

Changing trends in mortality of thyroid cancer in Belgrade population

B. Bukvic¹, S. Sipetic¹, N. Kalezic¹, A. Diklic¹, I. Paunovic¹, B. Kovacevic¹, A. Knezevic², V. Zivaljevic¹

¹Center for Endocrine Surgery, Institute for Endocrinology, Clinical Centre of Serbia, Belgrade; ²Institute for Epidemiology, School of Medicine, University of Belgrade, Belgrade, Serbia

Summary

Purpose: Thyroid cancer patients have favorable prognosis. The aim of this study was to analyze changing trends in mortality of thyroid cancer in Belgrade, during the period between 1987 and 2006.

Methods: Mortality data were obtained from the Belgrade Office of Statistics. Mortality rates per 100,000 inhabitants were standardized according to the Segi's world population. Regression analysis was used to estimate the thyroid cancer mortality trend for the period 1987-2006.

Results: The average percent of deaths due to thyroid cancer among all deaths was almost 2-fold higher in females (0.11%) than in males (0.6%), as well as among deaths due to all malignancies (females 0.54% and males 0.27%). During this 20-year period, the average standardized mortality

rate was 1.5 times higher in females (0.74 per 100.000) than in males (0.51 per 100.000). In the observed period, the mortality rates for thyroid cancer were increased (+0.40%) in women and decreased (-0.42%) in men. In particular, in the 60-69 years age group in males, a significant trend for mortality decrease of 3.5%/year was detected.

Conclusion: Belgrade is classified in the regions with low risk of dying due to thyroid malignancies. The increasing trend of thyroid cancer mortality in females during the examined period calls for improvement of methods for early detection of disease and differential diagnosis of thyroid nodules, so that surgical treatment of thyroid cancer could be performed at a stage when it is not life threatening.

Key words: epidemiology, mortality, standardized rates, thyroid cancer

Introduction

Thyroid cancer is relatively uncommon and constitutes 1% of all malignancies worldwide [1,2]. The annual incidence varies considerably in different countries. High incidence rates are known for Hawaii, Iceland, Austria and Finland, while relatively low incidence characterizes the UK, Netherlands and Denmark. Among endocrine gland cancers, thyroid tumors are the most frequent (90%) [1,2]. It is three times more common in females than in males [3-6]. Yearly, more than 20,000 new thyroid cancer cases are diagnosed in USA, while in Scotland about 100 cases per year are registered [1,6].

In recent decades, the incidence of thyroid cancer is increasing in some European countries, USA, Canada and Australia [5-9]. This increase has been accompanied by a change in the distribution of histological types with a particular increase in papillary thyroid cancer. The in-

cidence of follicular, medullary and anaplastic types has not changed significantly. It is not certain whether this increase of papillary cancer incidence is real or it is artificial due to improved diagnostic methods or changed histological criteria. Papillary cancer represents the most frequent histological thyroid cancer type [6,10,11].

Generally, it is perceived that thyroid cancer has favorable prognosis. Ten-year relative survival for papillary thyroid cancer is 98%, for follicular cancer 92%, for medullary cancer 80%, while for anaplastic thyroid cancer it is 13%. During recent years, 1-, 5- and 10-year relative survival for thyroid cancer patients has increased, a fact indicating that earlier diagnosis and adequate treatment improve the prognosis of patients with this malignancy [12-14].

The aim of the present study was to analyze changes in thyroid cancer mortality trends in Belgrade population during the last 20 years, from 1987 to 2006.

Methods

We used death certificates stating thyroid cancer diagnosis (International Classification of Disease VIII, IX and X edition, codes 193 and C73), cancer diagnosis (140-209 and C00-D48) and all diagnosis (codes 000-999 and A00-Z99). Mortality data were obtained from the Belgrade Office of Statistics for the 1987 through 2006 period. In the calculation of mortality rates, the denominator was average Belgrade population in two censuses (1991 and 2002). For data analyses, we used crude and standardized mortality rates per 100,000 inhabitants, which were calculated for 5 time periods (1987-90, 1991-94, 1995-98, 1999-2002 and 2003-06), because of the small numbers which would produce unstable rates for individual years. Mortality rates were standardized according to the Segi's world population. Regression analysis was used to estimate the thyroid cancer mortality trend for the period 1987-2006.

Results

Compared with all other malignancies, thyroid cancer was the cause of death in approximately 0.40% of the Belgrade population (0.54% in women and 0.27% in men) (Table 1). In the studied period, among all other causes of death in Belgrade, thyroid cancer occurred two times more often in women (0.11%) than in men (0.06%).

In Belgrade, from 1987 to 2006, the standardized thyroid cancer mortality rates for the whole population were in the range of 0.55-0.83 per 100,000 (average 0.64); in women they were 0.64-0.89 (average 0.74) and in men 0.35-0.77 (average 0.51), while the average crude mortality rates were 1.19 in women, 0.67 in men and 0.92 for men and women taken together (Table 2). Thyroid cancer was approximately the cause of death in

Table 2. Number of deaths, crude and standardized thyroid cancer mortality rates per 100,000 by gender in Belgrade, 1987-2006

Gender	Time period (years)	Number of deaths rates	Crude mortality	Standardized [†] rates
Males	1987-1990	17	0.57	0.54
	1991-1994	19	0.62	0.45
	1995-1998	18	0.59	0.46
	1999-2002	30	0.99	0.77
	2003-2006	17	0.57	0.35
Females	1987-2006	5	0.67	0.51
	1987-1990	25	0.79	0.64
	1991-1994	37	1.12	0.69
	1995-1998	37	1.12	0.77
	1999-2002	46	1.39	0.89
Combined	2003-2006	42	1.27	0.69
	1987-2006	9	1.19	0.74
	1987-1990	42	0.69	0.60
	1991-1994	56	0.88	0.59
	1995-1998	55	0.87	0.63
Combined	1999-2002	76	1.20	0.83
	2003-2006	59	0.94	0.55
	1987-2006	14	0.92	0.64

[†]standardized according to the Segi's world population [21]

14 people (9 women and 5 men) in Belgrade each year.

The average age-specific thyroid cancer mortality rates in Belgrade between 1987 and 2006 are shown in Figure 1. Age-specific mortality rates were extremely low in the <40 and 40-49 years age groups in both sexes and in general. For both sexes, the number of deaths due to thyroid cancer increased with age and the highest age-specific mortality rate was in the 80⁺ age group.

During the 20-year time period the thyroid cancer mortality trend was almost stable ($y=0.629+0.001x$) (Table 3). In women, a slight increase was noticed ($y=0.731+0.003x$), while in men the trend was decreasing ($y=0.541+0.002x$). Discrete changes in thyroid cancer mortality trends were not significant. During the study period an increasing trend in mortality of thyroid

Table 1. Average percentage part of deaths due to thyroid cancer among all deaths as well as among deaths due to all malignancies, by gender, Belgrade, 1987-2006

Time period (years)	Average percentage part of deaths due to thyroid cancer among deaths due to all malignancies			Average percentage part of deaths due to thyroid cancer among all deaths		
	Males (%)	Females (%)	Combined (%)	Males (%)	Females (%)	Combined (%)
1987-1990	0.28	0.49	0.38	0.07	0.11	0.09
1991-1994	0.28	0.61	0.43	0.06	0.12	0.09
1995-1998	0.23	0.55	0.37	0.05	0.11	0.08
1999-2002	0.34	0.61	0.46	0.07	0.12	0.10
2003-2006	0.23	0.42	0.32	0.04	0.11	0.07
1987-2006	0.27	0.54	0.39	0.06	0.11	0.09

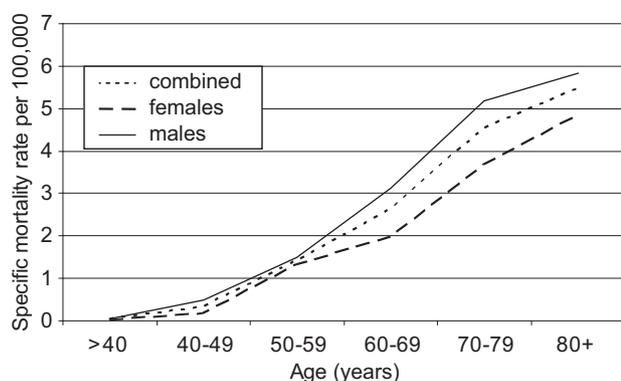


Figure 1. Average age-specific thyroid cancer mortality rate in Belgrade, 1987-2006.

cancer was noticed in the age groups 50-59, 70-79 and over 80 years in both sexes and in general (Table 3). In males it was increasing also in the 40-49 years age group, with average annual percent increase of 3.4%. Mortality trend was decreasing in all other age groups. Statistically significant decrease ($p < 0.05$) (3.5% per year on average) was detected in males in the 60-69 years age group.

Table 3. Average percentage change of trend in mortality of thyroid cancer by gender, average number of deaths and age-specific mortality rate for Belgrade, 1987-2006

Gender	Linear trend equation	Average annual changing trend in mortality	Average annual number of deaths	Average age-specific mortality rate/100,000
Males (years)				
0-39	$y=0.051-0.003x$	-4.89	0.10	0.02
40-49	$y=0.128+0.005x$	+3.37	0.20	0.18
50-59	$y=1.171+0.015x$	+1.38	1.35	1.32
60-69	$y^*=3.165-0.113x$	-3.51*	1.50	1.98
70-79	$y=3.005+0.066x$	+2.03	1.45	3.69
80+	$y=3.296+0.148x$	+4.07	0.45	4.85
Total	$y=0.541-0.002x$	-0.42	5.05	
Females (years)				
0-39	$y=0.081-0.003x$	-3.76	0.20	0.05
40-49	$y=0.606-0.011x$	-1.79	0.60	0.49
50-59	$y=1.445+0.005x$	+0.35	1.70	1.50
60-69	$y=3.366-0.019x$	-0.54	3.00	3.17
70-79	$y=4.386+0.075x$	+1.60	2.90	5.17
80+	$y=2.690+0.299x$	+9.51	0.95	5.83
Total	$y=7.31+0.003x$	+0.40	9.35	
Combined (years)				
0-39	$y=0.067-0.003x$	-4.30	0.30	0.04
40-49	$y=0.379-0.004x$	-0.91	0.80	0.34
50-59	$y=1.311+0.010x$	+0.74	3.05	1.42
60-69	$y=3.273-0.062x$	-1.83	4.50	2.63
70-79	$y=3.805+0.072x$	+1.76	4.35	4.56
80+	$y=2.950+0.242x$	+7.19	1.40	5.49
Total	$y=0.629+0.001x$	+0.15	14.40	

* $p < 0.05$

Discussion

Mortality of thyroid cancer is very low, but it is still the highest among all other endocrine malignancies if ovarian cancer is excluded [15]. In USA, 1,300 deaths are caused by thyroid cancer [4].

In this study death was more frequent in females (0.54%) than in males (0.27%), a finding similar to the results published by Katagawa et al. for Japan (females 0.76%, and males 0.23%) [16].

In USA thyroid cancer mortality did not change significantly in a 30-year period (1973-2002) and it was 0.5/100,000 per year on average. According to our results, the average standardized thyroid cancer mortality rate was 0.64/100,000 per year, 1.5 times more frequent in females than in males. Also Esik et al. [17] found 3-fold higher thyroid cancer mortality rates in females than in males (1.8: 0.6/100,000), and according to Katagawa et al. [16] that ratio was 2.16: 1.

The highest number of deaths due to thyroid cancer was noticed in the 60-69, 70-79 and 80+ years age groups in Belgrade. Coeli et al. from Brazil [13] published similar results. Age-specific mortality rates are low in younger age groups and highest in older people [6,16]. The commonest occurrence of anaplastic thyroid cancer in older age groups may have an influence on this mortality distribution. Anaplastic cancer represents just 1-2% of all thyroid gland cancers, but causes almost half of the deaths from thyroid cancer [18,19].

In the present study, a slight increase in thyroid cancer mortality was detected in females (+0.40% yearly) and combined (+0.14% yearly), while in males it was decreasing (-0.42% yearly). Plesko et al. [9] found increasing mortality of thyroid cancer in Slovakia between 1968 and 2000. Other previous published studies indicated steady or decreasing trend in mortality of thyroid cancer in both sexes. Coeli et al. in Brazil [13] found a fall in mortality of 21% in males (from 0.28 to 0.22 per 100,000) and 17% in females (from 0.51 to 0.42 per 100,000) during 1980-1999. Casella et al. [8] showed that in Italy, between 1986 and 1997, despite the increase in incidence of thyroid cancer, there has been a fall in mortality of 3.4% in males, 4.6% in females and 4% in general. Also Sprongel et al. [17] published that in Denmark mortality is falling despite increasing incidence. Reynolds et al. [6] reported that in Scotland, despite increasing incidence during 1960-2002 in both sexes, mortality was falling in both females (from 1.05 to 0.28 per 100,000) and males (from 0.73 to 0.34 per 100,000). According to Hrafnkelsson et al. [12] during a 30-year period (1955-1984), mortality of thyroid cancer in Iceland did not change significantly.

Increasing incidence might be real due to risk

factors such as radiation exposure, but a possible significant factor may have also been an artificial increase in incidence due to increased diagnostic accuracy or changed histological criteria. Steady or falling mortality, despite increasing incidence, might reflect increased detection of subclinical disease and less aggressive tumors as well as adequate and better treatments of these patients [6].

Standardized thyroid cancer mortality rate was low in Belgrade and classified this region in the regions with low risk of dying of thyroid cancer. Considering that there was no decreasing mortality of thyroid cancer in females, differential diagnosis of thyroid nodules should be improved so that surgical treatment of well differentiated tumors could be performed at a stage when they are not life threatening.

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