



ORIGINAL ARTICLE

Estimation of bladder cancer projections in Spain[☆]

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KEYWORDS

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Abstract

Introduction: One of the most frequent cancers in the world is bladder cancer that affects, according to some authors, 5.4 million persons in the most developed countries. Our study has aimed to estimate the impact projections of this disease in Spain between 2007 and 2022.

Material and methods: Mortality data for bladder cancer mortality was used International Classification of Diseases 10th revision (ICD-10 C67), and the population data from 1998 to 2007. The data were obtained from the National Institute of Statistics (INE). Relative survival was obtained from the EUROCARE study. The projections of incidence, prevalence, and mortality were estimated using the statistical program Mortality-Incidence Analysis Model (MIAMOD) and after the joinpoint regression that calculates the Annual Percentage of Change (APC).

Results: Between the years 1998 and 2022, it is foreseen that there will be a decrease in prevalence in the men, from 156.93 (adjusted rate AR=128.71) to 132.99 (AR=84.68) cases per 100,000 inhabitants/year in the year 2022. The incidence rate would decrease from 30.2 (AR=24.93) to 24.87 (AR=15.88) and mortality from 14.96 (AR=12.25) to 12.08 (AR=7.67). In women, an increase is expected in prevalence from 21.18 (AR=13.23) to 35.6 (AR=21.46) cases per 100,000 inhabitants/year. The incidence of 4.8 (AR=2.91) in 1998 to 7.79 (AR=4.69), Mortality will increase from 2.25 (AR=1.32) to 3.37 (AR=1.89) between the years 1998 and 2022. In men, the APCs found for prevalence, incidence and mortality were, respectively, 0.69 (95% CI: −6.9/8.9); 0.69 (95% CI: −6.9/8.95) and −4.18 (95% CI: −11.32/3.51), these not being statistically significant. In women, the APC for prevalence was −4.44 (95% CI: −13.4/5.44) from 19.24 (95% CI: 8.93/30.52) and from −3.28 (95% CI: −20.26/17.20) for mortality.

Conclusions: This cancer should be monitored and in turn prevented based on the controllable risk factors, especially in women.

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PALABRAS CLAVE

Proyecciones;
Cáncer;
Vejiga;
España

Estimación de las proyecciones del cáncer de vejiga en España**Resumen**

Introducción: Uno de los cánceres más frecuentes en el mundo es el de vejiga, que afecta según algunos autores a 5,4 millones de personas en los países más desarrollados. El objetivo de nuestro estudio es el de estimar las proyecciones del impacto de esta enfermedad en España, entre los años 2007 y 2022.

Material y métodos: Se han utilizado los datos de mortalidad por cáncer de vejiga de la *International Classification of Diseases 10th revision* (ICD-10 C67) y los datos de la población entre 1998 a 2007. Los datos fueron obtenidos del Instituto Nacional de Estadística (INE) español. La supervivencia relativa ha sido recogida del estudio EUROCARE. Se han estimado las proyecciones de incidencia, prevalencia y mortalidad mediante la utilización del programa estadístico *Mortality-Incidence Analysis MODel* (MIAMOD), y posteriormente, la regresión *joinpoint* que calcula el porcentaje anual de cambio (PAC).

Resultados: Entre los años 1998 y 2022 se prevé en los varones una disminución de la prevalencia de 156,93 (tasa ajustada [TA] = 128,71) a 132,99 (TA = 84,68) casos por 100.000 habitantes/año en el año 2022. La tasa de incidencia disminuiría desde 30,2 (TA = 24,93) a 24,87 (TA = 15,88) y la mortalidad de 14,96 (TA = 12,25) a 12,08 (TA = 7,67). En las mujeres, se espera un incremento de la prevalencia de 21,18 (TA = 13,23) a 35,6 (TA = 21,46) casos por 100.000 habitantes/año. La incidencia de 4,8 (TA = 2,91) en 1998 a 7,79 (TA = 4,69), la mortalidad aumentará de 2,25 (TA = 1,32) a 3,37 (TA = 1,89) entre los años 1998 y 2022. En los varones, los PAC encontrados para la prevalencia, incidencia y mortalidad han sido respectivamente 0,69 (IC 95%: -6,9/8,9); 0,69 (IC 95%: -6,9/8,95) y -4,18 (IC 95%: -11,32/3,51), no son estadísticamente significativos. En las mujeres, el PAC para la prevalencia ha sido de -4,44 (IC 95%: -13,4/5,44) de 19,24 (IC 95%: 8,93/30,52) y de -3,28 (IC 95%: -20,26/17,20) para la mortalidad.

Conclusiones: Debe de monitorizarse y a la vez prevenir este cáncer en función de los factores de riesgo controlables, especialmente en las mujeres.

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Introduction

One of the most common cancers in the developed world is bladder cancer, according to some authors affecting 5.4 million people in the most developed countries and 6.7 million in developing countries.¹ Some risk factors persist in the environment and maintain this upward trend that has a serious impact on the population, especially in older people, which is a burden on society.² Overall mortality is about 4 per 100,000 in men and 1.1 per 100,000 in women.³ Its incidence varies considerably among geographic areas, varying the incidence rate among the highest with 89.6 adjusted rates in men and 6.7 in women, to the lowest areas with adjusted rates of 5.3 in men and 1.6 in women.⁴

The aim of our study is to estimate the future projections of this disease in Spain between 2007 and 2022.

Material and methods

For their study, we used the mortality data from bladder cancer of the International Classification of Diseases 10th revision (ICD-10 C67), as well as the population data by sex, age and year in the period 1998–2007. The data were obtained from the Spanish National Institute of Statistics (INE),⁵ since the mortality figures reported in this publication refer to all deaths from bladder cancer and include the usual histopathological types.

The relative survival data, equally necessary for this study, were collected from the EUROCARE study which includes a mean survival for bladder cancer in Spain.⁶

Estimates and projections of incidence, prevalence and mortality were calculated by using the *Mortality-Incidence Analysis MODel* (MIAMOD)⁷ statistical program also applying the 'backwards' calculation from the mortality and survival data. This method relies on the mathematical relationships between mortality and prevalence, as well as the likelihood of incidence and survival. The incidence is calculated using a Poisson regression which provides maximum likelihood estimates on mortality. The model calculates the crude and adjusted incidence rates (per 100,000 inhabitants/year), using the European population as a reference. The incidence is projected after the last year of observed data based on changes in the age-period-cohort of the observed period. The program uses a Weibull parametric model and relative survival data. The selection of the best model was made based on the likelihood. The model was validated, finding that the estimates obtained retrospectively (years 1998–2007) are comparable to those observed by mortality. The 'backwards' calculation model of the MIAMOD program recalculates the mortality data necessary for the start of the program, so that a correlation between the observed and estimated data can be made to assess the validity and reliability of the estimates.

The data estimated by the MIAMOD program have been used to conduct a study of trends using the joinpoint regression program.⁸ The objective was to determine whether the

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