

RESEARCH ARTICLE

Comparison of Male and Female Breast Cancer Incidence and Mortality Trends in Central Serbia

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Abstract

Background: To compare breast cancer incidence and mortality trends in Central Serbia between males and females in the period 1999-2009. **Materials and Methods:** In this descriptive study, mortality data were obtained from the National Statistics Institute and morbidity data were derived from Institute of Public Health of Serbia for the period of interest. **Results:** Breast cancer is a leading cancer in the female population of Central Serbia, whereas in male population it is not on the list of 10 leading localizations, concerning both incidence as well as mortality. In the period 1999-2009 the average standardized incidence rates of breast cancer were 60.5/100,000 in women and 1.4/100,000 in men, while average standardized mortality rates were 20.4/100,000 and 0.4/100,000. The average standardized incidence and mortality rates were about 45 times higher in females than males. Male breast cancer comprises approximately 2.1% of all breast cancer cases. The average age-specific mortality and incidence rates increased with age in both sexes. In the observed period standardized mortality rates of breast cancer increased significantly only in men ($y=0.320+0.021x$, $p=0.044$). **Conclusions:** The increase of breast cancer incidence in both sexes and mortality in men, indicate an urgent need for Serbian health professionals to apply existing cancer control and preventive measures. Male breast cancer is more present than in other world regions, with an outstanding increase of mortality, which demands a timely identification (screening) and adequate treatment. A national policy including mammography should be considered in the light of the newest findings.

Keywords: Breast cancer - incidence - mortality - trend - descriptive epidemiologic study

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Introduction

Breast cancer is the most commonly diagnosed cancer in women worldwide. It is estimated that there were 1.4 million of new cases in 2008, that comprises 23% of all cancers in female population and 10.9% of all cancers which ranks it on the second place, just behind lung cancer (1.6 million of new cases comprises 12.7% of all cancers) (Ferlay et al., 2010: <http://globocan.iarc.fr/>). The highest rates of breast cancer incidence are noted in North America, North and West Europe and Australia (American Cancer Society, 2011). Starting with 1999, the rates of breast cancer incidence have decreased in The USA, Canada and in countries of West and North Europe, whereas they have risen in many Eastern European, African, Latin American and Asian countries (Jemal et al., 2010).

It is estimated that 458,000 people died of breast cancer in the world in 2008 (American Cancer Society, 2011). In the overall structure of dying from malign tumors in the world, breast cancer is on the fifth place behind lung, gastric, liver cancer and colorectal carcinoma, but it is first

ranked when only female population is being observed (Ferlay et al., 2010: <http://globocan.iarc.fr/>). Breast cancer mortality rates are stable or decreasing in the countries of North America and Europe, but they are rising in Asian countries, such as Japan or Korea (Jemal et al., 2010). Mortality rates are significantly lower in comparison with the rates of incidence because of early detection through mammography and improved treatment, especially in the developed countries, such as the USA and European countries (Althuis et al., 2005; Sant et al., 2006; Ferlay et al., 2010).

Cancer of male breast is uncommon (Giordano et al., 2002; Weiss et al., 2005) and comprises approximately 1% of all breast cancer cases, and about 0.1% of cancer mortality in male population in The USA (Weiss et al., 2005). Although the epidemiologic literature on female breast cancer is extensive, little is known about the epidemiology and etiology of male breast cancer.

The aim of this descriptive epidemiological study was to compare breast cancer incidence and mortality trends in Central Serbia between male and female in the period 1999-2009.

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Materials and Methods

In this descriptive study, the source of mortality data (1999-2009) related to the male and female breast cancer (codes C50 according to the International Classification of Diseases, ICD 10th revision) and all malignant tumors (codes C00-C97, ICD 10th revision) were obtained from The National Statistics Institute for the period 1999-2009. Morbidity data were obtained from Institute of Public Health of Serbia for the period 1999-2009. As denominator for rates, male and female population from the results of census for 2002 was used.

Mortality and morbidity rates per 100,000 population were standardized according to the WHO world population. To estimate the breast cancer incidence and mortality trend we performed regression analysis using SPSS version 17.0 for Windows (SpSS inc. Chicago, IL, USA).

Results

Breast cancer is a leading cancer in female population of Central Serbia (2,805,021 inhabitants), whereas in male population (2,660,988 inhabitants) it is not on the list of 10 leading localizations, concerning both incidence as well as mortality. During the period 1999-2009 the average number of breast cancer incidence cases was 61 for male and 2,800 for female, which accounted for 0.5% and 124.4% of all cancer deaths (Table 1). In the same period the average number of breast cancer deaths was 23 for male and 1068 for female, which accounted for 0.3% and 18.9% of all cancer deaths. The average number of breast cancer incidence cases for male represented 0.5% of all cancer cases and 124.4% for female. The average standardized (world) incidence rates of breast cancer were 60.5/100,000 in women and 1.4/100,000 in men, while average mortality rates were 20.4/100,000 and 0.4/100,000. The average standardized incidence and mortality rates were about 45 times higher in female than male. Male breast cancer comprises approximately 2.1% of all breast cancer cases.

Breast cancer incidence rates also increased with

Table 1. Standardized* Incidence and Mortality Rates (per 100,000 population) of Breast Cancer in Male and Female Population of Central Serbia, 1999-2009

Year	Male				Female			
	No. of cases	Incidence rates*/100	No. of deaths	Mortality rates*/100	No. of cases	Incidence rates*/100	No. of deaths	Mortality rates*/100
1999	47	1.1	15	0.3	2387	71.5	989	23
2000	44	1	16	0.3	2715	61.1	999	20.2
2001	83	2.1	16	0.3	2837	60.2	1031	20.3
2002	56	1.2	25	0.5	2912	59.4	981	18.7
2003	59	1.4	20	0.4	2846	56.1	1085	20.9
2004	68	1.6	27	0.5	2690	57.9	1081	20.5
2005	60	1.3	27	0.6	2617	60.4	1115	20.9
2006	56	1.2	30	0.6	2784	64.1	1079	19.1
2007	98	1.9	26	0.5	2835	62	1120	20
2008	51	1	24	0.5	2869	60.2	1121	20.3
2009	54	1.1	24	0.4	3307	58.3	1145	20.3
Average	61	1.4	23	0.4	2800	60.5	1068	20.4

*Standardized according to world population (WHO)

Table 2. Average Age-Specific Incidence Rates (per 100,000) and Incidence Trend for Breast Cancer in Male and Female Population of Central Serbia, 1999-2009

Age groups	Average age-specific incidence rates/100,000	Equation of the linear trend	p value
Male <40	0.1	y=0.081-0.001x	p=1.000
Male 40-49	1.8	y=2.384-0.104x	p=0.131
Male 50-59	3.7	y=4.152-0.080x	p=0.457
Male 60-69	6.6	y=4.925+0.271x	p=0.414
Male 70+	8.2	y=6.363+0.306x	p=0.164
Female <40	10.4	y=2.132-0.060x	p=0.197
Female 40-49	130.7	y=10.565+0.061x	p=0.653
Female 50-59	195.5	y=133.868-0.527x	p=0.612
Female 60-69	216.6	y=176.219+6.733x	p=0.004
Female 70+	181.7	y=166.351+2.565x	p=0.069

Table 3. Average Age-Specific Incidence Rates (per 100,000) and Mortality Trend for Breast Cancer in Male and Female Population of Central Serbia, 1999-2009

Age groups	Average age-specific incidence rates/100,000	Equation of the linear trend	p value
Male <40	0.01	y=0.028-0.003x	p=0.373
Male 40-49	0.4	y=0.594-0.038x	p=0.231
Male 50-59	1	y=0.754+0.044x	p=0.462
Male 60-69	2.3	y=1.101+0.196x	p=0.044
Male 70+	4.2	y=3.211+0.164x	p=0.070
Female <40	1.8	y=2.132-0.060x	p=0.197
Female 40-49	29.3	y=36.050-1.128x	p=0.004
Female 50-59	63.5	y=66.990-0.585x	p=0.141
Female 60-69	82.6	y=72.515+1.678x	p=0.001
Female 70+	111.9	y=91.436+3.411x	p=0.001

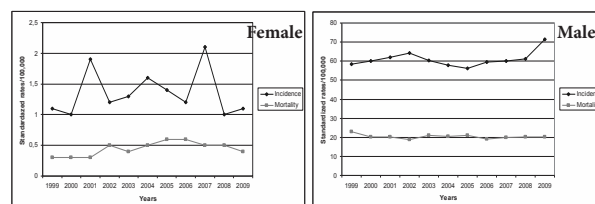


Figure 1. Standardized* Incidence and Mortality (per 100,000) of Breast Cancer for Male and Female Population of Central Serbia, 1999-2009

age (Table 2). The average age-specific incidence rate was the highest in the age group 60-69 years in female (216.6/100,000) and in the age group 70 and more years in men (8.2/100,000), but in both sexes the lowest rate was among people less than 40 years old (0.1/100,000 for men and 10.4/100,000 for women). Difference in average age-specific incidence rates between women and men was much higher in younger (under 40 years about 130 times higher in women) than older age groups (the age above 70 years about 22 times higher in women). In the observed period, the incidence rates significantly increased only in female in the age group 60-69 ($y=176.219+6.733x$, $p=0.004$).

The average age-specific mortality rates increased with age in both sexes (Table 3). In both sexes the highest mortality rate was in people older than 69 and the lowest among people less than 40 years old. Difference in average age-specific mortality rates between women and men was

much higher in younger (under 40 years about 148 times higher in women) than older age groups (the age above 70 years about 26 times higher in women). During the 11-year period, the mortality rates significantly increased in the age group 60-69 ($y=1.101+0.196x$, $p=0.044$) in female and in the age groups 60-69 ($y=72.515+1.678x$, $p=0.001$) and older than 70 ($y=91.436+3.411x$, $p=0.001$) in men. Significantly decreased of mortality rates was observed only in female population aged 40-49 years ($y=36.050-1.128x$, $p=0.004$).

In the period 1999-2009 in Central Serbia the standardized incidence rates increased in both sexes (women: $y=58.264+0.459x$; $p=0.258$; and men: $y=1.316+0.006x$; $p=0.867$), but the increase was not statistically significant (Figure 1). When dying of breast cancer in Central Serbia was observed, a slight linear decreased of mortality rates was noticed in female ($y=21.102-0.120x$; $p=0.274$) and significant increased in male ($y=0.320+0.021x$, $p=0.044$).

Discussion

On the international level, female breast cancer is a significant public health problem. Wide variation in its incidence persists among countries. Average standardized incidence rate in Central Serbia is 60.5/100,000 which is similar to the other European countries with the low incidence rate. Low rates of breast cancer in Europe are reported in the Russian Federation (67.3/100,000), Slovakia (69.7/100,000), Romania (61.2/100,000) and Lettonia (64.8/100,000) (Ferlay et al., 2006). The highest rates are registered in Western Europe (Belgium 137.8/100,000, France 127.4/100,000, Switzerland 126.5/100,000, Italy) and in Australia with average values of 60-100/100,000 inhabitants, but the lowest (between 18-30/100,000) in India, Thailand, China and Africa (Curado, 2011).

Incidence rates of breast cancer in men are much lower than those in women (Hill et al, 2005; Hill and Doyon, 2007). The highest incidence rates of male breast cancer are recorded in Europe and America, and the lowest in Asia (Weiss et al., 2005). In Central Serbia average standardized incidence rate of male breast cancer is 1.35/100,000 and it is 45 times lower than the rate in female.

Male breast cancer comprises approximately 2.1% of all breast cancer cases in Central Serbia and this percentage is higher than it is in The USA, Canada and some other European countries (about 1%) (Hill et al., 2005; Hill and Doyon, 2007; American Cancer Society, 2011). According to Thailand population-based cancer registry in the period 2002-2011, a majority of the breast cancer cases (7,711) were females (99.3%), giving a male:female ratio of 0.007:1 (Kotepui and Chupeerach, 2013). In sub-Saharan Africa male breast cancer accounts for 15% of newly diagnosed breast cancer (Carlsson et al., 1981). This very high percent is attributed to possible hyperestrogenism as a result of liver damage from endemic infectious diseases

In the period 1999-2009 in Central Serbia the standardized incidence rates increased in both sexes. In the period 1980-1990 in many developed countries incidence

rates of female breast cancer increased by around 30% due to changes in reproductive behavior (earlier menarche, later menopause, delivery in older age, etc.) and due to introduction of screening programme (Althuis et al., 2005). However, in the period of 1996-2006 in the USA incidence rates decreased due to reduction in the use of combined hormone therapy in menopause (Ravdin et al., 2007). Similar tendency of decreasing incidence is noticed in other countries such as: Great Britain, France and Australia (American Cancer Society, 2011). The Austrian study, which followed incidence and mortality of female breast cancer in the period 1970-2006, shows a slight decreasing of incidence, but that difference was not statistically significant (Oberaigner et al., 2010). The incidence rates of breast cancer have been increasing in many African and Asian countries, including Japan (Parkin et al., 2005; Ito et al., 2009). Reasons for this increase are not completely explained, but it is considered that some of them are changes in reproductive behavior, obesity, physical inactivity, consumption of calorie-dense food and because of lack of or limited access to screening programmes (Colditz et al., 2006; Sripung et al., 2006). A most recent study revealed that women who have lifetime occupation in an industrial setting may have higher risk to develop breast cancer (Ekpanyaskul et al., 2010). In migrate studies, women who migrate from low to high risk countries breast cancer rates typically increase rapidly to reach those of the local population, and this is associated with a strong effect of lifestyle or environmental factors (Ziegler et al., 1993; Deapen et al., 2002). Also incidence rates of female breast cancer are lower for more deprived women and there is a clear trend of decreasing rates from least to most deprived women (Rowan, 2007).

The National Cancer Institute Surveillance, Epidemiology, and End Results (SEER) Program noted that the incidence of male breast cancer increased by 26% from 1973-1998 (Nahleh and Girmius, 2006). In The USA in the period 1975-2006 incidence of male breast cancer have been increasing, reasons for that are unknown (American Cancer Society, 2011). But in the United Kingdom breast cancer incidence rates for men have changed very little since the late 1970s (Office for National Statistics, 2011). Usually men with breast cancer visit their doctors in the later stages of the disease, therefore prognosis is worse, and mammography is not recommended because the disease is rare (American Cancer Society, 2011).

The incidence rates of breast cancer increase with age in Serbia, as it is in the most countries (American Cancer Society, 2011). In Central Serbia cases of breast cancer are more frequent registered among younger population (in female 54% of new cases of breast cancer above 40 years, but in male 80%). But in the USA, 95% of new cases of breast cancer above 40 years occurred in women (American Cancer Society, 2011). In Thailand 14.6% of all breast cancer cases were under the age of 40 and 85.4% of cases were age of 40 and older (Ekpanyaskul et al., 2010). In the UK between 2007 and 2009, around 65% of male breast cancer cases were in men aged 65 years and over. In the USA the lowest rates of incidence are registered in the age group 20-24 years and the highest in the age

group 75-79 years (421/100,000) (American Cancer Society, 2011). The situation is similar in Central Serbia (the highest incidence rates of female breast cancer are registered in the age group 60-69 years and in men above 70 years and the lowest in the age less than 40 years).

An average standardized mortality rate of female breast cancer in Central Serbia is 20.4/100,000 which classifies our country as one of those countries with the low mortality rate in Europe. Mortality rates for female breast cancer in Europe vary from 19.2/100,000 in Spain and Portugal, to 34.5/100,000 in Denmark, 33.5/100,000 in Belgium and 30.3/100,000 in Hungary (American Cancer Society, 2011). Changes in female breast cancer mortality in the period 1989-2006 varied widely between 30 European countries (Autier et al., 2010). England and Wales, Northern Ireland, and Scotland had the largest decreases of 35%, 29%, and 30%, respectively, but in France, Finland, and Sweden, mortality decreased by 11%, 12%, and 16%, respectively. In the period 1989-2006, in central European countries mortality did not decline or even increased (Autier et al., 2010).

Mortality rates of female breast cancer in the last 25 years have been stable or have decreased in the countries of North America and Europe (Ravdin et al., 2007). Decrease of mortality is the result of introducing the efficient screening programmes and appropriate therapy (Althuis et al., 2005). However, in some Asian countries, such as Japan, Korea, Taiwan, increase of dying from female breast cancer is noticed, most possibly influenced by changes in lifestyle, which are the consequence of adopting lifestyle from Western countries and prolonged introduction of efficient screening programmes (Ito et al., 2009). Also mammography screening is cost-effective in most of Western countries, but it is not in Asian countries. The reason for this result may be the issues of incidence rate or racial characteristics, such as dense breast tissue (Yoo et al., 2013). In Central Serbia in the eleven-year-old period there was a slight linear decrease of mortality from breast cancer in women. Significant decrease of mortality in women was noticed in the age group 40-49 years and increased in the age group 60-69 and above 70.

In male population of Central Serbia there was a significant increase of mortality in the period of 1999-2009. In UK, and in other developed countries, breast cancer mortality rates for men have been consistently very low, fluctuating around 0.3-0.4 per 100,000 men between the 1970s and the early 1990s and then slightly falling (<http://www.ons.gov.uk/ons/search/index.html?newquery=cancer+registrations>). In the UK between 2008 and 2010, an average of around 92% of male breast cancer deaths were in men aged 50 years and over. Similarly, in Central Serbia 98% of male breast cancer deaths noted in men aged above 40.

In conclusion, the incidence rate of breast cancer in Central Serbia is similar to the other European countries with the low incidence rate. The increase of breast cancer incidence in both sexes and mortality in men, 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 vegetables (American Cancer Society, 2011).

Male breast cancer is more present in Central Serbia than in the other world's regions, with an outstanding increase of mortality, which demands a timely identification (screening) and adequate treatment. Breast cancer in men is an under-researched area in comparison to a range of other cancers and to breast cancer in female. The risk of breast cancer for most men is low, but neither individual men nor their doctors regularly examine men's breasts, so men will continue to present with more advanced cancers than women. Considerable work (especially education) is necessary to raise the profile of breast cancer in men among general population. Future prospective studies are needed to analyse the experiences of male through every stage of disease (diagnosis, treatment and care).

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