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Original article

Trends in Premature Mortality Due to Heart Failure by Autonomous Community in Spain: 1999 to 2013

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ABSTRACT

Introduction and objectives: Heart failure (HF) is a major public health problem, and the prevalence increases with age. In Spain, there are considerable differences between autonomous communities. The aim of this study was to analyze trends in premature mortality due to HF between 1999 and 2013 in Spain by autonomous community.

Methods: We analyzed data on mortality due to HF in Spanish residents aged 0 to 75 years by autonomous community between 1999 and 2013. Data were collected from files provided by the Spanish Statistics Office. Age-adjusted mortality rates were analyzed and the average annual percentage rate was estimated by Poisson models.

Results: Mortality due to HF represented 10.9% of total mortality. In 2013, the national age-adjusted rate was 2.98 deaths in men and 1.29 deaths in women per 100 000 inhabitants, with an annual mean reduction of 2.27% and 4.53%, respectively. In men, average mortality showed the greatest reduction in Castile-La-Mancha (6.30%). In Cantabria, average mortality significantly increased (3.97%). In women, average mortality showed the greatest decrease in the Chartered Community of Navarre (15.17%).

Conclusions: During the study period, mortality due to HF showed an overall average decrease, both nationally and by autonomous community. This decrease was more pronounced in women than in men. Premature mortality significantly decreased in most—but not all—autonomous communities.

Tendencias de mortalidad prematura por insuficiencia cardiaca por comunidades autónomas en España, periodo 1999-2013

Palabras clave:
Insuficiencia cardiaca
Mortalidad evitable
Mortalidad
Epidemiología
Prevención
Enfermedad cardiovascular

RESUMEN

Introducción y objetivos: La insuficiencia cardiaca (IC) es un problema de salud pública de primer orden. La prevalencia aumenta con la edad. En España, existen diferencias considerables entre comunidades autónomas. El objetivo es analizar las tendencias de mortalidad prematura por IC entre 1999 y 2013 en España, por comunidades autónomas.

Métodos: Se analizó por comunidades autónomas la mortalidad prematura por IC de españoles residentes con edades entre 0 y 75 años en el periodo 1999-2013; se utilizó como fuente de datos el Instituto Nacional de Estadística. Se calcularon las tasas de mortalidad ajustadas por edad y el porcentaje de cambio medio anual de la mortalidad estimados por modelos de Poisson.

Resultados: La mortalidad prematura por IC supuso el 10,9% del total. En 2013, la tasa nacional ajustada por edad fue 2,98 defunciones de varones y 1,29 de mujeres cada 100.000 habitantes, de modo que se habían producido reducciones medias anuales significativas, del 2,27 y el 4,53% respectivamente. En varones, la mayor reducción media anual tuvo lugar en Castilla-La-Mancha, con un 6,30%. En Cantabria hubo un aumento medio significativo de la mortalidad (3,97%). En mujeres, la región con la mayor reducción media anual de mortalidad fue la Comunidad Foral de Navarra (15,17%).

Conclusiones: Se observó una generalizada reducción de la media de la mortalidad prematura por IC, tanto la nacional como por comunidades autónomas, de manera más acusada en mujeres que en varones. Se ha producido una reducción significativa de la mortalidad prematura en la mayoría de comunidades autónomas, aunque no en todas.

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Abbreviations

AAMR: age-adjusted mortality rate
AAPR: average annual percentage rate
HF: heart failure
PM: premature mortality

INTRODUCTION

Cardiovascular disease is the leading cause of mortality in developed countries. After coronary disease and cerebrovascular disease, heart failure (HF) is the third cause of cardiovascular mortality.[1–3]

Heart failure is a major public health problem. In developed countries it affects 2% of the population, whereas in Spain its prevalence is higher, with percentages ranging from 5% to 6.8%.[4,5] There is an exponential increase with age: prevalence is less than 1% before 50 years and more than 10% after 70 years. The increase in prevalence over recent decades is related to the progressive aging of the population, because patients with coronary events have longer survival times.[1,2,4,6]

Despite improvements in the percentage of patients with HF who receive optimal treatment with drugs,[7,8] implantable cardioverter-defibrillators,[9] and the treatment of comorbidities,[10] the prognosis of this disease remains unfavorable, with high mortality rates[7] and hospital readmission rates.[11]

According to the key indicators of the Spanish National Health System,[12] premature mortality (PM) is defined as any death in individuals younger than 75 years,[13,14] that is, those occurring before they reach the mean life expectancy at birth. This threshold coincides with that of several causes of avoidable mortality, which have been widely studied in Spain and the European Union.[15]

To decrease PM, attempts are being made to prevent cardiovascular events at younger ages.[16] It is important to understand the health effects of these actions and the mortality trends due to HF by autonomous community in Spain. These data have been previously analyzed, but since then more than 15 years have passed[1] and this information needs to be updated.

Thus, the aim of this study was to analyze trends and features of PM due to HF between 1999 and 2013 in Spain as a whole and by autonomous community.

METHODS

We conducted a trend study of PM due to HF between 1999 and 2013 in Spain by autonomous community. Premature mortality was defined as any death due to HF in individuals younger than 75 years. We analyzed data on PM due to HF between 1999 and 2013 in Spanish residents aged between 0 and 74 years by autonomous community. The basic cause of death was defined using the ICD-10 (10th revision of the International Classification of Diseases) I50 codes. Data on deaths and populations were collected from the Spanish Institute of Statistics.[17]

The direct method was used to calculate the age-adjusted mortality rates (AAMR) for each year by autonomous community and sex in 5-year age groups (0-4, 5-9, 10-15, and so on, up to 70-74 years), using the European Standard Population for 2013 as the reference group. The results are shown with their 95% confidence intervals (95%CI).

To assess changes in PM during the study period, Poisson regression models were adjusted to the logarithm of the number of deaths, taking the logarithm of the population as an offset, and adjusting for the age groups less than 50, from 50 to 64, and from 65 to 74 years. The average annual percent change (AAPC) in PM was estimated using the expression $(\exp(\beta) - 1) \times 100\%$, where the parameter β corresponds to the variable year of death. The Poisson regression model used to make the adjustment took into account all the years of the study, so that the AAPR was an estimator of changes in mean mortality over the entire period. A 95%CI was calculated for the AAPR and estimated by autonomous community and by sex.

Figure 1 and Figure 2 show maps representing the initial situation in 1999. Areas are shown in which the 95%CI of the AAMR of the corresponding autonomous community excluded the 95%CI of the national AAMR, that is, where there were significant differences at a confidence level of 95%. The maps are simply descriptive and are not intended to identify PM by autonomous community. Each map shows the initial situation in 1999 by sex.

All analyses were conducted using the statistical program R 3.3.1.

RESULTS

In Spain in 1999, there were 2457 premature deaths due to HF (58.4% men and 41.6% female). In 2013, there were 1587 premature deaths due to HF (68.7% men and 31.3% women).

A total of 30 092 premature deaths due to HF were analyzed for the entire study period (61.6% men and 38.4% women). Premature mortality due to HF in individuals younger than 75 years accounted for 10.9% of HF mortality at all ages.

Table 1 and Table 2 show the AAMR for each year, and the AAPC and its 95%CI for the entire period. Each table shows sex-disaggregated data for Spain as a whole and for each autonomous community. Tables 1 to 10 of the supplementary material show sex-disaggregated data on the number of deaths, the AAMR, and the 95%CIs for each year for Spain as a whole and for each autonomous community.

In 1999, the Spanish national AAMR was 4.36/100 000 in men and 2.66/100 000 in women (henceforth, rates per 100 000 population). In 2013, the AAMR for HF was 2.98 in men and 1.29 in women. Over the entire period, there was a reduction of the AAPC of 2.27% in men and 4.53% in women.

In 1999, the autonomous communities with the most and the least PM in men (Table 1) were the Balearic Islands (AAMR, 7.24) and La Rioja (AAMR, 2.47), respectively. In 2013, the autonomous communities with the most and the least PM in men were Cantabria (AAMR, 6.58) and the Basque Country (AAMR, 1.41), respectively. There was a significant mean reduction in PM in all the autonomous communities, except in the Principality of Asturias, the Region of Murcia, La Rioja, the Autonomous City of Ceuta, and the Autonomous City of Melilla. In Cantabria there was a significant increase in the mean PM (AAPR 3.97%; 95%CI, 0.73-7.31). The greatest mean reduction in PM during the study period was in Castile-La-Mancha (AAPR−6.30; 95%CI,−8.59 to−3.94).

In 1999, the autonomous communities with the most and the least PM in women (Table 2) were Andalusia (AAMR, 4.53) and the Basque Country (AAMR, 1.22), respectively. In 2013, the autonomous communities with the most and the least PM were the Balearic Islands (AAMR, 2.64) and the Chartered Community of Navarre (AAMR, 0.00), respectively. There was a significant mean reduction in PM in all the autonomous communities, and a nonsignificant mean reduction in the Balearic Islands and the Autonomous City of Ceuta. The greatest reduction of PM in the study period was in the Chartered Community of Navarra (AAMR 0.00; AAPC−15.17, 95%CI,−20.79 to−9.15).

The Autonomous City of Ceuta and the Autonomous City of Melilla showed wide variability in the AAMR estimates. In the latter city, the AAMR varied from 0 to 15.23 in men and from 0 to

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