Original article

Resistant Hypertension: Demography and Clinical Characteristics in 6292 Patients in a Primary Health Care Setting

Teresa Gijón-Conde,[a,b,*] Auxiliadora Graciani,[b] and José R. Banegas[b]

[a] *Centro de Salud Universitario Cerro del Aire, Dirección Asistencial Noroeste, Majadahonda, Madrid, Spain*
[b] *Departamento de Medicina Preventiva y Salud Pública, Universidad Autónoma de Madrid/IdiPaz, CIBER de Epidemiología y Salud Pública (CIBERESP), Madrid, Spain*

A B S T R A C T

Introduction and objectives: The prevalence of resistant hypertension has recently been reported, but there are no studies on its demography. This study aimed to examine the demography and clinical characteristics of resistant hypertension in a large sample of primary care patients.
Methods: A cross-sectional study was performed of all computerized medical records of hypertensive patients in Health Area 6 of Madrid (Spain). Of 63 167 hypertensive patients, we selected 48 744 with prescription of antihypertensive medication; of these, we selected those who met the American Heart Association criteria for resistant hypertension.
Results: A total of 6292 patients had resistant hypertension, representing 9.9% of all hypertensive patients and 12.9% of those treated. A total of 5.5% were < 50 years (8.5% men and 3.2% women) and 24.7% were > 80 years (15.8% men and 31.4% women) (*P* < .001). In patients < 50 years, resistant hypertension was associated with male sex (odds ratio female/male = 0.006; 95% confidence interval, 0.000-0.042; *P* < .001), systolic blood pressure, obesity, stroke, and chronic kidney disease (*P* < .001). In those > 80 years, resistant hypertension was associated with female sex (odds ratio female/male = 1.27; 95% confidence interval, 1.08-1,10; *P* = .004), systolic blood pressure, diabetes mellitus, obesity, chronic kidney disease, coronary heart disease, and atrial fibrillation (*P* < .001). More than 50% of patients > 80 years with resistant hypertension had cardiovascular disease.
Conclusions: One in 4 patients with resistant hypertension is > 80 years. Resistant hypertension is associated with cardiovascular disease, age < 50 years in men and age > 80 years in women. There is a high proportion of cardiovascular disease in elderly patients with resistant hypertension.

© 2013 Sociedad Española de Cardiología. Published by Elsevier España, S.L. All rights reserved.

Demografía y características clínicas de la hipertensión resistente en 6.292 pacientes en atención primaria

R E S U M E N

Introducción y objetivos: Se ha publicado recientemente la prevalencia de hipertensión resistente pero no existen estudios específicos sobre su demografía. Este estudio tiene como objetivo analizar la demografía y las características clínicas de la hipertensión resistente en una amplia muestra de pacientes en atención primaria.
Métodos: Estudio transversal de todas las historias clínicas informatizadas de pacientes hipertensos en el Área 6 de Madrid (España). De 63.167 pacientes, se seleccionó a 48.744 con tratamiento antihipertensivo; de estos, se analizó a los que tenían criterios de hipertensión resistente según la *American Heart Association*.
Resultados: Un total de 6.292 pacientes tenían hipertensión resistente, lo cual representa el 9,9% del total de hipertensos y el 12,9% de los tratados; el 5,5% era < 50 años (el 8,5% varones y el 3,2% mujeres) y el 24,7% era > 80 años (el 15,8% varones y el 31,4% mujeres) (p < 0,001). En los pacientes < 50 años, la hipertensión resistente se asoció a sexo masculino (*odds ratio* mujeres/varones = 0,006; intervalo de confianza del 95%, 0,000-0,042; p < 0,001), presión arterial sistólica, obesidad, ictus y enfermedad renal crónica (p < 0,001). En los pacientes > 80 años, se asoció a sexo femenino (*odds ratio* mujeres/varones = 1,27; intervalo de confianza del 95%, 1,08-1,10; p = 0,004), presión arterial sistólica, diabetes mellitus, obesidad, enfermedad renal crónica, cardiopatía isquémica y fibrilación auricular (p < 0,001). Más del 50% de los pacientes > 80 años con hipertensión resistente tenían enfermedad cardiovascular.
Conclusiones: De cada 4 pacientes con hipertensión resistente, 1 es > 80 años. La hipertensión resistente está asociada a la enfermedad cardiovascular, al varón < 50 años y la mujer > 80. La prevalencia de enfermedad cardiovascular en el anciano con hipertensión resistente es elevada.

© 2013 Sociedad Española de Cardiología. Publicado por Elsevier España, S.L. Todos los derechos reservados.

INTRODUCTION

Resistant hypertension, defined as failure to control blood pressure (BP) >140/90 mmHg despite the concomitant use of 3 or more antihypertensive medications, including 1 diuretic at optimal or best tolerated dose, or with BP controlled despite the use of 4 or more medications, seems to be an important problem in clinical practice.[1,2] Since the publication of the American Heart Association BP guidelines on resistant hypertension in 2008,[1] very few studies have reported data on the prevalence of resistant hypertension and associated conditions.[3–7] This contrasts with the figures reported in clinical trials, which range over a wide interval between 15% and 30%.[8–10] A few population-based studies such as the Framingham Heart Study,[11] the National Health and Nutrition Examination Survey, and the Spanish Ambulatory Blood Pressure Monitoring Registry have identified age, race, diabetes mellitus (DM), associated cardiovascular disease (CVD), and chronic kidney disease as predictors of resistant hypertension.[4,12] However, there is a relative lack of data on hypertensive patients < 50 years and > 80 years,[13,14] and we have found no studies on the demography of resistant hypertension. We consider that such studies could be important because of progressive aging in developed countries and because they could also provide additional, potentially relevant information, both from the epidemiologic and clinical practice points of view. It is estimated that 19.3% of Americans will be > 65 years by 2030 and in 2050 the number of Americans aged 65 years and older is projected to be 88.5 million, more than double its projected population of 40.2 million in 2010.[15] Most hypertension guidelines provide no recommendations specific to the elderly population, except the American College of Cardiology Foundation/American Heart Association consensus statement[16–20] and the very recently reported 2013 European Society of Hypertension/European Society of Cardiology guidelines.[21]

This study had 2 objectives: *a)* to estimate the frequency and clinical characteristics of resistant hypertension in a large sample of all hypertensive patients managed in a primary care setting, and *b)* to analyze the demography of resistant hypertension.

METHODS

Design

We designed a cross-sectional study based on computerized registries of hypertensive men and women belonging to Health Area 6 of Madrid. Patients were included if they had attended their health center in 2008 for monitoring and to request prescriptions; this definition represents almost all hypertensive patients on drug treatment, whether or not they are treated in primary care, since most people go to their health center for prescriptions. Of the whole population, 63 167 patients met the criterion of adequate data quality to carry out the analysis. From this group, we first selected the 48 746 persons who had received prescriptions for antihypertensive drugs and, of these; we selected those who met the criteria for resistant hypertension. In accordance with the American Heart Association definition, patients were considered to have resistant hypertension if their systolic blood pressure (SBP) was ≥ 140 and/or and diastolic BP ≥ 90 mmHg while taking 3 antihypertensive drugs, including 1 diuretic, or if they were taking 4 or more drugs, regardless of whether they were controlled.[1] Hypertension was considered to exist if it had been previously diagnosed or if the clinical history documented 3 BP measurements in the consultation ≥ 140/90 mmHg on 3 different days in a 3-month period, or 1 measurement of ≥ 180/110 mmHg, under usual conditions of clinical practice with predominantly aneroid sphygmomanometers calibrated annually according to a standard protocol. BP was considered to be controlled if the last 2 measurements on 2 different dates were < 140/90 mmHg, in accordance with the recommendations of the European guidelines.[16–21]

Variables Studied

The variables selected were age, sex, smoking habits, SBP and diastolic BP (mmHg), weight (kg), height (cm), body mass index (kg/m²), total cholesterol (mg/dL), low density lipoprotein cholesterol (mg/dL), high density lipoprotein cholesterol (mg/dL), triglycerides (mg/dL), and creatinine (mg/dL). The estimated glomerular filtration rate (mL/min/1.73 m2) was calculated using the Modification of Diet in Renal Disease-4 formula.[22] The laboratory variables were taken from samples obtained primarily in the health centers in baseline conditions after an 8-h fast and were sent to the 2 reference laboratories for the area. The morbidity analyzed was the presence of a previous diagnosis in the clinical history according to ICPC-2 [23] codes for the following conditions: DM (T90), which considers the diagnostic criteria of random glucose test ≥ 11mmol/L or 200 mg/dL with classic symptoms of DM, 2 or more random glucose tests ≥ 7 mmol/L or 126 mg/dL and 2 or more glucose tests ≥ 11 mmol/L or 200 mg/dL 2 h after oral loading with 75 g of glucose; hyperlipidemia (T93) using the following criteria: 2 measurements of total cholesterol ≥ 6.57 mmol/L (250 mg/dL) or ≥ 5.18 mmol/L (200 mg/dL) if there is DM or CVD; obesity (T82), if body mass index ≥ 30 kg/m²; and smoking (P17) for consumption of any amount of tobacco.

The following diagnoses (usually taken from hospital discharge reports) were considered in the clinical history: coronary heart disease (K74, K76), heart failure (K77), peripheral arterial disease (K99), chronic kidney disease (U99), stroke (K89, K90), and atrial fibrillation (K78). CVD was considered if some of the conditions were present.

Antihypertensive drug prescriptions were analyzed according to the classification by therapeutic groups of the Anatomical Therapeutic Chemical Classification System, which is the European system for coding drugs and medications.[24] The following drug classes were analyzed: antihypertensive (C02); diuretics (C03); aldosterone antagonists alone or in combination (C03D,C03E); alpha-blockers (C02C); beta blockers (C07); calcium channel blockers (C08); and inhibitors of the renin-angiotensin-aldosterone system, either angiotensin converting enzyme inhibitors (C09) or angiotensin receptor blockers, alone or in combination.

Data Analysis

The data was reviewed and checked for possible coding errors, and frequency distributions were calculated. The Kolmogorov-Smirnov test was used to test the normality of the variables. We used basic central tendency statistics: the arithmetic mean (standard deviation) for continuous variables, and relative distribution of frequencies (prevalence) for categorical variables, with their 95% confidence intervals 95%CI. For comparison of means between groups we used Student's *t* test for binary