipertensión arterial en una amplia muestra de españoles \geq 65 años asistidos en atención primaria, los factores asociados al mal control y la conducta del médico ante esa situación.

Pacientes y método. Estudio transversal realizado en hipertensos \geq 65 años tratados farmacológicamente. Se midió la presión arterial (PA) siguiendo normas estandarizadas y se consideró que había un control óptimo si era $<$ 140/90 mmHg (en diabéticos $<$ 130/85 mmHg).

Resultados. Se incluyó a 5.970 pacientes (edad media, 72,4 años; 62,8%, mujeres). El 33,5% presentó un buen control sistólico-diafólico, el 35,5% sólo sistólico y el 76,2% únicamente diafólico. El grado de control fue significativamente mayor ($p < 0,001$) por las tardes (39,8%) y en los pacientes que habían tomado la medicación antihipertensiva el día de la visita (35,1%). El 12,9%

ABBREVIATIONS

BP: blood pressure.
 BMI: body mass index.
 CI: confidence interval.
 ACE: angiotensin-converting enzyme.
 ARA II: angiotensin II receptor blockers.

de los diabéticos mostró una PA < 130/85 mmHg y el 9,7% < 130/80 mmHg. El médico modificó su conducta terapéutica en el 17,2% de los no controlados.

Conclusiones. Tan sólo 3 de cada 10 hipertensos españoles ≥ 65 años tienen la PA bien controlada. Hay diferencias apreciables en el grado de control según el horario de consulta y la toma previa de antihipertensivos. La conducta terapéutica del médico ante el mal control es demasiado tolerante.

Palabras clave: Hipertensión arterial. Control. ≥ 65 años. Atención primaria.

INTRODUCTION

A longer life expectancy together with increased blood pressure (BP) levels in older persons has led to hypertension being one of the main reasons why elderly persons consult their primary care physicians.

The prevalence of hypertension in persons older than 60 years of age now surpasses 65%,^{1,2} and it may continue rising.^{3,4} These elderly persons usually have a higher systolic BP, a greater incidence of cardiovascular risk factors and increased cardiovascular morbidity and mortality.⁵⁻⁸

The main guidelines recommend that in adults with hypertension the systolic BP should not surpass 140 mm Hg and diastolic BP not be over 90 mm Hg. In diabetic persons these BP figures should be less than 130/85 mm Hg or currently even 130/80 mm Hg.^{3,9-12}

Only one third of patients with pharmacologically-treated hypertension actually achieve the objectives for the recommended BP levels.^{1,2,13-16} Poor BP control is associated, among other factors, with the measurement of the BP (the average of at least 2 measurements should be recorded) and BP variation during the day (morning or evening measurements), whether the patient has taken his or her antihypertensive drugs, whether single drug therapy is the most common treatment regimen, whether the body mass index (BMI) is high, and whether the patient has visited the physician during the previous year.^{1,2,12,17,18}

The aim of this study was to analyze the degree of control of hypertension in Spanish persons 65 years of age or older receiving antihypertensive treatment and seen in their primary care centers, as well as factors

associated with poor BP control and the therapeutic behavior of the physicians toward their poorly controlled patients.

PATIENTS AND METHODS

PRESCAP,¹⁹ a cross-sectional study of pharmacologically treated hypertensive patients undertaken in primary care centers of the 17 autonomous regions in Spain, also analyzed the degree of BP control in persons ≥65 years of age. To this end, 2785 family physicians selected up to 4 patients each, by consecutive sampling, to reach a total of 5970 patients (Figure 1).

Hypertensive patients were included if they were ≥65 years of age, of either sex, and had been receiving pharmacological antihypertensive therapy for at least 3 months. Patients who were diagnosed with hypertension within the previous three months or patients who refused to participate were excluded from the study.

Patient Data

The physician completed a questionnaire which included the following information obtained from the clinical history: age, sex, habitat,²⁰ weight, height, family history of early cardiovascular disease, associated cardiovascular risk factors, a sedentary lifestyle, high intake of alcohol, associated cardiovascular disease, nephropathy and retinopathy.

Patients were considered to be obese if they had a BMI of 30 kg/m² or more, to have hypercholes-

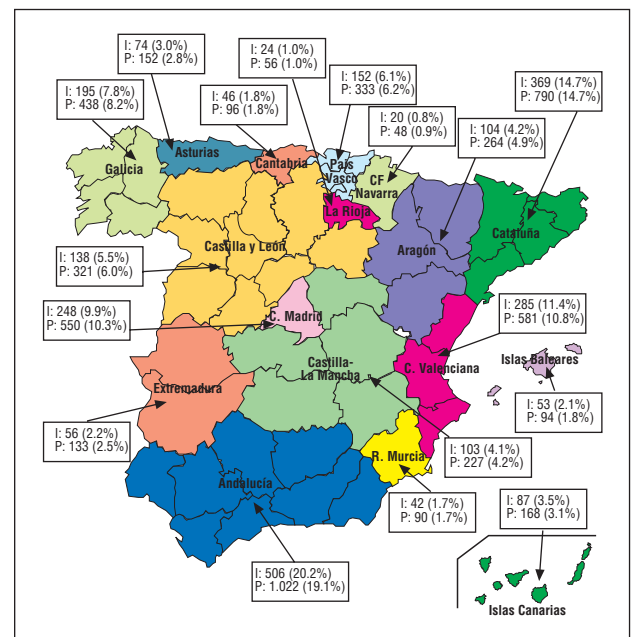


Figure 1. Researchers and patients according to regional autonomous community (data of origin were provided by 2503 of the 2785 researchers participating and 5363 of the 5970 patients studied). I indicates number of investigators (percentage of the total); P, number of patients (percentage of the total).

terolemia or diabetes if these were recorded in their clinical history, nephropathy if they had a history of microalbuminuria (30-299 mg/24 h), proteinuria (≥ 300 mg/24 h) or raised blood concentrations of creatinine (>2 mg/dL), smokers if they had smoked at least one cigarette per day²¹ during the previous month, not having a sedentary lifestyle if they had walked actively for at least half an hour per day or practiced some sporting activity three times per week,²² and an excessive drinker if they reported a daily alcohol consumption of at least 4 beers, 4 glasses of wine, 2 whiskies or a similar drink, or 3 coffees laced with brandy or a similar drink.²³

Blood Pressure Data

Blood pressure was measured according to the recommendations of the sixth report of the Joint National Committee.²⁴ With the patient seated and after 5 minutes rest, 2 measurements were taken with an interval of 2 minutes between readings, and the average of the 2 recordings was calculated. If the difference between the 2 measurements was ≥ 5 mm Hg, a third reading was taken. The BP recording devices were electronic and recently calibrated mercury or aneroid sphygmomanometers. Note was made of the type of measuring instrument used, the time of the measurement, whether the measurement was taken in the morning (08:00-14:00) or afternoon (14:00-20:00), and whether the patients had taken their antihypertensive medication that day. Blood pressure control was considered to be optimal if the measurement (average of the 2 recordings) was $<140/90$ mm Hg in general or $<130/85$ mm Hg in diabetic patients (in whom BP measurements of $<130/80$ mm Hg were also analyzed).^{3,10,11}

Antihypertensive Treatment Data

The class and number of antihypertensive drugs used was recorded, as well as the length of time they had been taken for.

Physicians' Therapeutic Behavior

The physicians were asked whether they decided to change the pharmacological agent at the time of interview and after determining BP control and, if they did change the treatment, then for what reason.

Statistical Analysis

Statistical analysis was made with SPSS (version 11.5) and SAS (version 8). The 95% confidence interval (CI) was calculated for the variables of interest, which were assumed to be normal, and the exact method was used for small proportions.²⁵ Comparison between means was done with the Student *t* test for in-

dependent data. Comparison of quantitative data which failed to follow a normal distribution was done with the Mann-Whitney nonparametric test. The possible association between qualitative variables was measured with the χ^2 test. Values were considered to be statistically significant if the $P < .05$. Multivariate analysis included the candidate variables for the model, such as diabetes, excessive alcohol consumption, smoking, female sex, obesity (BMI ≥ 30 kg/m²), and a family history of cardiovascular disease. The selection of the variables associated with poor BP control (≥ 140 or 90 mm Hg in general; ≥ 135 or 85 mm Hg in diabetics) was done by stepwise backward regression, for which conditional criteria were used.

RESULTS

Description of the Sample

The 2785 physicians who took part in the study provided a valid sample of 5970 patients (mean age, 72.4 \pm 5.7 years; 62.8%, women). Table 1 shows the social and demographic characteristics of the patients and the most frequent cardiovascular risk factors, of which the most important were a sedentary lifestyle, hypercholesterolemia, obesity, a history of cardiovascular disease, and diabetes.

TABLE 1. Social, Demographic and Clinical Characteristics of the Patients*

	% (n)	95% CI
Sex		
Women	62.8 (3742)	61.6-64.1
Age, years		
65-70	36.3 (2166)	35.1-37.5
70-74	32.8 (1959)	31.6-34.0
75-79	17.8 (1060)	16.8-18.7
80-84	9.4 (559)	8.6-10.1
≥ 85	3.8 (226)	3.3-4.3
Habitat		
Rural	17.5 (999)	16.5-18.4
Semiurban	18.5 (1056)	17.5-19.5
Urban	64.1 (3665)	62.8-65.3
Family history of high blood pressure	46.4 (2773)	45.2-47.7
Obesity, BMI ≥ 30	36.6 (2079)	35.3-37.9
Smoking	10.9 (651)	10.1-11.7
Diabetes mellitus	25.8 (1542)	24.7-26.9
Hypercholesterolemia	45.5 (2718)	44.3-46.8
Family history of early CVD	26.6 (1586)	25.4-27.7
Personal history of CVD	31.2 (1862)	30.0-32.4
Nephropathy	6.5 (390)	5.9-7.2
Sedentary lifestyle	48.2 (2880)	47.0-49.5
High alcohol intake	10.1 (602)	9.3-10.8

*CVD indicates cardiovascular disease; CI: confidence interval; BMI: body mass index; n: total number of patients with defining criteria for the variable. n=5970 except for sex, BMI and habitat, for which no data were available for the variable in 15, 286, and 250 persons, respectively.

TABLE 2. Blood Pressure Levels (mm Hg) in the Study Population According to the Classification of the Sixth Report of the Joint National Committee

	%	95% CI
Optimal (systolic BP<120 and diastolic BP<80)	2.8	2.4-3.3
Normal (systolic BP<130 and diastolic BP<85)	11.9	11.1-12.7
High-normal (systolic BP 130-139 and/ or diastolic BP 85-89)	24.6	23.5-25.7
Grade 1 hypertension (systolic BP 140-159 and/or diastolic BP 90-99)	45.0	43.8-46.3
Grade 2 hypertension (systolic BP 160-179 and/or diastolic BP 100-109)	13.1	12.3-14.0
Grade 3 hypertension (systolic BP≥180 and/ or diastolic BP≥110)	2.5	2.1-2.9
ISH (systolic BP≥140 and diastolic BP<90)	40.7	39.5-41.9

*ISH indicates isolated systolic hypertension; CI, confidence interval; BP, blood pressure. The prevalence reported is that of patients with the different degrees of blood pressure as established by the Sixth Report of the Joint National Committee, and not subject to control. The prevalence of patients with blood pressure readings <140/90 mm Hg was 39.3% and it does not correspond to that of the population with a good control (33.5%) because this latter included control criteria <130/85 mm Hg in persons with diabetes. n=5970.

Differences were found for all the demographic variables according to the sex of the patient. The women were older and more obese ($P<.001$), as well as having a more sedentary lifestyle and having dyslipidemia ($P<.01$). The men, on the other hand, smoked more, had a high alcohol consumption and a greater incidence of cardiovascular disease ($P<.001$).

Blood Pressure Measuring Conditions and Values

The most commonly used BP measuring devices were the mercury sphygmomanometer (69.1%), an electronic device (17.8%), and an aneroid sphygmomanometer (12.3%). A few physicians (0.8%) used more than one measuring device. A third BP measurement was required for 22.4% of the patients because the difference between the first 2 measurements was ≥5 mm Hg. The mean systolic and diastolic BP measurements were 142.6±15.6 and 81.2±9.1 mm Hg, respectively. Isolated systolic hypertension, defined as a systolic BP≥140 mm Hg and a diastolic BP<90 mm Hg, was detected in 40.7% of the patients, with 24.6% of the patients having a normal-high BP (Table 2). In the diabetic patients the systolic BP, but not the diastolic BP, was significantly higher than in the patients without diabetes (144.6 vs 141.8 mm Hg) ($P<.001$).

Optimal Control of Hypertension

Optimal control of the hypertension (both systolic and diastolic pressures) was found in 33.5% (95% CI, 32.3%-34.7%) of the study population. The systolic BP alone was well controlled in 35.5% (95% CI, 34.3%-

TABLE 3. Clinical Characteristics of the Patients With Poor and Good Control of Hypertension*

	Poor Control (n=3970)	Good Control (n=2000)	P
Age	72.5±5.7	72.4±5.6	NS
BMI	29.1±4.3	28.5±4.1	<.001
Sex, % women	63.3	61.8	NS
Systolic BP	150.1±12.9	127.8±7.8	<.001
Diastolic BP	83.8±8.8	76.0±7.2	<.001
Diabetes, %	87.1	12.9	NA

*BMI indicates body mass index; n, number of patients included with hypertension; NA, not assessable; NS, not significant; BP, blood pressure. Some surveys provided no data concerning age, body mass index, or sex. Good control: systolic BP<140 mm Hg (130 mm Hg in diabetics) and diastolic BP<90 mm Hg (85 mm Hg in diabetics); n (diabetes)=1542. The results are expressed as the mean ± standard deviation.

36.7%) of the patients and the diastolic BP alone in 76.2% (95% CI, 75.1%-77.2%). The main characteristics of the patients with well controlled or poorly controlled BP (66.5%; 95% CI, 65.3%-67.7%) are shown in Table 3. Those patients who had not taken their anti-hypertension medication on the day of their visit to the health care center had an average BP of 149.8/84.4 mm Hg and those who had taken their medication had an average BP of 142.0/80.9 mm Hg ($P<.001$). The patients who had the BP measurements taken during the

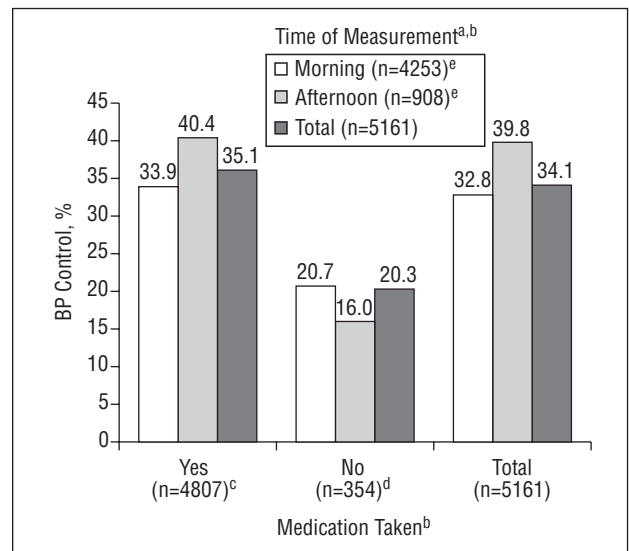


Figure 2. Blood pressure control (%) according to the time of measurement and the time of taking antihypertensive medication. BP indicates blood pressure.

^aThe time of day at which the blood pressure was measured was recorded: morning (08:00-14:00) or afternoon (14:00-20:00).

^bStatistically significant differences were detected in the percentage of patients with good control ($P<.001$).

^cDifferences were found depending on the time of day of the visit in the percentage of patients with good control ($P<.001$).

^dNo differences were found regarding the time of day of the visit in the percentage of patients with good control.

^eDifferences were found depending on the time of day of the visit in the percentage of patients with good control ($P<.05$).

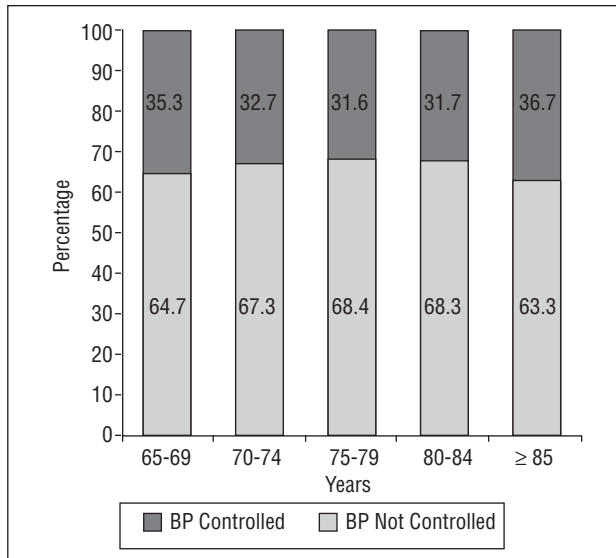


Figure 3. Optimal blood pressure control according to age in the population ≥65 years (no statistically significant differences were found). BP indicates blood pressure.

morning (82.4%) had an average BP of 142.3/81.0 mm Hg and those whose measurements were taken in the afternoon (17.6%) had an average BP of 139.9/79.9 mm Hg ($P<.001$). Optimal control (Figure 2) was significantly better in the afternoon patients than in the morning patients ($P<.01$) and in those patients who had taken their antihypertensive medication on the day of the recording compared with those who had not taken it ($P<.001$). The mean duration, in hours, between taking the medication and measuring the BP was greater in those patients with well-controlled hypertension

TABLE 4. Variables Associated With Poor Control of Hypertension*

	OR†	95% CI	P
Diabetes	4.64	3.87-5.57	<.001
Alcohol consumption	1.99	1.56-2.55	<.001
Smoking	1.49	1.17-1.87	.001
Female	1.28	1.11-1.49	.001
Obesity (BMI≥30)	1.23	1.07-1.41	.003
Family history of CVD	1.19	1.03-1.37	.017

*CI indicates confidence interval; BMI, body mass index; CVD, cardiovascular disease; OR, odds ratio.

†When the corresponding parameter changes in 1 unit.

($P<.001$). No significant differences were found in the patients with well-controlled hypertension according to the measuring device used (34.3% mercury sphygmomanometer, 33.8% aneroid sphygmomanometer, and 31.7% electronic device). Significant differences ($P<.05$) were found between the patients with well-controlled hypertension who were >70 years of age (35.3%) compared with those who were ≥70 years (32.5%). The patients who were ≥80 years ($n=785$) had an increasing trend to a good control, which reached 36.7% in patients ≥85 years (Figure 3).

Blood Pressure Control in the Diabetic Patients

In the diabetic patients, 12.9% (95% CI, 11.2%-14.6%) had BP measurements <130/85 mm Hg and 9.7% (95% CI, 8.2%-11.2%) had BP measurements <130/80 mm Hg.

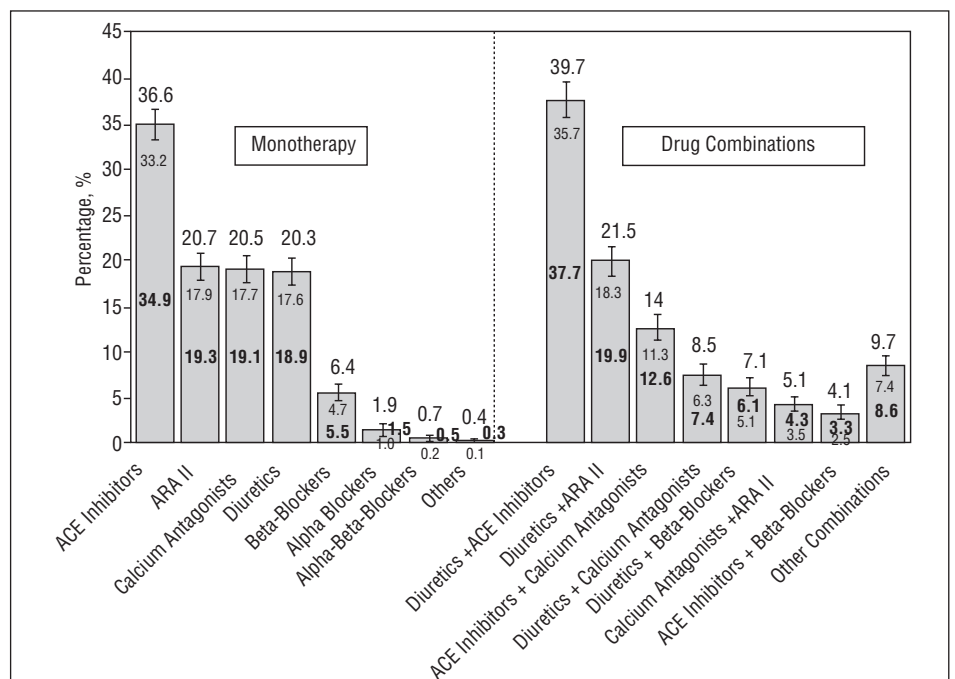


Figure 4. Most commonly used antihypertensive drugs in the patients with high blood pressure ≥65 years. ARA II indicates angiotensin II receptor antagonists; ACE inhibitors, angiotensin-converting enzyme inhibitors. Data are expressed as percentages with 95% confidence intervals.

Variables Associated With Poor BP Control

The likelihood of having poor control was 4.6 times greater among the diabetic patients, 1.99 times greater among the patients who had a high alcohol consumption and 1.49 times greater among the smokers than among the nonsmokers (Table 4).

Antihypertensive Therapy

The mean duration of pharmacological antihypertensive therapy was 7.9 ± 5.8 years and the median number of antihypertensive agents was one drug (range, 1-6 drugs). Single drug therapy was followed by 51% of the patients, different combinations of 2 drugs by 38.6% and 3 or more drugs by 10.4% of the patients. The most commonly used antihypertensive agents for single drug therapy were angiotensin-converting enzyme (ACE) inhibitors, angiotensin II receptor blockers (ARA II), calcium antagonists and diuretics (Figure 4). In the patients treated with 2 antihypertensive agents, fixed combinations accounted for 76.7% of the cases and free combinations for 23.3%. Good BP control was found in 36.6% of the patients receiving single drug therapy, 31.8% of those who received 2 drugs and 25.7% of those taking 3 drugs ($P < .001$).

Therapeutic Behavior of the Physician in the Event of Poor Control of the Hypertension

In 13.1% of the cases, the physician chose to modify the treatment at the time of interview. The percentage rose to 17.2% in the patients with poorly controlled hypertension, for whom the most common change was a swap in the antihypertensive agent prescribed (8.3%) followed by combination with another agent (6.3%). The main reasons given by the physician for modifying the treatment were lack of efficacy (7.3%) and adverse events (0.8%); the price of the medication accounted for just 0.1% of all the reasons.

DISCUSSION

The results of this study, undertaken in almost 6000 patients ≥ 65 years of age with hypertension, seen in their primary care health centers and treated with antihypertensive agents, show that the hypertension was well controlled in just 33.5% of the patients. As seen in other studies,^{13,19,26,27} the control of diastolic BP (76.2%) was much better than that of systolic BP (35.5%) and an important percentage of patients (40.7%) had isolated systolic hypertension.

Possible Limitations of the Study

The nonrandomized selection of physicians and patients, the fact that this study is a substudy of

PRESCAP¹⁹ (not specifically designed for elderly patients with hypertension) and that the study population had a very high rate of accompanying disease (25% were diabetic and almost 50% had dyslipidemia, among other conditions) impedes strict generalization of the study results to the general population of elderly Spanish persons with hypertension. Nevertheless, the main aim of the study was to analyze the control of Spanish persons ≥ 65 years of age with hypertension in the usual clinical practice of primary care physicians. The sample size was large with the consecutive recruitment of 4 patients per physician, so that the results are reasonably representative of this group of patients with hypertension seen in primary care.

Control of Hypertension

Spanish patients with hypertension attended in the primary care setting^{26,27} have been shown to have a much lower control of their hypertension, but using just one BP measurement. Although two BP measurements should always be taken,^{3,9,10,27} this is not the case in more than 25% of primary care consultations.²⁸ In our study, control at the first measurement was seen in 28% of the patients and at the second in 32.7% ($P < .001$). The better control seen in those patients who visited the health care center in the afternoons influences the taking of antihypertensive medication, because control was only detected when the medication is taken beforehand. Moreover, as most patients take their medication during the morning, these patients may experience a trough effect of the drug (a peak effect in afternoons).

Results of Other Studies

Similar results to those seen here have been reported in the general Spanish population over 60 years of age, in whom control of treated hypertension was 30%,² and in the Belgian population,²⁹ in whom two thirds of patients with hypertension older than 65 years are not well controlled. Worse results were reported in similar populations in Italy ($< 20\%$)³⁰ and Germany (22%).³¹ In the United States,¹ although control has improved in those > 18 years of age (31%), a similar rate of control has not been seen in those > 60 years of age. Finally, among the population aged 35-64 years in 5 European countries, the United States and Canada,³² better control was seen in the United States, (29%) than in Europe ($\leq 10\%$).

Patient Age and Control of Hypertension

As in other studies,^{2,7,13,19,26,27} we found a higher systolic BP and lower diastolic BP as the age of the patient increased, as well as a high prevalence of isolated systolic hypertension (40.7%) and persons with normal-high BP (24.6%). The better control seen in persons over the age of 85 years may be due to the de-

crease in systolic BP which usually occurs with effect from the age of 80-85 years³³ and that this age group may include fewer poorly controlled persons as other patients may have died from this or other causes.

Control in Diabetic Patients

The low percentage (12.9%) of well-controlled diabetic patients (<130/85 mm Hg) was similar to that of other studies in Spain undertaken in these patients^{7,34} and in patients with heart failure, who have an identical goal in BP control.³⁵ With the currently recommended BP figures of <130/80 mm Hg,^{3,10,11} we found a lower percentage of well-controlled patients (9.7%), though similar to other studies.^{7,34,36-38.}

Factors Predicting Poor Control of Hypertension

We, as others,^{3,9-12,24} found a greater likelihood of poor control of hypertension if the patient had diabetes, had a high consumption of alcohol and smoked.

Pharmacological Treatment

The pattern was similar to other studies,¹³ with half the patients taking just one single drug and almost 40% taking 2 drugs.

Therapeutic Behavior of the Physician for Poorly Controlled Hypertension

This behavior, in which only 17.2% of the physicians in our study modified the treatment regimen, is already known.^{13,19} Other studies³⁹ have shown that up to 20 consecutive visits are required before the treatment regimen is changed in patients with high systolic BP. We believe that the greater increase in systolic BP seen in our patients, over 75% of whom had good diastolic BP control, may partly account for this tolerant attitude of the physicians towards treatment. On the other hand, although treatment of hypertension in elderly patients is known to be able to prevent more cardiovascular complications in absolute terms than in younger patients,^{11,40} this tolerant physician behavior has also been seen in secondary prevention, with the prescription of fewer drugs in coronary patients >64 years of age.⁴¹ Finally, we found, as have other researchers,^{13,19,26,27} that when the physician modifies treatment, the most frequent course of action is substitution of one drug for another and the main reason given is the lack of efficacy of the antihypertensive agent.

Clinical Indications

Although the control of hypertension in our study (33.5%) is still far from optimum, it is nevertheless

better than that seen in previous years.^{13,19,26,27} We found appreciable differences in the degree of control depending on the time of the visit to the physician and the previous taking of antihypertensive drugs. Strict BP control^{3,10-12} in older diabetic patients with hypertension (9.7%) remains another challenge. Single drug antihypertensive therapy was used by over half the patients. Combination therapy of antihypertensive agents should be encouraged, as currently recommended by consensus agreements.^{3,10-12} Further research is necessary on the variables which influence poor control of hypertension in older patients in order to improve their BP.

CONCLUSIONS

Only 3 out of 10 Spanish patients with hypertension ≥ 65 years of age and seen by primary care physicians have optimal BP control. The variables most commonly associated with poor BP control are diabetes, a high consumption of alcohol and smoking. The therapeutic attitude of the physician faced with a poorly-controlled patient is too tolerant.

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AUTHORS NOTE

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