CANCER MORTALITY IN NORTH CYPRUS 1995-2007

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ABSTRACT

BACKGROUND: *From 1995 to 2007, age-standardized total cancer mortality rates in the North Cyprus (NC) fell by around 9% in both sexes. Available cancer mortality data in Europe up to 2002 allow a first check of the forecast of further declines in cancer mortality.* **MATERIALS AND METHODS:** *We considered trends in age-standardized mortality from major cancer sites in the NC during the period 1995-2007.* **RESULTS**: *In women, total cancer mortality declined by 23% from 92/100 000 to 75/100 000 between the years 1995-2007. Corresponding figures for men were 85/100 000 to 66/100 000, corresponding to falls of 23% from 1995 to 2007. Lung cancer in men declined from 20/100 000 around 1995 to 16 around 2007 (−20%). In women, lung cancer mortality was 2/100 000 and there were no changes between the years 1995 and 2007. Bladder cancer declined by 25% for both men and women from 1995 to 2007. Breast cancer mortality declined from 18/100 000 around 1995 to 15/100 000 (−16%) in 2007. Prostate cancer was approximately stable until 2000, but declined from 8 to 6 (−25%) in 2007.* **CONCLUSIONS:** *Despite the persisting rises in female lung cancer in the EU, the recent trends in cancer mortality in the NC are encouraging and indicate that a 9% reduction in total cancer mortality from 1995 to 2007 is realistic and possible.*

Key words: Cancer, cyprus, mortality, time trends

INTRODUCTION

Cancer is a major health issue in Europe, as in most of the rest of the western world.[1] Although cancer mortality in Europe and its specific regions are regularly been reported,[2-6] Cyprus has not always been included in the analyses. The purpose of the present study was to analyze information on cancer mortality in North Cyprus (NC), which has a population of around 265 000. Apart from the fact that this is the first study of its kind for NC, the country was deemed potentially interesting from an epidemiological perspective. On one hand, as part of a Mediterranean island, NC may be expected to have living conditions, including a diet rich in fresh vegetables, fruit, and fish favorable generally for good health and low cancer incidence, although this issue is far from settled.[6-11] On the other hand, the inter-communal strife and the military operations that NC endured in the last 40 years might be expected to have had adverse effects on cancer incidence. Indeed, the possible effects of war on cancer have been much discussed.[12-16]

Cancer mortality in the European Union (EU), as in North America, has peaked in the late 1980s.[17,18] From 1988 to 1997, age-standardized cancer mortality rates fell by 9.3% in men and 8.8% in women. This corresponded to the avoidance of 80 000 deaths per year in the late 1990s in the 15 countries of the former EU, as compared with

cancer mortality in the late 1980s.[18] On the basis of the recent trends in cancer mortality in the 25 countries of the EU, a forecast was proposed for cancer mortality in 2015 of a further fall by 11% in cancer deaths from 2000 to 2015, corresponding to >150 000 fewer deaths per year in 2015 as compared with the rates of 2000.[19] Data have now been made available for cancer mortality in Europe up to 2002, allowing a first check of the forecast of further declines in cancer mortality. To evaluate cancer mortality in NC, which was deemed an interesting epidemiological case due to possible contrasting prevailing factors, in relation to EU countries, during the period 1995-2007, age-standardized mortality rate (ASR) was determined for 12 different cancers, separately for males and females. Annual trends were analyzed using slopes of linear regressions. The order of incidence for male (M) cancers was as follows: Lung, skin, colorectal, prostate, brain, bladder, liver, and stomach. Similar data for females (F) were as follows: Breast, gynecological, skin, colorectal, lung, liver, brain, stomach, and bladder. The following cancer cases were worse compared with EU: lung (M) and skin (both cases). The following cancers were better: breast (F), prostate, stomach (F), bladder (both sexes), cervix, and corpus; the rest were comparable. There was no difference in the annual trends of ASR for NC, compared with EU. The worst cases could be improved by reducing smoking and protecting from the sun.

The information on cancer mortality available for 1995-2007 has been analyzed. The present study analyzes the records obtained from the North Cyprus Cancer Registry, NCCR. This is an official population-based cancer registry, set up in 1988 and based at the national Dr. Burhan Nalbantoglu Hospital's, Oncology Department (Ministry of Health).

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This is the only unit in NC, where cancer drugs may be prescribed and, hence, records kept. Thus, the NCCR is the primary source of information on patient, date and site of diagnosis, and type of cancer, according to the International Classification of Diseases for Oncology.[20] For the purposes of the present study, cancer cases registered as mortality between 1st January 1995 and 31st December 2007 were considered. All information received were treated as confidential and ethically approved by the local authorities.

MATERIALS AND METHODS

Nature of data

The number of deaths by cause, stratified for sex and by 5-year age group for cancer for the period 1995-2007, was derived from vital statistics. Population figures were obtained from census data and intercensus estimates, by calendar year, age, and gender. Population censuses of NC are conducted every 5 years by the Statistics Bureau, Ministry of Internal Affair and Communications. (i) Data sets were created in which patients were listed by name (in confidence), age, gender, nature of cancer, and date and place of diagnosis; (ii) Each case was re-examined individually to eliminate possible repeated registration; (iii) Tourists and persons who did not live in NC for more than six months prior to diagnosis were not counted. Thus, the assembled data set on cancer mortality for the defined study period was deemed the most complete for NC.

Cancer subtypes and their grouping

Here, only the following 12 types of cancer mortality have been analyzed: Breast, lung, skin, liver, gynecological (ovary, corpus and cervix), stomach, bladder, colorectal, brain, and prostate. Male and female cancers were analyzed separately. These represented 80 to 83% of the total number of mortality in the Registry. The lung mortality data were registered as including larynx.

Basic parameters studied

The values of the following two parameters were determined and analyzed as the bases of the assessment and comparison of each cancer type: Age-standardized mortality rates per 100 000 (world standard population) and Standardized mortalities were obtained as before.[20-21] Population values were derived from census data available for the years 1990 and 1996. Data for non-census years were estimated by extrapolation.[16]

European regional data

The NC data were compared with EU countries, in line with UN definitions.[23-31] ASR data for EU were obtained for the period 1995-2007 from EUROCIM of the European Network of Cancer Registries (ENCR).[32,33] The official death certification numbers and population estimates for 24 countries of the EU were also obtained from the World Health Organization database during the period 1995-2007.

RESULTS

Table 1 gives an overall age-standardized mortality from all cancers, lung, skin, breast, and prostate cancers during the period 1995-2007, and the annual percent change in rate between the 1995-2007. In women, total cancer mortality declined by 23% from 92/100 000 to 75/100 000 between the years 1995-2007. Corresponding figures for men were 85/100 000 to 66/100 000, corresponding to falls of 23% from 1995 to 2007. Lung cancer in men declined from 20/100 000 around 1995 to 16 around 2007 (−20%). In women, lung cancer mortality was 2/100 000 and there were no changes between the years 1995 and 2007. Bladder cancer declined by 17% for men and 29% for women from 1995 to 2007. Breast cancer mortality declined from 18/100 000 around 1995 to 15/100 000 (−16%) in 2007. Prostate cancer was approximately stable until 2000, but declined from 8.9 to 6.1 (−25%) in 2007.

Figure 1c and d gives trends in mortality from the eight major cancer sites in NC men and women during the period 1995-2007. Steady persistent falls were observed for all kinds of cancers in both sexes. Figure 1a and b shows that the lung cancer is the first site of cancer deaths in North Cyprus men (17,95/100 000) and breast for the women

Table 1: Age-standardised mortality rates per 100 000 (world standard population) from all cancers, breast, prostate, skin, lung bladder by gender in the North Cyprus, 1995-2007

Year	All Cancers		Breast	Prostate	Skin		Lung		Bladder	
	Male	Female			Male	Female	Male	Female	Male	Female
1995	85,1	92,3	18,3	8,9	16,9	13,8	20,7	2,9	8,6	4,8
2000	76,2	77,6	16,1	8,3	14,8	12,1	18,2	2,5	7,1	3,4
2007	66,1	75,4	15,6	6,1	14	10,7	16,6	2	6,4	3
Change in rate, 1995-2000										
Absolute	−9	−15	−2,2	−0,6	−2,1	−1,7	−2,5	−0,4	−1,5	−1,4
Percent	−10,6	−16,3	−12,02	−6,7	−12,4	−12,3	−12,1	−13,8	−17,4	−29,4
Annual %	−0,88	1,35	−1	−0,6	−1	−1	−1	−1,1	−1,4	−2,4
Change in rate, 2000-2007										
Absolute	−10	−2	−0,5	−2,2	−0,8	−1,4	−1,6	−0,5	−0,7	−0,4
Percent	−13,1	−2,6	−3,1	−26,5	−6,7	−11,5	−8,8	−20	−9,8	−13,3
Annual %	−1	−0,2	−0,2	−2,2	−0,6	−0,9	−0,7	−1,7	−0,8	−1,1

[a]Average annual rate in quinquennial periods 1993-1997,1998-2002, 2005-2009, [b]From a log-linear model based on single calendar year rates
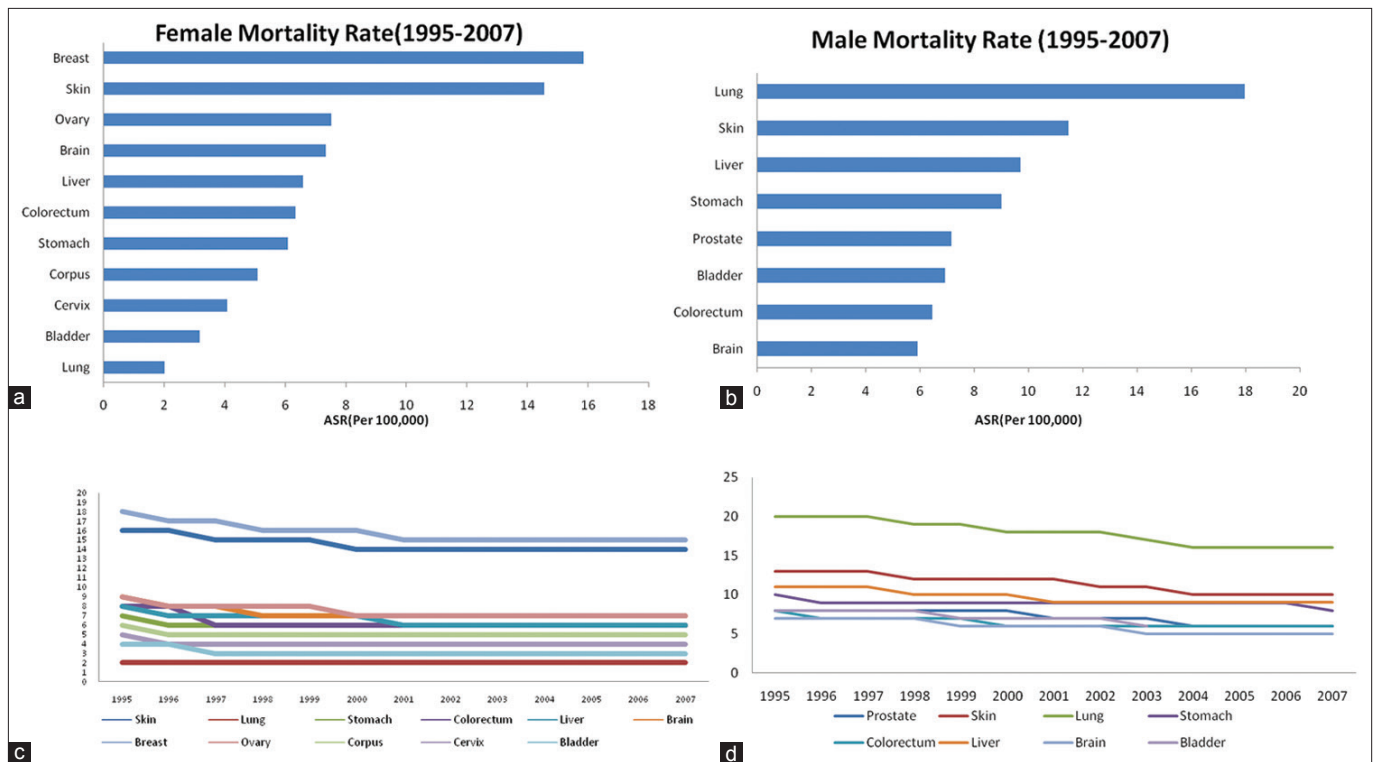
Figure 1: (a) and (b) Male, Female mortality rates between 1995-2007, (c) and (d) trends in age-standardized (per 100 000, world population) mortality rates for cancers by sex in the North Cyprus, 1995-2007

(15,83/100 000). Skin cancer is in the second place and higher rate in women than men.

DISCUSSION

The present study is the first to analyze cancer mortality in the Mediterranean island of Cyprus during 1995-2007, dealing specifically with the region in the North, which was separated from the South in 1974.

The accuracy of the cancer mortality data would critically determine the results of the analyses presented in this paper, as in any epidemiological study. All the data used here are of a unique official nature, being obtained directly from the only medical center in NC allowed to dispense cancer drugs, and hence the most completely available. Further arguments in favor of the quality and scrutiny of our data were given in the Introduction and Materials and Methods. Although Cyprus is quite homogeneous in terms of lifestyle and diet, there has been some movement of people since 1974, which could have generated some heterogeneity in the population. We also cannot exclude the possibility that some patients sought private care abroad and were never registered in the national system. Lung cancer had the highest mortality amongst NC males and this was higher than EU countries.[19] In men, about 40% of the decline is due to lung cancer alone, and at least an additional 10% to other tobacco-related cancers, following the decreased prevalence of tobacco smoking in European men over the last decades.[33] About 15% of the fall is still due to the persisting decline colorectal and prostate cancers. The association of lung cancer

with cigarette smoking is well known.[34,35] On the other hand, in many developed countries, lung cancer in women has increased four-fold over the last 30 years and has overtaken breast cancer as the leading cause of cancer death.[36] Moreover, in women, the largest contributions to the fall in cancer mortality are due to breast and colorectum, indicating that the advancements are largely attributable to improved diagnosis, and mostly treatment of breast cancer.[36-38] Cigarette consumption in females *vs* males in NC is not known, but a comparative study for North America has shown that smoking status affects women more than men.[35] As regards socio-economics, "lower" classes and certain occupations may be related to an increased risk for lung cancer.[35] The political problems, including the inter-communal fighting, experienced by NC during the third quarter of the twentieth century could have contributed to this problem. Recent studies have questioned the impact of war on cancer. Two reports have shown an overall risk,[14,15] whilst another study failed to find an association.[20] Other contributory factors could be occupational exposure to potential carcinogens (e.g. asbestos) and possible contamination of the environment from the copper mines in the west of NC.[39-42] Skin cancer also showed a high mortality level in both males and females. A likely cause of this is exposure to sun, since Cyprus as a whole has ~80% sunny days and the average temperature is 19°C.[22]

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