



ORIGINAL PAPER

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## Comparative analysis of the incidence of Oropharyngeal cancer and Laryngeal cancer in the region of south-eastern Poland from 1980 to 2013

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### ABSTRACT

**Introduction.** The incidence of head and neck cancers in Poland demonstrated a general tendency to stabilize in the last two decades. However, a global phenomenon in the change of morbidity structure in terms of the specific anatomical location is observed, which will probably increasingly apply also to Poland.

**Aim.** The aim of the study was to present the changes that have occurred in the structure of the incidence of oropharyngeal cancer in comparison to laryngeal cancer in the period from 1980 to 2013, in the region of south-eastern Poland and the whole country.

**Material and methods.** A retrospective analysis of the incidence due to the head and neck organ cancer in 1980-2013 in the region of south-eastern Poland and the whole country was performed based on demographic data from the Provincial Statistical Office in Rzeszow and Podkarpackie Cancer Register as well as the Department of Epidemiology, Oncology Centre in Warsaw.

**Results and conclusion.** In the last three decades, the percentage of laryngeal cancer incidence in women (13% vs 18%) as well as oropharyngeal cancer (18.2% vs 21.6%) was lower in Podkarpacie than in Poland overall. The incidence of oropharyngeal cancer in men in Podkarpacie was lower in the analyzed period than in Poland overall, and only in the last 3 years of observation has it reached a value close to the average for the country. The incidence of laryngeal cancer in men showed a dramatic downward trend both in Poland and in the Podkarpacie province, whereby both in terms of incidence rates and standardized rates and percentages – it is far more pronounced in the analyzed province.

**Keywords.** oropharyngeal cancer, laryngeal cancer, incidence.

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## Introduction

After a period of dynamic increase, mainly in the 70s and 80s of the last century, the incidence of the head and neck cancers in Poland demonstrated a tendency to stabilize in the last two decades.<sup>1-3</sup> The phenomenon observed in Western Europe and the United States is a change in the structure of morbidity in terms of specific anatomical locations of cancer in the head and neck. This incidence of typical squamous cell cancers dependent on exposure to e.g. tobacco smoke, is decreasing. The most common tumor in this group is laryngeal carcinoma. At the same time, the number of human papilloma virus (HPV) dependent cancers is increasing. Typically, they are located in the oropharynx and the oral cavity.<sup>4-8</sup> HPV dependent cancers as compared to typical head and neck organ cancers are a distinct disease entity. In general, they occur in younger people, often those with high socio-economic status, that are usually fit. HPV dependent cancer is characterized by molecular alterations, greater susceptibility to chemotherapy and radiation and a better prognosis.<sup>9-13</sup> The increasing role of HPV infection with gradually decreasing importance of traditional etiopathogenetic factor of squamous cell carcinoma in the head and neck area, that is exposure to tobacco smoke and alcohol, results in a worldwide trend to change the structure of disease localization, which probably applies also to Poland.

## Aim of the study

The aim of this study is to present the changes in the structure of oropharyngeal cancers incidence compared to the laryngeal cancers in 1980–2013 in the region of south-eastern Poland and across the country.

## Material and methods

A retrospective analysis of the incidence due to the head and neck organ cancer in 1980–2013 in the region of south-eastern Poland, including from 1980–1998 the areas of former Krosno, Przemysl, Rzeszow and Tarnobrzeg provinces, and since 1999 – the area of the present Podkarpackie province.

Using conventional statistical methods, based on demographic data from Provincial Statistical Office in Rzeszow and Podkarpackie Cancer Register – incidence rates and structure indicators (percentage) for the carcinomas located in C01, C09, C10 and C32 in ICD10 were calculated. The calculation of standardized rates for the region of south-eastern Poland was possible since 1999, due to changes in the administrative division of the country. Based on the published data of the Department of Epidemiology, Oncology Centre in Warsaw, similar data for Poland were compiled.

In 1997–1998, due to strikes in Health Care, cancer reports were not filled in, therefore, there is no data available for this period for both Poland and the south-eastern Poland, which was marked on the charts.

## Results

In 1980–2013, in the region of south-eastern Poland, 10,046 cases of the head and neck cancer were registered, including 8,341 in men (87%) and 1,707 in women (13%). In this group 4,029 new cases of laryngeal cancer were registered, including 3,716 in men (92.2%) and 313 in women (8.0%). The absolute number of new cases per year in men, which was increasing from the 60's and was 77 in 1980, reached its peak of 164 cases in 1990 and then gradually decreased to 84 in 2013. The incidence among women in 1980 was 8 and reached a highest value of 19 cases in 2002 and then a decrease in the number of cases to 11 in 2013 was recorded. In the region of south-eastern Poland, incidence rates among men in the analyzed period increased from 7.8/100 thousand in 1980 to 15.1/100 thousand in 1990, and then it gradually decreased to 8.1/100 thousand in 2013.

Among women, the incidence rate increased from 0.8/100 thousand in 1980 to 1.3/100 thousand in 1990 and 1.8/100 thousand in 2002, then it dropped to 1.0/100 thousand in 2013. The standardized coefficients which, due to changes in the administrative division of the country, were possible to calculate for the region since 1999, amounted to 7.1/100 thousand for men and decreased to 5.4/100 thousand in 2013. Standardized coefficients for women were 0.5/100 thousand and 0.7/100 thousand, respectively.

The percentage of laryngeal cancer in men in relation to all malignancies in the province - increased from 3.8% in 1980 to 6.0% in 1990. Then it steadily decreased to 1.9% in 2013. The percentage for women grew from 0.4% in 1980 to 0.7% in 2002. Then it decreased to 0.3% in 2013.<sup>3,14</sup> In Poland, 180,285 cases of head and neck cancers were registered in 1980–2013 including 147,917 in men (82%) and 32,368 in women (18.0%).

For Poland, the absolute number of new cases of the laryngeal cancers totaled 81,032 in 1980-2013, including 72,724 (89.7%) in men and 8308 (10.3%) in women. The incidence of laryngeal cancer in men per year, which was steadily growing since the 60's and 70's, rose from 1,916 in 1980 to 2,720 in 1993. Then it decreased to 1,913 in 2013. The incidence in Polish women rose from 174 in 1980 to 321 in 2013 with the highest absolute number of cases – 330 diagnosed in 2003. The incidence rate increased in men from 11.1/100 thousand in 1980 to 14.5/100 thousand in 1993. Then it declined to 10.3/100 thousand in 2013.<sup>15-18</sup>

Incidence rate in women increased from 1.1/100 thousand in 1980 to 1.7/100 thousand in 2003 respectively and oscillated from 1.4/100 thousand to 1.6/100 thousand in 2013. Standardized incidence ratios for men were 10.5/100 thousand in the 1980s reaching 13.3/100 thousand in 1982 and 13.1/100 thousand in 1993. Then it gradually decreased to 6.5/100 thousand in 2013. Standardized incidence ratios for women were 0.8/100 thousand

in 1980 reaching 1.2/100 thousand in 1992, 1993, 1995 and 2000 and then they gradually decreased to 0.9/100 thousand in 2013.

The percentages were 5.6% in males in 1980 and 2.5% in 2013. In women, they amounted to 0.6% and 0.4%, respectively.<sup>16-18</sup>

According to ICD-9, which was in force in the period 1980-1997, oropharyngeal cancer was labelled with a code 146. In current ICD-10, it was marked with the code C10, however, it is commonly accepted to use the clinical definition of the oropharynx including the base of the tongue, the soft palate, tonsils and the throat, that means the sites with the following codes C01, 09, and 10.

According to this definition in the region of south-eastern Poland in 1980-2013, a total of 1,093 cases were registered, of which 895 (81.8%) were men and 198 (18.2%) were women. The incidence of this group of cancers increased in the period in question from 15 to 66 in men, while in women between 1980 with 11 cases and 2013 with 10 cases – only 3 times more cases than 10 were registered. This resulted in an increase in the incidence rate in men from 1.5/100 thousand in 1980 to 6.2/100 thousand in 2013. The incidence rate in women in 1980 was 1.1/100 thousand and in 2013 it amounted to 1.0/100 thousand.

Standardized incidence ratio for males was 0.9/100 thousand in 1999 and it increased to 4.6/100 thousand in 2013. Standardized incidence ratios for women were 0.2/100 thousand and 0.5/100 thousand, respectively. At the same time, the percentage changed from 0.7% to 1.5% in men and 0.6% to 0.3% in women.<sup>3,14,15</sup>

In the same period in Poland a total of 23,303 cases of this group of cancers were recorded, of which 18,268 (78.4%) in men and 5035 (21.6%) in women.

The absolute number of cases of oropharyngeal cancers (C01, C09, and C10) in men in 1980 in Poland was 286 and until 2013 it increased to 1,146 cases. The incidence in women increased from 102 in 1980 to 386 in 2013. The incidence rate in males were 1.6/100 thousand in 1980 and 6.1/100 thousand in 2013 and in women 0.6/100 thousand and 2.0/100 thousand, respectively.

Standardized coefficients for men amounted to 1.6/100 thousand in 1980 and 4.1/100 thousand in 2013. Standardized coefficients for women in Poland amounted to 0.5/100 thousand in 1980 and 1.2/100 thousand in 2013.

The percentage of cases in men increased from 0.8% in 1980 to 1.5% in 2013. The percentage in women increased from 0.3% in 1980 to 0.5% in 2013 (1.5-12, 17-29). In this group, significantly varied dynamics of disease in individual sites was also found.<sup>16-18</sup>

## Discussion

Head and neck tumors in the analyzed period were 6th in terms of cancer incidence both in Poland and in the region of south-eastern Poland.<sup>3,14</sup> Although laryngeal

cancer for many years were a major concern in this group of cancers, cancer of the oral cavity and oropharynx are becoming a subject of interest in the last decade.

Analyzing trends in the incidence of these cancers, the differences between the region of south-eastern Poland and Poland at large became visible. In Podkarpacie and in Poland, a decreasing trend in the incidence of laryngeal cancer in men is clearly visible, however, in terms of incidence rate and standardized coefficients and percentages it is far more pronounced in Podkarpacie. A decreasing tendency in the incidence in men is visible in Podkarpacie since 1991, while in Poland since 1994.

However, among women the tendency of decreasing incidence is observed in Podkarpackie where both incidence rate and percentage are lower than for Poland. This bears similarities to other regions close to the eastern border, where in the neighboring regions of Lublin and Świętokrzyskie incidence in women shows similar trends to Podkarpacie, and increased incidence was recorded only in the Warmia-Mazury region.<sup>3,16-18</sup>

Overall in Poland, since 1999, a slow but steady upward trend is recorded in the incidence in women; the absolute number of cases increased in the period by nearly a half, and the incidence rate increased by nearly 1/3.

These phenomena demonstrate great diversity not only among countries but also among regions. For example, in France in 2009, the differences in the incidence between regions in men ranged from 7.0/100 thousand to 13.4/100 thousand and in women from 0.2/100 thousand to 1.7/100 thousand.<sup>19</sup> In Poland, in 1999-2013, in half of the regions was recorded an increase in the incidence of laryngeal cancer in women, with the highest values of the incidence rate found in Kuyavian-Pomeranian, Lubuskie, Lodz, Pomerania, Silesia, Wielkopolska regions.<sup>16-18</sup>

On the other hand, in the estimation of the incidence in European countries in 2012 the values for laryngeal cancer for men averaged 8.8/100 thousand with the lowest figures for Iceland 2.2/100 thousand and the highest for Hungary 16.6/100 thousand. European average for women was estimated at 0.8/100 thousand with the highest incidence in Albania 2.7/100 thousand and the lowest for Finland and Belarus 0.2/100 thousand.

In this context, it is interesting to compare the results with the trends for neighboring countries. In the Czech Republic, incidence rates of laryngeal cancer in men amounted to 9.4/100 thousand in 1980 and after peak with 10.4/100 thousand in 1996 and 2003 and 2004 they returned in the following years to the value of 9.8 to 8.8/100 thousand, thereby presenting a relatively stable trend below 10.0 / 100 thousand, which was slightly lower than in Poland.<sup>20</sup> The opposite tendency was registered in the Czech Republic in women. While in 1980, the incidence was 0.6/100 thousand, in subsequent years a slow growth trend was registered and since 2009 it remained above 1.1/100 thousand until 2013. The similarity to the

trend among women in Poland is worth noting although the range of values are 1/3 lower.<sup>3,16-18,20</sup>

On the other hand, in Slovakia, the incidence of the laryngeal cancer in men decreased from 14.6/100 thousand in 1980 to 9.6/100 thousand in 2012, therefore, it is a lower value than in Poland - with a similar downward trend.<sup>19</sup> The incidence in women in Slovakia was 0.3/100 thousand in 1980 and reached 0.7/100 thousand in 2012. Thus increasing incidence trends are observed, although the coefficients were more than twice lower than in Poland.<sup>3,16-19</sup> In Prešov District in Slovakia, neighboring Podkarpacie, incidence rate for laryngeal cancer in men increased from 9.7/100 thousand in 2003 to 11.6/100 thousand in 2009 – which is an opposite trend than that of Podkarpacie, and the incidence rate for women from 0.7/100 thousand rose to 1.0/100 thousand – which is also an opposite trend than in Podkarpacie where at the same time it decreased from 1.5/100 thousand to 1.0/100 thousand.<sup>3,21-28</sup>

Analyzing the cancer in the oropharynx that is C01, C09, and C10, we attempted to relate the results to the neighboring provinces, Poland and other countries in a similar way as in the case of the larynx. Assessing morbidity in terms of its location C01, C09 and C10 is a subject of further changes in 1997 due to ICD revision from 9 to 10. This factor is always associated with difficulties in the interpretation of new definitions and not only in relation to cancers of the head and neck. In 1963–1997 the location “tongue” with a code 141 did not distinguish locations C01- tumor of the base of the tongue and C2-malignant neoplasm of other and unspecified parts of the tongue, which were created in ICD10. Therefore, the first years after the change of location, definitions were affected with too low registration of location C01 since C02 was easier to interpret. Regardless of this fact, the completeness of the registration was affected by strikes in Health Care in 1997–1998 when, among others, cancer reports were not filled in, therefore, the system of cancer registration was shuttered not only during strike, but also years after it.

This issue is extensively discussed in the literature from 1999–2005.<sup>17,18</sup> The above values of the analyzed three decades for Poland and Podkarpacie – similar laryngeal cancer do not fully reflect the differences between various regions. In Świętokrzyskie, the incidence increased from 2.0/100 thousand in 1999 to 4.8/100 thousand in 2013 for men and from 0.4/100 thousand to 0.5 for women – although in the past few years these rates exceeded 1.0/100 thousand.<sup>17,18,31-34</sup> In the Lublin region, the incidence of oropharyngeal cancers (C01,09,10) increased from 1.0/100 thousand in 1999 to 3.7/100 thousand in males, and from 0.1/100 thousand to 0.5/100 thousand for women.<sup>17,18,35-41</sup>

In the Czech Republic these tumors (C01, 09, 10) showed in 1980-2013 more than a fourfold increase in the incidence in men from 1.9/100 thousand to 8.5/100

thousand and in women five-fold from 0.5/100 thousand to 2.5/100 thousand.<sup>19</sup> Increasing incidence trend both in men and women was thus significantly higher than in Poland.

In Slovakia, the incidence rate in 2003–2009 increased in males from 8.5/100 thousand to 11.5/100 thousand and in women from 0.7/100 thousand to 1.6/100 thousand.<sup>20-27</sup> Thus they were also higher than in Poland, for both men and women.

In the district of Prešov, incidence increased in men from 6.9/100 thousand in 2003 to 11.5/100 thousand and in women from 0.7/100 thousand to 1.0/100 thousand in 2009.<sup>20-27</sup> The incidence was thus higher in that region than in Podkarpacie both in men and women.

The above discussion documents besides presentation of the figures also familiar data on the geography of cancer. Significant differences between individual countries and also very important regional differences make it an important source material for healthcare organizations in the region.

## Conclusion

1. The incidence of cancer of the head and neck over 3 decades shows that the proportion of cases in women in Poland was higher than in Podkarpackie (18% vs 13%) similar to the laryngeal (10.3% vs 8.0%) and oropharyngeal cancers (21.6% vs 18.2%).
2. In laryngeal cancer, a trend of decreasing incidence in men is visible in Podkarpacie since 1991, and overall in Poland since 1994.
3. In Poland, a visible steady upward trend in throat cancer in women is observed; the absolute number of cases increased in the period by nearly half, the incidence rate increased by 1/3, and in the years 1999–2013 in half of regions an increase in laryngeal cancer rate in women was observed.
4. In Podkarpacie, in women, both the incidence rate and percentage of laryngeal cancer are lower than in Poland overall, similar to other provinces close to the eastern border, where in Lublin and Świętokrzyskie regions similar incidence trends in women to Podkarpacie are observed and an increase in the incidence was recorded only in the Warmia-Mazury region.
5. Oropharyngeal cancer incidence in Podkarpacie in men was, in the analyzed period, lower than for Poland overall, and only in the last 3 years of observation it reached a value close to the average for the country.

## Compliance with ethical standards

*Conflict of interest:* The authors declare that they have no conflicts of interest.

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