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The analysis of colorectal cancer morbidity and mortality in Kazakhstan, 2012-2016

Relevance: *Colorectal cancer (CRC) occupies one of the leading places in the world in the structure of cancer incidence and tends to grow what makes this cancer a global problem. In the Republic of Kazakhstan, CRC incidence is also steadily growing over the past few years. Since 2012, CRC ranks 4th among all cancer pathologies with a share of 8.6%, which is even higher than stomach cancer incidence.*

The purpose of this study is to analyze the incidence and mortality of CRC in the Republic of Kazakhstan for five years (2012-2016) after the launch of the National Screening Program for the detection of precancerous and neoplastic diseases of the colon.

Results: *The analyzed data shows an increase in the incidence of CRC per 100 thousand populations from 16.5‰ in 2012 to 17.7‰ in 2016. At the same time, the mortality per 100 thousand populations has slightly decreased: from 9.1‰ in 2012 to 8.3‰ in 2016.*

Conclusion: *We associate this epidemiological trend with the launch of the CRC screening program. It has led to an increase in morbidity due to an increase in detection and a decrease in mortality due to the growth of early detection and, therefore, better treatment outcomes.*

Keywords: *colorectal cancer, incidence, mortality, rectal cancer, colon cancer.*

Introduction: Colorectal cancer (CRC) is a malignant neoplasm of the large intestine, a malignant tumor of the colon and its appendage, the appendix. Due to an inaccurate translation of the English term (English: colorectal cancer), an often-generalized group of such tumors is called simply colorectal cancer, although in Russian it is a narrower term that does not include, in particular, large intestine lymphoma; the English term also covers colorectal cancer.

Colon cancer incidence is significantly growing for recent decades [1-3]. With all the advances in modern medicine, CRC occupies a leading position in prevalence, being the fourth in the world among oncological diseases in frequency for both sexes. CRC frequency is 19,7 per 100,000 [4].

In Kazakhstan, colon cancer incidence has amounted to 1706 cases in 2016, or 9.6 per 100,000, rectal cancer – 1452 cases, or 8.2 per 100 thousand of the population [5].

CRC ranks 2nd in frequency in women and 3rd in men all over the world. The geographical spread of CRC has significant differences [6]. It is generally accepted that the incidence rate is more characteristic of industrialized, high-income countries [7-8]. High incidence rates are recorded in North America, Australia, New Zealand, Europe and South Korea, average rates – in Latin America, and low rates – in Africa and Central Asia [8, 9].

Some authors believe that low incidence and mortality rates in the countries with low incidence may reflect low prevalence of colon cancer risk factors, as well as low life expectancy [10-13]. According to the American Cancer Society, the largest increase in the incidence of colon cancer is observed in Asia (Japan, Kuwait, and Israel) and Eastern Europe (Czech Republic, Slovenia, and Slovakia), which is associated with an increase in the prevalence of risk factors for its development [7]. In 50% of cases, CRC development is associated with the lifestyle and extended exposure to carcinogens [14-15]. The leading role of genetic factors of CRC de-

velopment is revealed in 5-20% of cases [15].

The main risk factors for CRC are: age over 50 years old, smoking, alcohol abuse, excessive consumption of red meat, low intake of whole grains, fruits and vegetables, physical inactivity, obesity, genetic syndromes, adenomatous polyposis of the colon, inflammatory bowel disease, a family history, previous breast or female genital cancer, type 2 diabetes [15]. Main risk factor for CRC development is high animal fat diets [14]. Though most of CRC patients are above 50 years, there is evidence of its increasing incidence in young people [16].

20-50% of CRC patients already have distant metastases during the initial visit, as well as when undergoing presumably radical operations [14].

Taking the above situation with CRC in the world and Kazakhstan, the study of epidemiological aspects of this disease remains an acute topic of oncology. Constant analysis and monitoring of CRC incidence and mortality are some of the main indicators of the effectiveness of the screening program for the detection of tumor and precancerous diseases of the colon, introduced in Kazakhstan in 2011.

Purpose of the study: To study the dynamics of CRC incidence and mortality in the Republic of Kazakhstan in 2012-2016.

Materials and methods: The study was based on the analysis of official indicators of cancer care service in Kazakhstan in **2012-2016**. Information-analytical and graphical methods were used to study the incidence.

Results: In the study period, CRC, namely, colon cancer and rectal cancer, ranked 6th and 7th in the structure of cancer pathologies in the Republic of Kazakhstan after breast, skin, lung, stomach, and cervical cancers. The share of colon cancer has increased from 8.0% in 2012 to 9.6% in 2016, the share of rectal cancer – from 7.5% in 2012 to 8.2% in 2016 (Table 1).

Table 1 - The incidence of colorectal cancer in the structure of oncopathology in the Republic of Kazakhstan, 2012-2016

Years	Colon cancer		Rank	Rectal cancer		Rank
	Abs.	%		Abs.	%	
2012	1322	8.0%	6	1241	7.5%	8
2013	1457	8.7%	6	1309	7.8%	7
2014	1637	9.5%	6	1449	8.4%	7
2015	1724	9.8%	6	1424	8.1%	7
2016	1706	9.6%	5	1452	8.2%	8

As of the end of 2016, the total incidence rate of malignant neoplasms (MN) in the whole country was 180.4‰; 32103 new MN cases were registered.

The highest incidence of colon cancer was noted in Karaganda (17.3‰), Pavlodar (17.0‰), North Kazakhstan (16.9‰), East Kazakhstan (15.5‰), Akmola (13.9‰) and West Kazakhstan (13.0‰) regions, the cities of Nursultan (12.6‰) and Almaty (11.1‰).

The highest incidence of colorectal cancer was noted in Pavlodar (15.6‰), Kostanay (15.1‰), North Kazakhstan (14.5‰), Akmola (13.5‰), East Kazakhstan (12.9‰), Karaganda (10.6‰) and West Kazakhstan (10.0‰) regions.

In the five years under study, CRC firmly held positions in the ranking hierarchy of cancers, with a slightly higher incidence among men. In 2016, the standardized colon cancer incidence in women increased up to 8.4‰ with a growth rate of 1.0%. At that, colon cancer incidence in men has decreased up to 10.4‰, with a rate of decline of 10,0%.

Today, in Kazakhstan, the indicator of morphological confirmation of the diagnosis in newly identified patients with MN has increased by up to 92.2% (Table 2). Morphological verification has improved in the regions and in the Republic as a whole, which is explained by the improvement of the equipment of laboratories, the improvement of qualifications among pathomorphologists. CRC verification is associated with a positive trend in the period of study (Figure 1).

Table 2 - Morphological verification of CRC in the Republic of Kazakhstan, 2012-2016

Year	Morphological verification of the diagnosis, per 100 new patients	Colon cancer (%)	Rectal cancer (%)
2012	85.5	91.1	95.7
2013	83.1	89.2	94.2
2014	86.4	91.1	96.2
2015	91.2	94.6	96.2
2016	92.2	95.8	98.4

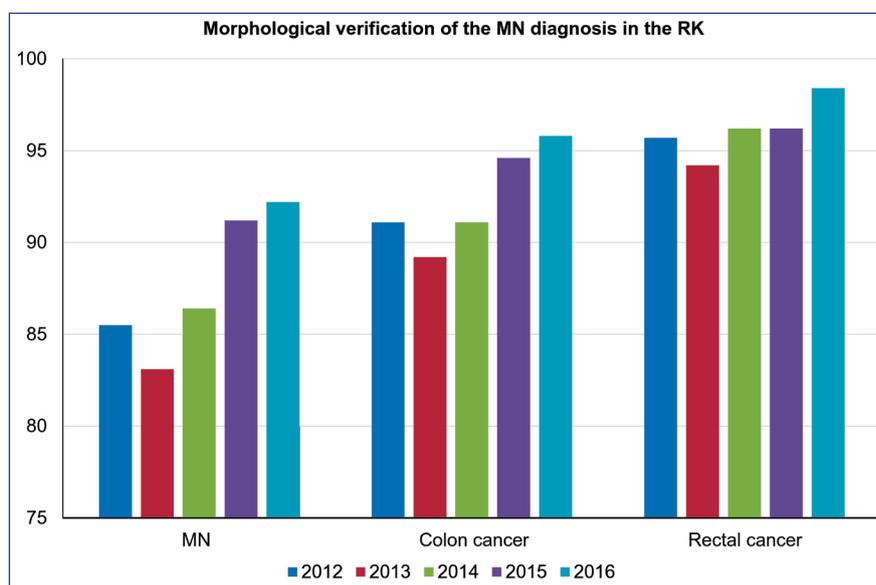


Figure 1 – CRC detection in the Republic of Kazakhstan, 2012-2016

Several decades ago, CRC incidence was low. However, since then the disease has become predominant cancer and currently accounts for about 10% of cancer mortality in Western countries and about 5% in Kazakhstan. One of the reasons for widening the screening programs is the fact of the presence of a polypoid precursor for CRC, which allows emphasis on prevention programs.

In Kazakhstan, quite a lot of attention is paid to CRC screening. It affects the diagnostic results (table 3): there is an increase in the detection of early stages of cancer and CRC cases in general.

CRC screening has covered about a million people each year. At that, patients with detected precancers were registered at the dispensaries, and patients diagnosed with CRC were put on record by oncologists for treatment.

Table 3 - Cases of the colon and rectal cancer detected by screening, in 2012-2016

Year	Colorectal cancer	
	Examined	Detected
2012	1174155	228
2013	896278	366
2014	970056	514
2015	791904	467
2016	796781	475

Among all localizations, CRR is actively detected during periodic medical examinations. In 2015-2016, early detection of CRC during periodic medical examinations had increased from 61.2% to 88.1%.

Table 4 – Cases of the colon cancer and rectal cancer detected during periodic medical examinations in 2015-2016

Year	Colon cancer			Rectal cancer		
	Abs.	Stages I-II	%	Abs.	Stages I-II	%
2015	203	148	56.3	201	175	61.2
2016	263	193	73.4	286	252	88.1

According to the data obtained, during five years under study, the CRC screening program remains acute and relevant for Kazakhstan.

Still, in spite of positive screening results, there are factors contributing to the fact that in 2016 the proportion of stage IV colon cancer was 14.7% and stage IV rectal cancer – 12.3% at the time of diagnosis. Such factors include late visits to the doctors, as well as the refusal to under-

go screening. Besides, according to the literature data, 20-50% of CRR patients have metastatic lesions at the initial visit [14]. The mortality from this pathology remains disappointingly high.

Despite of all measures taken in Kazakhstan concerning CRC diagnostics and treatment, the mortality from this pathology is in TOP10 causes of death from cancer (Tables 5, 6).

Table 5 – Mortality from colon cancer in the structure of oncopathologies in the Republic of Kazakhstan, 2012-2016

Year	Both sexes		Rank	Growth rate, %
	Abs.	Per 100,000		
2012	767	4.6	6	-4.4
2013	838	4.9	5	7.7
2014	769	4.4	7	-9.6
2015	747	4.3	7	-4.3
2016	767	4.3	5	1.2

In the study period, the mortality from colon cancer constantly ranked 5th-7th in the total structure of cancer mortality (Table 6).

Table 6 – Mortality from rectal cancer in the structure of oncopathologies in the Republic of Kazakhstan, 2012-2016

Год	Оба пола		Ранговое место	Темп прироста, %
	Абс.	на 100 тыс.		
2012	766	4.6	7	2.2
2013	801	4.7	7	3.1
2014	801	4.6	6	-1.5
2015	782	4.5	5	-3.8
2016	717	4.0	8	-9.6

In the study period, the mortality from rectal cancer constantly ranked 7th-8th in the total structure of cancer mortality (Table 7).

In 2016, colon cancer mortality by regions was above the republican average in Pavlodar (8.6‰), East Kazakhstan (7.5‰), Karaganda (6.5‰), and Akmola (5.4‰) regions, as well as in the cities of Almaty (6.0‰) and Nur-Sultan (5.2‰). Low colon cancer mortality was registered in Almaty (2.3‰), Qyzylorda (2.3‰), and South

Kazakhstan (1.8‰) regions.

In the same year, the highest mortality from rectal cancer was registered in Pavlodar (7.8‰), Akmola (7.4‰), North Kazakhstan (7.1‰), Kostanay (7.0‰), East Kazakhstan (6.7‰), and Atyrau (5.3‰) regions, as well as in the city of Nur-Sultan (5.3‰). At that, the indices below the average republican level were registered in South Kazakhstan (1.3‰), Qyzylorda (1.8‰), and Mangistau (1.9‰) regions.

Table 8 – One-year mortality from CRC in the Republic of Kazakhstan, 2012-2016

Years	One-year mortality (%)		The ratio between one-year mortality and neglect (stage IV), in %	
	Colon cancer	Rectal cancer	Colon cancer	Rectal cancer
2012	29.0	29.6	1.7	2.2
2013	29.8	28.1	1.8	2.0
2014	28.2	26.3	1.7	1.8
2015	24.8	24.6	1.6	1.9
2016	23.7	22.7	1.4	1.6

One-year mortality indices show a certain downward trend but still remain high.

Conclusions: The analysis of the epidemiological situation for CRC in Kazakhstan in 2012-2016 has shown an increase in CRC incidence against a background of a decrease in mortality rates. This natural pattern shows the effectiveness of the ongoing CRC screening program. The screening program on the detection of precancer and cancer diseases of the colon shall be prolonged, and the approaches to CRC treatment optimized to improve the epidemiologic situation in Kazakhstan for CRC. Algorithms and protocols of personified treatment shall be introduced taking into account individual data of the patients.

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