

The Rising Incidence and Mortality of Prostate Cancer in Belgrade Population

Janko Janković¹ and Sandra Šipetić²

¹ University of Belgrade, School of Medicine, Institute of Social Medicine, Belgrade, Serbia

² University of Belgrade, School of Medicine, Institute of Epidemiology, Belgrade, Serbia

ABSTRACT

The purpose of this study was to analyze the epidemiological situation of prostate cancer in Belgrade population. Morbidity data were obtained from the Institute of Public Health of Serbia for the period 1999–2005. Mortality data for the period 1990–2006, were derived from the Statistical Office of Republic of Serbia. Average standardized incidence and mortality rates for the prostate cancer were 33.57 and 11.86 respectively. Standardized incidence rates of prostate cancer steadily increased from 29.34 per 100,000 in 1999 to 36.86 per 100,000 in 2005. In the observed period, the mortality rates significantly increased in the age groups 50–59 ($y=2.77+0.42x$, $p=0.015$), 70–79 ($y=61.92+10.70x$, $p=0.000$) and 80+ ($y=183.08+19.99x$, $p=0.000$). The average annual percentage of changes (AAPC) was the highest (7.2%) for the 70–79 age group, the lowest (0.1%) for the youngest group (≤ 50), and 5% for the total. The increase of prostate cancer incidence and mortality during the observed period in Belgrade population indicate urgent need for Serbian health professionals to adopt existing evidence-based cancer control and preventive measures. A national policy including prostate specific antigen (PSA) screening should be considered.

Key words: incidence, mortality, trend, prostate cancer, Belgrade

Introduction

Prostate cancer is an important public health problem in the world although there are great differences between countries in both the level and trend of its morbidity and mortality.

Prostate cancer represents the second most frequently diagnosed male cancer in the world with estimated 782,600 new cases in 2007. Nearly three-quarters of the mentioned number are expected to be diagnosed in affluent countries. Internationally, the incidence of prostate cancer varies for more than 50-fold¹. The disease is reported most frequently in the United States (standardized incidence rate 124.8 per 100,000) where prostate cancer is the most commonly diagnosed cancer in man^{2,3}. Incidence is also high in the western (61.6 per 100,000) and northern Europe (57.4 per 100,000) and Australia/New Zealand (79.9 per 100,000). The lowest age standardized incidence rates are in North Africa (5.8 per 100,000) and in southern Central Asia (4.4 per 100,000)¹.

Prostate cancer is the tenth leading cause of cancer deaths in the world. It holds sixth place among men with

254,000 death cases in 2007¹. Looking at standardized mortality prostate cancer rates in 2008, huge differences persist among the countries of the world. The highest rates (per 100,000) were recorded in Caribbean region (26.3), South Africa (19.3) and Middle Africa (13.4), while the lowest rates are in the Eastern (2.5) and Southern Central Asia (2.8)⁴.

Trends in prostate cancer mortality rates have been decreasing in many developed countries, such as USA, Canada, UK, Sweden, Denmark, France and Australia, while they are rising in Japan and Singapore^{2,5}.

Continual monitoring of trends and patterns in both high-risk and low-risk populations remains an important element in etiologic research on prostate cancer as well as in cancer control and prevention⁵.

The reasons for this high degree of variability among countries are probably multi-factorial. They include in the first place different availability of improved detection methods although variability in diet and other risk fac-

tors, including genetic and differences in treatment, could also be of importance.

The aim of this descriptive study was to analyze the epidemiological situation of prostate cancer among the Belgrade population for the period 1990–2006.

Methods

In this study, the source of mortality data (1990–2006) related to the male genital organ cancers (codes 185–187 according to the International Classification of Diseases, ICD 9th revision and codes C60–C63, according to the ICD 10th revision), and all malignant tumors (codes 140–208, ICD 9th revision and C00–C97, ICD 10th revision) was the Belgrade Office of Statistics. Morbidity data were obtained from the Institute of Public Health of Serbia for the period 1999–2005. There are no relevant morbidity data for the years that precede the mentioned period. As denominator for rates, the average Belgrade male population of two census years, 1991 and 2002 was used (761,608).

Mortality and morbidity rates per 100,000 inhabitants were standardized according to the Segi's world population⁶. To estimate the prostate cancer mortality trend we performed regression analysis using SPSS version 17.0 for Windows (SPSS Inc. Chicago, IL, USA). Linear trend was used whenever it significantly ($p < 0.05$) represented estimated mortality rates. The average percentage of annual changes (AAPC) with corresponding 95% confidence interval (95% CI) were calculated using the Joinpoint regression program⁷ (Version 3.4.2 – October 2009). Tests of significance used a Monte Carlo permutation method⁸.

Results

During the period 1999–2005 the average number of prostate cancer incidence cases was 395 per year, which was 86.6% of all male genital cancers, and 9.6% of all cancers in men. The average standardized incidence rate of prostate cancer was 33.6 per 100,000 (Table 1).

During the period 1990–2006 the average number of prostate cancer deaths was 135 per year, which accounted for 93.1% of all male genital cancers deaths and for 6.3% of all cancer deaths in men. The average standardized mortality rate of prostate cancer was 11.9 per 100,000 (Table 1).

The number of prostate cancer incidence cases has been rising from one year to another, with the maximum of 435 incidence cases reached in 2005. Standardized incidence rate per 100,000 inhabitants was the lowest in 1999 (29.3), while the highest rate (36.9) was recorded in 2005 (Table 2).

During the 17-year period analyzed, 2,302 subjects died from prostate cancer in Belgrade (Table 2). The total number of cancer deaths increased from 103 in 1990 to 204 in 2006. The lowest standardized mortality rate was in 1993 (8.5) while the highest one was recorded ten years later, in 2003 (18.6, Table 2).

Age-specific incidence rates increased with age (Figure 1). The highest incidence rate was in the 70–79 age group and the lowest among the people ≤ 50 years old. In all age groups, the incidence rates showed a tendency of slight increase, except in the oldest age group (80+) where decrease was recorded.

Prostate cancer mortality rates also increased with age (Table 3). The lowest mortality rate was in the ≤ 50 age group and the highest among the people ≥ 80 years old. In the observed period, the mortality rates significantly increased in the age groups 50–59 ($y = 2.77 + 0.42x$, $p = 0.015$), 70–79 ($y = 61.92 + 10.70x$, $p = 0.000$) and 80+ ($y = 183.08 + 19.99x$, $p = 0.000$). The AAPC was the highest (7.2%) for the 70–79 age group, the lowest (0.1%) for the youngest (≤ 50), and 5% for all ages.

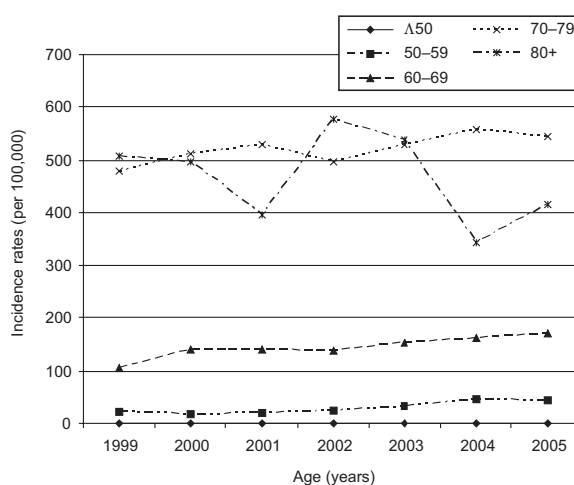


Fig. 1. Age-specific incidence rates (per 100,000) of prostate cancer in male population of Belgrade, 1999–2005.

TABLE 1
AVERAGE STANDARDIZED* INCIDENCE AND MORTALITY RATES (PER 100,000) OF PROSTATE CANCER, GENITAL ORGAN CANCERS AND ALL CANCERS IN MALE POPULATION OF BELGRADE

Cancers (Codes according to the ICD 9 th and ICD 10 th revision)	Number of cases (1999–2005)	Standardized incidence rates	Number of deaths (1990–2006)	Standardized mortality rates
Prostate (185, C61)	395	33.57	135	11.86
All genital organ cancers (185–187, C60–C63)	456	8.67	144	1.13
All cancers	4115	341.70	2143	183.70

*According to the Segi's world population⁶.

TABLE 2
STANDARDIZED INCIDENCE AND MORTALITY RATES (PER 100,000) OF PROSTATE CANCER IN MALE POPULATION OF BELGRADE

Years	Number of cases	Standardized incidence rates*	Number of deaths	Standardized mortality rates*
1990	–**	–	103	9.11
1991	–	–	97	8.49
1992	–	–	100	8.82
1993	–	–	94	8.45
1994	–	–	103	9.15
1995	–	–	118	10.50
1996	–	–	101	8.77
1997	–	–	110	9.56
1998	–	–	120	10.14
1999	344	29.34	153	13.36
2000	377	31.92	133	11.54
2001	378	32.08	159	13.85
2002	386	33.13	167	14.65
2003	414	35.28	213	18.58
2004	429	36.35	166	14.55
2005	435	36.86	161	14.16
2006	–	–	204	17.93
Average	395	33.57	135	11.86

*According to the Segi's world population⁶.

**No relevant morbidity data were available.

TABLE 3
AVERAGE AGE-SPECIFIC MORTALITY RATES (PER 100,000) AND MORTALITY TREND FOR PROSTATE CANCER IN MALE POPULATION OF BELGRADE, 1990–2006

Age groups	Mortality rates	Equation of the regression analyses	AAPC*	95% CI**
≤50	0.19	***	0.1****	–14.3, 16.8
50–59	6.53	$y=2.77+0.42x$	1.4****	–11.4, 16.0
60–69	39.21	***	0.8****	–0.8, 2.4
70–79	158.18	$y=61.92+10.70x$	7.2****	5.3, 9.1
80+	363.03	$y=183.08+19.99x$	5.3****	2.8, 7.8
Total	17.78	$y=9.86+0.88x$	5.0****	3.8, 6.1

*Average Annual Percentage Change

**Confidence Interval

***None of the regression analysis models is adequate for the presented data.

****The AAPC is statistically significant from zero.

Discussion

On the international level, prostate cancer is a significant public health issue. Wide variation in its incidence persists among countries. For example, the rates in the USA are 2.5 times higher than those in the UK and almost 10 times than the levels in Japan^{9,10}. The average standardized incidence rate in Belgrade for the period 1999–2005 is 33.6/100,000 which is 3.7 times lower than in the USA (standardized incidence rate for 2002 was 124.8/100,000)¹¹. But in comparison with the countries in the region (Croatia 24.5, Macedonia 27.5, Slovenia

30.9, Bosnia and Herzegovina 19.0 in 2002)¹¹ the incidence rate (per 100,000) in Belgrade is higher.

There has been long-term increase in the incidence of prostate cancer in many countries in the world like Australia¹², Denmark¹³, Germany¹⁴, the Netherlands¹⁵, Sweden¹⁶ and Canada¹⁷, and the explanation for this can be found in the increased use of prostate specific antigen (PSA) tests and transurethral resection^{18–23}. In Belgrade, the cancer incidence rates also increased during the observed period and it is not clear whether this increase was due to changes in prostate cancer risk factors, beginning of use of PSA test in its early detection, or in both. A

further rise can be expected in the upcoming years as the use of the sophisticated methods in the early detection of diseases, such as PSA test, becomes more widespread and frequent.

Our results are in accordance with the numerous epidemiological studies which have shown that prostate cancer incidence rates are rare in the age group 50 years and younger, rising very steeply with the increase of age^{10,21,24}. Like in the USA²¹, the rates in Belgrade were lower among men aged 80 years and over than among the age group 70–79. These patterns suggest that increases in rates related to improved diagnosis and screening were more pronounced among men aged 70–79 years compared with the oldest men.

Prostate cancer standardized mortality rates (per 100,000) in Belgrade population almost doubled during the period observed (from 9.1 in 1990 to 17.9 in 2006). The average standardized mortality rate of prostate cancer in Belgrade of 11.9 per 100,000, is similar to the rates in the region (Croatia 13.5, Macedonia 8.7, Slovenia 18.8, Bosnia and Herzegovina 10.8 per 100,000 in 2002)¹¹. In some Asian countries, like Singapore and Japan prostate cancer mortality rates have been increasing probably as a consequence of the adoption of unhealthy lifestyle from the West, so called »westernization«, including increased intake of animal fat, obesity, insulin resistance, and physical inactivity²⁵. On the contrary, in many developed countries like USA, Great Britain and Canada prostate cancer mortality rates have been decreasing²⁶. In Spain²⁷, the age-standardized mortality rates reached their peak value in 1996 and then declined at an annual rate of 2.7%. The tendency of prostate cancer mortality reduction from year 1996 was also observed in Chile²⁸. The main reason for this may be found in the increased usage of PSA screening and in better treatment of the early stage disease. The average annual increase of age-specific mortality rates in Belgrade over the 17-year time period was 5%.

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As it was mentioned previously PSA screening was introduced in a number of developed countries to detect prostate cancer at an early stage and to reduce prostate cancer mortality^{29,30}. Recently Bouchardy et al.³¹ performed joinpoint analysis to examine prostate cancer mortality trends in 38 countries. Their results suggest that PSA screening may be effective in reducing mortality from prostate cancer.

In Serbia there is still reluctance to use PSA as a sole indication for biopsy³². To our knowledge national prostate cancer screening programs do not exist in the South Eastern European countries. Opportunistic prostate cancer screening uptake is low in the Croatian adult population³³, and there is no evidences about its use in other countries in the region.

The increase of prostate cancer incidence and mortality, during the observed period in Belgrade population, indicate urgent need for Serbian health professionals to adopt existing cancer control and preventive measures, such as maintaining a healthy body weight, getting regular physical activity, and consuming a diet low in animal fat and high in fruits and vegetables¹. A national policy including PSA screening should be considered in the light of the newest findings. The most recent studies^{34,35} have highlighted that a shared decision making approach to PSA screening is highly appropriate, given the likelihood of harm due to overdiagnosis. However, both the PLCO (Prostate, Lung, Colorectal and Ovarian Cancer Screening)³⁴ and the ERSPC (European Randomized Study of Screening for prostate Cancer)³⁵ trials are ongoing and further updates should be expected.

Acknowledgements

This work was supported by the Ministry of Science and Technological Development of Serbia, contract No. 145084D, 2006–2010. Conflicts of interest none declared.

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J. Janković

*University of Belgrade, School of Medicine, Institute of Social Medicine, Dr Subotića 15, 11000 Belgrade, Serbia
e-mail: drjankojankovic@yahoo.com*

RASTUĆA INCIDENCIJA I SMRTNOST OD RAKA PROSTATE U POPULACIJI GRADA BEOGRADA

SAŽETAK

Cilj ovoga rada bio je analizirati epidemiološku situaciju raka prostate na populaciji grada Beograda. Podatci o oboljevanju prikupljeni su na Institutu za javno zdravlje Srbije za period 1999–2005. Podaci o smrtnosti za razdoblje 1990–2006 dobivenu su iz Republičkog zavoda za statistiku. Prosječna standardizirana incidencija i stopa smrtnosti od raka prostate su 33,57 i 11,86. Standardizirana incidencija raka prostate stalno se povećava od 29,34 na 100 000 u 1999. godina na 36,86 na 100 000 u 2005. godini. U promatranom razdoblju, stopa smrtnosti znatno se povećava u dobnim skupinama 50–59 ($y=2,77+0,42x$, $p=0,015$), 70–79 ($y=61,92+10,70x$, $p=0,000$) i 80+ ($y=183,08+19,99x$, $p=0,000$). Prosječna godišnja stopa promjene bila je najveća (7,2%) za dobnu skupinu 70–79, najmanja za najmlađu dobnu skupinu (≤ 50), i 5% za sve dobne skupine. Povećanost incidencije raka prostate i smrtnosti tijekom promatranog perioda u beogradskoj populaciji indicira urgentnu potrebu za srpske zdravstvene djelatnike da usvoje postojeće mjere kontrole raka i preventivne mjere zasnovane na dokazima. Također, nacionalna politika trebala bi razmotriti i screening specifičnog antigena (PSA) prostate.