

Malignant Neoplasms of Respiratory and Intrathoracic Organs (C30-C39) in the Osijek-Baranja County, Croatia

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ABSTRACT

The Institute of Public Health of the Osijek-Baranja County in collaborate with different county institutes provide up-dated information on the cancer occurrence and trends in the Osijek-Baranja County (OBC). The cancers were defined according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10), codes of malignant neoplasms of respiratory and intrathoracic organs (C30-C39). The aim of this article was to show the size of cancer problem with the C30-C39 cancer group in the Osijek-Baranja County (OBC). This article processes data on cancer incidence and mortality, appertaining age distribution, median age, cancer survival and length of stay in hospital collected in period 2001–2009. Out of all patients diagnosed with C30-C39 cancers, there were 18.2% of females and 81.8% of males. The total incidence rate in males (119.5/100,000) decreases while the total mortality rate (110.9/100,000) does not change in 9-year period. In the same period, the total mortality rate in females (15.7/100,000) increase moderately. The age-standardized incidence rate was six times higher in males than in females. The overall median age at diagnosis of C30-C39 cancers of both genders was 64.5 years, which exceeds the average age at diagnosis of cancer in general in the OBC by 4.8 years. Five-year relative survival rate was 14.8%, 19.7% for females and 13.7% for males. Male lung and bronchus cancer patients (C34) were 1 year younger at diagnosis of cancer than the respective female patients. An average C30-C39 cancer patient was hospitalized 2.0 times during the course of their illness while the median length of stay in hospital amounted to 16.1 days. The number of hospital admissions in both genders decreased over the 2001–2009 period. In both genders, the total length of stay in hospitals was slightly reduced. Females spent 0.4 days more in hospital than males. The overall incidence and mortality rate in the OBC were among the highest in Europe. However, these rates in females reached neither the Croatian nor the EU average. Other data are similar to those in Europe.

Key words: cancer, respiratory organs, age-standardized mortality rate, age-standardized incidence rate, 5-year relative survival, age at diagnosis, age at death, age distribution, C30-C39, median age, length of stay in hospital, admissions in hospital, lung cancer, Croatia, Osijek-Baranja County

Introduction

While cancer incidence and mortality can reflect the effectiveness of public health strategies in mitigating the implications of the cancer disease, the survival indicator is typically used to evaluate treatments in clinical trials of selected cancer patients. There is an estimate that over one-quarter of new cases of cancer in the world are registered in Europe, although the population of Europe represents only 1/8 of the world's population^{1,2}. According to an assessment, there were more than 1.6 million newly registered cancer patients in the European Union

in 1997, out of which there were slightly more males (53%). One million people died of cancer in the EU in the same year. The percentage of death cases in males (56%) exceeded the percentage of death cases in females. In the EU-27, one of the most common cancers (both genders) is bronchus and lung cancer (C34) with the incidence rate of 44.1/100,000 and the highest mortality rate of 36.5/100,000, calculating pursuant to the EU standard population³. Many factors, like cigarette smoking, passive smoking, diet, occupation, host factors and similar

may exercise influence on C30-C39 cancers incidence and mortality rate in both genders⁴.

The life expectancy of smokers is at least a decade shorter than that of non-smokers⁵. There is a study on the influence of human papilloma virus on the occurrence of lung cancer in Croatia. The data obtained in this study have indicated low prevalence of HPV in patients with lung carcinomas and its contribution to the development of lung carcinomas⁶. In the USA, the incidence rate of lung and bronchus (second position) cancer declined significantly in males (from 102/100,000 in 1984 to 73.6 in 2004). Nowadays in females, the rate is approaching a plateau after a long period of increase. In the USA, the 5-year survival rate is only 15%^{7,8}. In Osijek-Baranja County (OBC), C30-C39 was the second most common cancer in both genders and in males separately (the incidence rate of 64 and 125/100,000, respectively) while in females, this cancer group was in the fifth position (the incidence rate was 19/100,000). This cancer group revealed a six-fold disparity in the incidence rate between males and females. Moreover, the mortality rate in males was seven times higher than in females⁹. In Croatia, the age-standardised incidence and mortality rates (both genders) diagnosed with the malignant neoplasm of trachea, bronchus and lung were 52.5/100,000 and 49.7/100,000, respectively¹⁰. In the OBC, the C30-C39 cancers in both genders were the most common fatal cancer⁹.

The goal of this paper is to stress the complexity of the issue and its influence on the health care system regarding cancers of respiratory organs in the OBC in the period from 2001 to 2006. General information on this cancer group has so far existed only on the national level and only for particular sites. This means that this is the first paper that elaborates the issue of cancer group C30-C39 at a county level in Croatia.

Materials and Methods

Data source

Although the representativeness of their data might be challenged, mandatory county hospitals data reports, IPHO, county bureaus of statistics and the County Register of Deaths still represent the only available source of information on the profile of cancer in the OBC. All data from the 2001–2009 period originate from these institutions. Data obtained from the mandatory hospital reports are accompanied with personal identification number which represents a unique key for making connection with other data obtained from various administrative bodies in the OBC and their integration into a single database. It was used the unique identification number of each person that had the role of the key parameter of linking data from different sources and different reports. That way, every patient got their chronology of hospitalization.

The cohort studied in this article included all people with cancer who were registered as the patients in one of two hospitals in the OBC in the time period from 2001 to 2009 (follow up period from 1996 to 2010). Based on these sources, a database of people who were hospitalized in the area of the OBC for any reason whatsoever (including cancer) has been generated^{11,12}. The data on each of the hospitalized patients have been supplemented with data obtained from the Register of Deaths.

Data on every person with cancer are accompanied with their chronological order of illness and hospitalization. The database are involved all hospitalizations and all data on ONKO or BSL forms (mandatory statistical patterns for all hospitalized patients in Croatia). The ONKO form is mandatory statistical reports on every hospitalized cancer patients in Croatia. The BSL form is

TABLE 1
THE MEDIAN AGE AT DIAGNOSIS AND AT DEATH FOR MALIGNANT NEOPLASMS OF RESPIRATORY AND INTRATHORACIC ORGANS (C30-C39) IN THE OBC, PERIOD 2001–2009

		Males, MADg									Correlation Coefficient (strength)
ICD-10	Age	2001	2002	2003	2004	2005	2006	2007	2008	2009	
C34	65+	70.5	72.3	72.0	71.9	73.7	72.8	72.9	72.6	73.0	$y=71.01x+0.013$ $R^2=0.632$
C30-C39	65+	70.8	72.7	71.9	72.0	73.5	72.7	73.0	72.6	73.5	$y=71.18x+0.013$ $R^2=0.619$
		Males, MAD									
ICD-10	Age	2001	2002	2003	2004	2005	2006	2007	2008	2009	
C34	65+	71.5	72.3	72.1	72.5	73.7	73.7	73.0	73.0	73.2	$y=71.57x+0.011$ $R^2=0.690$
C30-C39	65+	71.8	72.6	72.2	72.4	73.6	73.8	72.9	73.0	73.9	$y=71.74x+0.011$ $R^2=0.631$
		Females, MAD									
ICD-10	Age	2001	2002	2003	2004	2005	2006	2007	2008	2009	
C30-C39	45-64	54.8	56.2	56.7	55.8	57.0	57.2	56.6	56.7	57.6	$y=55.16x+0.017$ $R^2=0.677$

Only cancer sites with strong and very strong correlation coefficient of determination (strength), MADg – median age at diagnosis, MAD – median age at death

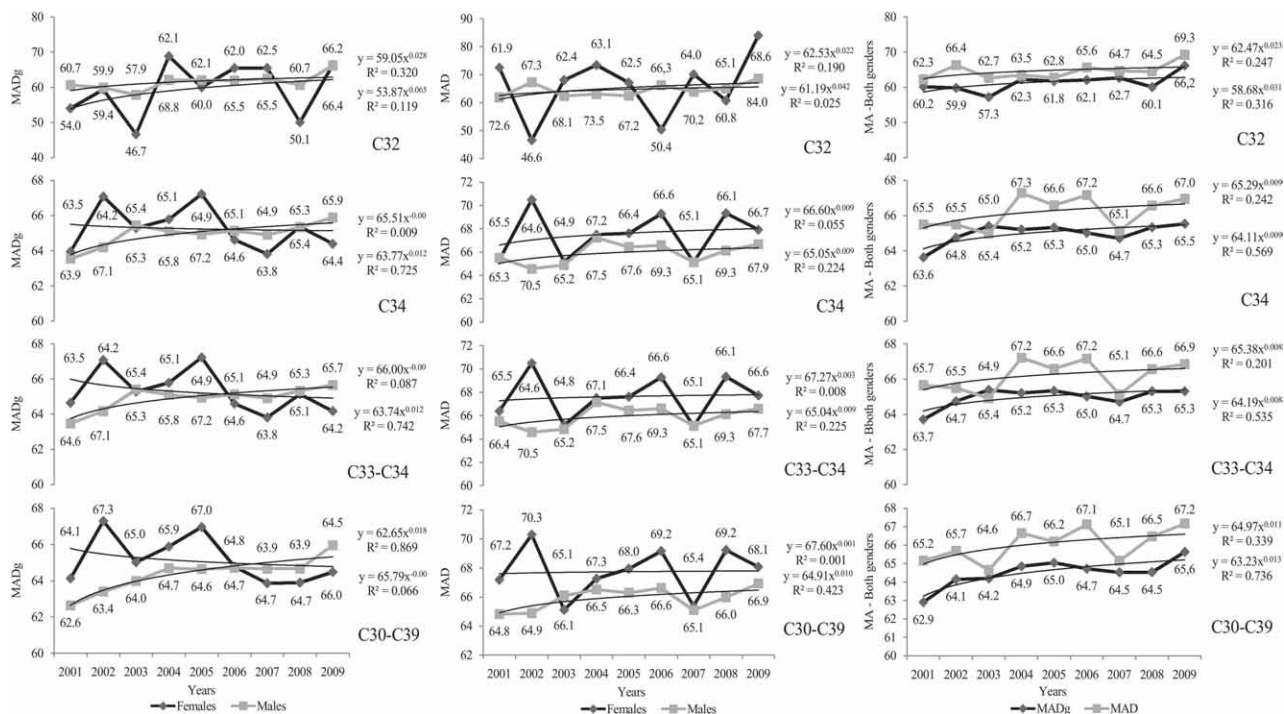


Fig. 1. The median age of cancer patients at diagnosis (MADg) and at death (MAD) by primary cancer site (C30-C39 in the OBC, period 2001-2009). The rising trendlines in males suggest that a very strong and extremely dependable relationship exist between the MADg and years, $R^2=0.869$ ($R^2>0.80$) and a moderate between the MAD and years, $R^2=0.423$ ($R^2>0.16<0.49$). No relationship in females, $R^2=0.066$ and $R^2=0.001$ ($R^2<0.16$). MA – median age.

a mandatory statistical report on every hospitalized person, regardless of the causes of hospitalization. All cancer patients are hospitalized in the state-owned (public) hospitals since there are still the only hospitals here.

Statistical analysis

The cancer group of malignant neoplasms of respiratory and intrathoracic organs, codes C30-C39, was classified according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Version for 2010 (ICD-10). The cancer incidence and mortality estimates in the period from 2001 to 2009 were prepared for all cancers based on gender and for age groups 0–19, 20–44, 45–64, 65+ by the year at diagnosis and at death of cancer. Based on the 2001 census, the analysis covered a total population of 330.506 people in the OBC. The Croatian National Health Insurance is a universal health insurance that covers all or almost all the costs (depends on personal participation) of treatment of Croatian citizens and provides them with the same chances of recovery. Therefore, in this article we write about the entire population of cancer patients treated in the OBC.

Descriptive statistics were used for both age and gender. The survival rates denote the outcome up to 5 years after diagnosis for cancer patients who were diagnosed during the 2001–2005 period. All survival estimates were age-adjusted, on the basis of four age groups: 0–19, 20–44, 45–64, 65+ years. The analyses were conducted using age-specific rates, the age-standardization-direct

method and 95% confidence intervals (95% CI). The standardized incidence and mortality ratios as well as the 95% confidence intervals were calculated for C30-C39 pursuant to the year at diagnosis and at death of cancer. Also, both ratios were stratified by year at diagnosis of cancer, age and gender. The median age was the observation ranked in the middle; that is 50% of patients are diagnosed at an older age and 50% are diagnosed at a younger age compared to the median. The EU standard population was used in the analysis¹³. The length of stay was determined according to the date of admission and to the date of discharge with regard to the index admission. The SAS statistical package (version 9.1, SAS Institute INC., Cary, NC, SAD) was used for statistical analysis¹⁴ and Microsoft® Office Excel® 2007.

Results

From 2001 to 2009, a total of 2,124 people were registered with cancer C30-C39 and treated at the two hospitals in the OBC. Among them, there were 18.2% (386) of females and 81.8% (1,738) of males.

In the 2001–2009 period, the median age at diagnosis of C30-C39 cancers was 64.5 years. The median age in males was 64.7 years. Females were later diagnosed with this group of cancer by 0.1 years (64.8 years). Both genders seeing as a whole were characterized by a time shift at diagnosis to an older median age (Table 1, Figure 1 and 2). Considering males, this shift was extremely strong ($R^2=0.869$, Figure 1) while in females, this shift was

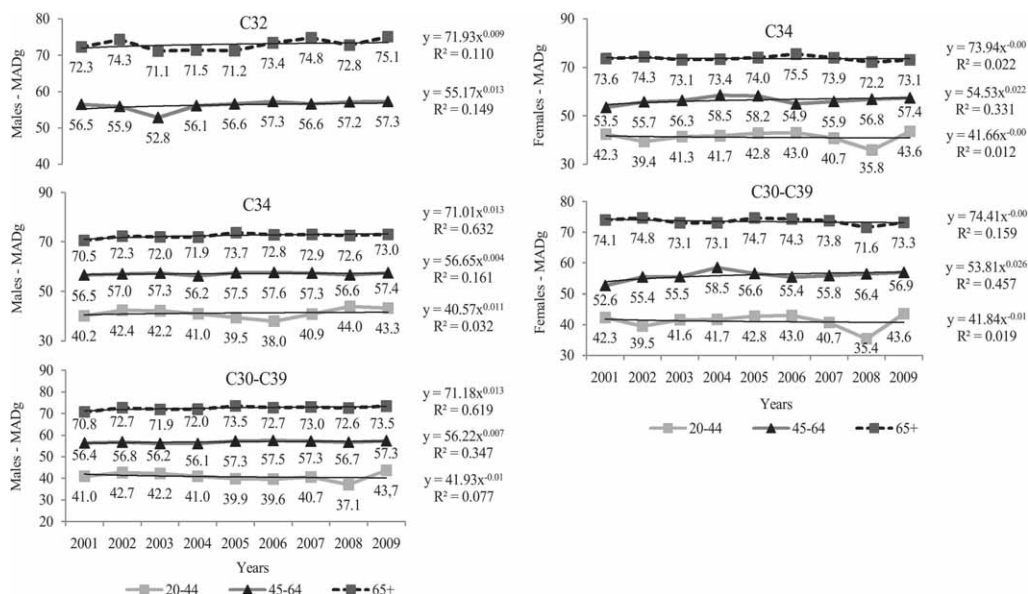


Fig. 2. The median by age groups of cancer patients at diagnosis (MADg) by primary cancer site C30-C39 (selected sites) in the OBC, period 2001–2009. The rising trendline suggests that a strong relationship exists in males for C34 (malignant neoplasm of bronchus and lung) of age 65+ between the MADg and years, $R^2=0.632$ ($R^2>0.48<0.81$).

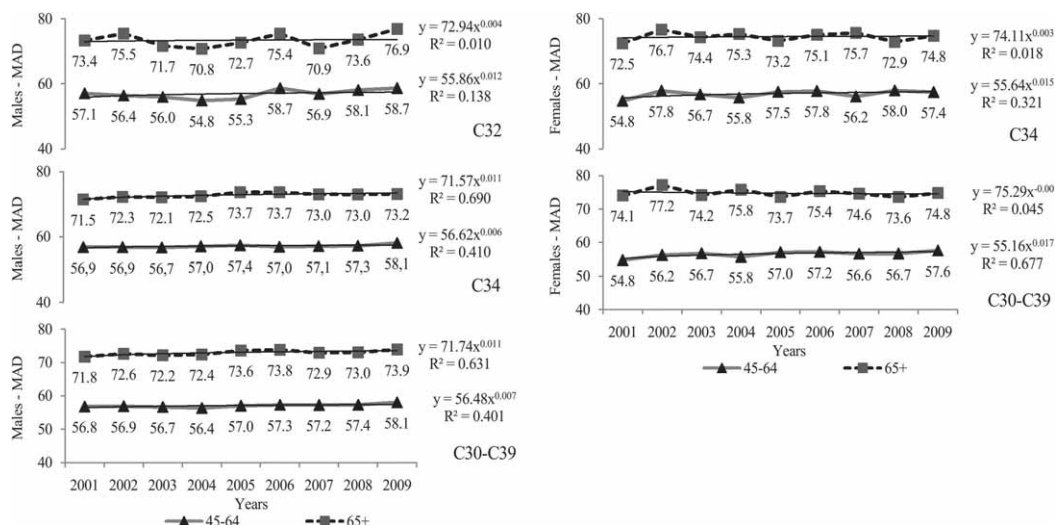


Fig. 3. The median by age groups of cancer patients at death (MAD) by primary cancer site C30-C39 (selected sites) in the OBC, period 2001–2009. The rising trendlines suggest that strong and moderate relationships exists for C34 ($R^2=0.690$ and $R^2=0.410$, respectively) and C30-C39 ($R^2=0.631$ and $R^2=0.401$, respectively) cancer sites of ages 65+ and 45–65 between the MAD and years in males and strong relationship for C30-C39 in females of age 45–64 ($R^2=0.677$).

barely opposite ($R^2=0.066$). The malignant neoplasm of bronchus and lung (C34) as the most common cancer in C30-C39 cancer group (79.4% of all cases) was featured by a strong shift to an older median age ($R^2=0.725$, Figures 1 and 2) during 9-years observed period.

The overall median age at death (MAD) was 66.2 years. It exceeded the median age at diagnosis of C30-C39 cancers by 1.7 years. In females, this difference was 3.2 years (68.0 years) while in males (66.0 years) the difference was 1.3 years.

Table 1 presents data about the trend of the median age for the selected cancer sites and patient age. The

strength of rising trendlines of the median age at diagnosis and at death in males, in the nine-year period of cancer of bronchus and lung (C34, $R^2=0.632$) as well as in group of cancer C30-C39 ($R^2=0.619$) were strong, suggests that males aged 65+ years getting cancer later. Similar strong rising trendline was in females aged 45–64 years at death ($R^2=0.677$, Table 1, Figures 1 and 3).

The overall incidence of new C30-C39 cancers were 236 cases/year (or 0.7 case/day) (Tables 2 and 3). The incidence rate decreased (moderately) in males ($R^2=0.414$) more than in females ($R^2=0.038$) (Figure 4). Every year, an average of 215 (or 0.6 case/day) patients died of

TABLE 2
HISTORICAL DATA ON C30-C39 CANCER AGE-STANDARDIZED INCIDENCE AND MORTALITY NUMBER AND RATE PER 100,000 (USING EU STANDARD POPULATION), PERIOD 2001–2009

Year of data collection	Incidence						Mortality					
	Males		Females		Both genders		Males		Females		Both genders	
	N	ASR	N	ASR	N	ASR	N	ASR	N	ASR	N	ASR
2001	198	122.4	43	19.4	241	62.4	169	104.5	27	11.6	196	49.8
2002	225	139.4	53	22.6	278	72.6	183	113.1	31	13.0	214	54.5
2003	195	120.8	50	21.8	245	63.0	166	102.7	47	21.7	213	55.1
2004	208	128.5	31	13.3	239	60.7	179	110.5	36	15.5	215	53.4
2005	206	127.5	44	19.4	250	65.0	219	135.5	32	13.8	251	64.2
2006	179	110.8	43	20.0	222	57.6	160	98.9	38	16.1	198	50.0
2007	192	118.8	41	19.1	233	60.7	192	118.9	40	18.3	232	60.1
2008	164	101.5	33	14.7	197	50.9	180	111.3	31	12.7	211	53.7
2009	171	105.8	48	22.3	219	56.2	166	102.7	43	18.4	209	53.0
2001–2009	193	119.5	43	19.2	236	61.0	179	110.9	36	15.7	215	54.9

N – average number of cases per year, ASR – age-standardized rate (EU)

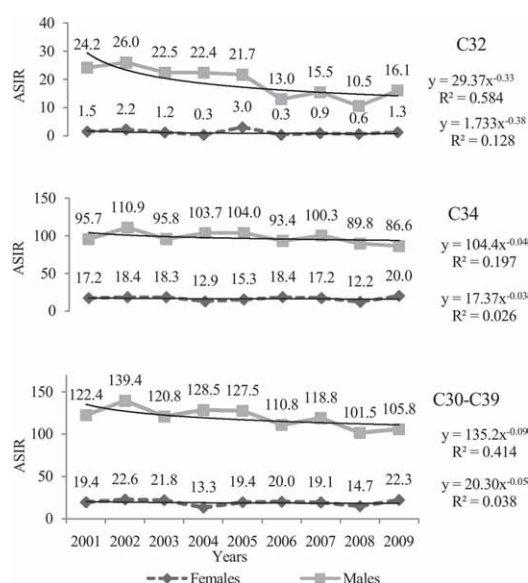


Fig. 4. The cancer age-standardized incidence rate (ASIR) for cancer group C30-C39 in the period 2001–2009 in the OBC per 100,000 inhabitants using the EU standard population. The downward trendline in males suggest that moderate relationship exist between the ASIR and years for C30-C39 cancer group, $R^2=0.414$ ($R^2>0.16<0.49$).

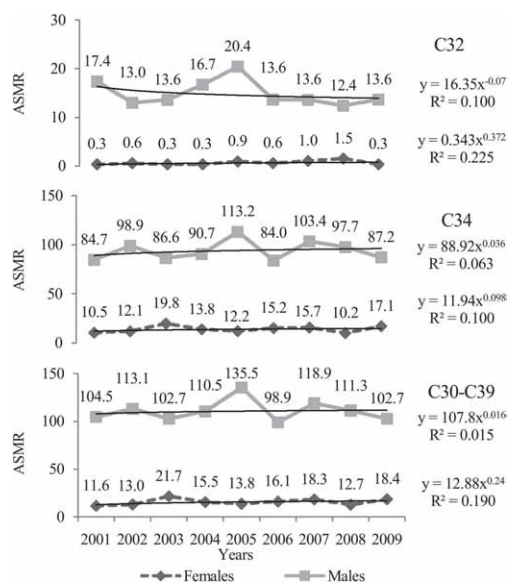


Fig. 5. The cancer age-standardized mortality rate (ASMR) for cancer group C30-C39 in the period 2001–2009 in the OBC per 100,000 inhabitants using the EU standard population. The downward trendlines in females suggest moderate relationship exist between ASMR and years for C30-C39 cancer group, $R^2=0.190$ and for C32, $R^2=0.190$ ($R^2>0.16<0.49$).

C30-C39 cancers in the OBC, which implies the mortality rate of 54.9/100,000. The increase in the mortality rate in females was slightly ($R^2=0.190$) while in males it was barely ($R^2=0.015$, Figure 5). The overall incidence and mortality rates in males (119.5 and 110.9/100,000, respectively) were six and seven times higher than the incidence and mortality rates in females (19.2 and 15.7/100,000, respectively) (Tables 2, 3 and 4).

The 2001–2009 age-standardised incidence rate of the C30-C39 cancer group in the OBC was 61.0/100,000, tak-

ing both genders into account (SD±4.0, 95% CI 53.15–68.91), 119.5/100,000 for male patients (SD±8.58, 95% CI 102.68–136.31) and 19.2/100,000 for female patients (SD±3.0, 95% CI 13.24–25.11). The most frequent cancer site within the male population was malignant neoplasm of bronchus and lung (C34, 97.8/100,000), followed by the malignant neoplasm of larynx (C32, 19.1/100,000, Table 3). The same sites of cancer were present in the female population, but with a fivefold lower incidence rate (16.7 and 1.3/100,000, respectively). The incidence rate

TABLE 3
 THE AGE-STANDARDIZED INCIDENCE RATE (ASIR) IN THE OBC FOR MALIGNANT NEOPLASMS OF RESPIRATORY AND
 INTRATHORACIC ORGANS (C30-C39) PER 100,000 USING EU STANDARD POPULATION, PERIOD 2001–2009

Females										
ICD-10	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001–2009
C30	–	1.6	0.3	–	–	–	–	0.3	0.3	0.3
C31	0.3	–	0.3	–	0.3	–	0.9	1.0	–	0.3
C32	1.5	2.2	1.2	0.3	3.0	0.3	0.9	0.6	1.3	1.3
C33	0.3	–	–	–	–	0.6	–	0.6	0.6	0.2
C34	17.2	18.4	18.3	12.9	15.3	18.4	17.2	12.2	20.0	16.7
C37	–	0.3	0.3	–	0.3	0.3	–	–	–	0.2
C38	–	–	0.9	–	0.3	0.3	–	–	–	0.2
C39	–	–	0.3	–	–	–	–	–	–	0.0
C30-C31	0.3	1.6	0.7	–	0.3	–	0.9	1.3	0.3	0.6
C33-C34	17.5	18.4	18.3	12.9	15.3	19.0	17.2	12.8	20.6	16.9
C30-C39	19.4	22.6	21.8	13.3	19.4	20.0	19.1	14.7	22.3	19.2

Males										
ICD-10	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001–2009
C30	–	1.2	–	–	0.6	0.6	1.9	–	–	0.5
C31	1.2	–	0.6	–	1.2	2.5	0.6	0.6	1.2	0.9
C32	24.2	26.0	22.5	22.4	21.7	13.0	15.5	10.5	16.1	19.1
C33	0.6	0.6	1.2	–	–	–	–	–	1.3	0.4
C34	95.7	110.9	95.8	103.7	104.0	93.4	100.3	89.8	86.6	97.8
C38	–	0.6	–	2.5	–	0.6	0.6	0.6	0.6	0.6
C39	0.6	–	0.6	–	–	0.6	–	–	–	0.2
C30–C31	1.2	1.2	0.6	–	1.8	3.1	2.5	0.6	1.2	1.4
C33-C34	96.3	111.5	97.1	103.7	104.0	93.4	100.3	89.8	87.9	98.2
C30-C39	122.4	139.4	120.8	128.5	127.5	110.8	118.8	101.5	105.8	119.5

Both genders										
ICD-10	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001–2009
C30	–	1.5	0.2	–	0.2	0.2	0.7	0.2	0.2	0.4
C31	0.8	–	0.5	–	0.7	1.1	0.7	0.7	0.4	0.6
C32	11.5	12.9	10.6	9.9	11.1	5.9	7.2	5.0	7.3	9.0
C33	0.5	0.3	0.5	–	–	0.3	–	0.3	0.9	0.3
C34	49.2	57.5	49.9	49.8	52.7	49.2	51.7	44.4	47.1	50.2
C37	–	0.2	0.2	–	0.2	0.2	–	–	–	0.1
C38	–	0.3	0.5	1.0	0.2	0.4	0.3	0.3	0.2	0.4
C39	0.3	–	0.5	–	–	0.3	–	–	–	0.1
C30-C31	0.8	1.5	0.7	–	0.9	1.3	1.5	1.0	0.7	0.9
C33-C34	49.7	57.8	50.4	49.8	52.7	49.5	51.7	44.7	48.0	50.5
C30-C39	62.4	72.6	63.0	60.7	65.0	57.6	60.7	50.9	56.2	61.0

of cancer C34 declined slightly in females and strong in males ($R^2=0.128$ and $R^2=0.584$, respectively). The highest mortality rate among all age groups was registered in the male 65+ group (overall 592.7/100,000) and barely increased in observed period ($R^2=0.005$, Table 5). There were no registered deaths in patients under 20 years of age.

The 5-year relative survival rate from C30-C39 cancer group was poor for both genders (14.8%, in males 13.7% and in females 19.7%). It decreased with age and was always higher in females (Table 6, Figure 4). Over the years, survival is getting worse in both genders.

The age distribution at diagnosis of C30-C39 cancers in the OBC was marked by a constant rise, viewing from

TABLE 4
THE AGE-STANDARDIZED MORTALITY RATES (ASMR) IN THE OBC FOR MALIGNANT NEOPLASMS OF RESPIRATORY AND INTRATHORACIC ORGANS (C30-C39) PER 100,000 USING EU STANDARD POPULATION, PERIOD 2001–2009

Females										
ICD-10	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001–2009
C30	0.3	0.3	0.6	0.3	0.3	–	–	0.3	0.3	0.3
C31	–	–	–	0.6	–	0.3	0.6	0.3	–	0.2
C32	0.3	0.6	0.3	0.3	0.9	0.6	1.0	1.5	0.3	0.7
C33	0.3	–	–	–	–	–	0.6	–	0.6	0.2
C34	10.5	12.1	19.8	13.8	12.2	15.2	15.7	10.2	17.1	14.1
C37	–	–	–	0.3	–	–	–	0.3	–	0.1
C38	–	–	0.9	–	0.3	–	0.3	–	–	0.2
C39	–	–	–	–	–	–	–	–	–	–
C30-C31	0.3	0.3	0.6	1.0	0.3	0.3	0.6	0.7	0.3	0.5
C33-C34	10.9	12.1	19.8	13.8	12.2	15.2	16.3	10.2	17.7	14.2
C30-C39	11.6	13.0	21.7	15.5	13.8	16.1	18.3	12.7	18.4	15.7
Males										
ICD-10	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001–2009
C30	–	–	–	–	–	–	0.6	–	–	0.1
C31	0.6	–	–	0.6	0.6	1.2	–	1.2	1.2	0.6
C32	17.4	13.0	13.6	16.7	20.4	13.6	13.6	12.4	13.6	14.9
C33	–	–	1.9	0.6	–	–	–	–	0.6	0.3
C34	84.7	98.9	86.6	90.7	113.2	84.0	103.4	97.7	87.2	94.0
C37	0.6	–	–	0.6	–	–	–	–	–	0.1
C38	0.6	1.2	–	1.2	1.2	–	0.6	–	–	0.5
C39	0.6	–	0.6	–	–	–	0.6	–	–	0.2
C30-C31	0.6	–	–	0.6	0.6	1.2	0.6	1.2	1.2	0.7
C33-C34	84.7	98.9	88.5	91.3	113.2	84.0	103.4	97.7	87.8	94.4
C30-C39	104.5	113.1	102.7	110.5	135.5	98.9	118.9	111.3	102.7	110.9
Both genders										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001–2009
C30	0.2	0.2	0.3	0.2	0.2	–	0.2	0.2	0.2	0.2
C31	0.3	–	–	0.6	0.2	0.7	0.3	0.7	0.5	0.4
C32	7.7	5.6	6.0	7.2	9.2	6.1	6.3	6.2	5.9	6.7
C33	0.2	–	0.8	0.3	–	–	0.3	–	0.6	0.3
C34	40.6	48.1	47.2	44.1	53.8	43.3	52.1	46.4	45.7	46.8
C37	0.2	–	–	0.4	–	–	–	0.2	–	0.1
C38	0.2	0.5	0.5	0.5	0.7	–	0.5	–	–	0.3
C39	0.3	–	0.3	–	–	–	0.3	–	–	0.1
C30-C31	0.5	0.2	0.3	0.8	0.4	0.7	0.5	1.0	0.7	0.6
C33-C34	40.8	48.1	48.0	44.4	53.8	43.3	52.4	46.4	46.3	47.1
C30-C39	49.8	54.5	55.1	53.4	64.2	50.0	60.1	53.7	53.0	54.9

younger to older age categories (Table 7.1, age 45–64 and 65+, upward trend). There were 3.5% of patients in the 0–44 age group at diagnosis, 44.5% of patients in the 45–64 age group, and 52.0% of patients above 65 years of age (Table 7.3, Figure 9). A similar age distribution was determined at death. There were 2.1% of patients in the

0–44 age group, 40.6% of patients in the 45–64 age group, and 57.3% of patients above 65 years of age (Table 8.3). There was at least a distinguished fourfold difference in the incidence and the mortality rate between males and females in every age category and in total, which clearly shows that these cancers are cancers dominating the

TABLE 5
THE AGE-STANDARDIZED INCIDENCE AND MORTALITY RATES IN RELATION WITH AGE FOR MALIGNANT NEOPLASMS OF RESPIRATORY AND INTRATHORACIC ORGANS (C30-C39) IN THE OBC, PERIOD 2001–2009

Age	Incidence rate/100,000 EU population				Mortality rate/100,000 EU population			
	Females				Females			
	2001–2009	COF(S)	Trendline	R	2001–2009	COF(S)	Trendline	R
20–44	3.7	R ² =0.468	DW	Moderate	2.1	N/A	–	–
45–64	36.0	R ² =0.063	UW	No	27.1	R ² =0.096	UW	No
65+	80.9	R ² =0.275	DW	Moderate	74.2	R ² =0.466	UW	Moderate
	Males				Males			
	2001–2009	COF(S)	Trendline	R	2001–2009	COF(S)	Trendline	R
	0–19	0.3	N/A	–	–	N/A	–	–
20–44	7.0	R ² =0.318	DW	Moderate	3.4	N/A	–	–
45–64	210.3	R ² =0.230	DW	Moderate	178.1	R ² =0.018	UW	No
65+	585.2	R ² =0.209	DW	Moderate	592.7	R ² =0.005	UW	No
	Both genders				Both genders			
	2001–2009	COF(S)	Trendline	R	2001–2009	COF(S)	Trendline	R
	20–44	5.4	R ² =0.660	DW	Strong	2.8	R ² =0.030	DW
45–64	120.3	R ² =0.114	DW	Weak	100.1	R ² =0.038	UW	No
65+	263.9	R ² =0.342	DW	Moderate	262.4	R ² =0.083	UW	No

COF(S) – Coefficient of determination (strength), R – Relationship, DW – downward, UW – upward

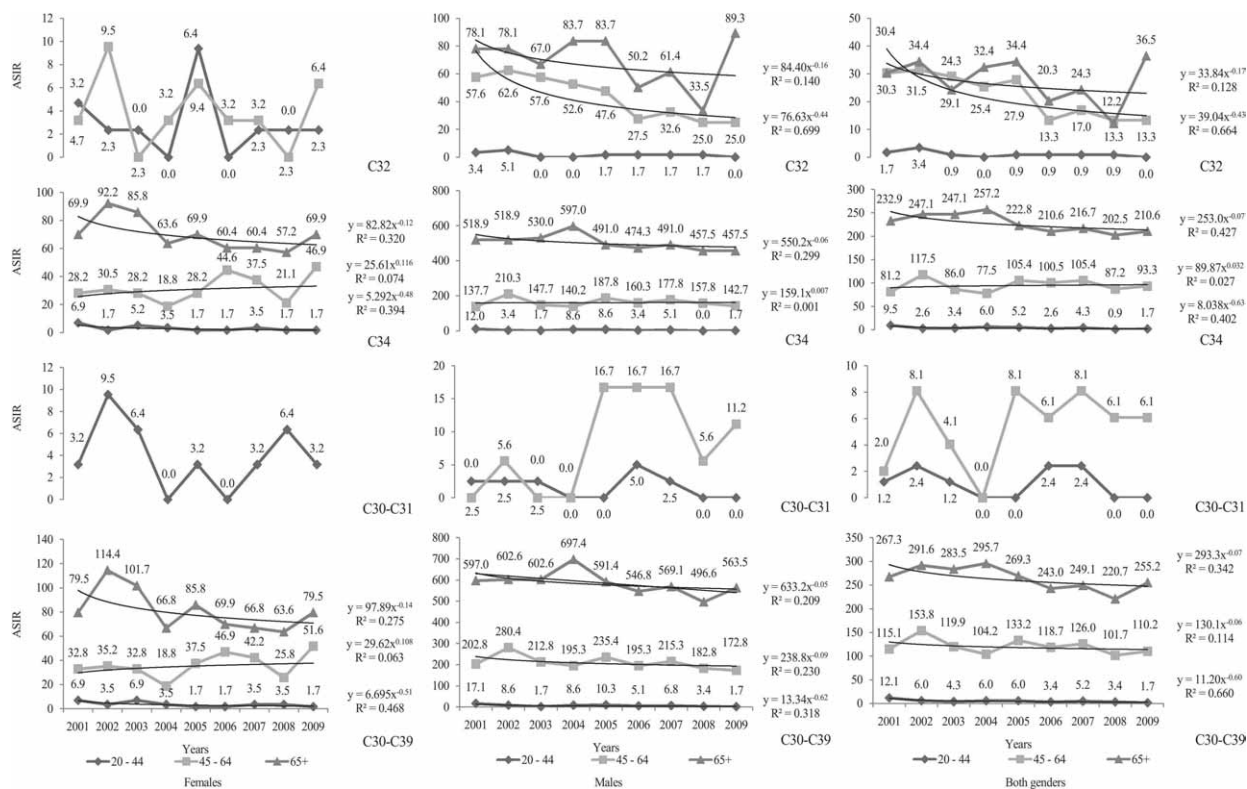


Fig. 6. The cancer age-standardized incidence rate (ASIR) for C30-C39 (selected cancer sites) in the period 2001–2009 in the OBC per 100,000 inhabitants using the EU standard population. The downward trendline suggests that strong and mostly moderate relationships exist for selected cancer sites, as well as for the entire group of cancer for all age groups. The exception (a weak upward trendline) was only in females, age 45–65 years, with cancer site C34 (malignant neoplasm of bronchus and lung). Certain age groups of cancer are not shown as well as related trendlines because of the small and inconsistent number of cancer patients.

TABLE 6
THE 5-YEARS RELATIVE SURVIVAL RATES FOR MALIGNANT NEOPLASMS OF RESPIRATORY AND
INTRATHORACIC ORGANS (C30-C39) IN THE OBC, PERIOD 2001–2005

Females – % (number of survival cases)					
ICD-10	0–19	20–44	45–64	65+	All ages
C30	–	–	0.0	53.3 (2)	40.5 (2)
C31	–	–	–	71.1 (2)	67.5 (2)
C32	–	100.1 (2)	50.5 (4)	30.5 (2)	47.7 (8)
C33	–	–	–	0.0	0.0
C34	–	38.5 (5)	19.9 (12)	11.2 (12)	15.6 (29)
C37	–	–	–	35.5 (1)	33.8 (1)
C38	–	–	0.0	0.0	0.0
C39	–	–	–	106.6 (1)	101.3 (1)
C30-C31	–	–	0.0	60.9 (4)	50.6 (4)
C33-C34	–	38.5 (5)	19.9 (12)	11.1 (12)	15.5 (29)
C30-C34 C38.4	–	46.7 (7)	23.1 (16)	14.9 (18)	19.4 (41)
C37-C38 (no C38.4)	–	–	0.0	21.3 (1)	16.9 (1)
C30-C39	–	46.7 (7)	22.8 (16)	15.8 (20)	19.7 (43)
Males – % (number of survival cases)					
ICD-10	0–19	20–44	45–64	65+	All ages
C30	–	–	101.0 (1)	53.3 (1)	67.5 (2)
C31	–	100.1 (1)	50.5 (1)	0.0	40.5 (2)
C32	100.1 (1)	50.1 (4)	40.8 (46)	21.3 (13)	34.5 (64)
C33	–	–	0.0	0.0	0.0
C34	–	24.2 (7)	9.1 (31)	8.0 (34)	8.8 (72)
C38	–	–	0.0	0.0	0.0
C39	–	0.0	0.0	–	0.0
C30-C31	–	100.1 (1)	67.4 (2)	26.6 (1)	50.6 (4)
C33-C34	–	24.2 (7)	9.0 (31)	8.0 (34)	8.8 (72)
C30-C34 C38.4	100.1 (1)	31.6 (12)	17.2 (79)	9.8 (48)	13.8 (140)
C37-C38 (no C38.4)	–	–	0.0	0.0	0.0
C30-C39	100.1 (1)	30.8 (12)	17.1 (79)	9.8 (48)	13.7 (140)
Both genders – % (number of survival cases)					
ICD-10	0–19	20–44	45–64	65+	All ages
C30	–	–	50.5 (1)	53.3 (3)	50.6 (4)
C31	–	100.1 (1)	50.5 (1)	42.6 (2)	50.6 (4)
C32	100.1 (1)	60.1 (6)	41.4 (50)	22.2 (15)	35.6 (72)
C33	–	–	0.0	0.0	0.0
C34	–	28.6 (12)	10.7 (43)	8.7 (46)	10.1 (101)
C37	–	–	–	35.5 (1)	33.8 (1)
C38	–	–	0.0	0.0	0.0
C39	–	0.0	0.0	106.6 (1)	33.8 (1)
C30-C31	–	100.1 (1)	50.5 (2)	48.5 (5)	50.6 (8)
C33-C34	–	28.6 (12)	10.6 (43)	8.6 (46)	10.0 (101)
C30-C34 C38.4	100.1 (1)	35.9 (19)	17.9 (95)	10.8 (66)	14.8 (181)
C37-C38 (no C38.4)	–	–	0.0	13.3 (1)	9.2 (1)
C30-C39	100.1 (1)	35.2 (19)	17.8 (95)	11.0 (68)	14.8 (183)

»–« – no cases, 0.0 – no survival cases

TABLE 7
THE AGE DISTRIBUTION AT DIAGNOSIS FOR MALIGNANT NEOPLASMS OF RESPIRATORY AND INTRATHORACIC ORGANS (C30-C39) IN THE PERIOD 2001–2009

Table 7.1

ICD-10	Age	Both genders			Males			Females		
		2001–2009 (%)	Trend line	COF(S)	2001–2009 (%)	Trend line	COF(S)	2001–2009 (%)	Trend line	COF(S)
C30	20–44	–	–	N/A	28.6	–	N/A	–	–	N/A
	45–64	21.4	–	N/A	71.4	–	N/A	14.3	–	N/A
	65+	78.6	–	N/A	–	–	N/A	85.7	–	N/A
C31	20–44	10.0	–	N/A	7.7	–	N/A	14.3	–	N/A
	45–64	25.0	–	N/A	30.8	–	N/A	14.3	–	N/A
	65+	65.0	–	N/A	61.5	–	N/A	71.4	–	N/A
C32	0–19	0.3	–	N/A	0.4	–	N/A	–	–	N/A
	20–44	4.3	–	N/A	4.0	–	N/A	8.3	–	N/A
	45–64	58.8	DW	R ² = 0.031	59.9	DW	R ² =0.059	45.8	–	N/A
C33	65+	36.5	UW	R ² = 0.135	35.7	UW	R ² =0.175	45.8	–	N/A
	20–44	10.0	–	N/A	16.7	–	N/A	–	–	N/A
	45–64	70.0	–	N/A	66.7	–	N/A	75.0	–	N/A
C34	65+	20.0	–	N/A	16.7	–	N/A	25.0	–	N/A
	20–44	3.1	DW	**R ² =0.628	2.6	DW	**R ² =0.489	5.4	DW	**R ² =0.539
	45–64	42.5	UW	*R ² =0.380	43.4	UW	*R ² =0.165	38.5	UW	**R ² =0.545
C37	65+	54.4	DW	R ² =0.130	54.0	DW	R ² =0.014	56.1	DW	*R ² =0.313
	65+	100.0	DW	*R ² =0.130	–	–	N/A	100.0	–	N/A
	C38	20–44	7.7	–	N/A	11.1	–	N/A	–	–
45–64		30.8	–	N/A	33.3	–	N/A	25.0	–	N/A
65+		61.5	–	N/A	55.6	–	N/A	75.0	–	N/A
C39	20–44	25.0	–	N/A	33.3	–	N/A	–	–	N/A
	45–64	50.0	–	N/A	66.7	–	N/A	–	–	N/A
	65+	25.0	–	N/A	–	–	N/A	100.0	–	N/A
C30–C39	20–44	3.4	DW	**R ² =0.789	3.0	DW	**R ² =0.541	5.4	DW	*R ² =0.401
	45–64	44.5	UW	*R ² =0.226	46.0	UW	R ² =0.009	37.8	UW	**R ² =0.540
	65+	52.0	UW	R ² =0.001	51.0	UW	*R ² =0.112	56.7	DW	*R ² =0.418

Table 7.2

C30		0.7	–	N/A	0.4	–	N/A	1.8	–	N/A
C31		0.9	–	N/A	0.7	–	N/A	1.8	–	N/A
C32	All ages	14.2	DW	**R ² =0.528	15.9	DW	**R ² =0.577	6.2	DW	R ² =0.113
C33		0.5	–	N/A	0.3	–	N/A	1.0	–	N/A
C34		82.8	DW	**R ² =0.619	81.9	DW	**R ² =0.612	86.8	DW	R ² =0.028
C37		0.2	–	N/A	–	–	N/A	1.0	–	N/A
C38		0.6	–	N/A	0.5	–	N/A	1.0	–	N/A
C39		0.2	–	N/A	0.2	–	N/A	0.3	–	N/A

Table 7.3 The age proportion of each cancer site

	0–44			45–64			65+			All ages		
	BG	F	M	BG	F	M	BG	F	M	BG	F	M
C30	–	–	–	0.1	0.3	0.1	0.5	1.6	0.3	0.7	1.8	0.4
C31	0.1	0.3	0.1	0.2	0.3	0.2	0.6	1.3	0.5	0.9	1.8	0.7
C32	0.7	0.5	0.7	8.3	2.8	9.6	5.2	2.8	5.7	14.2	6.2	15.9
C33	–	–	0.1	0.3	0.8	0.2	0.1	0.3	0.1	0.5	1.0	0.3
C34	2.6	4.7	2.1	35.2	33.4	35.6	45.0	48.7	44.2	82.8	86.8	81.9
C37	–	–	0.1	–	–	0.2	0.2	1.0	0.3	0.2	1.0	0.5
C38	–	–	0.1	0.2	0.3	0.1	0.4	0.8	–	0.6	1.0	0.2
C39	–	–	–	0.1	–	–	–	0.3	–	0.2	0.3	–
C30-C39	3.5	5.4	3.0	44.5	37.8	46.0	52.0	56.7	51.0	100.0	100.0	100.0

R – Relationship, * – moderate R, ** – strong R, *** – very strong and extremely dependable R, COF(S) – Coefficient of determination (strength), N/A – not available COF(S) (small number of cases), DW – downward, UW – upward, «–» – weak or no R, BG – both genders, F – females, M – males

TABLE 8
THE AGE DISTRIBUTION AT DEATH FOR MALIGNANT NEOPLASMS OF RESPIRATORY AND INTRATHORACIC ORGANS (C30-C39) IN THE OBC, PERIOD 2001–2009

Table 8.1

ICD-10	Age	Both genders			Males			Females		
		2001–2009 (%)	Trend line	COF(S)	2001–2009 (%)	Trend line	COF(S)	2001–2009 (%)	Trend line	COF(S)
C30	45–64	12.5	–	N/A	100.0	–	N/A	14.3	–	N/A
	65+	87.5	–	N/A	–	–	N/A	85.7	–	N/A
C31	20–44	7.7	–	N/A	–	–	N/A	25.0	–	N/A
	45–64	38.5	–	N/A	44.4	–	N/A	25.0	–	N/A
	65+	53.8	–	N/A	55.6	–	N/A	50.0	–	N/A
C32	20–44	2.2	–	N/A	2.3	–	N/A	–	–	N/A
	45–64	48.9	DW	R ² =0.057	49.8	UW	R ² =0.053	35.7	–	N/A
	65+	48.9	UW	*R ² =0.185	47.9	DW	R ² =0.229	64.3	–	N/A
C33	45–64	75.0	–	N/A	80.0	–	N/A	66.7	–	N/A
	65+	25.0	–	N/A	20.0	–	N/A	33.3	–	N/A
C34	20–44	2.0	UW	R ² =0.009	1.6	–	N/A	4.1	–	N/A
	45–64	39.5	UW	R ² =0.002	41.0	UW	R ² =0.001	32.6	UW	R ² =0.013
	65+	58.4	DW	R ² =0.001	57.4	DW	R ² =0.003	63.2	UW	R ² =0.000
C37	65+	100.0	–	N/A	100.0	–	N/A	100.0	–	N/A
C38	45–64	33.3	–	N/A	37.5	–	N/A	25.0	–	N/A
	65+	66.7	–	N/A	62.5	–	N/A	75.0	–	N/A
C39	20–44	33.3	–	N/A	33.3	–	N/A	–	–	N/A
	45–64	66.7	–	N/A	66.7	–	N/A	–	–	N/A
C30-C39	20–44	2.1	DW	*R ² =0.370	1.7	–	N/A	4.0	–	N/A
	45–64	40.6	UW	R ² =0.000	42.3	DW	R ² =7E–06	32.3	UW	R ² =0.057
	65+	57.3	UW	R ² =0.008	56.0	UW	R ² =0.011	63.7	DW	R ² =0.006

Table 8.2

ICD-10	Age	Both genders			Males			Females		
		2001–2009 (%)	Trend line	COF(S)	2001–2009 (%)	Trend line	COF(S)	2001–2009 (%)	Trend line	COF(S)
C30	All ages	0.4	–	N/A	0.1	–	N/A	2.2	–	N/A
C31		0.7	–	N/A	0.6	–	N/A	1.2	–	N/A
C32		11.9	DW	*R ² =0.187	13.4	DW	*R ² =0.212	4.3	UW	R ² =0.081
C33		0.4	–	N/A	0.3	–	N/A	0.9	–	N/A
C34		85.6	UW	*R ² =0.206	84.8	UW	*R ² =0.254	89.5	DW	R ² =0.069
C36		0.2	–	N/A	0.1	–	N/A	–	–	N/A
C38		0.6	–	N/A	0.5	–	N/A	0.6	–	N/A
C39		0.2	–	N/A	0.2	–	N/A	1.2	–	N/A

Table 8.3 The age proportion of each cancer site

	0–44			45–64			65+			All ages		
	BG	F	M	BG	F	M	BG	F	M	BG	F	M
C30	–	–	–	0.1	0.3	–	0.4	1.8	0.1	0.4	2.2	0.1
C31	0.1	0.3	–	0.3	0.3	0.2	0.4	0.6	0.3	0.7	1.2	0.6
C32	0.3	–	0.3	5.8	1.5	6.7	5.8	2.8	6.4	11.9	4.3	13.4
C33	–	–	–	0.3	0.6	0.2	0.1	0.3	0.1	0.4	0.9	0.3
C34	1.8	3.7	1.4	33.8	29.2	34.8	5–	56.6	48.7	85.6	89.5	84.8
C39	–	–	–	–	–	–	0.2	0.6	0.1	0.2	0.6	0.1
C30-C39	2.1	4.0	1.7	40.6	32.3	42.3	57.3	63.7	56.0	10–	10–	10–

R – Relationship, * – moderate R, ** – strong R, *** – very strong and extremely dependable R, COF(S) – Coefficient of determination (strength), N/A – not available COF(S) (small number of cases), DW – downward, UW – upward, »–« – weak or no R, BG – both genders, F – females, M – males

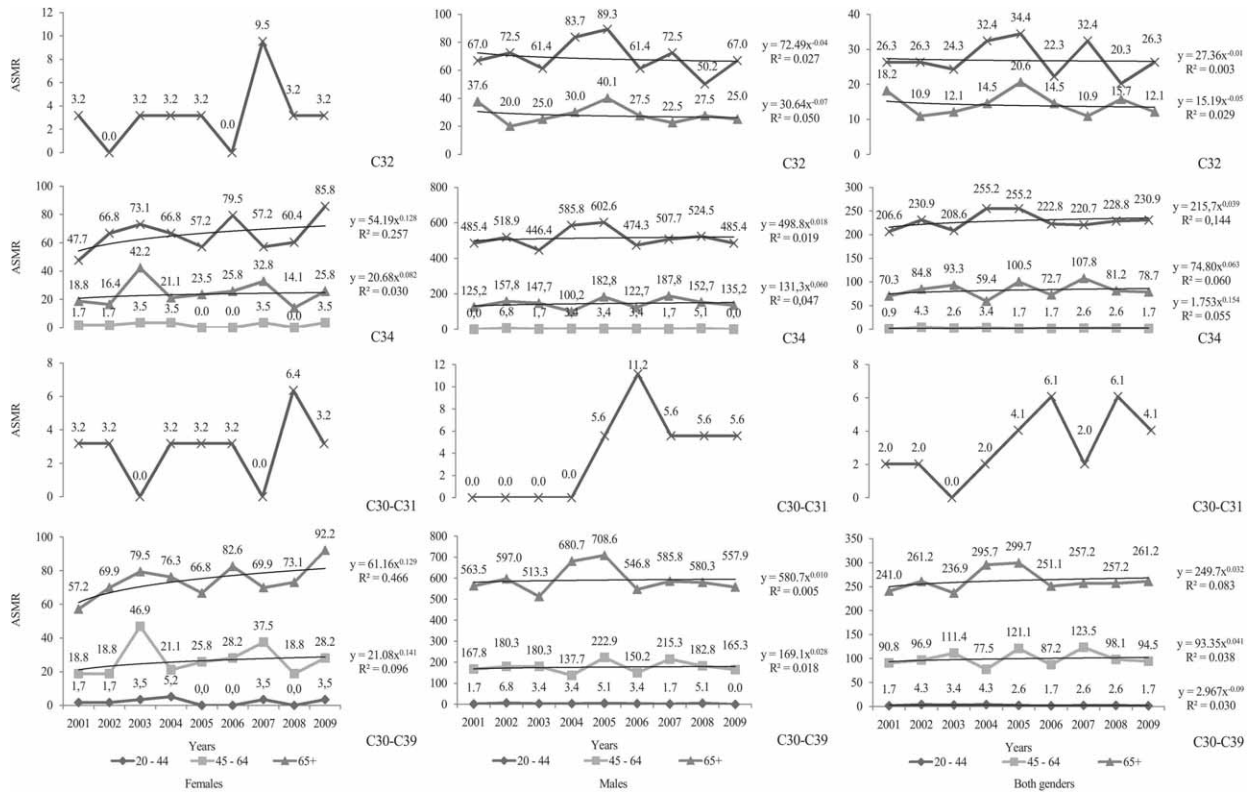


Fig. 7. The cancer age-standardized mortality rate (ASMR) for C30-C39 (selected cancer sites) in the period 2001–2009 in the OBC per 100,000 inhabitants using the EU standard population. The upward trendline suggests that a weak relationships exist for selected cancer sites, as well as for the entire group of cancer. The exceptions (a weak downward trendline) were only in males age 45–65 and 65+ years with cancer site C32 (malignant neoplasm of larynx). Certain age groups of cancer are not shown as well as related trendlines because of the small and inconsistent number of cancer patients.

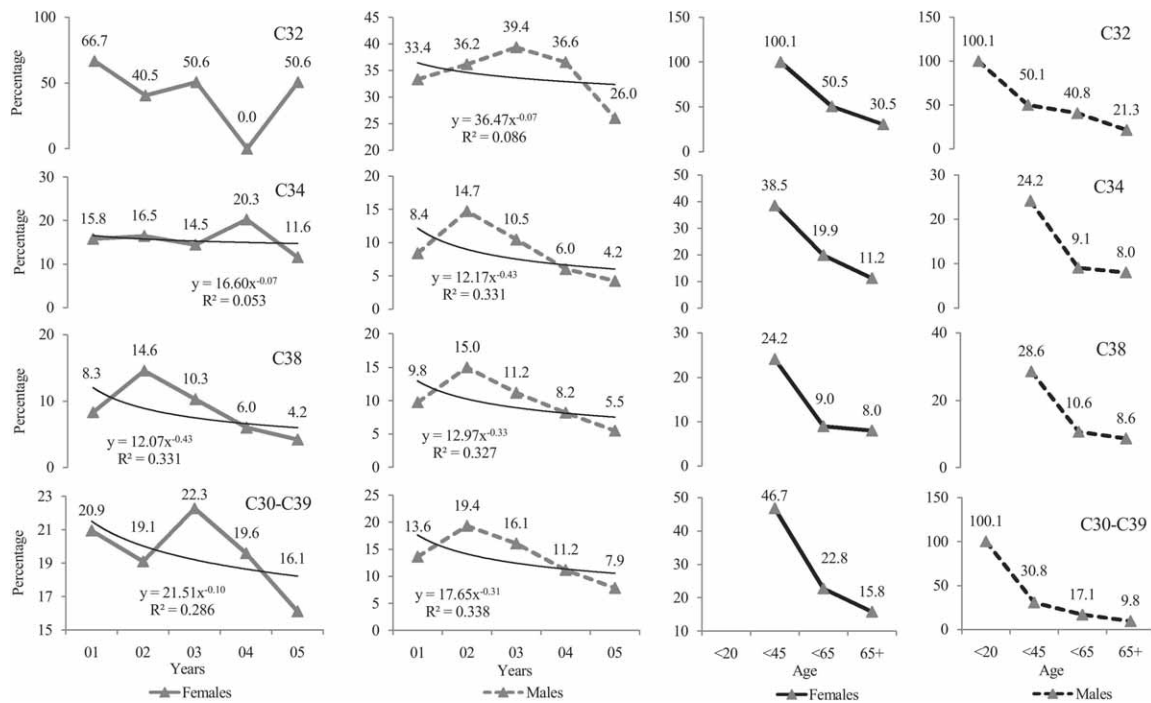


Fig. 8. The age-standardized 5-year relative survival rate for C30-C39 in the OBC in the 2001–2005 period. The downward trendlines suggests that a median relationship exist for C30-C39 between 5-years relative survival rate and years ($R^2=0.286$ and $R^2=0.338$, respectively ($R^2>0.16<0.48$)) in females and males.

TABLE 9
THE NUMBER OF CANCER HOSPITALIZATIONS AND THE AVERAGE LENGTH OF STAY IN HOSPITAL FOR MALIGNANT NEOPLASMS OF RESPIRATORY AND INTRATHORACIC ORGANS (C30-C39) IN THE PERIOD 2001–2009

	Females – number of hospital admissions					Females – average length of stay				
	0–19	20–44	45–64	65+	All ages	0–19	20–44	45–64	65+	All ages
C30	–	–	2	9	11	–	–	14.0	16.1	15.7
C31	–	4	1	18	23	–	9.3	6.0	23.4	20.2
C32	–	3	30	28	61	–	23.7	18.0	25.5	21.7
C33	–	–	4	2	6	–	–	15.5	7.0	12.7
C34	–	43	320	313	676	–	13.5	14.8	15.6	15.1
C37	–	–	–	4	4	–	–	–	16.5	16.5
C38	1	–	2	9	12	14.0	–	24.0	22.0	21.7
C39	–	–	–	1	1	–	–	–	4.0	4.0
C30-C39	1	50	359	384	794	14.0	13.8	15.1	16.8	15.8

	Males – number of hospital admissions					Males – average length of stay				
	0–19	20–44	45–64	65+	All ages	0–19	20–44	45–64	65+	All ages
C30	–	–	3	23	26	–	–	6.7	19.3	17.9
C31	1	6	13	12	32	11.0	18.8	20.1	30.5	23.5
C32	1	24	579	270	874	24.0	16.3	20.6	19.9	20.3
C33	–	2	6	5	13	–	26.5	25.2	10.8	19.8
C34	–	83	1252	1246	2581	–	12.2	14.7	14.8	14.6
C37	–	–	1	–	1	–	–	36.0	–	36.0
C38	1	2	4	9	16	2.0	20.0	23.5	16.8	17.9
C39	–	1	3	–	4	–	20.0	11.7	–	13.8
C30-C39	3	118	1861	1565	3547	12.3	13.8	16.6	15.8	16.2

	Both genders – number of hospital admissions					Both genders – average length of stay				
	0–19	20–44	45–64	65+	All ages	0–19	20–44	45–64	65+	All ages
C30	–	–	5	32	37	–	–	9.6	18.4	17.2
C31	1	10	14	30	55	11.0	15.0	19.1	26.3	22.1
C32	1	27	609	298	935	24.0	17.1	20.5	20.4	20.4
C33	–	2	10	7	19	–	26.5	21.3	9.7	17.6
C34	–	126	1572	1559	3257	–	12.7	14.7	14.9	14.7
C37	–	–	1	4	5	–	–	36.0	16.5	20.4
ght C38	2	2	6	18	28	8.0	20.0	23.7	19.4	19.5
C39	–	1	3	1	5	–	20.0	11.7	4.0	11.8
C30-C39	4	168	2220	1949	4341	12.8	13.8	16.4	16.0	16.1

male population (the mortality ratio males to females was 83.2:16.8% and the incidence ratio males to females was 81.8:18.2). There was also a difference in the age distribution between males and females. Females aged 65+ were frequently diagnosed with cancer and died of it more often (56.7%, (moderate downward trendline, $R^2=0.418$) and 63.7% (barely downward trendline, $R^2=0.006$), respectively) than males did (51.0% (slightly upward trendline, $R^2=0.112$) and 56.0% (barely downward trendline, $R^2=0.011$), respectively). Unfortunately, in females aged 45–64 increasing the proportion of patients

($R^2=0.540$) (Table 7.1). In females at diagnosis, there was completely opposite data for the 45–64 age group. There was also a relevant difference in the age distribution between males and females. Females aged 65+ at diagnosis got sick from C30-C39 cancers more frequently, by 5.7 percent points (56.7%), then males of the same age did (51.0%). Also, regarding the 45–64 age group, males got C30-C39 cancers more frequently, by 8.2 percent points (46.0%) than females were (37.8). Similar relations featured the age distribution at death (Table 8.1).

TABLE 10
 THE YEARS OF DIAGNOSIS AND THE AVERAGE LENGTH OF STAY IN HOSPITAL FOR MALIGNANT NEOPLASMS
 OF RESPIRATORY AND INTRATHORACIC ORGANS (C30-C39) IN THE PERIOD 2001–2009

Year	Females – number of hospital admissions					Females – average length of stay				
	0–19	20–44	45–64	65+	All ages	0–19	20–44	45–64	65+	All ages
2001	–	8	39	47	94	–	13.3	17.1	15.1	15.8
2002	–	5	45	53	103	–	8.4	12.0	16.8	14.3
2003	–	12	42	49	103	–	15.4	13.9	17.1	15.6
2004	–	5	25	31	61	–	21.4	15.4	11.7	14.0
2005	–	1	40	43	84	–	9.0	15.2	17.5	16.3
2006	–	6	46	40	92	–	10.0	19.3	17.4	17.9
2007	–	4	44	41	89	–	15.3	17.5	20.1	18.6
2008	1	2	29	48	80	14.0	17.5	12.6	18.5	16.3
2009	–	7	49	32	88	–	12.0	12.5	15.2	13.4
2001–2009	1	50	359	384	794	14.0	13.8	15.1	16.8	15.8

Year	Males – number of hospital admissions					Males – average length of stay				
	0–19	20–44	45–64	65+	All ages	0–19	20–44	45–64	65+	All ages
2001	1	24	193	183	401	11.0	11.8	16.4	16.5	16.1
2002	–	29	232	171	432	–	8.7	17.0	16.7	16.3
2003	1	11	225	174	411	24.0	16.3	15.5	16.0	15.8
2004	1	10	214	193	418	2.0	15.6	19.2	17.5	18.3
2005	–	13	208	170	391	–	18.2	19.1	16.2	17.8
2006	–	9	205	166	380	–	21.8	16.8	15.0	16.1
2007	–	6	208	176	390	–	11.8	14.8	16.1	15.4
2008	–	10	181	163	354	–	14.3	14.5	13.6	14.1
2009	–	6	195	169	370	–	18.8	15.9	14.4	15.3
2001–2009	3	118	1861	1565	3547	12.3	13.8	16.6	15.8	16.2

Year	Both genders – number of hospital admissions					Both genders – average length of stay				
	0–19	20–44	45–64	65+	All ages	0–19	20–44	45–64	65+	All ages
2001	1	32	232	230	495	11.0	12.2	16.5	16.2	16.1
2002	–	34	277	224	535	–	8.6	16.2	16.8	15.9
2003	1	23	267	223	514	24.0	15.8	15.3	16.3	15.7
2004	1	15	239	224	479	2.0	17.5	18.8	16.7	17.8
2005	–	14	248	213	475	–	17.6	18.4	16.5	17.5
2006	–	15	251	206	472	–	17.1	17.2	15.5	16.5
2007	–	10	252	217	479	–	13.2	15.3	16.9	16.0
2008	1	12	210	211	434	14.0	14.8	14.2	14.7	14.5
2009	–	13	244	201	458	–	15.2	15.2	14.5	14.9
2001–2009	4	168	2220	1949	4341	12.8	13.8	16.4	16.0	16.1

In the 2001–2009 period, a total of 2,124 people were diagnosed with C30–C36 cancers and they were admitted to the OBC hospitals 4,341 times where they spent a total of 69,946 days. An average patient was admitted to hospital 2.04 times during the course of their illness with the average length of stay in hospital (LOSH) of 16.1 days (Table 9, Figure 10). The share of hospitalizations of patients under 45 years of age in the total hospitaliza-

tions amounted to 3.96%. The number of hospitalizations and the LOSH are both the greatest in the 45–64 group (2,220 admissions (or 51.14% of all admissions) and the average length of stay of 16.4 days). A bit smaller number of hospitalizations and a shorter length of stay were registered among patients aged 65+. The hospitalizations lasted 0.4 day longer in males than in females. As far as males from the 45–64 age group are concerned,

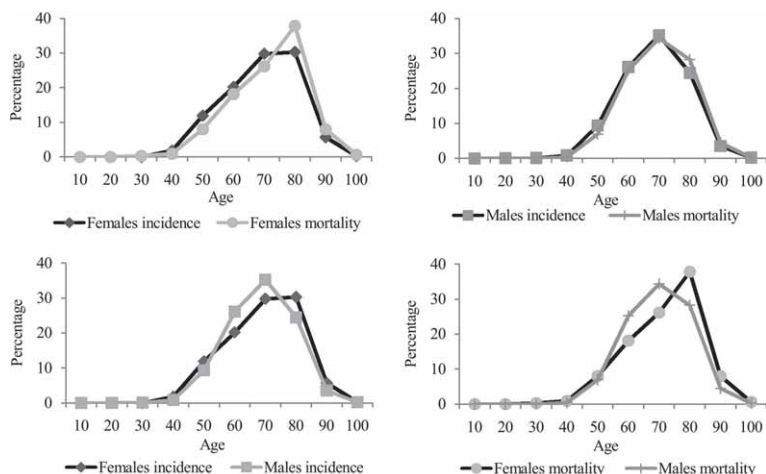


Fig. 9. The age distribution for malignant neoplasms of respiratory and intrathoracic organs (C30-C39) in the period 2001–2009, both genders.

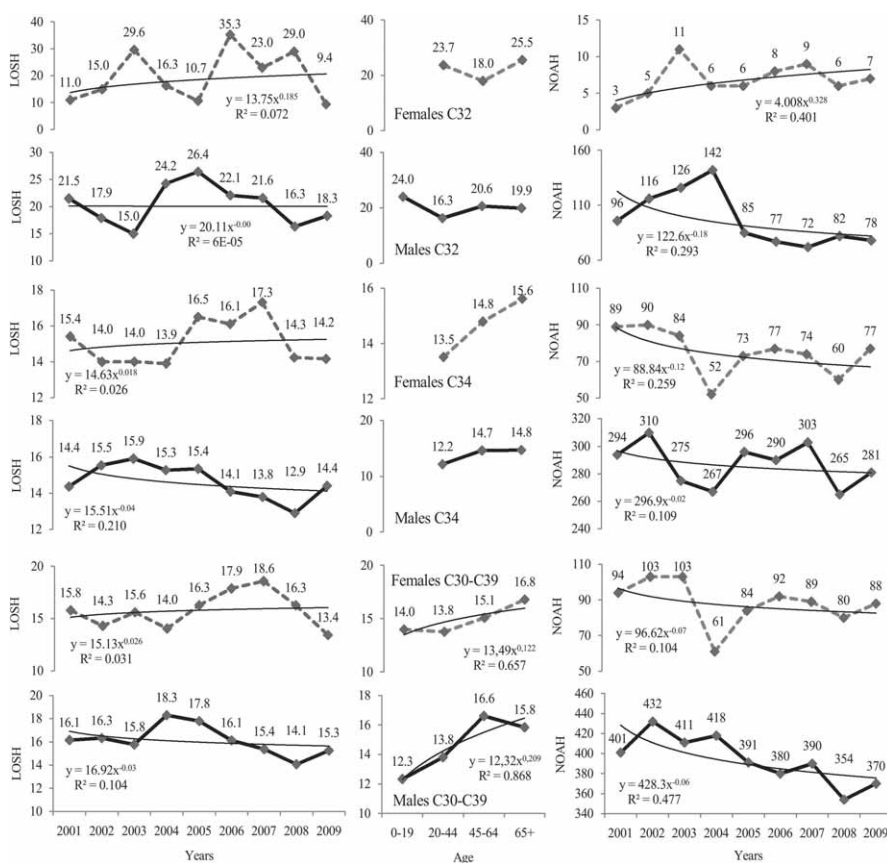


Fig. 10. Length of stay in hospital (LOSH, in days) for cancer group C30-C39 in the OBC in the 2001–2009 period. The downward trendline suggests that a weak relationship ($R^2=0.104$) exists the LOSH and years and NOAH and year ($R^2=0.477$) in both genders except for LOSH for C30-C39 cancer group in females ($R^2=0.031$).

they spent 1.5 days more in hospital on average than females did. Also, males from the 44–64 group spent 0.4 days more in hospital on average than males from the 65+ group did.

In both genders, the number of total hospitalizations in the period from 2001 to 2009 unequally but gradually

fell (Table 10, Figure 10). The downward trendline from the year 2001 to the year 2009 was strong in males ($R^2=0.477$) and slightly in females ($R^2=0.104$). The LOSH did not show any change in trend. It reached its peak in 2004 and 2005 in males and in 2006 and 2007 in females. Since this cancer group was typical for males, they con-

stituted 81.7% of all hospitalizations and 82.02% of the total length of stay in hospital.

Discussion

The shortness of the time in which the data of cancer were collected and processed makes it difficult to indicate a particular tendency. In order to make the first assessment on the incidence and mortality trends, the subsequent nine-year period should be taken into consideration too. In the OBC, the C30-C39 cancer incidence rate corresponded in both genders to the C30-C39 cancer mortality rate due to the high fatality of lung cancer. In the 1990s, there was a decline in the C30-C39 cancer incidence rate in developed countries, especially in males, due to various preventive measures¹⁵. In the OBC, the incidence rate of respective cancer group decreases in both genders. This downward trend is moderate in males and very weak in females. Although weak, there is upward trend of incidence rate in females aged 45–64 years. Some indicators show that the overall smoking prevalence in Croatia decreased by 5.2% during 1994–2005 period, which was much more dominant among females (–9.9%) than among males (–0.3%)¹⁶. It is hard to believe that this positive change can have such a quick impact on general decline in the incidence rate of C30-C39 cancer in the OBC. If it is true, the prevalence of smoking habit appears to be higher in the east regions of inland Croatia (the OBC is part of east region called Slavonia which is depicted as the region with the highest prevalence of cigarette smoking in males) and the north Adriatic region than in other regions^{17,18}. A potential impact of the Homeland War (1991–1995) on the occurrence of lung cancer (as the most frequent cancer site among this cancer group) in the OBC has not been researched yet. This impact might be taken into account due to the devastation of the heavy metal industry in Osijek which is the county centre and hosts 1/3 of the county inhabitants. The age standardized incidence rates in females are more than 6-fold lower than in males, which is similar to the national data. Comparing to the data on the national level in males, the C30-C39 cancer age-standardized incidence rate in the OBC was higher and the corresponding mortality rate was not significantly lower. In other words, the incidence and mortality rates in the OBC were among the highest in Europe, though the data on females do not fit into that assertion since they reveal lower rates compared to the Croatian and EU average^{19–22}. Unfortunately, the mortality rate in both genders increases, however, in males very slowly, while the rate in females increases moderately.

With respect to the entire OBC cancer population, the median age at diagnosis (MADg) of C30-C39 cancers was 64.5 years, which implies the fact that C30-C39 cancer patients were diagnosed with cancer 2.5 years later on average than the total cancer patient corpus in the OBC (females 61.3 and males 64.1 years)⁹. In both genders, MADg increased strongly ($R^2=0.736$) as a result of extremely strong upward trend in males ($R^2=0.869$) due to

sixfold greater numerical dominance of males. A similar trend has been reported in many European countries²³, but in Australia, the median age at diagnosis in both genders of C30-C39 cancers was 70 years in 2008²⁴. There were strong upward MADg trends in males aged 45–64 and 65+ years for C34 and C30-C39 group indicating that the age at diagnosis of this cancer group moves into the older age group.

The fact that the median age at death (MAD) was 66.2 years suggests that patients in the OBC survived an average of only 1.7 years after the diagnosis, which is two times less than in the USA²⁵. There was strong upward MAD trend in males for C34 and in both genders for whole cancer group.

Despite a raised survival rate from many other types of cancer in recent years, C30-C39 cancers are still the most lethal ones, one of the most common cancers in Europe and are accompanied with the lowest 5-year relative survival rate in both genders. This rate amounts to approximately 15%. Such a low relative survival rate is mainly caused by the time and the stage of the illness when the diagnosis is made and hence at that moment, these cancers are often well-advanced and treatment options are limited^{26,27}. Lung cancer in Croatia was the most common cancer in males and the fifth most common cancer in females²⁰. Unfortunately, it is difficult to find more recent data on the survival from C30-C39 cancer in Croatia. The available literature includes only one study on 5-year cancer survival prepared in 2006 and it elaborates the data on cancer from 1988 to 1998 in Croatia. In the OBC, the 5-year relative survival rate was similar to that in Europe and the USA²⁶. It should be noted that every Croatian citizen has an equal right to the highest level of medical care regardless of their financial status. In many developed countries, the highest health care quality is reserved to those who can pay for it. Therefore, the data presented in this article should be deemed as representative in terms of the OBC despite some limitations listed below. The authors share an opinion that these limitations do not significantly influence the final data and conclusions.

An average hospitalized patient is admitted to hospital two times during the course of their illness and stayed there for 16.1 days on average. Unfortunately, mandatory hospital reports did not encompass data on the performed procedures, so it is difficult (fields for these data are empty) to compare the length of stay in hospital in the OBC with those from other countries, except just for the sake of general information. In some hospital in the USA, the average length of stay due to lung cancer was 8 days while this figure in the OBC was 14.7 days²⁸. The number of hospital admissions decreased strong in males and slightly in females over the 2001–2009 period. However, both genders slightly extended their length of stay in hospitals on average. Females stay shorter 0.4 day in hospital.

The cancer of the respiratory system (especially lung cancer) is on a global scale, as well as in the OBC, still a very large problem due to its high mortality. In some de-

veloped countries, the incidence of this cancer has decreased as a result of long-running campaign against smoking. In Croatia, including the OBC, such a campaign was initiated relatively late (in 1996). Moreover, the period of monitoring of this cancer group was short and thus one can not (in our opinion) connect the decreased incidence of cancer of the respiratory system in the OBC with the campaign against smoking. The fact is that the 5-year survival rate of patients with the cancer of respiratory system is similar to the respective EU average. This information indicates that the level of the quality of care of patients with the cancer of respiratory system in the OBC is at the same level of the quality of

this care in the EU. The health authorities should work on maintaining the quality of primary and hospital care as well on raising the people's awareness of the problem through preventive programs.

Limitations

Patients who were treated outside the two hospitals in the OBC are not registered with the IPHO. Despite the efforts to obtain this information (it exist at the national level) in its original form, the authors were unable to obtain those data for unknown reasons. Therefore, these data on cancer in the OBC may differ from official state data on cancer in the OBC.

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RAK DIŠNOG SUSTAVA I PRSIŠTA (C30-C39) U OSJEČKO-BARANJSKOJ ŽUPANIJI, HRVATSKA

SAŽETAK

Zavod za javno zdravstvo Osječko-baranjske županije je u suradnji s različitim tijelima državne uprave i Maticom umrlih na razini županije prikupljao i obradio podatke o osobama oboljelih od raka s područje Osječko-baranjske županije (OBC) koristeći se obvezatnim bolničkim prijavama oboljelih osoba. Za šifriranje raka korištena je Međunarodna klasifikacija bolesti, 10-ta revizija, a u članku je obrađena grupa raka dišnih i intratorakalnih organa s oznakom za grupu C30-C39. Cilj rada je prikazati veličinu problema i opterećenost zdravstvenog sustava karcinomima dišnog sustava C30-C39 u OBC u razdoblju od 2001-2009. Članak obrađuje incidenciju i smrtnost, dobnu raspodjelu, prosječnu dob oboljelih i umrlih, 5-godišnje relativno preživljavanje te broj i dužinu hospitalizacija u bolnicama OBC. Od ukupnog broja oboljelih u cijelom razdoblju bilo je 18,2% žena i 81,8% muškaraca. U 9-godišnjem promatranom vremenu stopa incidencije (119.5/100,000) u muškaraca pada, dok se stopa smrtnosti ne mijenja (110.9/100,000). Stopa smrtnosti u žena (15.7/100,000) u istom periodu umjereno raste. Dobno standardizirana stopa incidencije je u muškaraca šestorostruko viša nego u žena. Srednja dob u trenutku postavljanja dijagnoze raka je bila 64,5 godine za oba spola što je za 4.8 godine više nego što je srednja dob u trenutku postavljanja dijagnoze svih grupa raka za oba spola u OBC. 5-godišnje relativno preživljavanje je bilo 14,8%, u muškaraca 13,7%, a u žena 19,7%. U trenutku dijagnoze raka bronha i pluća muškarci su prosječno mlađi za 1 godinu od žena s istim rakom. Prosječno se jedna osoba oboljela od raka ove skupine hospitalizira 2.0 puta tijekom trajanja bolesti, a prosječna dužina hospitalizacije je 16.1 dana. Broj hospitalizacija oboljelih oba spola pada tijekom 9-godišnjeg perioda. U oba spola se neznatno skraćuje dužina hospitalizacije. Žene borave 0.4 dana u bolnici duže nego muškarci. Ukupna stopa incidencije i smrtnosti od raka C30-C39 u OBC je među najvišima u Europi. Ipak, u žena OBC ona je niža nego što je u Hrvatskoj i u Europi. Ostali podaci u OBC su slični onima iz Europe.