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ABSTRACT

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Andrii Kurochkin
https://orcid.org/0000-0002-5080-7529
Sumy Regional Council Municipal Non-Profit Enterprise «Sumy Regional Clinical Oncology Center», Sumy, Ukraine

Yuliia Moskalenko
https://orcid.org/0000-0002-5398-0298
Department of Oncology and Radiology, Sumy State University, Sumy, Ukraine

Oleksii Kmyta
Department of Neurology and Neurosurgery, Sumy State University, Sumy, Ukraine

ANALYSIS OF THYROID CANCER INCIDENCE AND MORTALITY TRENDS AMONG THE RESIDENTS OF THE SUMY REGION

Introduction. Thyroid cancer ranks ninth in the structure of malignant neoplasms. Since the 1980s, most countries in the world have seen a rapid increase in the incidence rate and a relatively stable or even decreasing mortality rate.

The objective of our study was to analyze the thyroid cancer morbidity and mortality trends in the Sumy region during 2014–2021, to study the prevalence of histological variants and sex-age-specific characteristics, and to compare them with all-Ukrainian and global data.

Study results. According to the National Cancer Registry of Ukraine, 24,626 people were diagnosed with thyroid cancer between 2014 and 2021, including 4,556 men (18.5%) and 2,0070 women (81.5%). On average, 3078.25 ± 136.15 people were diagnosed per year. The incidence rate among women is 3.8 times higher than among men. The average incidence rate in Ukraine in 2014–2021 was 6.5 per 100,000 population, while in the Sumy region – 8.9 per 100,000 population.

The average mortality rates among residents of the Sumy region and Ukraine did not differ and amounted to 0.4 per 100,000 population. A distinctive feature was represented by the lower male and higher female mortality rates in the Sumy region compared to all-Ukrainian indicators (0.2 versus 0.3 per 100,000 population and 0.6 versus 0.4 per 100,000 population, respectively).

The study of histological types of thyroid malignancies demonstrated that papillary variant was most common (70.5 to 81.9%). The specific share of follicular cancer ranged from 12.8 to 19.2%. The medullary variant occured much less often – in 1.5 to 4.6% of cases, while undifferentiated and squamous cell cancer was extremely rare (0.2 to 3.3% of cases).

In Buryn district, Velyka Pysarivka district, Konotop district, Krasnopillia district, Krolevets district, Lebedyn district, Nedrygailiv district, Putyvl district, Sumy district, Trostyanets district and the city of Sumy, a significantly higher incidence rate was observed.

Women aged 50–64 and men aged 55–69 are most often affected in Ukraine. The highest mortality rate is reported for the age range of 70–84 years for both males and females.

Conclusions. During 2014–2021, the incidence and mortality rates among the population of Ukraine remained at a stable level and were lower compared to global indicators. Since 2017, the Sumy region has been presenting with a decrease in the incidence rate, which corresponds to European trends. In the Sumy region, papillary thyroid cancer remains the most common histological variant. In general, the shares of papillary, follicular, medullary, and anaplastic cancers are consistent with the European figures. In general, the age trends in Ukraine and other countries of the world are similar.

Keywords: cancer, thyroid gland, incidence, mortality, histological variants.

Corresponding author: Yuliia Moskalenko, Department of Oncology and Radiology, Sumy State University, Sumy, Ukraine
e-mail: yl.moskalenko@med.sumdu.edu.ua

РЕЗЮМЕ

Андрій Курочкін
https://orcid.org/0000-0002-5080-7529
КНП СОР «Сумський обласний клінічний онкологічний диспансер», вул. Привокзальна, 31, м. Суми, 40022, Україна

Юлія Москаленко
https://orcid.org/0000-0002-5398-0298
Сумський державний університет, кафедра онкології та радіології, вул. Римського-Корсакова, 2, м. Суми, 40007, Україна

Олексій Кмита
Кафедра неврології та нейрохірургії, Сумський державний університет, м. Суми, Україна

АНАЛІЗ ТЕНДЕНЦІЙ ЗАХВОРЮВАНОСТІ ТА СМЕРТНОСТІ ВІД РАКУ ЩИТОПОДІБНОЇ ЗАЛОЗИ СЕРЕД ЖИТЕЛІВ СУМСЬКОЇ ОБЛАСТІ

Вступ. Рак щитоподібної залози займає дев'яте місце у структурі злоякісних новоутворень. Починаючи з 1980-х років, у більшості країн світу спостерігається швидке зростання рівня захворюваності та відносно стабільний або навіть знижуваний рівень смертності.

Метою нашого дослідження був аналіз тенденцій захворюваності та смертності від раку щитоподібної залози в Сумській області впродовж 2014–2021 рр., вивчення поширеності гістологічних варіантів та статево-вікових характеристик, а також порівняння їх із загальноукраїнськими та світовими даними.

Результати досліджень. За даними Національного канцер-реєстру України, на рак щитоподібної залози у період з 2014 по 2021 рік захворіло 24626 осіб, серед яких було 4556 чоловіків (18,5 %) та 20070 жінок (81,5 %). В середньому в рік – 3078,25 ± 136,15 осіб. Показник захворюваності серед жінок у 3,8 разів вищий у порівнянні з чоловіками. Середній показник захворюваності по Україні за період 2014–2021 рр. склав 6,5 на 100 тис. населення, по Сумській області – 8,9 на 100 тис. населення.

Середні показники смертності серед жителів Сумської області та України не відрізнялися та склали 0,4 на 100 тис населення. Відмінною рисою виявилася нижча смертність серед чоловіків Сумської області та вища серед жінок у порівнянні із загальноукраїнськими даними (0,2 проти 0,3 на 100 тис. населення та 0,6 проти 0,4 на 100 тис. населення відповідно).

Під час дослідження гістологічних типів злоякісних пухлин щитоподібної залози було встановлено, що найбільш поширеним варіантом є папілярний (від 70,5 до 81,9 %). Питома частка фолікулярного раку коливається в межах від 12,8 до 19,2 %. Медулярний варіант зустрічається значно рідше – у 1,5–4,6 %,

а недиференційований та плоскоклітинний рак вкрай рідко (0,2-3,3 % випадків).

Найвищі показники захворюваності виявлені у Буринському, Велико-Писарівському, Конотопському, Краснопільському, Кролевецькому, Лебединському, Недригайлівському, Путивльському, Сумському, Тростянецькому районі та місті Суми.

Найчастіше в Україні хворіють жінки віком 50–64 роки та чоловіки віком 55–69 років. Найвища смертність спостерігається у віковому діапазоні 70–84 роки серед представників обох статей.

Висновки. Протягом 2014–2021 років захворюваність та смертність серед населення України залишаються на стабільному рівні та є нижчими, у порівнянні із загальносвітовими показниками. В Сумській області з 2017 року спостерігається зниження показника захворюваності, що відповідає загальноєвропейським тенденціям. В Сумській області найпоширенішим гістологічним варіантом залишається папілярний рак щитоподібної залози. Загалом частки папілярного, фолікулярного, медулярного та анапластичного варіантів раків є аналогічними країнам Європи. Вікові тренди в Україні та інших країнах світу також є аналогічними.

Ключові слова: рак, щитоподібна залоза, захворюваність, смертність, гістологічні варіанти.

Автор, відповідальний за листування: Москаленко Юлія Василівна, вул. Римського-Корсакова, 2, м. Суми, 40007, Україна
e-mail: yl.moskalenko@med.sumdu.edu.ua

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INTRODUCTION / ВСТУП

According to the latest data from Global Cancer Statistics 2020, thyroid cancer was diagnosed in 586,000 people worldwide. Due to these figures, this cancer type ranks ninth in the structure of malignant neoplasms. The incidence among women is 10.1 per 100,000 population, which is three times higher than among men. Thyroid cancer mortality rates are relatively low in women and men (0.5 and 0.3 per 100,000 population, respectively). In total, this malignancy caused 44,000 deaths in 2020 [1].

The highest incidence among representatives of both sexes is observed in North America, Australia/New Zealand, East Asia, Southern Europe, and Micronesia/Polynesia. Cyprus remains the undisputed leader in terms of morbidity among men and women, while South America and Micronesia/Polynesia are leading only among women [2].

According to the data of the 2020 National Cancer Registry, the incidence of thyroid cancer in Ukraine is 5.5 per 100,000 population. Among women, this indicator is traditionally higher than among men (8.6 vs. 2.2 per 100,000 population, respectively). Mortality rates are 0.3 (in women) and 0.3 (in men) per 100,000 population [3].

Thyroid cancer is a complex problem. The only proven risk factor is ionizing radiation, especially in childhood [4]. Some studies demonstrate the role of being overweight, tall stature, hormonal influence, salts of heavy metals, and other toxic substances as risk factors.

Since the 1980s, most countries in the world have seen a rapid increase in the incidence rate and a relatively stable or even decreasing mortality rate [5].

The objective of our study was to analyze the thyroid cancer morbidity and mortality trends in the Sumy region during 2014–2021, to study the prevalence of histological variants and sex-age-

specific characteristics, and to compare them with all-Ukrainian and global data.

Materials and Methods. The materials of the National Cancer Registry of Ukraine for 2014–2021 and biopsy results logs of the Sumy Regional Clinical Oncology Dispensary were used for the research. Global trends were monitored using the Global Cancer Statistics data. Scientific literature analysis was carried out in PubMed, Scopus, Web of Science networks. Standard statistical methods (analysis of mean values, standard deviation) were used to process the results.

Study results. According to the National Cancer Registry of Ukraine, 24,626 people were diagnosed with thyroid cancer between 2014 and 2021, including 4,556 men (18.5%) and 2,0070 women (81.5%). On average, 3078.25 ± 136.15 people were diagnosed per year. The incidence rate among women is 3.8 times higher than among men. The average incidence rate in Ukraine in 2014–2021 was 6.5 per 100,000 population, while in the Sumy region – 8.9 per 100,000 population. The average mortality rate was somewhat higher among women of the Sumy region than that on a nationwide scale (0.6 vs. 0.4 per 100,000 population). The corresponding data are presented in Table 1 and Table 2.

Table 1 – Thyroid cancer incidence and mortality rates among the residents of Ukraine in 2014–2021

Year	Incidence			Mortality		
	Male + Female	Male	Female	Male + Female	Male	Female
2014	6.3	2.8	9.5	0.4	0.4	0.4
2015	6.6	2.5	10.2	0.3	0.2	0.4
2016	6.3	2.3	9.9	0.4	0.3	0.4
2017	6.4	2.7	9.7	0.4	0.3	0.4
2018	7.0	3.0	10.6	0.3	0.3	0.3
2019	6.9	2.8	10.5	0.3	0.3	0.3
2020	5.5	2.2	8.6	0.3	0.3	0.3
2021	7.3	2.8	11.3	0.5	0.4	0.6
2014–2021 average	6.5	2.6	10.0	0.4	0.3	0.4

Table 2 – Thyroid cancer incidence and mortality rates among the residents of the Sumy region in 2014–2021

Year	Incidence			Mortality		
	Male + Female	Male	Female	Male + Female	Male	Female
2014	11.4	4.8	17.3	0.5	0.3	0.6
2015	11.0	4.2	17.1	0.4	0.3	0.5
2016	8.7	3.2	13.6	0.3	0.2	0.4
2017	10.1	2.5	16.7	0.5	0.2	0.7
2018	9.2	3.7	14.1	0.5	0.3	0.6
2019	8.5	4.3	12.3	0.4	0.3	0.5
2020	5.6	2.4	8.6	0.4	0.2	0.6
2021	6.9	3.1	10.2	0.5	0.1	0.9
2014–2021 average	8.9	3.5	13.7	0.4	0.2	0.6

For the period from 2014 to 2021, the total incidence in the Sumy region was 26.9% higher than that in Ukraine. Figure 1 clearly shows this difference in incidence rates.

The average mortality rates among residents of the Sumy region and Ukraine did not differ and amounted to 0.4 per 100,000 population. A distinctive feature was represented by the lower male and higher female mortality rates in the Sumy region compared to all-Ukrainian indicators (0.2 versus 0.3 per 100,000 population and 0.6 versus 0.4 per 100,000 population, respectively).

We analyzed the incidence of thyroid cancer in different districts of the Sumy region (Table 3).

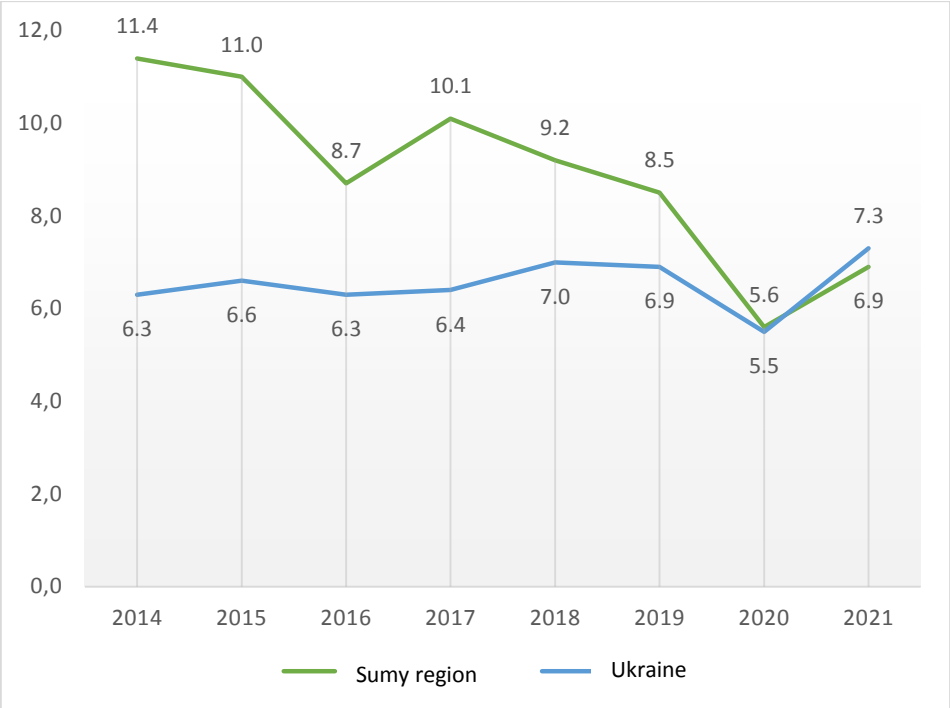


Figure 1 – Comparison of thyroid cancer incidence rates among residents of the Sumy region and Ukraine for the period from 2014 to 2021

Table 3 – Thyroid cancer incidence among the residents of Sumy and Sumy region in 2014–2021

Region	2014	2015	2016	2017	2018	2019	2020	2021	8-year average incidence	Standard deviation
Sumy	32.5	19.9	8.6	16.8	13.9	14.3	10.2	8.9	15.6	2.35
Okhtyrka district	9.3	14.7	8.1	12.1	6.8	8.2	12.5	2.8	9.3	1.84
Bilopillia district	5.8	5.9	2.0	10.0	10.1	6.2	6.2	6.3	6.5	1.32
Buryn district	19.2	7.8	19.9	12.2	12.4	12.7	4.4	13.2	12.7	3.11
Velyka Pysarivka district	5.0	20.3	15.3	10.5	10.7	5.5	12.4	23.1	12.8	3.12
Glukhiv district	10.3	17.4	10.6	12.5	7.2	12.8	3.7	5.7	10.0	2.12
Konotop district	13.1	19.8	12.5	84	18.6	17.9	8.6	5.3	13.0	3.14
Krasnopillia district	6.8	12.3	20.9	28.1	7.1	7.2	7.4	7.5	12.2	2.98
Krolevets district	5.1	2.6	12.8	13.1	29.3	13.5	2.7	84	10.9	2.48
Lebedyn district	12.8	12.9	17.4	19.7	8.9	11.3	13.7	4.7	12.7	2.76
Lypova Dolyna district	5.1	5.2	15.8	10.6	9.3	5.5	12.1	10.6	9.3	2.30
Nedrygailiv district	7.9	12.0	20.3	28.8	16.7	12.8	4.3	4.4	13.4	3.67
Putyvl district	7.0	17.9	17.9	7.3	25.8	3.8	8.8	7.8	12.0	3.62
Romny district	14.5	14.7	4.1	11.0	11.1	9.9	4.3	5.9	9.4	2.64
Seredyna-Buda district	7.3	8.5	6.0	84	5.3	6.2	6.4	6.5	6.8	1.25
Sumy district	9.5	16.0	4.8	14.3	15.9	8.0	3.2	11.4	10.4	2.84
Trostyanets district	13.7	16.6	14.2	8.6	12.7	8.8	6.0	15.1	12.0	2.99
Shostka district	7.0	6.1	5.1	11.3	11.4	5.3	8.5	4.3	7.4	1.21
Yampil district	4.0	20.4	4.1	12.6	4.2	4.3	10.1	4.5	8.0	1.87

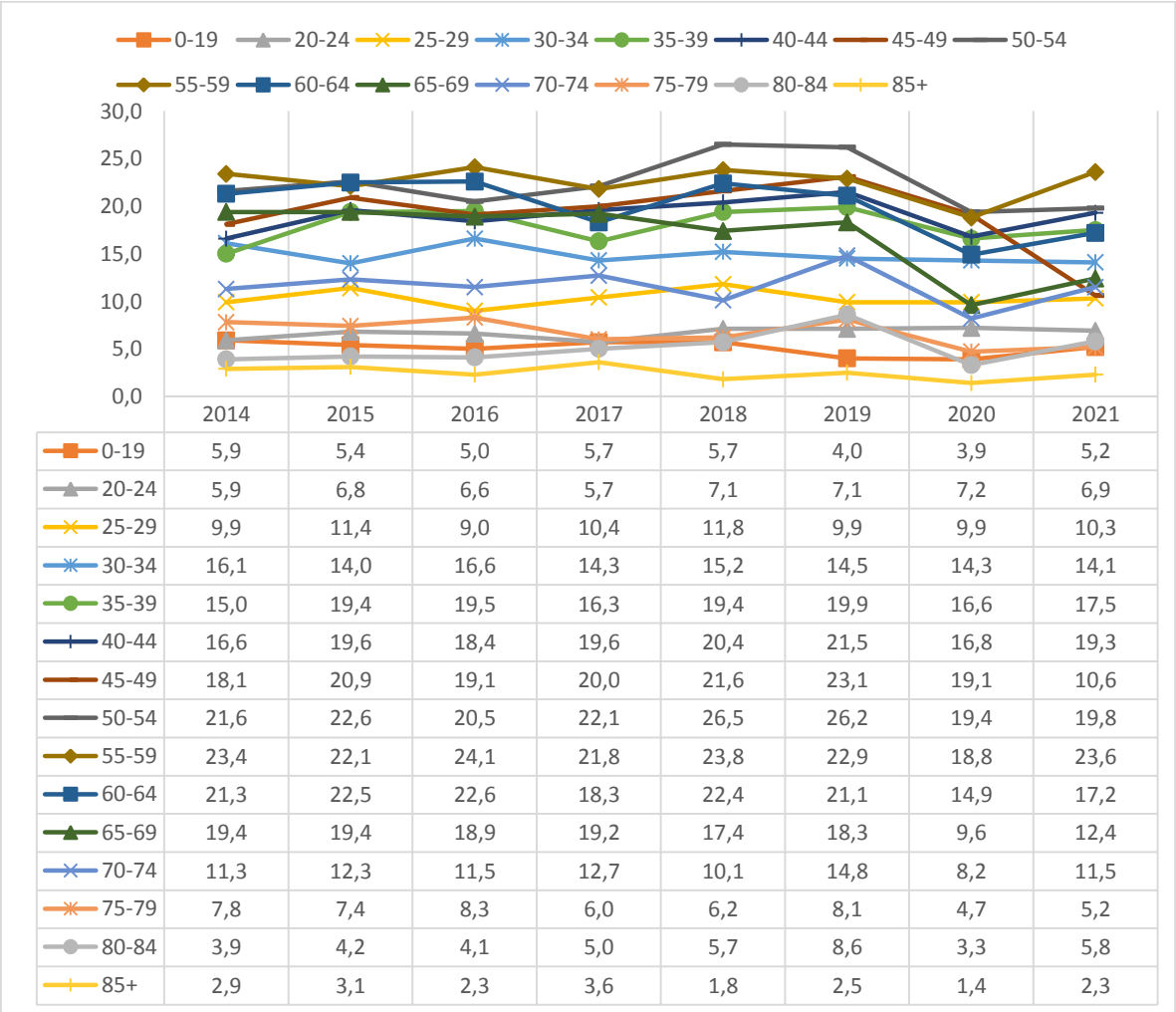
Taking into account the average rate of morbidity in Ukraine, all districts were tentatively divided into three groups:

1) with a low thyroid cancer incidence (0–6.5 ‰: Bilopillia district (6.5 ± 1.32);

2) with an average thyroid cancer incidence (6.5–10 ‰): Okhtyrka district (9.3 ± 1.84), Glukhiv district (10.0 ± 2.12), Lypova Dolyna district (9.3 ± 2.30), Romny district (9.4 ± 2.64), Seredyna-Buda district (6.8 ± 1.25), Shostka district (7.4 ± 1.21), Yampil district (8.0 ± 1.87);

3) with a high thyroid cancer incidence (above 10‰): Sumy (15.6 ± 2.35), Buryn district (12.7 ± 3.11), Velyka Pysarivka district (12.8 ± 3.12), Konotop district (13.0 ± 3.14), Krasnopillia district (12.2 ± 2.98), Krolevets district (10.9 ± 2.48), Lebedyn district (12.7 ± 2.76), Nedrygailiv district (13.4 ± 3.67), Putyvl district (12.0 ± 3.62), Sumy district (10.4 ± 2.84), Trostyanets district (12.0 ± 2.99).

According to the age-specific analysis, thyroid cancer in women is most often diagnosed in the following age groups: 50–54, 55–59, and 60–64 years (Fig. 2).



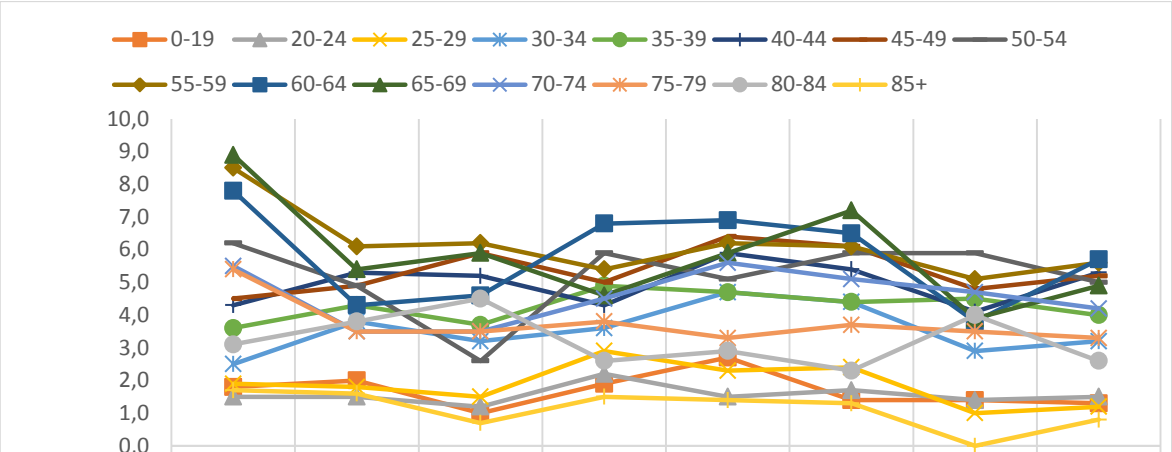
	2014	2015	2016	2017	2018	2019	2020	2021
0-19	5,9	5,4	5,0	5,7	5,7	4,0	3,9	5,2
20-24	5,9	6,8	6,6	5,7	7,1	7,1	7,2	6,9
25-29	9,9	11,4	9,0	10,4	11,8	9,9	9,9	10,3
30-34	16,1	14,0	16,6	14,3	15,2	14,5	14,3	14,1
35-39	15,0	19,4	19,5	16,3	19,4	19,9	16,6	17,5
40-44	16,6	19,6	18,4	19,6	20,4	21,5	16,8	19,3
45-49	18,1	20,9	19,1	20,0	21,6	23,1	19,1	10,6
50-54	21,6	22,6	20,5	22,1	26,5	26,2	19,4	19,8
55-59	23,4	22,1	24,1	21,8	23,8	22,9	18,8	23,6
60-64	21,3	22,5	22,6	18,3	22,4	21,1	14,9	17,2
65-69	19,4	19,4	18,9	19,2	17,4	18,3	9,6	12,4
70-74	11,3	12,3	11,5	12,7	10,1	14,8	8,2	11,5
75-79	7,8	7,4	8,3	6,0	6,2	8,1	4,7	5,2
80-84	3,9	4,2	4,1	5,0	5,7	8,6	3,3	5,8
85+	2,9	3,1	2,3	3,6	1,8	2,5	1,4	2,3

Figure 2 – Age-specific incidence of thyroid cancer in the female population of Ukraine in 2014–2021

Among men, the situation is somewhat different. The highest incidence rate is observed in older age groups compared to women: 55–59, 60–64, and 65–69 years (Fig. 3).

Most women who die from thyroid cancer are in the 70–74, 75–79, and 80–84 age groups (Fig. 4). The situation with men is similar (Fig. 5).

The study of histological types of thyroid malignancies demonstrated that papillary cancer was the most common variant (70.5 to 81.9%). The specific share of follicular cancer ranged from 12.8 to 19.2%. The medullary variant occurred much less often – in 1.5 to 4.6% of cases, while undifferentiated and squamous cell cancer was extremely rare (0.2 to 3.3% of cases).



	2014	2015	2016	2017	2018	2019	2020	2021
0-19	1,8	2,0	1,0	1,9	2,7	1,4	1,4	1,3
20-24	1,5	1,5	1,2	2,2	1,5	1,7	1,4	1,5
25-29	1,9	1,8	1,5	2,9	2,3	2,4	1,0	1,2
30-34	2,5	3,8	3,2	3,6	4,7	4,4	2,9	3,2
35-39	3,6	4,3	3,7	4,9	4,7	4,4	4,5	4,0
40-44	4,3	5,3	5,2	4,3	5,9	5,4	4,1	5,3
45-49	4,5	4,9	5,9	5,0	6,4	6,1	4,8	5,2
50-54	6,2	4,9	2,6	5,9	5,1	5,9	5,9	5,0
55-59	8,5	6,1	6,2	5,4	6,2	6,1	5,1	5,6
60-64	7,8	4,3	4,6	6,8	6,9	6,5	3,8	5,7
65-69	8,9	5,4	5,9	4,6	5,9	7,2	3,9	4,9
70-74	5,5	3,5	3,5	4,5	5,6	5,1	4,7	4,2
75-79	5,4	3,5	3,5	3,8	3,3	3,7	3,5	3,3
80-84	3,1	3,8	4,5	2,6	2,9	2,3	4,0	2,6
85+	1,7	1,6	0,7	1,5	1,4	1,3	0,0	0,8

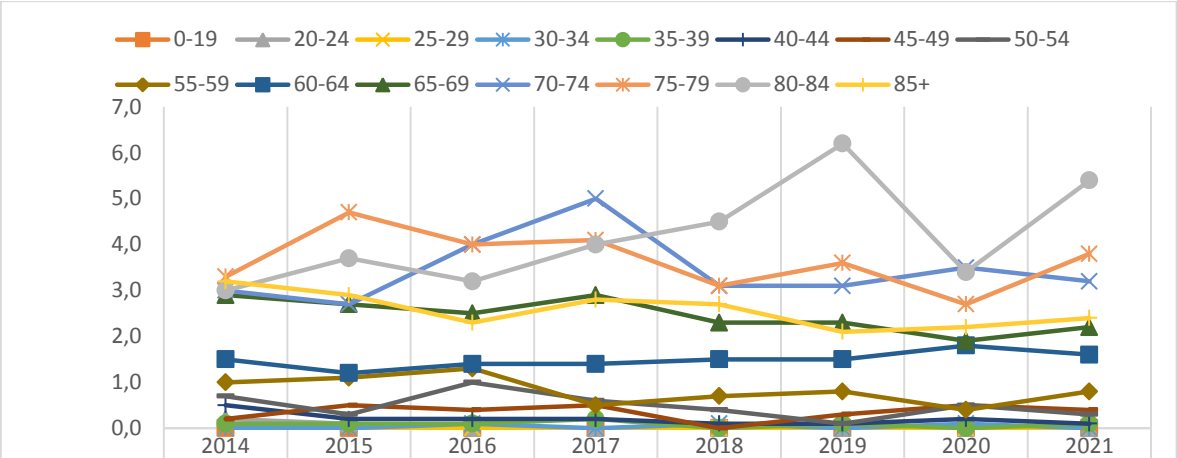
Figure 3 – Age-specific incidence of thyroid cancer in the male population of Ukraine in 2014–2021

Discussion

The incidence of thyroid cancer in the Sumy region and Ukraine is lower than the average world indicators. According to the data we obtained, the average incidence rate among women in Ukraine from 2014 to 2021 was 6.5 per 100,000 population, and in the Sumy region, it was 8.9 per 100,000 population, while the world average was 10.1 per 100,000 population.

The incidence rate among men in the Sumy region was slightly higher than the world rates (3.5 versus 3.4 per 100,000 population), while in Ukraine, this parameter was significantly lower (2.6 versus 3.4 per 100,000 population).

Higher incidence rates among Sumy region residents vs. Ukraine were probably due to belonging to the radioactive contamination zone after the Chernobyl nuclear power plant accident. In Buryn district, Velyka Pysarivka district, Konotop district, Krasnopillia district, Krolevets district, Lebedyn district, Nedrygailiv district, Putyvl district, Sumy district, Trostyanets district and the city of Sumy, a significantly higher incidence rate was observed compared to other districts. We believe this was primarily due to the improvement of diagnostic capabilities at the central district hospitals as a consequence of the medical reform implementation and the purchase of modern equipment. High indicators in the city of Sumy were undoubtedly related to greater accessibility of medical services for the population. In sparsely populated areas, statistics can be influenced even by a few patients. As a result, there may be an impression of a high prevalence of thyroid cancer in a certain area.



	2014	2015	2016	2017	2018	2019	2020	2021
0-19	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
20-24	0,2	0,1	0,0	0,0	0,0	0,0	0,0	0,0
25-29	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
30-34	0,0	0,0	0,1	0,0	0,1	0,0	0,1	0,0
35-39	0,1	0,1	0,1	0,2	0,0	0,1	0,0	0,1
40-44	0,5	0,2	0,2	0,2	0,1	0,1	0,2	0,1
45-49	0,2	0,5	0,4	0,5	0,0	0,3	0,5	0,4
50-54	0,7	0,3	1,0	0,6	0,4	0,1	0,5	0,3
55-59	1,0	1,1	1,3	0,5	0,7	0,8	0,4	0,8
60-64	1,5	1,2	1,4	1,4	1,5	1,5	1,8	1,6
65-69	2,9	2,7	2,5	2,9	2,3	2,3	1,9	2,2
70-74	3,0	2,7	4,0	5,0	3,1	3,1	3,5	3,2
75-79	3,3	4,7	4,0	4,1	3,1	3,6	2,7	3,8
80-84	3,0	3,7	3,2	4,0	4,5	6,2	3,4	5,4
85+	3,2	2,9	2,3	2,8	2,7	2,1	2,2	2,4

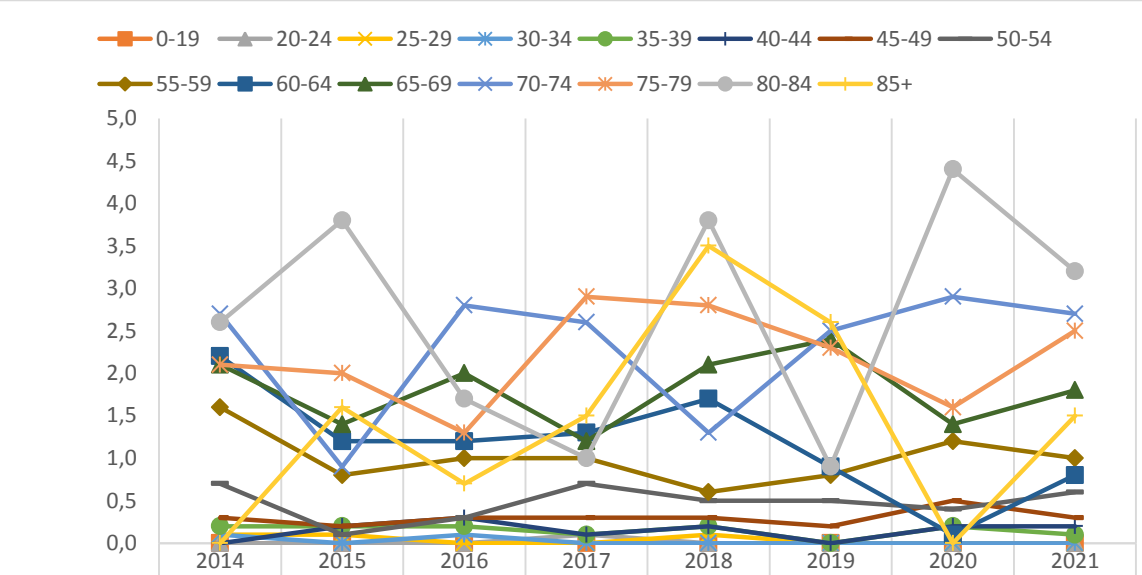
Figure 4 – Age-specific thyroid cancer mortality in the female population of Ukraine in 2014–2021

According to GLOBOCAN 2012, there were 229,900 cases of thyroid cancer in the world [6], while in 2020, this number increased to 586,000 [1]. The rapid increase in incidence is explained by the widespread use of ultrasound diagnostics and other imaging methods [7]. It made it possible to detect many subclinical thyroid lesions, which are very common in the general population [8]. In Denmark, Norway, Ireland, the United Kingdom, and Japan, overdiagnosis occurred in 50–70% of cases, while in the Republic of Korea, Belarus, China, Italy, Croatia, Slovakia, and France – in 80–95% of cases [9]. In this regard, many national and international practice guidelines have been revised, and it is now recommended against screening for thyroid cancer. The active surveillance of microcarcinomas was chosen instead [10].

Schuster–Bruce et al. analyzed the trends of thyroid cancer incidence and mortality in 15 countries of the European Union, the United States of America, Australia, Canada, and Norway. According to the researchers' conclusions, the trend toward a decrease in incidence and mortality rates has emerged in all countries except for the United States of America, Australia, and Denmark [11].

Our research proves that the incidence of thyroid cancer in Ukraine is at a stable level. The fluctuation of the indicator is within 10%. Since 2017, the Sumy region has been presenting a decrease in the incidence rate, which corresponds to European trends. Incidence rates in Ukraine and Sumy region in 2021 are somewhat higher compared to previous years. This is primarily due to the fact that in the latest Bulletin of the National Cancer Registry [3], only operational

information for 2021 was provided, and the indicators were given in compliance with the Ukrainian standard, while for the previous years, we provided the global standard indicators for correct comparison of data from Ukraine and other countries of the world.



	2014	2015	2016	2017	2018	2019	2020	2021
0-19	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
20-24	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,0
25-29	0,1	0,1	0,0	0,0	0,1	0,0	0,0	0,0
30-34	0,1	0,0	0,1	0,0	0,0	0,0	0,0	0,0
35-39	0,2	0,2	0,2	0,1	0,2	0,0	0,2	0,1
40-44	0,0	0,2	0,3	0,1	0,2	0,0	0,2	0,2
45-49	0,3	0,2	0,3	0,3	0,3	0,2	0,5	0,3
50-54	0,7	0,1	0,3	0,7	0,5	0,5	0,4	0,6
55-59	1,6	0,8	1,0	1,0	0,6	0,8	1,2	1,0
60-64	2,2	1,2	1,2	1,3	1,7	0,9	0,1	0,8
65-69	2,1	1,4	2,0	1,2	2,1	2,4	1,4	1,8
70-74	2,7	0,9	2,8	2,6	1,3	2,5	2,9	2,7
75-79	2,1	2,0	1,3	2,9	2,8	2,3	1,6	2,5
80-84	2,6	3,8	1,7	1,0	3,8	0,9	4,4	3,2
85+	0,0	1,6	0,7	1,5	3,5	2,6	0,0	1,5

Figure 5 – Age-specific thyroid cancer mortality in the male population of Ukraine in 2014–2021

After receiving more detailed information and recalculating the incidence rate in compliance with the world standard, the figures will be much lower, so we do not consider the 2021 data to suggest an upward trend in the incidence rate.

Average thyroid cancer mortality rates among men and women are lower in Ukraine compared to global rates. During 2014–2021, these rates remained stable; no downward trend was observed. The overestimated figures for 2021 were also related to the use of the Ukrainian standard, so we do not consider them informative for the present time.

The prevalence of histological variants of thyroid cancer varies significantly in different countries of the world. For example, about 70% of patients in Great Britain, Denmark, and the Netherlands have a papillary cancer variant, while in South Korea, it amounts to 96%. High-income countries such as South Korea, Italy, France, Canada, and the United States, as well as some countries in Asia (Turkey, China) and Latin America (Colombia) show the highest incidence rates of papillary cancer [12]. In the Sumy region, the indicators range from 70.5 to 81.9%, which is close to European trends.

Follicular cancer is much less common. Its share ranges from 3.3% in Canada to 18.8% in Denmark and 19.6% in Great Britain [12]. In the Sumy region for the period from 2014 to 2021, the indicators ranged from 12.8 to 19.2%.

The medullary variant of thyroid cancer is even rarer. Its share ranges from about 2% in Bulgaria and France to about 4% in Denmark [12]. In the Sumy region, the medullary thyroid cancer rate ranges from 1.5 to 4.6%.

Undifferentiated and squamous cell carcinomas are extremely rare both in the Sumy region and in other countries of the world (from 0.1 to 2.5% of cases). The incidence rate of anaplastic cancer tends to decrease even in those countries where a significant increase has been observed in the overall incidence rate of thyroid cancer and its papillary variant, in particular.

As to the global age-related trends of thyroid cancer, the highest incidence is observed in the age group of 50-69 years. The most significant burden in absolute terms is reported in subjects ≥ 65 years, with the indicators increasing from 8 to 23.4 per 100,000 population. From 1990 to 2017, the proportion of people aged 50 to 69 and over 70 increased, while the proportion of people aged 15 to 49 decreased [13]. Our study shows that the peak incidence among Ukrainian women falls upon the age groups of 50–54, 55–59, and 60–64 years, while for men, the age intervals are slightly different: 55–59, 60–64, and 65–69 years. In general, the age trends in Ukraine and other countries are similar.

CONCLUSIONS / ВИСНОВКИ

During 2014-2021, the incidence and mortality rates among the population of Ukraine remained stable and were lower compared to global indicators. Since 2017, the Sumy region has been presenting a decrease in the incidence rate, which corresponds to European trends.

In Buryn district, Velyka Pysarivka district, Konotop district, Krasnopillia district, Krolevets district, Lebedyn district, Nedrygailiv district, Putyvl district, Sumy district, Trostyanets district and the city of Sumy, a significantly higher incidence rate was observed.

In the Sumy region, papillary thyroid cancer remains the most common histological variant. Generally, the shares of papillary, follicular, medullary, and anaplastic cancers are consistent with the European figures.

Women aged 50–64 and men aged 55–69 are most often affected in Ukraine. The highest mortality rate is reported for males and females in the age range of 70-84 years. In general, the age trends in Ukraine and other countries are similar.

PROSPECTS FOR FUTURE RESEARCH / ПЕРСПЕКТИВИ ПОДАЛЬШИХ ДОСЛІДЖЕНЬ

In further research, it is reasonable to analyze the thyroid cancer incidence and mortality for the period from 1986 up to the present day, as well as to monitor the changes in the histological variants of tumors.

CONFLICT OF INTEREST / КОНФЛІКТ ІНТЕРЕСІВ

The authors declare no conflict of interest.

FUNDING / ДЖЕРЕЛА ФІНАНСУВАННЯ

None.

AUTHOR CONTRIBUTIONS / ВКЛАД АВТОРІВ

All authors substantively contributed to the drafting of the initial and revised versions of this paper. They take full responsibility for the integrity of all aspects of the work.

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INFORMATION ABOUT THE AUTHORS / ВІДОМОСТІ ПРО АВТОРІВ

Курочкін Андрій Вікторович, лікар-онколог, КНП СОР «Сумський обласний клінічний онкологічний диспансер», вул. Привокзальна, 31, м. Суми, Україна, 40022, e-mail: kurochkin_a@ukr.net, тел.: 067-542-33-02

Москаленко Юлія Василівна, к.мед.н., доцент кафедри онкології та радіології Сумського державного університету, вул. Римського-Корсакова, 2, м. Суми, Україна, 40007, e-mail: yl.moskalenko@med.sumdu.edu.ua, тел.: 097-615-73-96

Кмита Олексій Петрович, к.мед.н., асистент кафедри нейрохірургії та неврології Сумського державного університету, вул. Римського-Корсакова, 2, м. Суми, Україна, 40007, тел.: 0509925354, e-mail: o.kmyta@med.sumdu.edu.ua