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# COVID-19 PREVALENCE AMONG CANCER PATIENTS IN KAZAKHSTAN

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## ABSTRACT

***Relevance:*** *The new coronavirus infection, COVID-19, has been spreading rapidly around the world since 2019, affecting the healthcare systems of most countries. According to recent studies, malignant diseases increase the susceptibility to COVID-19 and are a risk factor for worse clinical outcomes in COVID-19 patients. COVID-19 also increases the risk of disease progression in patients with malignancies.*

***The study aimed to*** *study the prevalence of COVID-19 among cancer patients in Kazakhstan.*

***Methods:*** *The analysis included open-access articles published since 2019 and indexed in PubMed, Cochrane, Google Scholar, and e-Library by keywords "cancer," "malignant neoplasms," "COVID-19", "cancer patients," "mortality risk." The official statistics data, medical information systems of the Republic of Kazakhstan (Electronic Register of Cancer Patients, Electronic Register of Inpatient Patients), and official periodicals on cancer incidence and mortality for 2020-2021 and COVID-19 incidence and mortality for 2020-2022 in Kazakhstan were studied.*

***Results:*** *In the Republic of Kazakhstan, in 2020-2021, the highest cancer incidence was registered in North Kazakhstan (1.79-1.87%), Pavlodar (1.57-1.63%), Karaganda (1.54-1.53%) and Kostanay (1.53%) regions. The lowest rates were recorded in the Turkestan (0.42-0.41%), Kyzylorda (0.57-0.59%), Mangistau (0.62%) regions, and the city of Shymkent (0.60%). The highest cancer mortality in Kazakhstan was registered in the Turkestan (11.1%), Kyzylorda (10.2%), and Zhambyl (10.02%) regions in 2020, and in the Atyrau (25.4%), Turkestan (10.68%), and West Kazakhstan (10.30%) regions in 2021.*

*The mortality from COVID-19 among patients registered for cancer in 2020 was the highest in the city of Astana (1.06%), the Kyzylorda (0.46%), and Turkestan (0.33%) regions, and in 2021 – in the cities of Shymkent (1.05%) and Astana (1,00%), the Atyrau (0.93%) and West Kazakhstan (0.94%) regions.*

***Conclusion:*** *Thus, COVID-19 prevalence among cancer patients and their increased mortality during the pandemic, including the cases where the main cause of death was not an oncological process but the consequences of the viral infection, evidence the need to adjust the rules of statistical recording of cancer patients' morbidity and mortality, the algorithms, and protocols of diagnosis and treatment of cancer patients.*

***Keywords:*** *cancer, malignant neoplasms (MN), COVID-19, cancer patients, mortality risk.*

***Introduction:*** The new coronavirus infection, COVID-19, has been spreading rapidly around the world since 2019 [1-8]. Most patients with COVID-19 have mild or moderate respiratory symptoms [9-15]. However, 13.8% of patients have a severe form, as they get sick being in critical condition due to different symptoms of other diseases, which can lead to multiple organ failure and even death [16-23]. According to recent studies, patients with COVID-19 and comorbidities of the endocrine system, heart, kidneys, malignant neoplasms, and chronic respiratory or neurological diseases are more likely to have a relatively poor prognosis [24-34].

Cancer is a serious public health issue that threatens the health of the world's population [35]. According to recent studies, cancer increases susceptibility to COVID-19 and becomes a risk factor for worse clinical outcomes in COVID-19 patients [36-43]. Also, it should be noted that during the pandemic, 44% of worldwide ministries of health stressed an increase in the inferiority of screening for cancer diseases, which significantly affected the timeliness of early diagnosis [44]. However, cancer patients need a timely diagnosis, examination, and specialized anticancer treatment during and after the pandemic.

In this regard, recent years' studies aimed to analyze the data on the incidence and outcome in COVID-19 patients with malignant neoplasms (MNs). The Global Cancer Observatory reported 1.8 million new cancer cases and 606,000 new deaths from cancer worldwide in 2020 [45]. According to the information on COVID-19 morbidity in cancer patients from Wuhan, China, 12 out of 1524 (0.79%) patients admitted to the oncology department from December 2019 to February 2020 were infected with COVID-19. It is worth noting that among this group of patients, the infection rate was higher than the cumulative frequency of all diagnosed cases of COVID-19 registered in Wuhan over the same period (0.37%) [8]. According to other studies from Wuhan, among all those infected with COVID-19, approximately 1-2% had oncological diseases [9-11].

Other studies show a higher prevalence of cancer in people with COVID-19. Thus, in New York (USA), out of 5700 hospitalized patients with COVID-19, 6% had a concomitant oncological diagnosis [12].

In the region of Lombardy (Italy), 8% of patients admitted to the intensive care unit (ICU) for COVID-19 either had active cancer or were previously treated for can-

cer and were in remission [13]. Other sources report that 20.3% of deaths from COVID-19 in all of Italy are in patients with active tumors [14].

Unfortunately, data on the clinical characteristics of COVID-19-infected cancer patients are currently limited by sample sizes, such as a retrospective study of 28 COVID-19 cancer patients from three hospitals in Wuhan [17]. Among the cases, more than half (61%) were men, the median age of all patients was 65 years, and the most common oncological disease was lung cancer - in 7 (25%) patients. At the same time, 8 cases of infection are believed to have been associated with nosocomial transmission of the infection. Slightly more than half of the patients – 15 (54%) – had a severe course of the disease, and 6 (21%) were admitted to the intensive care unit. A significantly higher risk of developing severe complications of COVID-19 was noted among patients who received anticancer treatment within the last 14 days [17].

Another study included 105 cancer patients hospitalized with COVID-19 in 14 hospitals in Wuhan and 536 age-matched patients without a history of cancer (control group) [18]. Lung cancer was the most common site (n=22), followed by malignancies of the gastrointestinal tract (n=13), breast (n=11), thyroid (n=11), and blood (n=9). Compared with patients in the control group, patients with cancer had higher rates of mortality (odds ratio (OR) – 2.34, confidence interval (CI) 95%: 1.15-4.77), hospitalizations in the intensive care unit (OR – 2.84, 95% CI: 1.59-5.08), severe COVID-19 (OR – 2.79, 95% CI: 1.74-4.41); the likelihood of the need for artificial lung ventilation increased by twofold. It is noteworthy that oncological patients, more often than others, were infected with nosocomial infections (19% vs. 1.5%) and were smokers (34% vs. 9%). Patients with blood and lung cancers and metastatic cancers with various cancer locations had the highest incidence of severe COVID-19.

Another study of the severity of COVID-19 disease in cancer patients is presented in two New York hospitals' reports [19]. Of 5,688 patients with laboratory-confirmed COVID-19, 334 (6%) had cancer, including breast cancer (n=57), prostate cancer (n=56), lung cancer (n=23), urogenital cancer (n=18) and colorectal cancer (n=16) [19]. It was noted that cancer patients aged 66 to 80 years required lung intubation significantly more often than patients without cancer (relative risk (RR) – 1.76; 95% CI: 1.15-2.70); no significant differences were found in other age groups. At the same time, in cancer patients below 50, the mortality from COVID-19 was five times higher than at the same age without cancer (RR – 5.01; 95% CI 1.55-16.2). Interestingly, in elderly patients with cancer, such a significant difference was not observed compared with the corresponding control group.

Another New York hospital also noted higher mortality in patients with COVID-19 and cancer [20]. Within three weeks, 218 cancer and COVID-19 patients were identified; of them, 61 died, and the mortality amounted to 37% in blood cancer and 25% in solid tumors. The lung cancer in combination with COVID-19 mortality was 55% (6 out of 11 patients). In age- and sex-matched groups, among 1090 patients with COVID-19 but without cancer, from the same hospital and in the same period, cancer patients' mortality was twice as high as in patients without cancer (28% versus 14%).

Compared with the general population, the immunosuppressive states of cancer patients make them more vulnerable to severe complications that can affect the prognosis of the disease [38]. In addition to the immunosuppressive state, the average age of cancer patients is higher than the age of the general population, which may be another risk factor for severe COVID-19 [46-47]. Several studies have reported that cancer is a risk factor for patients with COVID-19 due to an immune response that can lead to adverse clinical outcomes [40]. However, it is known from the experience of virologists and immunologists that immunosuppression may not always cause serious complications and may even provide advantages in preventing "cytokine storms," which indicate an inadequate response of the patient's immune system to a viral infection.

W. Liang et al. [47] reported a cancer prevalence of 1.13% [95% confidence interval (CI): 0.61–1.65%] among 1590 cases of COVID-19 in China, which is 3. 8 times higher than the overall cancer incidence among the Chinese population (0.29%). In addition, VG Giannakoulis et al. [37] examined the results of a meta-analysis of systematic reviews involving 46499 patients with COVID-19 and MN and showed that all-cause mortality was higher in patients with cancer compared to patients without cancer [hazard ratio ( RR): 1.66, 95% CI: 1.33-2.07, P<0.0001].

The cancer prevalence in China among COVID-19 patients was 1.13% and was 3.9 times higher than the overall cancer incidence (0.29%) among the Chinese population without COVID-19. At the same time, mortality among infected cancer patients in China was 28.6% compared with 2.3% among patients with COVID-19 without cancer [9, 46]. According to the American Association for Cancer Research in April 2021, mortality from COVID-19 among cancer patients is fixed at 11-35% depending on location, patient condition, age, etc. [48].

An increase in the number of patients with cancer and COVID-19 confirms several important clinical care considerations and highlights an urgent need for additional preventive measures and clinical management of such patients since cancer patients are immunocompromised and at increased risk of serious complications associated with COVID-19 (hospitalization in the intensive care unit, need for mechanical ventilation, or death) [9, 10].

A relatively small sample size limits all existing research on the interaction between COVID-19 and can-

cer in humans. Therefore, targeted studies of COVID-19 prevalence in patients with MN are required in each country to study cancer incidence in patients with COVID-19 and identify a correlation between cancer and COVID-19.

***The study aimed to*** study the prevalence of COVID-19 among cancer patients in Kazakhstan.

***Materials and methods:*** The analysis included open-access articles published since 2019 and indexed in PubMed, Cochrane, Google Scholar, and e-Library by keywords "cancer," "malignant neoplasms," "COVID-19", "cancer patients," "mortality risk." Fifty-two literary sources were identified and included in the analysis.

The official statistics data, medical information systems of the Republic of Kazakhstan (Electronic Register of Cancer Patients, Electronic Register of Inpatient Patients), and official periodicals on cancer incidence and mortality for 2020-2021 and COVID-19 incidence and mortality for 2020-2022 in Kazakhstan were studied.

***Results:*** In Kazakhstan, the situation with COVID-19 infection is similar to other countries. Dynamic statistics (daily and monthly) reflect the trend in COVID-19 deaths and new infections. Figure 1 shows the dynamics of the spread of COVID-19 in Kazakhstan from January 2020 to December 2022, according to official statistics [49].

The main viral load was observed in the summer and autumn of 2020-2021 and in the winter of 2022 (January-February). These periods coincided with the partial lifting and weakening of organizational measures to prevent the spread of COVID-19 among the population.

A further (since March 2022) decrease in morbidity and mortality is due to the development and implementation of new effective protocols for the treatment of COVID-19, the introduction of mandatory vaccination of the population by the resolutions of the Chief State Sanitary Doctor "On the organization and implementation of sanitary, anti-epidemic and sanitary and preventive measures for COVID-19 in the Republic of Kazakhstan."

Official information on morbidity and mortality from oncopathology and COVID-19 in Kazakhstan by regions [50, 51], with recalculation for the population and analysis of mortality of cancer patients, depending on the indication of the cause of death of the patient in the Electronic Register of Cancer Patients (ERCP) and Electronic Register of Inpatient Patients (ERIP), is shown in Tables 1 and 2. Table 1 presents comparative data on mortality in Kazakhstan from the main disease (oncology or COVID-19), indicating the number of cancer patients infected with COVID-19 in 2020. The highest cancer incidence was registered in North Kazakhstan (1 .79%), Pavlodar (1.57%), and Karaganda (1.54%) regions. The lowest rates were recorded in the Turkestan (0.42%), Kyzylorda (0.59%), and Mangystau (0.62%) areas. The highest cancer mortality in Kazakhstan was registered in the Turkestan (11.1%), Kyzylorda (10.2%), and Zhambyl (10.02%) regions in 2020.

The mortality from COVID-19 among patients registered for cancer in 2020 was the highest in the city of Astana (1.06%), Kyzylorda (0.46%), and Turkestan (0.33%) regions, with lower incidence than in other areas.

**Table 1 - Information on oncological patients with concomitant COVID-19 disease registered at the dispensary for January-December 2020**

| Region | Population, December, 2020 | Registered in ERCP, abs. (%) | Deaths from cancer, 2020, abs. (%) | of them, according to ERIP | | Deaths from COVID-19, abs. (%) |
|---|---|---|---|---|---|---|
| | | | | U07.1* | U07.2** | |
| Akmola region | 736735 | 9005 (1.22%) | 707 (7.85%) | 99 | 109 | 1 2 (0.13%) |
| Aktobe region | 881561 | 7560 (0.85%) | 513 (6.78%) | 28 | 88 | 3 (0.03%) |
| Almaty region | 2055274 | 15549 (0.75%) | 1206 (7.75%) | 102 | 204 | 11 (0.07%) |
| Atyrau region | 645280 | 4161 (0.64%) | 387 (9.3%) | 36 | 44 | 4 (0.09%) |
| East Kazakhstan region | 1369597 | 20549 (1.50%) | 1642 (8.0%) | 412 | 242 | 39 (0.18%) |
| Zhambyl Region | 1130099 | 7663 (0.67%) | 768 (10.02%) | 63 | 99 | 2 (0.02%) |
| West-Kazakhstan region | 656844 | 7531 (1.15%) | 634 (8.4%) | 112 | 38 | 6 (0.07%) |
| Karaganda region | 1376882 | 21268 (1.54%) | 1301 (6.1%) | 321 | 164 | 4 (0.01%) |
| Kostanay region | 868549 | 13088 (1.50%) | 730 (5.57%) | 145 | 165 | 1 0 (0.07%) |
| Kyzylorda Region | 803531 | 4761 (0.59%) | 487 (10.2%) | 59 | 24 | 2 2 (0.46%) |
| Mangistau region | 698796 | 4359 (0.62%) | 322 (7.38%) | 29 | 68 | 5 (0.11%) |
| Pavlodar region | 752169 | 11850 (1.57%) | 894 (7.54%) | 133 | 198 | 5 (0.04%) |
| North-Kazakhstan region | 548755 | 9863 (1.79%) | 547 (5.54%) | 281 | 195 | 6 (0.06%) |
| Turkestan region | 2016037 | 8472 (0.42%) | 942 (11.1%) | 32 | 92 | 2 8 (0.33%) |
| Almaty | 1916822 | 26560 (1.38%) | 1643 (6.18%) | 313 | 137 | 19 (0.07%) |
| Nur-Sultan (Astana) | 1136156 | 11546 (1.01%) | 808 (6.99%) | 252 | 104 | 8 (1.06%) |
| Shymkent | 1038152 | 6526 (0.62%) | 649 (9.94%) | 36 | 92 | 15 (0.22%) |
| Kazakhstan | 18631779 | 190311 (1.02%) | 14150 (7.43%) | 2453 | 2063 | 199 (0.10%) |

*Notes:* *U07.1 – COVID-19 confirmed by PCR test; **U07.2 – COVID-19 not confirmed by PCR test

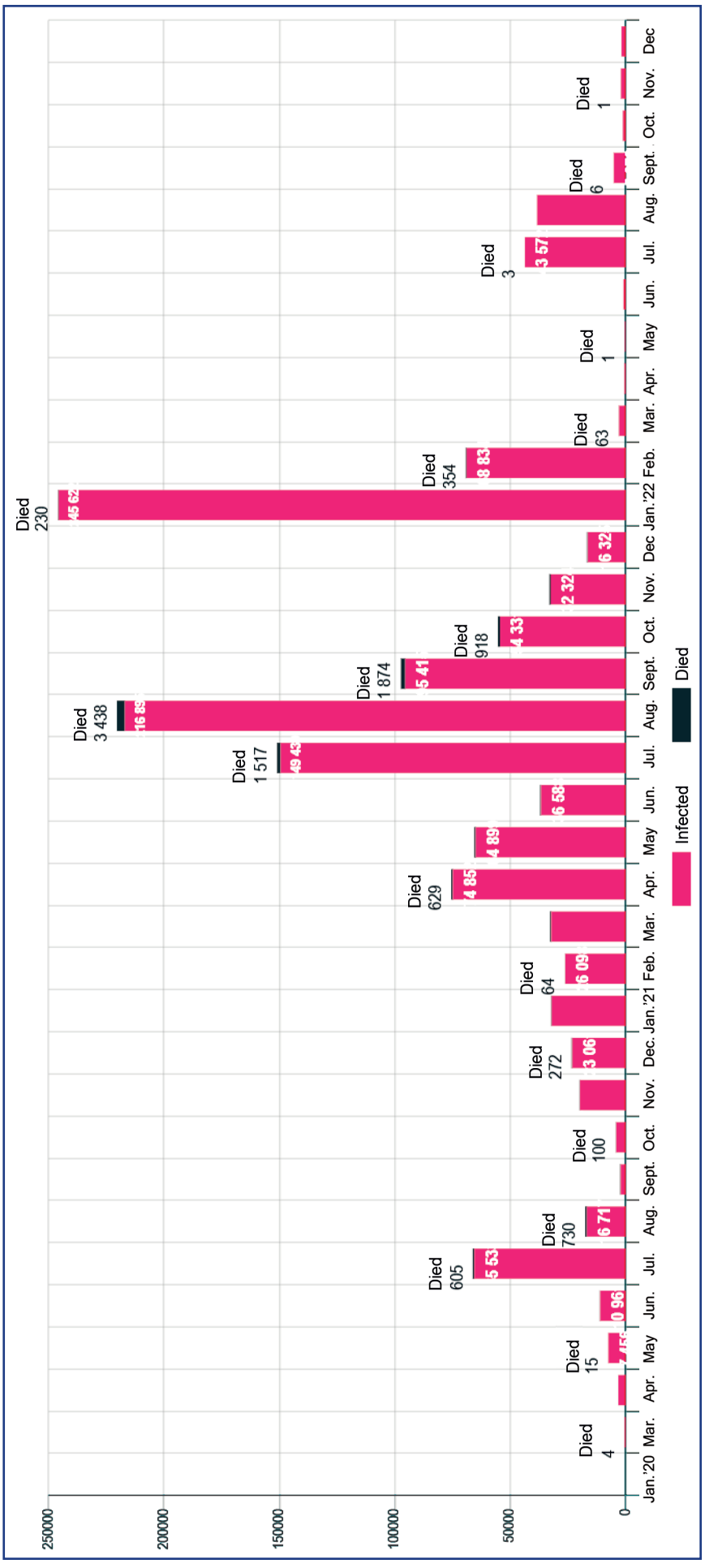


Figure 1 – New cases of infection and death from COVID-19 in Kazakhstan from January 2020 to December 2022 [49]

In 2021, high rates of cancer incidence were noted in North Kazakhstan (1.87%), Pavlodar (1.63%), Karaganda (1.53%), and Kostanay regions (1.53%). The lowest rates were noted in Turkestan (0.41%), Kyzylorda (0.57%) regions, and Shymkent (0.60%). The highest cancer mortality in Kazakhstan was registered in the Turkestan (11.1%), Kyzylorda (10.2%), and Zhambyl (10.02%) regions in 2020, and in the Atyrau (25.4%), Turkestan (10.68%), and West Kazakhstan (10.30%) regions in 2021.

The fact of increased mortality from COVID-19 oncological patients who were registered in the dispensary was recorded in Shymkent (1.05%), Astana, Atyrau (0.93%), and West Kazakhstan (0.94%) regions (Table 2).

**Table 2 - Information on oncological patients with concomitant COVID-19 disease registered at the dispensary for January-December 2021**

| Region | Population, December 2021 | Registered in ERCP, abs. (%) | Deaths from cancer, 2021, abs. (%) | Total patients with COVID-19, abs. (%) | of them, according to ERIP | | Deaths from COVID-19, abs. (%) |
|---|---|---|---|---|---|---|---|
| | | | | | U07.1* | U07.2** | |
| Akmola region | 734 413 | 9213 (1.25%) | 662 (7.18%) | 979 (10.6%) | 765 | 214 | 49 (0.53%) |
| Aktobe region | 905 355 | 8000 (0.88%) | 521 (6.51%) | 550 (6.8%) | 373 | 177 | 17 (0.21%) |
| Atyrau region | 667 300 | 4362 (0.65%) | 1110 (25.4%) | 392 (8.9%) | 267 | 125 | 41 (0.93%) |
| Almaty region | 2 105 195 | 15672 (0.74%) | 372 (2.37%) | 1450 (9.25%) | 748 | 702 | 27 (0.17%) |
| East-Kazakhstan region | 1 356 911 | 20760 (1.52%) | 1607 (7.74%) | 1132 (5.4%) | 678 | 454 | 27 (0.13%) |
| West-Kazakhstan region | 665 458 | 7605 (1.14%) | 784 (10.3%) | 729 (9.58%) | 697 | 32 | 72 (0.94%) |
| Zhambyl Region | 1 149 136 | 7777 (0.67%) | 621 (7.98%) | 1148 (14.7%) | 318 | 830 | 33 (0.42%) |
| Karaganda region | 1 372 199 | 21066 (1.53%) | 1240 (5.88%) | 2647 (12.5%) | 2349 | 298 | 133(0.63%) |
| Kostanay region | 858 347 | 13179 (1.53%) | 738 (5.59%) | 1025 (7.7%) | 790 | 235 | 12 (0.09%) |
| Kyzylorda Region | 826 958 | 4721 (0.57%) | 426 (9.02%) | 287 (6.0%) | 189 | 98 | 40 (0.84%) |
| Mangistau region | 738 861 | 4570 (0.61%) | 368 (8.05%) | 246 (5.3%) | 142 | 104 | 39 (0.85%) |
| Pavlodar region | 747 501 | 12199 (1.63%) | 825 (6.76%) | 1398 (11.4%) | 1208 | 190 | 47 (0.38%) |
| North-Kazakhstan region | 537 787 | 10073 (1.87) | 547 (5.43%) | 931 (9.2%) | 713 | 218 | 28 (0.27%) |
| Turkestan region | 2072804 | 8704 (0.41%) | 930 (10.68%) | 375 (4.3%) | 122 | 253 | 12 (0.13%) |
| Nur-Sultan (Astana) | 1 234 312 | 12581 (1.01%) | 860 (6.83%) | 1374 (10.9%) | 1168 | 206 | 126 (1.0%) |
| Almaty | 2020547 | 27421 (1.35%) | 1560 (5.68%) | 3284 (11.9%) | 2842 | 442 | 124 (0.45%) |
| Shymkent | 1 109 381 | 6732 (0.6%) | 536 (7.96%) | 555 (8.2%) | 364 | 191 | 71 (1.05%) |
| Kazakhstan | 19 102 465 | 194635 (1.01%) | 13676 (7.02%) | 18502 (9.5%) | 13733 | 4769 | 898 (0.46%) |

*Notes:* *U07.1 – COVID-19 confirmed by PCR test; **U07.2 – COVID-19 not confirmed by PCR test

The presented official statistics raise many questions. For example, why was the ratio of deaths to cases much lower at the peak of the pandemic (2020) than in 2021? Apparently, at the height of the pandemic (2020), all urgent measures and organizational measures were directed to fight COVID-19. Screening, diagnosis and treatment of other diseases, including cancer, were not carried out as usual. By 2021, most state public health institutions restored their operations. However, this temporary delay in diagnosis and treatment was fatal for some patients. In addition, a certain part of cancer mortality was "cannibalized" by COVID-19. This indicates the need to consider the mortality among oncological patients who died "from COVID-19" when analyzing oncological statistics.

***Discussion:*** The results of our research are confirmed by the data obtained by T.A. Adylkhanov et al. about 883 patients with cancer and confirmed COVID-19 who were treated in different regions of Kazakhstan for 2.5 months (from March 13 to May 28, 2020). The authors identified features that are not typical for other patients with COVID-19, namely: "in addition to typical symptoms such as cough, fever, weakness, there was also a decrease in breathing, even with less physical activity, headache, general weakness, chills, sweating, decreased resistance to physical activity"; in some, the disease was accompanied by anemia and hypoproteinemia, which unequivocally negatively affected the immunocompetence and clinical course of the oncological disease. There is also evidence that in patients over 60 years of age, COVID-19 was more severe [51].

To help medical institutions during the pandemic, cancer societies around the world, in particular the European Society for Medical Oncology (ESMO), American Society of Clinical Oncology (ASCO), the National Comprehensive Cancer Network (NCCN), have developed recommendations to mitigate the negative impact of the COVID-19 pandemic on the diagnosis and treatment of cancer patients.

Patients with MN are at risk of developing severe COVID-19 and death from COVID-19. Therefore, vac-

cination against SARS-CoV-2 should be a preventive measure. The Kazakh Institute of Oncology and Radiology has developed recommendations for vaccination against COVID-19 in Kazakhstani cancer patients based on the recommendations of international organizations, such as NCCN, MSC, and ASCO, to minimize the risk of infection. The guidelines "Vaccination against coronavirus infection of the population in the Republic of Kazakhstan" were approved by the Decree of the Chief State Sanitary Doctor of June 11, 2021, No. 28 "On further measures to prevent coronavirus infection among the population of the Republic of Kazakhstan" [52].

Due to untimely diagnosis and treatment, cancer patients are less likely to get good results from the rehabilitation complex of antitumor measures. It is also important to remember that cancer patients are immunocompromised and at increased risk of serious complications associated with COVID-19 (ICU admission, need for mechanical ventilation, or death) compared with the general population [9, 46]. Current developments call for pragmatic approaches to treating cancer patients.

***Conclusion:*** Thus, COVID-19 prevalence among cancer patients and their increased mortality during the pandemic, including the cases where the main cause of death was not an oncological process but the consequences of the viral infection, evidence the need to adjust the rules of statistical recording of cancer patients' morbidity and mortality, the algorithms, and protocols of diagnosis and treatment of cancer patients.

The consequences of COVID-19 disease, worsening the condition of cancer patients, challenge oncologists to develop effective organizational measures to prevent the spread of COVID-19 in patients with cancer. However, more specific conclusions require to obtain the results of studies involving a larger number of observations.

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**АҢДАТПА**

## ҚАЗАҚСТАНДА ҚАТЕРЛІ ІСІКТЕРІ БАР НАУҚАСТАРДА COVID-19 КЕСЕЛІНІҢ ТАРАЛУЫ

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***Өзектілігі:*** *COVID-19 жаңа коронавирустық инфекциясы 2019 жылдан бастап бүкіл әлемге тез таралып, көптеген елдердің денсаулық сақтау жүйелеріне әсер етті. Жақында жүргізілген зерттеулер қатерлі аурудың болуы COVID-19-ға сезімталдықты арттыратынын және COVID-19-бен ауырған емделушілерде клиникалық нәтижелердің нашарлауы қаупінің факторы екенін көрсетті. Сондай-ақ, қатерлі аурулары бар науқастарда COVID-19-дың болуы аурудың өршу қаупін арттырады.*

***Зерттеудің мақсаты*** *– Қазақстанда қатерлі ісігі бар науқастарда COVID-19-дың таралуын зерттеу.*

***Әдістер:*** *Әдебиетке шолу жасау үшін 2019 жылдан бастап ашық қолжетімділіктегі және ғылыми жарияланымдардың PubMed, Cochrane, Google Scholar, e-Library дерекқорларында индекстелген мақалаларға, «обыр», «қатерлі ісіктер (ҚІ)», «COVID-19», «онкологиялық науқастар», «өлім қаупі» кілт сөздері бойынша талдау жүргізілді. Қазақстан Республикасының ресми статистикасының, медициналық ақпараттық жүйелерінің (ОНЭТ, СНЭТ) және ресми мерзімді басылымдарының Қазақстандағы 2020-2021 ж.ж. қатерлі аурулардан және 2020-2022 ж.ж. COVID-19-дан сырқаттанушылық пен өлім-жітім бойынша деректері зерттелді.*

***Нәтижелері:*** *2020-2021 2020-2021 жылдары Қазақстан Республикасында ҚІА-мен сырқаттанушылық көрсеткіштері Солтүстік Қазақстан (1,79-1,87%), Павлодар (1,57-1,63%), Қарағанды (1,54-1,53%) және Қостанай (1,53%) облыстарында ең жоғары болды. Ең төменгі көрсеткіштер Түркістан (0,42-0,41%), Қызылорда (0,59%), Маңғыстау (0,62%) облыстарында және Шымкент қаласында (0,60%) байқалды. 2020 жылы ҚР-да ҚІ-ден болатын өлім-жітім Түркістан (11,1%), Қызылорда (10,2%) және Жамбыл облыстарында (10,02%), ал 2021 жылы Атырау (25,4%), Түркістан (10,68%) және Батыс Қазақстан (10,30%) облыстарында ең жоғары болды.*

*Онкологиялық ауру бойынша диспансерлік есепте тұрған COVID-19 науқастарынан болатын өлім - жітім 2020 жылы ең жоғары болды.*

*2020 жылы онкологиялық ауру бойынша диспансерлік есепте тұрған науқастардың COVID-19-дан болатын өлім-жітімі көрсеткіші Астана қаласында (1,06%), Қызылорда (0,46%) және Түркістан (0,33%) облыстарында және 2021 жылы Шымкент қаласында (1,05%), Астана қаласында (1,00%), Атырау (0,93%), Батыс Қазақстан (0,94%) облыстарында жоғары болды.*

***Қорытынды:*** *Осылайша, онкологиялық науқастар арасында COVID-19 таралуы және пандемия кезінде олардың өлімінің артуы, оның ішінде өлімнің негізгі себебі онкологиялық процесс емес, вирустық инфекцияның салдары болған жағдайларда, статистикалық есепке алу ережелеріне түзетулер енгізу.онкологиялық науқастардың аурушаңдық пен өлім-жітім, онкологиялық науқастарды диагностикалау және емдеу алгоритмдері мен хаттамалары.*

***Түйінді сөздер:*** *COVID-19-бен ауырған емделушілер, КВИ, қатерлі ісіктер (ҚІ), онкологиялық науқастар, өлім-жітім қаупі.*

**АННОТАЦИЯ**

## РАСПРОСТРАНЕННОСТЬ COVID-19 У БОЛЬНЫХ СО ЗЛОКАЧЕСТВЕННЫМИ НОВООБРАЗОВАНИЯМИ В КАЗАХСТАНЕ

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***Актуальность:*** *Новая коронавирусная инфекция COVID-19 с 2019 г. стремительно распространилась по всему миру, оказав влияние на системы здравоохранения большинства стран. Недавние исследования показали, что наличие злокачественного заболевания повышает восприимчивость к COVID-19 и является фактором риска ухудшения клинических исходов у пациентов с COVID–19. Также, наличие COVID-19 у больных со злокачественными заболеваниями повышает риск прогрессирования заболевания.*

***Цель исследования*** *– изучение распространенности COVID-19 у больных раком в Казахстане.*

***Методы:*** *Проведен анализ статей, опубликованных с 2019 года, находящихся в открытом доступе и проиндексированных в базах данных PubMed, Cochrane, Google Scholar, e-Library, по ключевым словам «рак», «злокачественные новообразования (ЗНО)», «COVID-19», «онкологические больные», «риск смертности». Изучены данные официальной статистики, медицинских информационных систем Республики Казахстан (ЭРОБ, ЭРСБ) и официальных периодических изданий по заболеваемости и смертности от злокачественных заболеваний за 2020-2021 гг. и по заболеваемости и смертности от COVID-19 – за 2020-2022 гг. в Казахстане.*

***Результаты:*** *Показатели Показатели заболеваемости ЗНО в Республике Казахстан в 2020-2021 гг. были наиболее высокими в Северо-Казахстанской (1,79-1,87%), Павлодарской (1,57-1,63%), Карагандинской (1,54-1,53%) и Костанайской областях (1,53%). Самые низкие показатели были отмечены в Туркестанской (0,42-0,41%), Кызылординской (0,57-0,59%), Мангистауской (0,62 %) областях и г.Шымкент (0,60%). Смертность от ЗНО в РК была наиболее высокой в 2020г. в Туркестанской (11,1%), Кызылординской (10,2%) и Жамбылской областях (10,02%), в 2021г. – в Атырауской (25,4%), Туркестанской (10,68%) и Западно-Казахстанской (10,30%) областях.*

*Смертность от COVID-19 больных, состоявших на диспансерном учете по онкозаболеванию, в 2020 г. была наиболее высокой в г. Астана (1,06%), Кызылординской (0,46%) и Туркестанской (0,33%) областях, в 2021г. – в г. Шымкент (1,05%), г. Астана (1,00%), Атырауской (0,93%) и Западно-Казахстанской (0,94%) областях.*

***Заключение:*** *Таким образом, уровень распространенности COVID-19 среди онкологических больных и повышение их смертности в период пандемии, в том числе в случаях, где основной причиной смерти был не онкологический процесс, а последствия перенесенной вирусной инфекции, свидетельствуют, что требуется внести коррективы в правила статистического учета заболеваемости и смертности онкологических больных, алгоритмы и протоколы диагностики и лечения онкологических больных.*

***Ключевые слова:*** *рак, злокачественные новообразования (ЗНО), COVID-19, онкологические больные, риск смертности.*

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