

Lung cancer trends in Vojvodina

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Summary

Purpose: Lung cancer in Vojvodina is the leading form of cancer as well as the leading cause of cancer deaths in men. It ranks 2nd in cancer deaths in women in Vojvodina. The goal of this report was to study lung cancer in Vojvodina in the period of 1989-1998 by analysing the crude and age-standardized incidence and mortality rates in the male and female population.

Materials and methods: Data used for analyses were provided by the Cancer Registry of Vojvodina from the Institute of Oncology Sremska Kamenica. Data included number of cases and deaths of lung cancer, by age groups in 5 year intervals and by municipalities for male and female population separately. Descriptive epidemiological method was used.

Results: An increasing tendency of linear trend of

lung cancer incidence in males based on crude and age-standardized incidence rates was found. The trend of lung cancer incidence in males was highly intense and extremely unfavorable. In females, an increasing tendency of linear trend of lung cancer incidence based on crude and age-standardized incidence rates was also found; this was not as intense but it was unfavorable. An increasing tendency of linear trend of lung cancer mortality based on crude and age-standardized mortality rates in both sexes was registered, which was not intense, but it was unfavorable.

Conclusion: Vojvodina is a region with high incidence and mortality rates in comparison to neighboring and European Union (EU) countries both in male and female population.

Key words: epidemiology, incidence, lung cancer, mortality, Vojvodina

Introduction

There are differences in lung cancer incidence and mortality among developed countries as well as in its distribution among all sites of malignancies. Lung cancer is the leading cancer in males in the EU, while in females it ranks 3rd [1]. Lung cancer in the United States of America (USA) is the leading cause of all cancer deaths in females, while the number of lung cancer deaths in males is decreasing since 1996 [2-4].

Lung cancer in Vojvodina is the leading cancer among men with malignant diseases as well as in cancer deaths. It ranks 5th in women with malignant diseases and 2nd in cancer deaths.

Our goal was to study lung cancer in Vojvodina by analyzing the crude and age-standardized incidence and mortality rates of this disease in the male and female population.

Materials and methods

Data used for analyses were provided by the Cancer Registry of Vojvodina from the Institute of Oncology Sremska Kamenica and included number of cases and deaths of lung cancer, by age groups in 5-year intervals (Table 1) and by municipalities for male and female population separately during the period 1989-1998.

Descriptive epidemiological method was used. We used basic statistical indicators, crude and age-standardized incidence and mortality rates. Age-standard-

Received 13-12-2005; Accepted 04-01-2006

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Table 1. Standard population of Vojvodina

Age group (years)	Number of inhabitants
0-4	5873,95
5-9	6560,00
10-14	6889,01
15-19	6564,80
20-24	6224,55
25-29	6748,99
30-34	7407,10
35-39	8259,43
40-44	7858,34
45-49	5559,39
50-54	6742,09
55-59	6944,63
60-64	6472,10
65-69	4964,59
70-74	2576,69
75-79	2296,65
80-84	1409,37
85+	648,32
Total	100 000,00

ized incidence and mortality rates were calculated by direct standardization in relation to standard population of Vojvodina and World standard population.

Incidence and mortality trends were described in general for male and female population for the entire observation period, based on crude and age-standardized incidence and mortality rates. Statistical significance was checked on the basis of correlation coefficient (r) by the use of table values for probability (p) on the level of 0.05 and 0.01 for certain degree of freedom.

Data from vital statistics from the 1991 census were provided and used for calculations. Results were analysed by computer and shown by graphs.

Results

1. Incidence and mortality rates of lung cancer in males and females in Vojvodina from 1989 to 1998.

During the entire period of observation, a total of 13,394 cases of lung cancer were registered. A total of 11,212 (83.71%) cases were in males and 2,182 (16.29%) of cases occurred in females. The crude incidence rate for the period of observation in males was 114.31/100,000, while the age-standardized incidence

rate in males was 102.44/100,000. The crude incidence rate for the period of observation in females was 21.12/100,000, while the age-standardized incidence rate was 15.95/100,000.

During the entire period of observation, a total of 11,131 deaths of lung cancer were registered. A total of 9,376 (84.23%) deaths were in males and 1,755 (15.77%) deaths occurred in females. The crude mortality rate for the period of observation in males was 95.60/100,000, while the age-standardized mortality rate in males was 86.33/100,000. The crude mortality rate for the period of observation in females was 16.99/100,000, while the age-standardized mortality rate was 12.66/100,000.

2. Trends of lung cancer incidence rates in male and female population of Vojvodina from 1989 to 1998.

The annually registered number of lung cancer cases varied. The highest number of cases in males was registered in 1996 (1,317) and the lowest number was at the beginning of the period of observation. The highest number of cases in females was registered in 1994 (262) and the lowest was, as in males, at the beginning of the period of observation.

An increasing tendency of linear trend of lung cancer incidence in males based on crude and age-standardized incidence rates was registered. During the period of observation the trend of lung cancer incidence in males was highly intense and extremely unfavorable (Figure 1).

$$Y_{asitr} = 4.3767X + 78.4320; r=0.901; p < 0.01$$

$$Y_{cir} = 3.0997X + 97.2743; r=0.832; p < 0.01$$

There was an increasing tendency of linear trend of lung cancer incidence in females based on crude incidence rates which was not intense but it was unfavorable. During the period of observation the trend of lung cancer incidence based on age-standardized incidence rates in females was intense and also unfavorable (Figure 1).

$$Y_{asitr} = 0.5624X + 13.0560; r=0.656; p < 0.05$$

$$Y_{cir} = 0.3520X + 19.1839; r=0.444; p > 0.05$$

3. Trends of lung cancer mortality rates in male and female population of Vojvodina from 1989 to 1998.

The annually registered lung cancer deaths varied. The highest number of deaths in males was registered in 1997 (1,063) and the lowest number was at the beginning of the period of observation. The highest number of deaths in females was registered in 1992 and 1994 (204) and the lowest number was, as in males, at the beginning of the period of observation, although

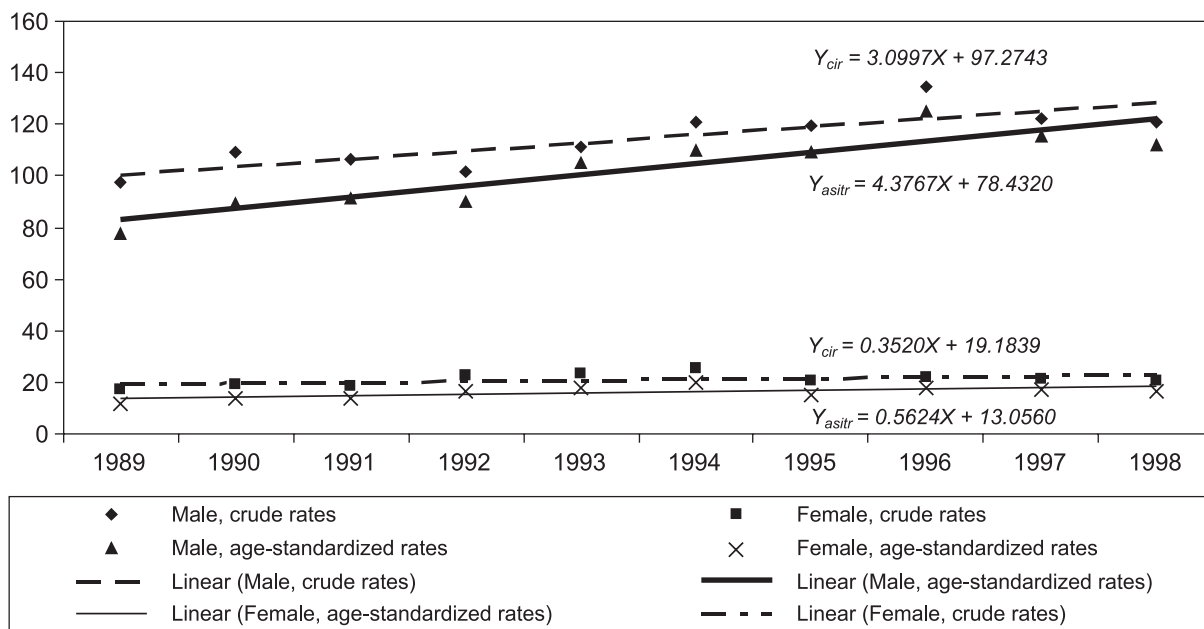


Figure 1. Lung cancer incidence trend in males and females in Vojvodina in the period 1989-1998.

differences in females were smaller between years than those in males.

An increasing tendency of linear trend of lung cancer mortality in males based on crude and age-standardized mortality rates for the period of observation was registered (Figure 2).

$$Y_{asmrt} = 3.0150X + 69.5213; r=0.820; p<0.01$$

$$Y_{cmr} = 1.6772X + 86.3777; r=0.631; p>0.05$$

There was an increasing tendency of linear trend of lung cancer mortality in females based on crude and age-standardized mortality rates for the period of observation (Figure 2).

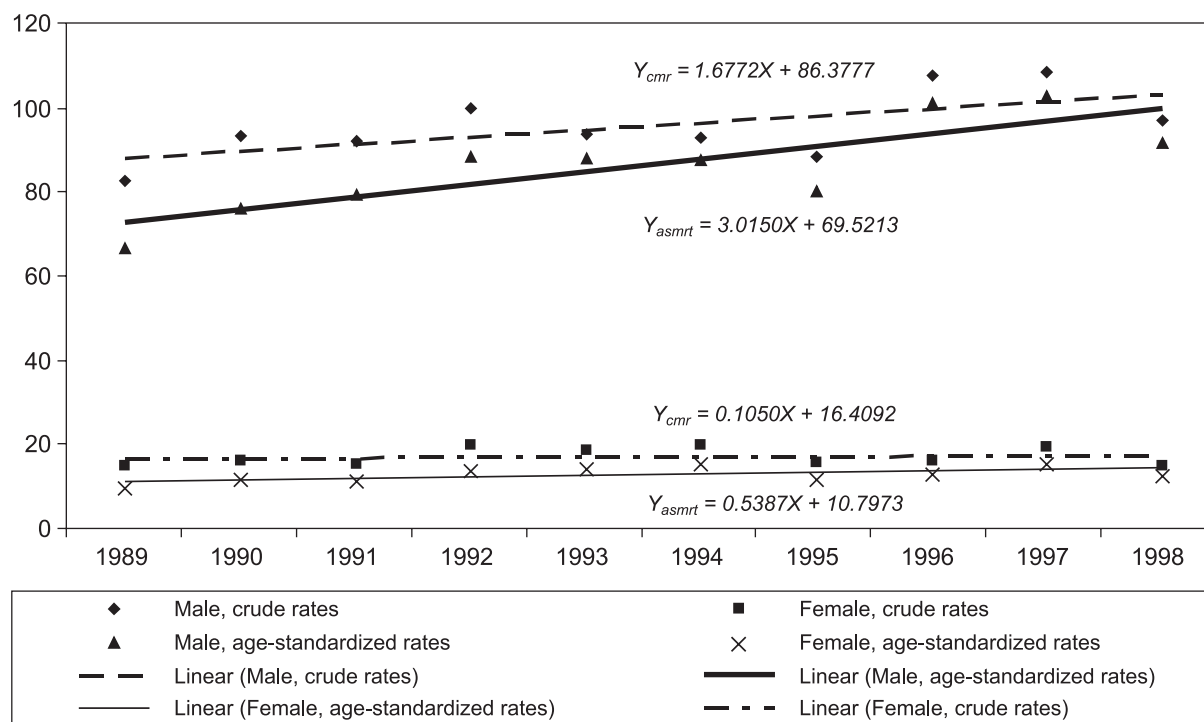


Figure 2. Lung cancer mortality trend in males and females in Vojvodina in the period 1989-1998.

$$Y_{asmrt} = 0.5387X + 10.7973; r=0.557; p>0.05$$

$$Y_{cmr} = 0.1050X + 16.4092; r=0.155; p>0.05$$

Lung cancer trends of mortality in both sexes were not intense, however they were unfavorable.

Discussion

The observational study in females from 1985 till 1997 showed an annual average number of lung cancer cases of 202,6 and an annual average number of lung cancer deaths of 166 [5]. In males, an annual average number of lung cancer cases of 1,050, and an annual average number of lung cancer deaths of 900 were registered [6]. Our study shows higher numbers of the same indicators in males and females.

Higher incidence rates in females than in males in the EU were registered in the United Kingdom (UK), Denmark and Ireland, while higher rates in males than in females were registered in Belgium and the Netherlands. Incidence and mortality rates in females in the USA are higher than in females in the EU. Incidence rates in males in the USA are on the level of males in the EU and mortality rates are lower than in males in the EU [1,7]. According to the GLOBOCAN 2000 data, based on age-standardized incidence rate, Yugoslavian males ranked 3rd among neighboring countries after Croatia and Bosnia & Herzegovina. Yugoslavian females were on the first place by age-standardized incidence rate, ahead of Bosnia & Herzegovina and Albania. Based on age-standardized mortality rate Yugoslavian males were on the 6th place and females were on the 5th place. The highest age-standardized mortality rate in males is in Croatia and in females in Slovenia [8].

Incidence and mortality rates in males and females are higher in our population than those in the EU. In relation to results of previous studies we registered an important increase in lung cancer incidence and mortality rates both in males and females, a fact indicating failure in primary prevention of lung cancer.

Epidemiological data of lung cancer in the EU in the period 1970 -1990 is characterized by decreasing of lung cancer mortality trend in males and clear increasing of lung cancer mortality trend in females in non-Mediterranean countries. All Mediterranean countries, except Italy, are in the phase of the beginning of decrease in lung cancer mortality trend in males. In Italy lung cancer mortality trend in males is decreasing steadily. Lung cancer mortality trend in Italian females is increasing and has a major influence on maintaining lung cancer as leading cause of death in Italy. Lung cancer mortality trend in females in all other Mediter-

anean countries is increasing steadily, except Spain and Greece where mortality rates are increasing at a slower rate [9,10].

Increase in lung cancer incidence trend in males has been stopped in some countries of the EU, like Belgium and the Netherlands, while in the UK there is a decrease in lung cancer incidence trend in several generations. There is evidence of beginning of decrease of lung cancer incidence trend in females in the UK as well. On the contrary, there is an increasing lung cancer incidence trend in males and females in France, Spain and Portugal [1]. In countries of Northern Europe (Denmark, Finland) a decrease in lung cancer incidence trend in males has been registered while in females it is increasing [11-13]. A study from Switzerland showed increase in lung cancer incidence trend in males based on the observation of incidence rates in two separate 10-year periods, while the incidence rate of all malignant neoplasms was decreasing during the two periods of observation [14]. Incidence rates in countries of Southern and Eastern Europe in males and females are increasing, indicating that the lung cancer epidemic is not over yet. Incidence and mortality rates in males in Eastern Europe are on the same levels as those in Belgium and the Netherlands, while in females they are on the levels of Spain and Greece [8].

In the USA, a decrease in lung cancer mortality trend in males is registered, that has started in 1996, but a continuous increase in lung cancer mortality trend in females is registered as well [3]. In some states of the USA an increase in lung cancer incidence trend in females is registered, while in males a decrease or a trend for stabilization of lung cancer incidence are seen [15-17]. In Alberta, Canada, there is an increasing lung cancer incidence trend in females, while in males the incidence is decreasing since mid-1980s. Mortality rates are going to a similar direction [18].

Further increase in lung cancer incidence and mortality rates is expected both in males and females in Brazil despite the reduction of smokers [19]. Incidence rates in Japan are maintaining on the same levels in the period from 1986 till 1995 in both males and females without statistically significant differences [20].

Analyses in some neighboring countries, like Bulgaria, show that incidence rates of all malignant neoplasms will increase in the years to come. Lung cancer incidence is expected to rise significantly till 2017 [21]. Analyses of the presence of risk factors in Slovenia point to a steady increase in lung cancer incidence till 2009 in females and a steady decrease in lung cancer incidence rates in males [22]. Concerning the female population of Vojvodina our study indicates a significant increase in lung cancer trends [5].

In Vojvodina lung cancer trends for both sexes are increasing. This is probably due to the more intense effect of etiological agents or because of insufficient preventive measures. Decreases in lung cancer trends in males in developed countries are the result of intensive efforts toward prevention of smoking that started 20 years ago and they provide a clear indicator of the proper way to stop unfavorable trends. However, in females of developed countries a similar situation like the one described in our study exists, with the presence of unfavorable increasing lung cancer trends.

Conclusion

Vojvodina is a region with high incidence and mortality rates of lung cancer in comparison to neighboring and the EU countries in both males and females.

Lung cancer trends in Vojvodina are increasing in both sexes. Trends are more unfavorable in male than in female population. Lung cancer incidence trend in males is very intense and represents the most unfavorable of all observed lung cancer trends.

Interpretation of the results taken in this study is not easy. One could assume that there are some etiological factors functioning, leading to increased incidence rates in males because of more intense activity of them or because males are more exposed to them. The same factors may have not the same effect in females probably because of less exposure or because of less intense activity and other possible unknown reasons.

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