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Kidney cancer epidemiology in Kazakhstan, 2010-2019

Relevance: Kidney cancer is among the most common oncological malignancies, which incidence is currently growing. Risk factors for kidney cancer include tobacco smoking, overweight, and a history of hypertension and chronic kidney diseases. Kidney cancer is twice more often in men than in women.

The purpose was to study the epidemiological trends in Kazakhstan in 2010-2019 years.

Results: In the study period, the kidney cancer incidence increased from 5.64 to 6.74, and mortality decreased from 2.65 to 1.96 per 100 000 population. Both unadjusted and standardized incidence was high at the age of 50-69 years in both sexes. The incidence decreased in the age group below 29, was stable at the age of 30-49, was unstable at the age of 50-69, and was growing at 70 years and above. Unadjusted mortality was high at the age of 70 and above. Standardized mortality was high at the age of 50-69.

Conclusion: In Kazakhstan, in 2010-2019, there was an increase in kidney cancer incidence against the background of a decrease in mortality from this disease. The most unfavorable in terms of incidence was the age group of 50-69 years in both sexes. The highest absolute mortality was registered at the age of 70 and above, while standardized mortality rates were the highest at 50-69.

Keywords: Kidney cancer, incidence, mortality, Kazakhstan, standardized rate.

Relevance: Noncommunicable diseases (NCDs) cause most of the deaths worldwide [1]. In the XXI century, cancer is expected to become the leading cause of death and the single most important obstacle to the increase in life expectancy in each country of the world. According to the World Health Organization (WHO) estimates, in 2015, cancer has become the first or second leading cause of death in people below 70 years of age in 91 of 172 countries and ranked third or fourth in 22 other countries. Kidney cancer is one of the most common oncological malignant neoplasms with an increasing incidence [2]. In 2018, 403262 new kidney cancer cases were registered worldwide, accounting for 2.2% of all cancers. Mortality from kidney cancer in 2018 totaled 175098 cases or 1.8% of all deaths from cancer. The main epidemiological characteristics of kidney cancer are large geographical and temporal variations in incidence rates. The established risk factors are limited to tobacco smoking, obesity, a history of arterial hypertension, and chronic kidney diseases.

Worldwide incidence rates vary widely, with the highest country incidence in the Czech Republic (21.9 per 100,000 males) and Lithuania (18.7 per 100,000 males). In low-risk countries like China, Thailand, and African countries, the incidence rate is less than 2 cases per 100,000 population [3]. In the United States, the incidence is higher in black men (15.6 per 100,000) than

in white men (14.0 per 100,000). Hispanics and non-Hispanics perform similarly. In the United States, the American Indians demonstrate an average incidence rate (10.9 per 100 000 males) versus a low incidence in Asian Indians (6.4 per 100 000 males). Some European countries report large intrastate disparities, particularly Germany (higher incidence in the eastern regions) and Italy (higher incidence in the north) [4].

International differences in mortality follow the incidence structure, with the highest rates in the Czech Republic (9.1 per 100,000) and the Baltic countries. The mortality rates were stable throughout the world since the 1990s. In recent years, deaths have declined in most countries, except for Brazil, Croatia, Greece, Ireland, Portugal, and Slovenia, where the rates continue to rise. In general, mortality in women is decreasing faster than in men. In the United States, mortality reduction was more pronounced in black patients; the mortality rate among African-American patients is lower than in white patients since the 1970s [5]. Ethnic differences in kidney cancer biology and aggressiveness could explain this variation, although other factors, such as competing mortality, may also play a role.

Kidney cancer ranks 13th globally in cancer prevalence, accounting for 2.4% of all cancers. More than 330 000 new cases are diagnosed each year. Higher rates are found in Europe, North America, Australia,

lia / New Zealand, and Japan, where kidney cancer is the 7th most common cancer. Its incidence steadily increases with age, with the peak incidence at about 75 years [6, 7].

In the Republic of Kazakhstan (RK), few studies have been conducted to study kidney cancer epidemiology. An analysis of kidney cancer incidence in the Akto-be region in 2007-2011 [8] showed 346 cases of oncological tumors, representing 5.8% of the total number of cases. This period accounted for 150 cases of kidney cancer, amounting to 43.3% of all urological cancers. The South Kazakhstan Regional Oncological Dispensary reported an increase in the regional kidney cancer incidence rate from 2.2% in 2005 to 2.7% in 2009 [9].

The study aimed to investigate the trends of kidney cancer epidemiological indicators in 2010-2019.

Materials and Methods: We analyzed data on kidney cancer incidence and mortality in the RK in 2010-2019. Statistical data on the Kazakhstani population for 2010-2019 was taken from the RK Statistics Committee's official website. Data for analysis were extracted from official statistical sources: Form No. 35 Annual "Report

on patients with malignant neoplasms" and statistical materials "Indicators of the oncological service of the Republic of Kazakhstan" for 2010-2019" [10]. From 2010 to 2016, information about the deceased in Form No. 35 was general, without sex and age characteristics. Therefore, the mortality by sex and age analysis is provided for 2017-2019. The incidence was analyzed for 2010-2019. The study included all registered incidence and mortality cases for the specified period. Intensive epidemiological rates were calculated per 100,000 population. Age groups had a twenty-year interval. A direct standardization method using the world population standard was applied to calculate standardized incidence and mortality.

Results and Discussion:

Our research revealed 10966 new kidney cancer cases in the Republic of Kazakhstan over 2010-2019 and 3866 deaths from this disease. Figure 1 shows the trends of incidence and mortality from kidney cancer for the period under study. The incidence has grown from 5.64 to 6.74 per 100 000, and mortality decreased from 2.65 to 1.96 per 100 000 population (Figure 1).

Figure 1 – Kidney cancer incidence and mortality trends in Kazakhstan, 2010-2019 (per 100,000 population)

Table 1 presents unadjusted kidney cancer incidence indicators for 2010-2019. Unadjusted kidney cancer incidence was high at the age of 70 and above in both sexes, followed by the age group of 50-69 (Table 1).

Table 2 presents standardized kidney cancer incidence in the study period. Standardized incidence was also high at the age of 70 and above in both sexes (Table 2).

Kidney cancer incidence is twice higher in men [11]. This pattern is repeatedly noted over time, in different countries and groups, and remains unexplained. The sex ratio's stability indicates that biological differenc-

es between men and women, rather than lifestyle differences such as tobacco smoking, are likely to account for much of the disease incidence difference. Kidney cancer incidence increases steadily with age, with a peak around the age of 75 [12, 13]. All over the world, around half of all cases are diagnosed in patients below 65 years [14].

Figures 2-5 show kidney cancer incidence trends in Kazakhstan in different age groups in 2010-2019 (per 100 000 population). Figure 2 shows a decrease in incidence in the age group below 29 years from 0.49 in 2010 to 0.19 in 2019.

Table 1 – Unadjusted kidney cancer incidence in the Republic of Kazakhstan, 2010 –2019 (per 100,000 males and females)

Years	Men				Women			
	below 29	30-49	50-69	70+	below 29	30-49	50-69	70+
2010	0.49	4.38	27.36	33.69	0.67	2.47	16.03	19.91
2011	0.46	3.77	25.44	39.16	0.78	2.63	16.61	20.14
2012	0.41	3.97	30.12	41.56	0.58	3.24	20.50	22.89
2013	0.36	4.16	28.43	40.02	0.44	2.93	18.37	21.20
2014	0.40	3.80	27.79	42.14	0.66	3.02	18.04	20.37
2015	0.44	3.96	28.03	41.31	0.57	2.78	18.43	20.19
2016	0.48	4.95	28.62	46.65	0.63	2.92	17.86	23.71
2017	0.46	4.64	27.40	48.15	0.34	2.91	19.03	23.46
2018	0.28	3.97	28.40	48.56	0.40	2.88	18.46	29.54
2019	0.19	4.65	28.52	40.24	0.27	3.10	20.18	26.27

Table 2 – Standardized kidney cancer incidence in the Republic of Kazakhstan, 2010-2019

Years	Men				Women			
	below 29	30-49	50-69	70+	below 29	30-49	50-69	70+
2010	0.25	1.23	4.65	1.68	0.34	0.69	2.73	1.00
2011	0.23	1.06	4.32	1.96	0.39	0.74	2.82	1.01
2012	0.21	1.11	5.12	2.08	0.29	0.91	3.49	1.14
2013	0.18	1.16	4.83	2.00	0.22	0.82	3.12	1.06
2014	0.20	1.06	4.72	2.11	0.33	0.85	3.07	1.02
2015	0.22	1.11	4.77	2.07	0.29	0.78	3.13	1.01
2016	0.24	1.39	4.87	2.33	0.32	0.82	3.04	1.19
2017	0.23	1.30	4.66	2.41	0.17	0.81	3.24	1.17
2018	0.14	1.11	4.83	2.43	0.20	0.81	3.14	1.48
2019	0.10	1.30	4.85	2.01	0.14	0.87	3.43	1.31

Figure 2 – Kidney cancer incidence in the age group below 29 years (per 100,000 population)

Figure 3 shows the incidence trends in the age group of 30-49 years. In this age group, kidney cancer incidence remained almost stable in the study period and varied within 3.77-4.95 per 100,000 population (Figure 3).

Figure 4 shows kidney cancer incidence trends in the age group of 50-69 years. This group is associated with the highest kidney cancer incidence. As seen in Figure 4, in 2011, the incidence has decreased up to

25.44 per 100 000 population, then it went up to 30.12 in 2012 and then remained nearly stable at the level of 27.40-28.62 per 100,000 population.

Figure 5 shows kidney cancer incidence in the age group of 70 and above. In the study period, kidney cancer incidence in this age group has increased from 33.69 per 100,000 population in 2010 to 48.56 per 100,000 population in 2018, and then decreased to 40.24 per 100 000 population in 2019.

Figure 3 – Kidney cancer incidence in the age group of 30-49 years (per 100,000 population)

Figure 4 – Kidney cancer incidence in the age group of 50-69 years (per 100,000 population)

Figure 5 – Kidney cancer incidence in the age group of 70 and above (per 100,000 population)

As mentioned above, till 2017, Form No. 35 "Report on patients with malignant neoplasms" provided only general mortality figures, without differentiation by age and sex. The age and sex characteristics were added to the report since 2017. Therefore, we presented unadjusted and standardized kidney cancer mortality rates from 2017 to 2019. Table 3 presents unadjusted kidney cancer mortality rates for 2017-2019 for men and women.

As seen from Table 3, in the age group of 70 years and above, kidney cancer mortality was high in both sexes.

Figure 5 shows kidney cancer incidence in the age group of 70 and above. In the study period, kidney cancer incidence in this age group has increased from 33.69 per 100,000 population in 2010 to 48.56 per 100,000 population in 2018, and then decreased to 40.24 per 100 000 population in 2019.

Table 3 – Unadjusted kidney cancer mortality rates per 100,000 male and female population of the Republic of Kazakhstan, 2017-2019

Year	Men				Women			
	below 29	30-49	50-69	70+	below 29	30-49	50-69	70+
2017	0.11	1.17	12.0	20.8	0.11	0.44	3.20	9.52
2018	0.06	0.70	10.0	23.9	0.07	0.35	3.69	8.78
2019	0.13	0.92	10.6	20.9	0.13	0.27	3.68	8.62

Table 4 presents the standardized kidney cancer mortality rates for 2017-2019. As can be seen from Table 4, after standardization, the mortality rates were high in the age group of 50-69 in both sexes.

Table 4 – Standardized kidney cancer mortality in the Republic of Kazakhstan, 2017-2019

Year	Men				Women			
	below 29	30-49	50-69	70+	below 29	30-49	50-69	70+
2017	0.05	0.33	2.03	1.04	0.06	0.12	0.54	0.48
2018	0.03	0.19	1.70	1.19	0.03	0.10	0.63	0.44
2019	0.06	0.26	1.80	1.05	0.07	0.07	0.63	0.43

Conclusions: Thus, in 2010-2019, kidney cancer incidence in Kazakhstan was growing against a downward mortality trend. The highest incidence was observed in the age group of 50-69 years in both sexes. Standardized incidence was also high in this age group in both sexes. The incidence was decreasing in the age group below 29 and was stable in the age group of 30-49. In the age group of 50-69 years, the incidence was unstable in 2010-2012, then varied within 27.40-28.62 per 100,000. In the age group of 70 and above, the kidney cancer incidence was growing. The highest mortality was registered at the age of 70 years and above in both sexes. Standardized mortality was highest in the age group of 50 to 69 years in both sexes.

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ТҰЖЫРЫМ

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Қазақстандағы 2010-2019 жылдары бүйрек қатерлі ісігінің эпидемиологиясы

Өзектілігі. Бүйрек қатерлі ісігі (БҚІ) - ең көп таралған онкоурологиялық қатерлі ісіктердің бірі, қазіргі уақытта бұл аурумен сырқаттану саны артып келеді. БҚІ дамуының қауіп факторлары – темекі тарту, артық салмақ қосу, артериялық гипертензия мен созылмалы бүйрек аурулары болып табылады. Ер адамдарда БҚІ ауруы әйелдерге қарағанда екі есе жоғары кездеседі.

Зерттеу мақсаты 2010-2019 жылдардағы БҚІ эпидемиологиялық көрсеткіштерінің динамикасын зерттеу.

Нәтижелері. Зерттеу жылдарында 100 000 тұрғынға шаққанда бүйрек қатерлі ісігімен сырқаттанушылық көрсеткіштерінің 5,64-дан 6,74-ке дейін жоғарылауы, ал өлім-жітім көрсеткіштері 100 000 адамға шаққанда 2,65-тен 1,96-ға дейін төмендеу үрдісіне ие болды. Сондай-ақ, түзетілмеген сырқаттанушылық көрсеткіштері 50-69 жас аралығындағы топта жоғары сандарды көрсетті. Бұл үрдіс ерлер де, әйелдер де байқалды. 29 жасқа дейінгі жас тобында сырқаттанушылық көрсеткіштері төмендеу үрдісіне ие болды, 30-49 жас тобында сырқаттанушылық көрсеткіштері бірдей болды, 50-69 жас тобында сырқаттанушылық көрсеткіштері тұрақсыз болды, ал 70 және одан жоғары жас тобында бүйрек қатерлі ісігімен сырқаттанушылық көрсеткіштерінің жоғарылауы байқалды. Түзетілмеген өлім-жітім 70 және одан жоғары жас тобында жоғары көрсеткіштерді көрсетті. Өлімнің стандартталған көрсеткіштері 50-69 жас аралығындағы топта жоғары көрсеткіштерді анықтады.

Қорытынды. ҚР-да 2010-2019 жылдар кезеңінде БҚІ аурушаңдығы көрсеткіштерінің жоғарылауы байқалады, ал өлім көрсеткіштерінің төмендеуі байқалды. Ауру көрсеткіштері бойынша ең айқын жағдайда 50-69 жас тобы болды. Бұл тенденция ерлер мен әйелдерде де сақталады. Ең жоғары өлім көрсеткіштері 60-79 және 80 және одан жоғары жас тобында анықталды. Өлім стандартталған көрсеткіштері 40-59 және 60-79 жас аралығындағы топта анықталды.

Түйінді сөздер: Бүйрек қатерлі ісігі, сырқаттанушылық, өлім көрсеткіштері, Қазақстан, стандартталған көрсеткіш.

АННОТАЦИЯ

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Эпидемиология рака почки в Казахстане за 2010-2019 годы

Актуальность: Рак почки (РП) является одним из наиболее распространенных онкоурологических злокачественных новообразований, заболеваемость которыми в настоящее время продолжает увеличиваться. Факторами риска развития РП являются курение табака, лишний вес, наличие в анамнезе артериальной гипертензии и хронических заболеваний почек. Заболеваемость РП у мужчин в два раза выше, чем у женщин.

Цель исследования: изучить динамику эпидемиологических показателей рака почки в Республике Казахстан за 2010-2019 годы.

Результаты: За изучаемый период наблюдалось повышение показателей заболеваемости РП – от 5,64 до 6,74 на 100 000 населения, а показатели смертности имели тенденцию к снижению – от 2,65 до 1,96 на 100 000 населения. И нескорректированные, и стандартизированные показатели заболеваемости были высокими в возрастной группе 50-69 лет. Эта тенденция отмечалась как в мужской, так и в женской популяции. В возрастной группе до 29 лет показатели заболеваемости имели тенденцию к снижению, в возрастной группе 30-49 показатели заболеваемости имели почти одинаковые цифры, в возрастной группе 50-69 лет показатели заболеваемости были нестабильные, а в возрастной группе 70 и старше лет наблюдалось повышение показателей заболеваемости РП. Нескорректированные показатели смертности продемонстрировали высокие цифры в возрастной группе 70 и старше. Стандартизированные показатели смертности выявили высокие цифры в возрастной группе 50-69 лет.

Закключение: В РК в 2010-2019 годах наблюдалось повышение заболеваемости РП и снижение смертности от РП. Самой неблагоприятной возрастной группой по показателям заболеваемости явилась возрастная группа 50-69 лет. Эта тенденция сохраняется как в мужской популяции, так и женской. Самые высокие показатели смертности выявлены в возрастных группах 70 лет и старше. После проведения стандартизации высокие показатели смертности были выявлены в возрастной группе 50-69 лет.

Ключевые слова: Рак почки, заболеваемость, смертность, Казахстан, стандартизированный показатель.