RESEARCH ARTICLE

Epidemiology of Pancreatic Cancer in Vojvodina Province in Serbia

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Abstract

Purpose: Analysis of descriptive epidemiological characteristics of pancreatic cancer in Vojvodina, Serbia. Materials and Methods: The study covers population of Vojvodina in the period from 2000 to 2009. The method used for data processing was the descriptive. The data, referring to a specified period of time, were analyzed from chronological and demographic aspects and according to histological diagnosis. Results: In the period from 2000 to 2009, there were 2,108 registered cases of pancreatic cancer of which 1,886 had a fatal outcome. Standardized incidence rates varied between 5.7 and 9.1 per 100,000 population in males and between 4.2 and 5.3 in females. Linear incidence trends in males in the specified period of time, based on crude (r=0.7883, p<0.05) and standardized (r=0,6373, p<0,05) incidence rates, demonstrated increase. Annual percent increase in the crude incidence rate was 4.5% in males, and 2.8% in females. Age-standardized mortality rates varied between 5.2 and 7.5 per 100,000 population in males and 3.6 and 4.7 in females. Linear mortality trends in males in the specified period of time, based on crude (r=0.8795, p<0.05) and standardized (r=0.7669, p<0.05) mortality rates, also demonstrated annual percent increase. Conclusions: Data analysis shows unfavorable onco-epidemiological situation related to pancreatic cancer in Vojvodina, in aspects of both incidence and mortality. Absence of primary and secondary prevention does not allow medical institutions to successfully fight against this disease.

Keywords: Pancreas - cancer - epidemiology - incidence - mortality - trend - prevention

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Introduction

It is estimated that in 2012 337.872 people worldwide were diagnosed with pancreatic cancer, while 330.372 people died of the consequences of the disease. Pancreatic cancer is ranked the 9th on the cancer frequency world list and is considered to be a relatively rare type of tumor. Pancreatic cancer is almost always fatal and because of its high mortality rate it is ranked the seventh most frequent cause of cancer death in the world (Ferlay et al., 2013a).

Pancreatic cancer is one of the most frequent and most aggressive types of malignancies and to the present day it remains an example of a rapid spreading and poor prognosis disease (Engin et al., 2012). Chances of survival are low, since only 23% of patients live beyond the first year from the point of diagnosis, while the five year survival is only 5% (http://www.ncrc.ac.rs/strane/rakpankreasa.htm). In Europe, a five-year survival rate is between 2% and 9% (Sant et al., 2009; Inal et al., 2012)).

According to available data, epidemiological pancreatic cancer situation in Serbia is unfavorable, and by prevalence and mortality rates, we belong to the very top of the list of the European countries (Ferlay et al., 2013; Ilic et al., 2013). In Vojvodina, the number of new cases in one year is 210 with the average incidence rate of 10.4/100with 000, and the number of deaths 188 with the average mortality rate of 9.3/100 000 (Miladinov and Dugandzija, 2013).

The purpose of the study is to analyze epidemiological characteristics of pancreatic cancer in Vojvodina in the period between 2000 and 2009.

Materials and Methods

The data used for the purpose of presenting the epidemiological pancreatic cancer situation in Vojvodina were obtained from the Registry of Malignant Neoplasm of Vojvodina which operates as part of the Epidemiology Section of the Institute of Oncology of Vojvodina.

Data processing was carried out by using the descriptive epidemiological method. The data, which refer to a specified period of time, were analyzed from chronological and demographic aspects and according to histological diagnosis. The parameters used were the basic statistical indicators and crude, specific and standardized incidence and mortality rates.

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Location of pancreatic cancer in the context of newly diagnosed cases and deaths in the ten leading malignant neoplasm localizations in Vojvodina in 2009 has been observed on the bases of the total number of newly diagnosed cases and deaths in males and females for all malignant neoplasm localizations and has been presented as percentage of participation of the observed localization for the given year.

Incidence and mortality trends in the given period of time, based on crude and standardized incidence and mortality rates, have been presented within the chronological analysis. Demographic analysis shows trends based on standardized rates.

Results

In the period between 2000 and 2009, 2108 persons with pancreatic cancer diagnosis were registered in AP Vojvodina - 55 % of them were males and 45% females. Pancreatic cancer represents 2, 5% of all diagnosed cancers and is ranked the eighth most common cancer in Vojvodina.

There is an increasing linear incidence trend in the given period of time, either observed through crude or standardized rates, with noticeable increase in 2007, when crude and standardized incidence rates had the highest values. (Figure 1)

Observed by years within the given ten-year period, the greatest number of newly diagnosed cases occurred in 2007 (272), with crude incidence rate of 13, 39/100 000, and the lowest number at the beginning of the specified period i.e. in 2000 (175) with incidence rate of 8, 61/100 000.

Within the given period, pancreatic cancer occurs almost in all age groups. Including both sexes, in 5, 7% cases it occurs in people under 50. The highest average age specified incidence rate occurs in the 75-79 age group, with the crude incidence rate for both sexes of 478, 52/100 000, and the greatest number of newly diagnosed cases occurs in the 70-74 age group.

Standardized incidence rate for males is between 5.7 and 9.1 per 100 000 population and between 4.2 and 5.3 per 100 000 for females. For both sexes the highest rates were in 2007. Annual percent of increase in incidence rate for males is 4.5%, and for females 2.8%.

Analysis of the incidence cumulative risk (0-74) in Vojvodina, in the period between 2000 and 2009, shows that in Vojvodina, one male in a hundred and one female in two hundred will develop pancreatic cancer by the age of 74.

Within the observed period, 1886 fatal outcomes of pancreatic cancer were registered in AP Vojvodina, 1032 deaths in male population which is equal to 54, 7%, and 854 deaths in female population which is equal to 45, 3%. With respect to percentage structure of deaths, among the ten leading localization of malignant tumors in 2009, classified by sex, pancreatic cancer was ranked the seventh on the list for males with 3, 5% presence in all other neoplasms and the eighth for females with 3, 5% presence.

Age standardized mortality rate was between 5.2 and 7.5 per 100 000 population for males and between 3.6 and 4.7 per 100 000 population for females. The highest registered standardized rate for males was in 2007 - 9, 1/100 000, and the greatest standardized rate for females of 5, 3/100 000 was in 2007 as well.

In the observed period, there is an unfavorable increasing trend of pancreatic cancer deaths. (Figure 2).

Average mortality rate is 9, 3/100 000. There is an increasing linear mortality trend in male population in the given period of time, either observed through crude or standardized rates. Linear mortality trends in male population during the observed period, based on the crude (r= 0, 8795, p<0, 05) and standardized mortality rates (r=0, 7669, p<0, 05) have been increasing and are statistically significant, with positive and actually significant correlation.

In the period between 2000 and 2009 the greatest number of deaths (231) were registered in 2007with mortality rate of 11, 37/100 000, and the lowest at the beginning of the observed period i.e. in 2000 with mortality rate of 7, 97/100 000. Annual percent increase in mortality rate is 3.7% in males, and 1.8% in females.

Age structure of patients who died shows the highest percentage of deaths in the 70-74 age group (18, 5%). Age structure also shows that the greatest number of patients who died occurred in the age between 55-80 i.e. 85%. Percentage of newly diagnosed cases under the age of 55 is 15%.

As much as 82% of all pancreatic cancers do not show any histological diagnosis, while the most frequent among those diagnosed is adenocarcinoma NOS (14, 7%), which is a dominant histological type 20 times more prevalent than not precisely specified cancers (0, 7%) as well as mucinous adenocarcinoma (0, 6%).

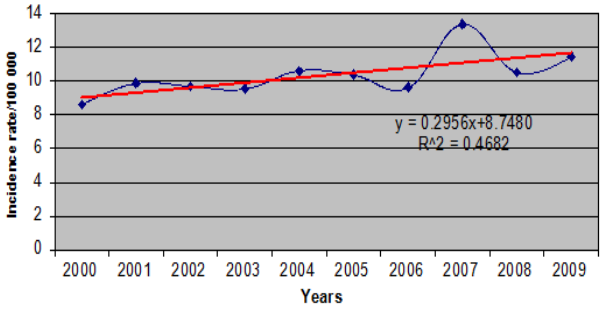

Figure 1. Age Standardized Incidence Rates and Trend of Pancreatic Cancer in Vojvodina in the Period 2001-2010

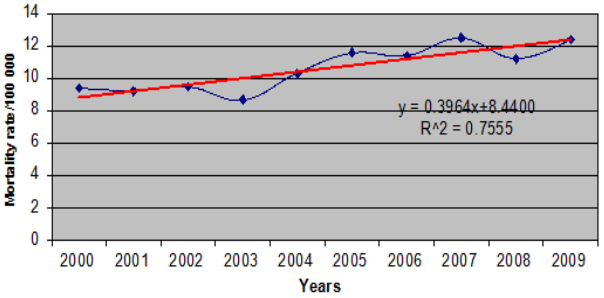

Figure 2. Age Standardized Mortality Rates and Trend of Pancreatic Cancer in Vojvodina in the Period 2001-2010

Discussion

Pancreatic cancer is one of the most aggressive ones and is ranked the ninth on the list of the most prevalent cancer localizations in the world. Pancreatic cancer is the seventh most frequent cancer in Europe with 103.773 newly diagnosed cases in 2012 and 104.463 fatal outcomes (Ferlay et al., 2013b).

Pancreatic cancer incidence and mortality rates vary around the world. The highest incidence and mortality rates occur in USA, Europe, Australia and Japan. India, Africa, Southeast Asia and a part of the Middle East have the lowest incidence and mortality rates, while Latin America has medium values of incidence and mortality rates (Anderson et al., 2006).

Pancreatic cancer more frequently occurs among older people. About 80% of all newly diagnosed cases are between 60 and 80 years of age (Hamilton and Altonen, 2000). According to the International Agency for Research of Cancer pancreas rates grow rapidly with the years of life (Hamilton and Aaltonen, 2000). Data from the USA show rates for patients aged 70-74 which are about 57/100 000 a year, compared to rates of 9, 8/100 000 in patients aged 50-54. Average age when the cancer is diagnosed is as follows: less than 13% of cancers are diagnosed before 55 years of age, and 69% of diagnosed cancers occur after 65 (Howlader et al., 2012).

Pancreatic cancer is slightly more frequent in males. Male/female ratio is 1, 6 in developed countries, and 1, 1 in developing countries (Hamilton et al., 2000). About 173.000 males, compared to 156.000 females around the world, die of pancreatic cancer a year (http://globocan.iarc.fr/Pages/fact_sheets_population.aspx, nd). In the developed countries, mortality rate is between 7 and 9 /100.000 for males and 4, 5 and 6/100.000 for females (http://www.iarc.fr/en/publications/pdfs-online/pat-gen/bb2/bb2-chap10.pdf, nd). In the given ten-year period in Vojvodina, 57% of pancreatic cancer were registered in patients between 65-80 years of age, and the highest age specific incidence rate has been recorded in the 70 - 74 age group, which is in compliance with the fact that the process of getting older is one of the greatest risk factors for pancreatic cancer

In America, in the period between 2007-2011, the average age of pancreatic cancer diagnosis was 71. Approximately 0, 1% is diagnosed in patients younger than 20, 0, 4% in the 30-34 age group, 2, 2% between 35 and 45 years of age, 20, 7% between 55 and 64 years of age, 25, 8% between 65 and 74, 27, 8% between 75 and 84 and 13, 3% in patients older than 85 years of age.(http://seer.cancer.gov/faststats/selections.php?#Output, nd)

According to data obtained from IARC, the annual age specific incidence rate in developed countries is between 3, 1 and 20, 8/100 000 in males and between 2 and 11/100 000 in females (Ferlay et al., 2013). In Europe in 2012, the highest age standardized incidence rate was recorded in Czech Republic for both sexes (13, 2/100 000), and the lowest in Bosnia and Herzegovina for both sexes (5.4/100 000). Besides Czech Republic, the age standardized incidence rate leading countries in Europe for both sexes are: Slovakia (14/100 000), Hungary (13, 5/100 000), Finland (13, 4/100 000) and Slovenia (13/100 000) (http://eco.iarc.fr/eucan/Cancer.aspx?Cancer=15, nd).

In less developed parts of the world, such as Africa and Asia, the age standardized rates are low (2 and 3.2/100 000), while Japan and Korea have high rates, and in Pakistan, Bangladesh and Sri Lanka the age standardized rates are below 1/100 000 (http://globocan.iarc.fr/old/summary_table_site, nd).

The world age standardized rate is 4, 2/100 000, whereas there is a difference between the developed (7, 2/100 000) and underdeveloped countries (2, 8/100 000) (Ferlay et al., 2013). It is obvious from the above stated data that the incidence, whether crude, specific or standardized, varies around the world, which indicates the existence and domination of various risk factors resulting from the level of development of different countries. Great number of smokers, alcohol consummation, harmful environmental factors, all of these contribute to the large number of disease struck people in underdeveloped countries. On the other hand, sedentary lifestyle, obesity, animal fat rich food, large number of diabetes patients, better life conditions, and better health care, and therefore longer life expectancy than in undeveloped countries are all reasons for increasing number of pancreatic cancer patients in developed countries. (Lowenfels et al., 2006; Ghadriani et al., 2003; Wood et al., 2006).

The highest registered standardized rate for males in Vojvodina was in 2007 - 9, 1/100 000, and the greatest standardized rate for females of 5, 3/100 000 was in 2007 as well. According to data from GLOBOCAN for 2012, Serbia is ranked 25th with age standardized rate for both sexes of 269/100 000 (Ferlay et al., 2013).

Average annual incidence in Vojvodina is 10, 4/100 000. In the period between 2000 and 2009, the incidence trend shows the increasing number of newly diagnosed cases. The highest standardized rates were registered in 2007 and 2009. Trend incidence data are different, and they show that in the USA there is also the incidence increasing trend in the period from 1999 to 2008 in males older than 55 by 0, 9% and in females of all ages by 1% per year, in the same period (http://seer.cancer.gov/faststats/selections.php?#Output., nd) However, in Australia, there is a decline in incidence trend in males, in the period from 1983 to 2006, with the opposite situation in females where the trend is increasing (Luke et al., 2009).

Average mortality rate in Vojvodina in the observed period is 9, 3/100 000 i.e. the number of deaths per year is around 188 . According to the Globocan data for the year of 2012, the number of deaths in Serbia was 1327, and the crude mortality rate was 13, 5 (http://globocan.iarc.fr/Pages/fact_sheets_population.aspx., nd).

In America, in the period between 2007-2011, average age of pancreatic cancer deaths was 73. Almost no cases of death were registered before the age of 20, 0, 2% were registered in the age between 20-34, 1, 5% in the age of 35-44, 8, 2% between 45 and 54, 19, 1% between 55 and 64, 25, 6% between 65 and 74, 30% between 75-84 and 15, 5% in patients older than 85. Age specific mortality rate for the period between 2005 and 2009 in USA is 10, 8/100 000 (http://seer.cancer.gov/faststats/selections.php?#Output., nd).

The greatest standardized rate for males of 7, 5/100 000 in Vojvodina was registered in 2007, and for females it was registered in 2005 and it was 4, 7/100 000. According to Globocan data for 2012, the crude mortality rate for the whole world is 4/100 000, and the age standardized mortality rate is 4, 1/100 000. Estimated crude mortality rate in the European region is 5, 7/100 000, while the age standardized rate is 6, 4/100 000 (http://globocan.iarc.fr/Pages/fact_sheets_population.aspx., nd).

Pancreatic cancer mortality rate trend in Vojvodina is also increasing. In Great Britain -during the last thirty years, there is a decline in mortality rate trend by around 18% in males, while in females there is a rise in the same trend by 6% (Wood et al., 2006). Mortality rate in Europe in the last decade is stable, while in females a 7% rise has been recorded http://www.cancerresearchuk.org/cancer-info/cancerstats/types/pancreas/mortality/, nd). Another decline in mortality rate in the last twenty years was recorded in the Nordic countries (http://www-dep.iarc.fr/nordcan/English/StatsFact.asp?cancer=130&country=0, nd).

The most prevalent histological type of malignant pancreatic tumor is adenocarcinoma (14%), though more than 80% of malignant tumors do not have any histological confirmation. For comparison only, the most prevalent histological type of pancreatic tumor in Australia is adenocarcinoma (42%), and 45% of all those cases are without histological diagnosis. (Maissonneuveu et al., 2010).

In conclusion, in this study it can be say that data analysis shows unfavorable onco-epidemiological situation related to pancreatic cancer in Vojvodina, in both aspects, incidence and mortality. Absence of primary and secondary prevention does not allow medical institutions to successfully fight against this disease.

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