Surgical Oncology 22 (2013) e31–e38

Contents lists available at SciVerse ScienceDirect

Surgical Oncology

journal homepage: www.elsevier.com/locate/suronc

Review

Incidence and mortality trends for four major cancers in the elderly and middle-aged adults: An international comparison

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ARTICLE INFO

Article history:
Accepted 22 February 2013

Keywords:
Elderly
Incidence
Mortality
Time trend
Middle-aged adults

ABSTRACT

Background: Time trends comparisons by age are important to understand the specific needs of elderly cancer patients and to improve clinical procedures. The aim is to compare 1998–2005 cancer incidence and mortality trends in Italy and the US for both sexes and for two age groups, namely 50–69 year old and 70+ year old.
Methods: Cancer incidence and mortality data came from 22 Cancer Registries (CRs) of the Italian association of cancer registries (AIRTUM), while the US incidence records were provided by 13 SEER CRs and the mortality statistics provided by the WHO Database. Trends were analysed by the Joinpoint Regression Program in order to obtain Annual Percent Changes and Joinpoints.
Results: Colorectal cancer incidence trends were favourable in the US for both sexes and in both age groups, whilst the rates increased in Italian elderly individuals and mortality rates fell markedly only in the US. For lung cancer, incidence and mortality decreased in men but increased in women in the two geographical areas. Breast cancer incidence and mortality declined both in Italy and the US for younger women, but the trends were less favourable in the Italian elderly individuals. The increase of prostate incidence slowed down and mortality diminished for every age group in the US, whilst in Italy only in the younger group.
Conclusions: For major cancers, the Italian elderly experienced less favourable trends than the middle-aged patients whereas, in the US, the trends were similar for both age groups and favourable also for the elderly.

Contents

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0960-7404/$ – see front matter
http://dx.doi.org/10.1016/j.suronc.2013.02.010

Introduction

The age-adjusted mortality rates registered in Europe (EU) have been decreasing steadily over the years 2000s. In men, the rates have levelled off, and, thereafter, declined, whilst in women they have been steadily decreasing since the earlier 1970s [1]. Very similar trends have also been observed in the US since 1992 [2]. These tendencies have been confirmed in the most recent EU and US statistics (EU 2011 vs. 2007: -7% in men, -6% in women; US 2003-07 vs. 1999–2003: -7.5% in men, -5.4% in women) [3–5]. According to the most up-to-date projections of cancer incidence and mortality, in 2008 the number of newly diagnosed cancers (non-melanoma skin cancers excluded) was 3.2 million and the deaths were 1.7 million in the EU [6], while the figures were 1.6 and 0.6 million, respectively [4,5], in 2011 for the US.

Nevertheless, people have a different awareness of the phenomenon and consider cancer as a disease that is becoming increasingly widespread. In fact, this perception is somewhat correct, given that the cancer burden is growing and the absolute numbers of new cases and deaths are increasing, this being due to the rapid increase in ageing in the population of Western countries. For example, in Italy life expectancy at birth increased from 68.7 years in 1970 to 79.2 years in 2010 for men, and from 74.7 years to 84.4 years for women, with 17.5% of men and 22.8% of women aged 65 years old or more in 2009 [7].

Nevertheless, looking at rates for all combined ages does not enable us to correctly interpret the very different causes of trend variations between middle-aged adults and elderly individuals. In fact, very different pictures can emerge if attention is focused on only one of the age groups [8]. Therefore, it is important to study recent incidence and mortality time-trends considering age-specific rates which can provide a more appropriate picture of the real disease occurrence. This study is aimed at carrying out time-trend analyses of incidence and mortality rates in Italy and the US over the period 1998–2005, classifying the group 50–69 year old as middle-aged adults and the 70+ year old as elderly individuals.

Material and methods

In order to compute incidence and mortality trends during the period 1998–2005 in Italy, cancer incidence records, provided by 22 cancer registries (CRs) belonging to the Italian Association of Cancer Registries [9], were used, while cancer mortality records came from local mortality registries (ReNCaM). In Italy the activity of CRs covers 34% of the whole resident population (38% in the North-West, 68% in the North-East, 25% in the Centre and 18% in the South).

US incidence rates, computed by means of SEER*Stat statistical software, concerned 13 CRs belonging to the SEER program, covering 13.8% of the total population [10], while US mortality rates derived from the WHO database (<http://www.who.int/whosis/>).

We selected middle-aged adults (50–69 years) and the elderly (70+ years). In order to assure the comparability between the two groups, we standardised rates per 100,000 using direct methods and the European standard population. For the two age groups, for both sexes, tumour cases and deaths from colon-rectum and lung cancers were analysed, whilst only for men prostate cancer and only for women breast cancer. We choose four major killing cancers that are also the most frequent in the elderly.

Incidence and mortality trends were analysed by means of Joinpoint regression models, using the Joinpoint Regression Program in order to obtain the Annual Percent Changes (APCs), the corresponding 95% confidence intervals (CI) and Joinpoints (JPs). The APCs are indicators which explain the sign and the intensity of the variation over time. They are calculated through a regression analysis in which trend data are described by contiguous linear segments and JPs at which trends change. The log-linear model of regression is based on linear segments connected at JPs that represent the best fit of the observed data. The time-trend is divided into segments and the number of segments depends on the number of JPs. The JP year is the point in time when we estimate the trend variation; joinpoint allows to carry out analyses using models with different number of joinpoints and in the present study we choose 2 points [11].

Results

Figs. 1–6 show 1998–2005 incidence and mortality trends by gender in Italy and the US for the 50–69 year old and 70+ year old age groups. The trends are illustrated by figures, comprehended by graphs and tables; in each table, the time-trend is described by means of APCs, JPs and the mean value of incidence and mortality rates per 100,000 for the whole period.

Colorectal cancer incidence trends (Fig. 1) were very similar in both sexes, with the rates increasing in Italy whilst decreasing in the US with a notable acceleration. In Italy, the increase was statistically significant only in men. In regards to the mortality in men, the rates fell in the US for both age groups, whilst in Italy the trends remained steady. Similarly, for women, we observed a strikingly significant fall in the US for all age groups, whilst in Italy the rates declined much less significantly (Fig. 2).

There were notable differences in lung cancer trends (Figs. 3 and 4) between the sexes and the two age groups: both incidence and mortality trends decreased in men and increased in women. Incidence APCs of men were negative and significant in the two countries (except in Italian elderly individuals), whereas trends in middle-aged adults were more favourable with respect to the elderly. In fact, in both Italy and the US, this decrease was double in the younger age group. In men, mortality trends showed a similar tendency: in the younger age group of both countries the decrease was marked, with similar significant APCs, whereas a downward trend was registered in the US elderly; the trends remain, however, fairly stable in Italy.

Moreover, the US showed the most favourable incidence and mortality trends for women. In younger groups incidence rates have increased in Italy with the US rates decreasing, whilst in the elderly individuals they increased not significantly in Italy and significantly since 2000 in the US. A similar pattern was observed for mortality, too. In Italy the rates increased in both age groups, whilst in the US they decreased in the younger age group and increased in the elderly.

Breast cancer incidence and mortality rates are shown in Fig. 5. In Italy incidence trends differed by age: in the younger age group, after a rapid growth, there was a reversal of the trend which began to decline significantly, whereas in the elderly the rates were substantially stable. In the US, a downward trend, similar in both age groups, was notable, however in the elderly the decrease slowed down since 2003. In 1998 the mortality rates had already started to diminish at all ages and this decrease was seen to be similar in the two age groups but only in the US, whereas in Italy the rates declined quickly and significantly in younger women with the elderly showing themselves to be fairly stable.

As you can see from Fig. 6, in regards to prostate cancer trends, in Italy there was a very large difference between the rates of middle-aged adults and those of the elderly, with a 1:6 ratio. Consequently, the variation of rates over the period was different: in younger people they increased strikingly until 2003, after which they levelled off, whilst in the elderly the growth was seen to be steady. On the contrary, in the US the rates started to diminish in the elderly in 2001. As regards mortality, in Italy trends were