

## ORIGINAL

# Prevalence of hypotension in hypertensive treated patients within the Primary Care setting. The PRESCAP 2010 study



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### KEYWORDS

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disease;  
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### Abstract

**Objective:** To determine the prevalence of hypotension and associated factors in hypertensive patients treated in the Primary Care setting.

**Materials and methods:** A cross-sectional, descriptive, and multicentre study was conducted with a total of 2635 general practitioners consecutively including 12,961 hypertensive patients treated in a Primary Care setting in Spain. An analysis was performed on the variables of age, gender, weight, height, body mass index, waist circumference, cardiovascular risk factors (diabetes, dyslipidaemia, smoking, obesity, sedentary lifestyle), fasting plasma glucose, complete

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Primary Care;  
Hypertensive patients

lipid profile, as well as the presence of target organ damage (left ventricular hypertrophy, microalbuminuria, carotid atherosclerosis) and associated clinical conditions. Hypotension was defined as a systolic blood pressure less than 110 mmHg or a diastolic blood pressure less than 70 mmHg. A multivariate analysis was performed to determine the variables associated with the presence of hypotension.

**Results:** The mean age was 66.2 years, and 51.7% of patients were women. The mean time of onset of hypertension was 9.1 years. A total of 13.1% of patients (95% confidence interval 12.4–13.6%) had hypotension, 95% of whom had low diastolic blood pressure. The prevalence of hypotension was higher in elderly patients (25.7%) and in those individuals with coronary heart disease (22.6%). The variables associated with the presence of hypotension included a history of cardiovascular disease, being treated with at least 3 antihypertensive drugs, diabetes, and age.

**Conclusions:** One out of 4–5 elderly patients, or those with cardiovascular disease, had hypotension. General practitioners should identify these patients in order to determine the causes and adjust treatment to avoid complications.

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## PALABRAS CLAVE

Hipotensión;  
Enfermedad  
cardiovascular;  
Anciano;  
Antihipertensivos;  
Atención primaria;  
Hipertensos

## Prevalencia de hipotensión en pacientes tratados con hipertensión atendidos en el ámbito de la atención primaria. El estudio PRESCAP 2010

### Resumen

**Objetivo:** Determinar la prevalencia de hipotensión y los factores asociados en pacientes hipertensos tratados en atención primaria.

**Material y métodos:** Estudio transversal, descriptivo y multicéntrico; 2.635 médicos generales incluyeron consecutivamente a 12.961 pacientes hipertensos tratados y atendidos en atención primaria en España. Fueron analizados: edad, sexo, peso, altura, índice de masa corporal, perímetro de cintura, factores de riesgo cardiovascular (diabetes, dislipidemia, tabaquismo, obesidad, sedentarismo), glucemia en ayunas, perfil de lípidos, así como la presencia de daño en órgano diana (hipertrofia ventricular, microalbuminuria, aterosclerosis carotídea) y enfermedades clínicas asociadas. La hipotensión se definió como presión arterial sistólica inferior a 110 mmHg o presión arterial diastólica inferior a 70 mmHg. Se realizó un análisis multivariante para determinar las variables asociadas a la presencia de hipotensión.

**Resultados:** La edad media fue de 66,2 años, un 51,7% de los pacientes eran mujeres. La antigüedad de la hipertensión fue de 9,1 años. Un 13,1% de los pacientes (intervalo de confianza del 95%: 12,4-13,6%) tenían hipotensión, de los cuales el 95% era presión arterial diastólica baja. La prevalencia de hipotensión fue mayor en pacientes de edad avanzada (25,7%) y en individuos con enfermedad coronaria (22,6%). Las variables asociadas con la presencia de hipotensión incluyeron los antecedentes de enfermedad cardiovascular, pacientes tratados con al menos 3 fármacos antihipertensivos, diabetes y edad.

**Conclusiones:** Uno de cada 4-5 pacientes de edad avanzada o con enfermedad cardiovascular tenía hipotensión. Los médicos generales deben identificar a estos pacientes para determinar las causas y ajustar el tratamiento para evitar complicaciones.

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## Introduction

There is a direct relationship between increased blood pressure (BP) levels and cardiovascular morbidity and mortality, without any evidence of a threshold down to at least 115/75 mmHg.<sup>1</sup> On the other hand, the reduction of BP with antihypertensive treatment in hypertensive population has been shown to decrease cardiovascular

events by 30–50%, mainly in those patients at higher risk.<sup>2</sup>

Therefore, achieving BP targets is mandatory in patients with hypertension. However, there are some relevant differences regarding the recommended BP goals between international clinical guidelines. Thus, whereas 2007 European Society of Hypertension guidelines suggested “the lower the better”, particularly in patients at higher

risk,<sup>3</sup> in 2009 the same Society considered that due to the risk of hypotension, a BP target in the range of 130–139/80–89 mmHg should be recommended.<sup>4</sup> In 2013 the European guidelines, in line with Joint National Committee (JNC)-8, recommend a BP target of less than 140/90 mmHg for the overall hypertensive population,<sup>5,6</sup> and the current European guidelines of 2018 recommend a BP target of less than 130/80 mmHg (but not <120/70 mmHg) for the hypertensive population in <65 years and less than 140/80 mmHg (but not <130/70 mmHg) in older people (aged  $\geq$ 65 years).<sup>7</sup> The last American guide of 2018 recommend a BP target of less than 130/80 mmHg for all patients.<sup>8</sup>

However, some studies, such as the meta-analysis of Bangalore et al.<sup>9</sup> (15 clinical trials with 66,504 patients) suggest that in patients with coronary artery disease, a more strict BP target (less than 130 mmHg) could be beneficial, but with a higher risk of hypotension.<sup>10</sup> In the SPRINT trial,<sup>11</sup> a more strict systolic BP goal (<120 vs <140 mmHg) was associated with a 30% reduction in the risk of death and cardiovascular disease. However, the risk of severe hypotension and syncope was higher in those patients assigned to a stricter systolic BP target. On the other hand, different studies have shown that excessive BP reductions could be harmful in some patients.<sup>12–14</sup>

At this moment, the possible existence of a J-curve remains a topic of discussion. The J-curve implies that both high and excessively low levels of BP with antihypertensive treatment are associated with an increased cardiovascular risk. Thus, it seems that there is a lowest value of BP (nadir), which represents a point at which BP is too low to maintain an adequate perfusion of vital organs. This is particularly important regarding diastolic BP and in patients with coronary artery disease.<sup>15,16</sup> Although it has not been clearly established, different studies have shown that BP levels below 110/70 mmHg could increase cardiovascular risk.<sup>17,18</sup>

By contrast, other studies have suggested that the J-curve could be different according to the type of organ, and consequently, the optimal BP to achieve for each organ.<sup>20</sup> With regard to the prevention of stroke, TNT,<sup>16</sup> ONTARGET<sup>21,22</sup> and ACCORD<sup>23</sup> trials did not find a J-curve. Moreover, other studies have questioned the existence of the J-curve.<sup>24,25</sup>

Achieving BP goals in hypertensive population without increasing the risk of side effects related with antihypertensive treatment should be one of the main objectives of general practitioners.<sup>5–7</sup>

Hypotension related with antihypertensive treatment has not been clearly defined. To the best of our knowledge, no studies have specifically analyzed the prevalence of hypotension in hypertensive treated patients. The main objective of this study was to determine the prevalence of hypotension in hypertensive treated patients and the factors associated with its development.

## Materials and methods

### Design of the study

PRESCAP (PREsión arterial en Centros de Atención Primaria) was a multicenter and cross-sectional study aimed to assess the BP control rates and clinical profile of treated

hypertensive patients in primary care setting in Spain. Clinical characteristics of the study population, the methodology and the definition of variables have been previously described.<sup>26</sup> In this study, the prevalence of hypotension of patients included in PRESCAP study was analyzed.

A total of 2635 general practitioners consecutively included up to 5 patients that met the inclusion criteria: subjects of both sexes;  $\geq$ 18 years old; with an established diagnosis of hypertension and treated with antihypertensive therapy during at least 3 months previous to the inclusion. Patients with a recent diagnosis of hypertension (<6 months) or those undergoing treatment for <3 months of the recruitment, were excluded from the study. The study was approved by the Ethics Committee of Hospital Clinic of Barcelona and every recruited patient gave a written informed consent before inclusion.

### Variables of the study

The variables analyzed in this study were: age (years), sex, weight (kg), height (cm), body mass index ( $\text{kg}/\text{m}^2$ ), waist circumference (cm), cardiovascular risk factors (diabetes, hypercholesterolemia, hypertriglyceridemia, smoking, obesity and sedentary life style), serum fasting glucose, total cholesterol, LDL-cholesterol, HDL-cholesterol, triglycerides, left ventricular hypertrophy, carotid wall thickening (intima-media thickness  $>0.9$  mm) or plaque, microalbuminuria and associated clinical conditions (ischemic heart disease, stroke and chronic kidney disease). These data were collected from the clinical history of every patient. Biochemical data were recorded when blood tests were available within 6 months prior to inclusion. Renal insufficiency was defined as an estimated glomerular filtration rate  $<60$  ml/min (CKD-EPI).

BP readings were taken according to current recommendations, with the patients in a seated position and their backs supported, after a 5 min rest, using calibrated aneroid or mercury sphygmomanometers or validated automatic devices, depending on the availability. The patients were advised to quit smoking or drinking coffee within 30 min of BP assessment. The visit BP was the average of two separate readings taken by the examining physician, and a third measure was obtained when a difference of  $\geq 5$  mmHg between the two measurements was detected. Hypotension was defined as a systolic BP  $<110$  mmHg or a diastolic BP  $<70$  mmHg (based on previous studies<sup>17,18</sup> that suggest that below these values the patients cardiovascular risk may be increased), and adequate BP control was defined as BP  $<140/90$  mmHg. As a result, those patients with a systolic BP 110–139 mmHg and a diastolic BP 70–89 mmHg were considered as hypertensives with a good BP control and those patients with a systolic BP  $\geq 140$  mmHg or a diastolic BP  $\geq 90$  mmHg as hypertensives with poor BP control. The patients were asymptomatic, they came to the office to measure their BP in a routine way.

### Statistical analysis

For the descriptive analysis, quantitative variables were described with measures of central tendency and dispersion (mean and standard deviation) and qualitative variables

**Table 1** Prevalence of hypotension according to different clinical characteristics.

	Overall	≥65 years	≥80 years	Diabetes	Stroke	Ischemic heart disease	Renal insufficiency
N	12.961	1.288	396	609	111	295	394
%	13.0	17.3	25.7	15.3	19	22.6	20.5

**Table 2** Mean values of systolic BP, diastolic BP and pulse pressure according to the presence of hypotension, good BP control and poor BP control.

	Overall	Hypotension	Good BP control	Poor BP control	P <sup>*</sup>
N (%)	12.961 (100)	1.689 (13)	6.510 (50.2)	4.762 (36.7)	
Mean age (years)	66.2 ± 11.4	71.4 ± 10.9	64.8 ± 11.3	66.4 ± 11.1	0.000
Sex, male	6.191	13.1%	50.0%	6.9%	0.878
Systolic BP	135.8 ± 14.4	126.2 ± 14.9	128.5 ± 7	149.3 ± 11.7	0.000
Diastolic BP	79.2 ± 9.4	64.1 ± 4.5	78.2 ± 5.3	85.9 ± 8.2	0.000
Pulse pressure	56.6 ± 12.8	62 ± 15.6	50.3 ± 7.6	63.3 ± 13	0.000

BP: blood pressure.

\* P: trend significance level between hypotension, good BP control and poor BP control.

were described as absolute (*n*) and relative (%) frequencies. The presence of normal distribution was tested using the Kolmogorov–Smirnov test. In the bivariate analysis to compare 2 means, parametric (Student *t* test) or nonparametric (Mann–Whitney *U* test) statistical tests were performed based on the sample distribution. To compare percentages, the chi-square test or Fisher test was used, according to the sample size.

To assess factors associated with the presence of hypotension, a logistic regression analysis was performed using those variables that reached statistical significance in the bivariate analysis. Age, obesity, diabetes, chronic renal disease, sedentary life style, history of cardiovascular disease and polymedication were included as potential predictive factors in the analysis.

The data design was subjected to internal consistency rules and ranges to control for inconsistencies/inaccuracies in the collection and tabulation of data. Statistical significance was set at a *p*-value <0.05. The statistical analysis was performed using the SPSS statistics package, version 20.0 (SPSS, Chicago, IL, USA).

## Results

### Study population and prevalence of hypotension

A total of 13,420 patients were included in the study. However, 459 (3.4%) patients were excluded from the study because of not meeting the inclusion criteria and/or clinical records were incomplete and/or inconsistent. As a result, 12,961 patients were finally analyzed (mean age 66.2 years; 51.7% women; mean time of evolution of hypertension 9.1 ± 6.7 years).

The prevalence of hypotension was 13% (95% CI 12.4–13.6%); 50.2% (95% CI 49.4–51.0%) of the study population had a good BP control; and 36.7% (95% CI 35.9–37.5%) of patients had a poor BP control. The prevalence of hypotension was similar between men and women (13.1% vs 13%,

respectively). From those patients with hypotension, 12.4% of patients had low systolic BP, 95% low diastolic BP and 7.4% systolic BP and diastolic BP. From those patients with a systolic BP ≥140 mmHg, 2.1% of patients had low diastolic BP. The prevalence of hypotension according to different clinical characteristics is shown in Table 1. The prevalence of hypotension increased with age and with the presence of cardiovascular disease. The prevalence of hypotension was 7.1%, 12.1% and 10.7% in patients <65 years (*N* = 382), patients without diabetes (*N* = 1076) and patients without cardiovascular disease, respectively.

### Clinical characteristics of the study population

Mean values of systolic BP, diastolic BP and pulse pressure are described in Table 2 and the clinical characteristics of the study population according to the presence of hypotension, good BP control and poor BP control in Table 3. Mean age of patients with hypotension was 71.4 ± 10.9 years and 6.6% of patients had a history of cardiovascular disease. Patients with hypotension were older, had a lower body mass index and waist circumference, and a more favorable lipid profile. Smoking and sedentary life style were less frequent. By contrast, the presence of cardiovascular disease (ischemic heart disease, stroke and renal insufficiency) was more common. In addition, patients with hypotension were taking more antihypertensive drugs than the other groups (17% were taking 3 or more antihypertensive drugs).

### Multivariate analysis: factors associated with hypotension

In the multivariate analysis, independent factors associated with the presence of hypotension were history of cardiovascular disease, treatment with 3 or more antihypertensive drugs, renal insufficiency, diabetes and age. On the other hand, obesity and sedentary lifestyle were protective factors (Table 4).

**Table 3** Clinical characteristics of the study population according to the presence of hypotension, good BP control and poor BP control.

	Overall	Hypotension	Good BP control	Poor BP control	<i>P</i> *
<i>Weight (kg)</i>					
Men	83.2 ± 12	78.7 ± 12	83.4 ± 12	84.7 ± 13	0.021
Women	73.2 ± 12	69.6 ± 12	73 ± 12	74.6 ± 13	0.015
<i>BMI (kg/m<sup>2</sup>)</i>	29.4 ± 4.6	28.5 ± 4.4	29.2 ± 4.5	29.9 ± 4.7	0.000
<i>Waist circumference (cm)</i>					
Men	102.2 ± 12	101.1 ± 13	101.4 ± 12	103.7 ± 12	0.008
Women	97.2 ± 14	96.9 ± 15	96.3 ± 13	98.5 ± 14	0.005
<i>Fasting serum glucose (mg/dl)</i>	109.3 ± 31	109.6 ± 30	106.6 ± 28	113 ± 34	0.000
<i>Total cholesterol (mg/dl)</i>	203.5 ± 38	192.5 ± 38	201.9 ± 36	209.7 ± 39	0.000
<i>HDL-cholesterol (mg/dl)</i>	53 ± 14	53 ± 15	53.1 ± 14	52.8 ± 14	0.578
<i>LDL-cholesterol (mg/dl)</i>	124.9 ± 33	115.3 ± 32	123.9 ± 32	129.7 ± 35	0.018
<i>Triglycerides (mg/dl)</i>	136.8 ± 67	128.5 ± 64	132.9 ± 61	145.3 ± 7	0.009
<i>Obesity (%)</i>					
BMI	39.8	32.3	38.3	44.6	0.000
Waist circumference	60.8	58.1	58.5	64.8	0.000
<i>Smoking (%)</i>	16.6	9.7	16	19.8	0.000
<i>Sedentary life style (%)</i>	55.5	50.9	53.5	59.8	0.000
<i>Diabetes (%)</i>	30.9	36.1	27.3	34	0.000
<i>LVH (%)</i>	7.9	8.6	7.2	8.6	0.013
<i>MAU (%)</i>	15.5	16.1	11.7	20.6	0.000
<i>Carotid atherosclerosis (%)</i>	0.9	1.6	0.8	0.7	0.003
<i>Renal insufficiency (eGFR &lt;60 ml/min/m<sup>2</sup>) (%)</i>	21.5	33.3	17.8	22.3	0.000
<i>Creatinine &gt;1.4/1.5 mg/dl (%)</i>	3.8	7.1	3.0	3.7	0.000
<i>Stroke (%)</i>	4.5	6.6	4.1	4.3	0.000
<i>Ischemic heart disease (%)</i>	10.1	17.5	9.6	8.0	0.000
<i>Number of drugs</i>	1.53 ± 0.7	1.70 ± 0.8	1.46 ± 0.7	1.56 ± 0.7	0.012
<i>3 or more drugs (%)</i>	10.9	17	8.6	12	0.000

LVH: left ventricular hypertrophy; MAU: microalbuminuria; eGFR: estimated glomerular filtration rate; BMI: body mass index; BP: blood pressure.

\* *P*: trend significance level between hypotension, good BP control and poor BP control.

**Table 4** Variables associated with the presence of hypotension.

Variables	Odds ratio	<i>p</i>	95% CI
History of cardiovascular disease	1.389	0.000	1.216–1.588
Treatment with ≥3 antihypertensive drugs	1.389	0.000	1.166–1.653
Renal insufficiency	1.238	0.003	1.075–1.425
Diabetes	1.145	0.042	1.005–1.305
Age	1.048	0.000	1.041–1.055
Sedentary life style	0.767	0.000	0.678–0.868
Obesity	0.709	0.000	0.622–0.809

CI: confidence interval.

## Discussion

In this study, the prevalence of hypotension due to antihypertensive drugs in hypertensive treated patients attended in Primary Care setting was analyzed.

Clinical guidelines do not clearly define hypotension,<sup>5,6</sup> but orthostatic hypotension is defined as a reduction in systolic BP of ≥20 mmHg or in diastolic BP of ≥10 mmHg within 3 min of standing.<sup>7</sup> In addition, despite different clinical

trials performed in hypertensive population included symptomatic hypotension as a side effect related with antihypertensive treatment, BP values defining hypotension were not given. Overall, the prevalence of symptomatic hypotension reported in these clinical trials was around 1–4%.<sup>15,21,27,28</sup>

In our study, hypotension was defined as a clinic systolic BP <110 mmHg and/or diastolic BP <70 mmHg. This definition was largely based on the results of PROVE IT-TIMI trial<sup>17</sup> that showed that BP levels below these values could



be harmful in patients with ischemic heart disease. Sub-study of ONTARGET<sup>29</sup> showed a nadir for diastolic BP around 72 mmHg. In other study performed in patients >70 years old with known cardiovascular disease, an "optimal" diastolic BP of 70 mmHg in subjects with isolated systolic hypertension was found.<sup>30</sup> In a study that included subjects >85 years, a higher cardiovascular risk was observed in those patients with systolic BP <120 mmHg.<sup>31</sup> In the study of Vamos et al.<sup>19</sup> that included patients >18 years with a recent diagnosis of diabetes with or without cardiovascular disease, reductions of BP below 110/75 mmHg were associated with an increased cardiovascular risk. In the study of Verdecchia et al.<sup>18</sup> that was performed in patients with coronary artery disease, reductions of BP up to 118/68 mmHg were associated with a decrease in the risk of stroke, but, importantly, without an increase in the risk of myocardial infarction.

In our study, the prevalence of hypotension in hypertensive treated patients was 13%, without significant differences according to gender. Hypotension was more common with diastolic BP (95% of patients) than with systolic BP (12.4% of patients). To the best of our knowledge, this was the first study to analyze the prevalence of hypotension in this clinical setting. In fact, the prevalence of hypotension reported in clinical trials comparing different antihypertensive drugs was limited only to symptomatic hypotension. As a result, the prevalence of hypotension reported in these studies may be lower than that observed in clinical practice, since many episodes of hypotension are not symptomatic and are detected when clinic BP is determined.

The prevalence of hypotension was higher in elderly patients and in those patients with coronary heart disease. Importantly, excessive BP reductions could be more harmful in these patients. Thus, in patients with coronary heart disease, such as those included in INVEST,<sup>15</sup> TNT,<sup>16</sup> and PROVE IT-TIMI<sup>17</sup> trials, the existence of a J-curve was demonstrated. With regard to elderly patients, in the study of Protogerou et al.<sup>30</sup> that was performed in patients >70 years, a higher risk was observed in those subjects with diastolic BP <60 mmHg. Similarly, in the studies J-VALID<sup>32</sup> and Iritani et al.,<sup>33</sup> a J-curve was observed in hypertensive patients >75 years, but not in those <75 years. In other study performed in subjects >85 years, a systolic BP <120 mmHg was associated with a higher mortality.<sup>31</sup>

In our study, the prevalence of hypotension was also higher in patients with stroke, renal insufficiency and diabetes. Other studies have also described the existence of a J-curve in patients with diabetes<sup>17,34</sup> and renal insufficiency.<sup>35</sup> Similarly, the PROGRESS<sup>36</sup> and the SPS3<sup>37</sup> studies suggested the presence of a J-curve in patients with previous stroke.

Of note, the higher prevalence of high pulse pressure shown in patients with hypotension and in those hypertensive subjects with uncontrolled BP when compared to patients with a good BP control could be related with the greater arterial stiffness observed in these patients with high systolic BP. In this case, hypotension could be a consequence, particularly in elderly patients and in those with known cardiovascular disease.

On the other hand, the presence of hypotension in elderly patients or in those with cardiovascular disease could also be related with the presence of other comorbidities, such as malnutrition, chronic conditions or cardiac dysfunction that

may increase the mortality risk.<sup>13,14</sup> In fact, in our study, patients with hypotension were older and the presence of cardiovascular disease was more common. In the study of Gutiérrez-Misis et al.,<sup>38</sup> only in those fragile elderly patients, a higher mortality risk was observed when systolic BP was below 120 mmHg, but not in nonfragile elderly patients.

The presence of a J-curve remains controversial. Its existence could be related with the severity of some chronic conditions, or with a greater arterial stiffness and pulse wave velocity. In addition, it could be a marker of cardiac dysfunction or may limit myocardial perfusion, particularly when diastolic BP is excessively low.

In contrast to coronary perfusion, cerebral perfusion depends mainly on systolic BP, but not on diastolic BP. This could explain the dissimilar effects of the J-curve observed in different vital organs.

Although our study cannot explain the pathophysiology of the J-curve, it showed that the prevalence of hypotension was more common in elderly patients and in those subjects with cardiovascular disease. Our data suggest that hypotension could be a consequence in these patients.

The prevalence of hypotension could also be related with the higher use of antihypertensive drugs in these patients and this with a greater difficulty to achieve BP goals in elderly patients. The higher systolic BP levels and the higher use of antihypertensive drugs may lead to excessive reductions of diastolic BP. In addition, it also could be related with the greater efforts made by physicians to attain BP targets in patients with cardiovascular disease.

In the multivariate analysis, the variables associated with the presence of hypotension included the history of cardiovascular disease, the intensive antihypertensive treatment (3 or more drugs), diabetes, and age. By contrast, sedentary life style and obesity were protective factors maybe because that one of the possible causes for this, is that the control of the BP is more difficult in obese patients.

Our study has some limitations. Thus, since a white-coat effect could occur in some patients, the prevalence of hypotension could be underestimated. In this context, ambulatory BP monitoring and home BP monitoring could be very useful. In addition, although in this type of studies a possible bias could occur regarding the BP determination, a single BP value with two PA measurements to minimize the alert reaction, it shows the hypotension in a point in time and we do not know if it is maintained over time, but the large sample size of our study could reduce this potential limitation. Another limitation of our study is the definition of hypotension chosen for our study. However, the definition of hypotension was largely based on the results of many clinical trials performed in hypertensive population, particularly with coronary artery disease,<sup>15-17,27-29</sup> that identified a nadir similar to the cut points used in our study.

## Conclusions

In conclusion, only around 50% of patients with hypertension were adequately controlled. The prevalence of hypotension was high, particularly in elderly patients and in those with cardiovascular disease. One out of 4-5 elderly patients or with cardiovascular disease had hypotension. The prevalence of hypotension was related mainly with diastolic BP.

This should be considered for the treatment of hypertensive patients, particularly in patients with coronary artery disease. On the other hand, our data suggest that hypotension may be the consequence in some patients such as elderly patients or those with cardiovascular disease. Future studies are required to determine whether hypotension is the cause or the consequence in these patients.

## Conflicts of interest

The authors have no conflicts of interest.

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## Appendix A. Members of the Working Group on Arterial Hypertension and Cardiovascular Disease of SEMERGEN:

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