

RESEARCH ARTICLE

Editorial Process: Submission:02/10/2022 Acceptance:06/14/2022

Knowledge, Attitudes, and Barriers (KABs) of Regarding Colorectal Cancer Screening among the Population of the Republic of Kazakhstan

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Abstract

Background: One of the obstacles to participating in CRC screening is the lack of knowledge about the importance of CRC, its risk factors and the benefits that can be obtained through screening. The aim of this study was to evaluate the awareness and to identify the barriers to colorectal cancer screening among the population of the Republic of Kazakhstan. **Methods:** This is a cross-sectional study based on questionnaire, which was conducted in different regions of Kazakhstan from 2020 to 2021. This study involved 486 respondents. The survey was conducted both personally and using a web questionnaire. The questionnaire was developed independently, taking into account international results and experience, and was validated. **Results:** 486 participants were included in this study. Out of 486 who participated: 245 (50.04%) did not know whether CRC can occur without symptoms, 259 (53.3%) did not know that the disease is widespread, 232 (47.7%) believed that the disease is curable, 276 (56.8%) believed that CRC is a fatal disease. 357 (73.5%) participants responded that screening can provide timely and effective treatment of CRC. 57.4% of respondents did not agree that the CRC screening procedure is ineffective. However, they had obstacles to screening, such as: fear of getting CRC in the future 298 people (61.3%); and receiving unfavorable results during the examination of 291 people (59.9%). 317 people (65.2%) indicated that their ignorance of CRC was also an obstacle to screening. **Conclusion:** The results of the study indicate a lack of knowledge about the perception of CRC, participants' perception of risk factors, signs and symptoms of CRC and screening methods. And the main obstacles to screening are: fear of getting unfavorable results during screening; fear of getting sick in the future; and lack of knowledge about CRC.

Keywords: Colorectal cancer- CRC- public awareness of CRC- screening, barriers

Asian Pac J Cancer Prev, **23** (6), 2057-2063

Introduction

Colorectal cancer (CRC) is one of the most common types of cancer; it ranks third in morbidity and second in mortality worldwide. According to Global Cancer Statistics, in 2020 there were more than 1.9 million new cases of colorectal cancer (including the anus) and 935,000 deaths, which is approximately one in 10 cases of cancer and death (Sung et al., 2021). CRC can be prevented by appropriate screening and successfully treated when detected at early stages (Turunen, 1986). With early detection of this type of cancer, the overall survival rate is approximately 90%. Only about 39% of CRC is detected in the early stages, mainly due to the fact that screening rates in the United States are low, especially among Latinos (Turunen, 1986; Jackson et al., 2016; Siegel et al., 2018).

WHO has shown that almost half of the new cases

were detected in Asia, mainly in China (Wong et al., 2019). There is an increase in the incidence of colon cancer among the population of Kazakhstan and this may be related to the screening program, which was launched in 2011 as part of the healthcare reform program (Bekisheva et al., 2020). Still, it has to be acknowledged that Kazakhstan is an environmentally-disadvantaged area, which has many implications for public health, including increased cancer incidence and mortality (Shalgumbayeva et al., 2020). This is particularly true for the population of East Kazakhstan that was affected by the nuclear weapons testing at the Semipalatinsk Nuclear Test Site (Drozdovitch et al., 2011) and by pollution due to activity of many mines and processing plants (Semenova et al., 2020).

Similar CRC screening programs were promoted in other countries (Yu et al., 2001; He et al., 2018), but the

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participation rate was low (Yu et al., 2001; Wong, 2016; He et al., 2018). One of the obstacles to participating in CRC screening is the lack of knowledge about the importance of CRC, its risk factors and the benefits that can be obtained through screening (Abdouli et al., 2018).

The level of awareness and knowledge about colorectal screening among the population in many countries has been assessed by many authors. The facts have shown that poor knowledge affects the attitude and practice of participation in screening for CRC (Le et al., 2014; Tam et al., 2011; Tran et al., 2018; Wong et al., 2013).

Barriers to screening for CRC are socio-economic, medical, transportation, psychological and environmental barriers or accessibility barriers. Basically, the majority of respondents can describe only one screening method of CRC (usually colonoscopy), knowledge about other screening methods was limited (Solenberg et al., 2021).

According to the results of a study conducted among low- and middle-income countries, the main obstacles to screening for CRC are divided into the following categories. At the level of the social context: poverty, health literacy and unprofessional beliefs related to gender, cancer, allopathic medicine and religion; at the level of the organization of health services: lack of knowledge about CRC among medical personnel and community perception of poor quality of medical care; and at the individual level: insufficient awareness of CRC and, consequently, lack of risk perception, together with the fear of participating in screening activities and learning about a serious disease (Unger-Saldaña et al., 2020).

The objectives of this study were to assess awareness and attitude of colorectal cancer screening among population of Kazakhstan, examine sociodemographic factors associated with colorectal cancer screening knowledge and behaviour and identify the barriers to colorectal cancer screening.

Materials and Methods

It was a cross-sectional study. In the period from 2020 to 2021, a population survey was conducted in Kazakhstan in order to study public awareness and identify barriers to screening for colorectal cancer. In general, 486 respondents who were permanent residents of the Republic of Kazakhstan took part in this study, excluding medical workers. We conducted a survey point-by-point across Kazakhstan, dividing it into regions: Northern Kazakhstan – 84 (17.3%), Southern Kazakhstan – 82 (16.9%), Western Kazakhstan – 84 (15%), Eastern Kazakhstan – 181 (37.2%), Central Kazakhstan – 66 (13.6%). We tried to cover all regions of Kazakhstan (Figure 1).

Since the authors themselves are located in East Kazakhstan, the survey was conducted in person using a paper questionnaire. In other regions, in connection with the coronavirus pandemic, the survey was conducted using a web questionnaire. The participants were recruited by a convenient sampling method using mass invitations of people to take a survey through social networks.

All study participants provided written consent after providing detailed information about the purpose of the

study and the confidentiality of personal data. Participants were coded with a unique code. The correspondence between this code and the personal identification information was stored in a file that only the database custodian had access to. The others had access to the coded (secure) database. Prior to data collection, the study received approval from the Semey Medical University Ethics Committee (Protocol № 2, October 28, 2020).

The questionnaire was developed independently in accordance with international findings and experience (Hasan et al., 2017) and underwent a validation process. The questionnaire used in the current study was adapted from the study (Hassan et al., 2017), then translated into Russian and Kazakh. In order to ensure the accuracy of the translation, the questionnaire was translated from Russian and Kazakh into English and compared with the original version. The questionnaire was validated through a pilot run using a group of 15 randomly selected individuals who were interviewed to ensure the reliability and suitability of the survey. The results of the pilot testing indicated minor changes, and based on the results of the pilot run, the final corrected version of the questionnaire was used to perform the current study.

The questionnaire contains 28 questions, which were divided into different sections.

The first section included socio-demographic characteristics such as gender, age, marital status, employment status, education level, profession and place of residence. The second part included 5 questions about the assessment of knowledge on CRC: is colorectal cancer asymptomatic, common, fatal and curable disease, and is screening able to provide timely and effective treatment of CRC.

Regarding screening practices (section three), questions were asked about whether participants and their relatives had been screened for CRC and whether they planned to undergo it in the future; the answers were “yes” or “no”.

The fourth section was related to the attitude to screening and about the alleged obstacles to screening. It included questions: whether the screening procedure is unsafe and ineffective, whether participants are afraid of getting CRC in the future or getting unfavorable results. And also whether the lack of knowledge is an obstacle to their screening for CRC.

Statistical analysis

Descriptive statistics were used to analyze the data. The choice of statistical criteria for data analysis depended on the type of variables being analyzed. Pearson chi-squared was used for qualitative data. Statistical analysis was performed using SPSS version 20.0 (IBM Ireland Product Distribution Limited, Ireland). The level of statistical significance was set at $p < 0.05$.

Results

The study sample included 486 respondents who agreed to take part in a sociological survey. According to the main demographic characteristics (Table 1).

Analysis of the 2nd Table of the questionnaire on the

Table 1. Participant Characteristics (n=486)

Characteristics	N (%)
Farmer	6 (1.2)
Worker	93 (19.1)
No profession	29 (6.0)
White collar	358 (73.7)
Gender	
Male	120 (24.7)
Female	366 (75.3)
Marital status	
Single	156 (32.1)
Married	292 (60.1)
Age (years)	
< 29	153 (31.5)
30-49	202 (41.6)
> 50	131 (27.0)
Education level	
High school	349 (71.8)
College or above	131 (27.0)
Other	6 (1.2)
Occupation	
Full-time work	315 (64.8)
Part-time work	65 (13.4)
Unemployed	74 (15.2)
Retired	22 (4.5)
Other	10 (2.1)
Family history of colorectal cancer	
Yes	
No	

assessment of knowledge and perception of CRC showed that the majority of respondents do not know whether CRC can proceed without symptoms – 245 people (50.4%); whether this disease is common – 259 (53.3%) and whether CRC is curable – 232 (47.7%) participants. Two hundred and seventy six (276 – 56.8%) respondents believe that CRC is a fatal disease and 357 (73.5%) answered that screening can provide timely and effective treatment of CRC.

In Table 3, we studied the attitude and barriers of subjects to screening for CRC, depending on gender. Women more than men noted that the screening procedure for CRC is unsafe (37.4%). Both men and women disagreed that the screening procedure for CRC is not effective. Nevertheless, men are more afraid of getting CRC in the future (64.2%) than women (60.4%). The majority of respondents noted that the lack of knowledge about CRC was an obstacle to screening (men – 70.8%, women – 63.4%). Persons of both sexes considered the screening procedure for CRC very expensive (men-40%, women-41%). Nevertheless, they were ready to undergo a CRC examination on their own initiative (men – 62.5%, women – 69.7%). There is no statistically significant difference between answers of two groups.

Table 4 shows the attitude to screening for CRC depending on age. With an increase in the age of respondents, the opinion that screening can provide timely and effective treatment for CRC also increases (up to 29 years – 66%, 30-49 years – 73.3%, 50 years and older – 82.4%). Also, with increasing age, the opinion also increases that the procedure for screening CRC is unsafe (up to 29 years – 27.5%, 30-49 years – 35.6%, 50 years and older – 45%). When studying the relationship of age with other variables, the analysis showed that people

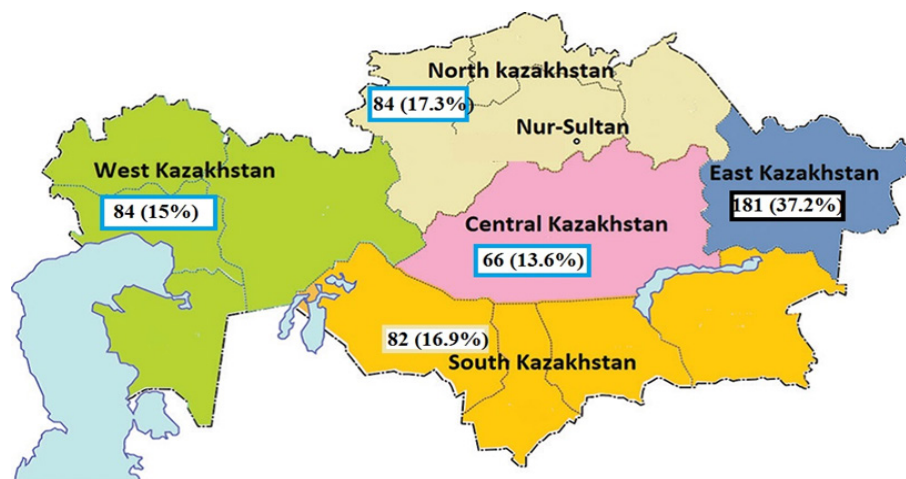


Figure 1. Distribution of the Number of Respondents Participating in the Study by Region of Kazakhstan

Table 2. Awareness of Colorectal Cancer and Screening (n=486)

	Yes N (%)	No N (%)	Do not know N (%)
Could colorectal cancer proceed without any symptoms?	186 (38.3)	55 (11.3)	245 (50.4)
Is colorectal cancer a common disease?	146 (30.0)	81 (16.7)	259 (53.3)
Is colorectal cancer a deadly disease?	276 (56.8)	37 (7.6)	173 (35.6)
Is colorectal cancer curable?	224 (46.1)	30 (6.2)	232 (47.7)
Can screening provide timely and effective treatment of CRC?	357 (73.5)	15 (3.1)	114 (23.5)

Table 3. Attitudes and Barriers of the 486 Subjects Towards Colorectal Cancer Screening (% , Proportion for Every Row) (n=486)

Attitudes and barriers to Colorectal Cancer screening		I agree	I don't agree	I don't know	Other	P
The screening procedure for CRC is unsafe	Male	30	39.2	30	0.8	0.424
	Female	37.4	35	26	1.6	
	Total	35.6	36	27	1.4	
Colorectal cancer screening are not effective	Male	18.3	52.5	28.3	0.8	0.285
	Female	18.6	59	20.5	1.9	
	Total	18.6	57.4	22.4	1.6	
I'm afraid of getting Colorectal Cancer in the future	Male	64.2	29.2	1.7	5	0.446
	Female	60.4	31.7	4.4	3.6	
	Total	61.3	31.1	3.7	3.9	
Afraid of detecting colorectal cancer	Male	57.5	36.7	2.5	3.3	0.908
	Female	60.7	34.7	2.2	2.5	
	Total	59.9	35.2	2.3	2.7	
It would be embarrassing for me to getting of colorectal cancer examination	Male	37.5	55	5.8	1.7	0.143
	Female	40.4	54.9	1.9	2.7	
	Total	39.7	54.9	2.9	2.5	
There is no equipment for inspection	Male	43.3	40.8	11.7	4.2	0.056
	Female	41.3	41.5	16.4	0.8	
	Total	41.8	41.4	15.2	1.6	
Lack of my knowledge about colorectal cancer is an obstacle to screening	Male	70.8	25.8	3.3	0	0.159
	Female	63.4	33.9	1.6	1.1	
	Total	65.2	31.9	2.1	0.8	
I am ready to undergo an examination for colorectal cancer on my own initiative	Male	62.5	31.7	5	0.8	0.054
	Female	69.7	24.3	2.2	3.8	
	Total	67.9	26.1	2.9	3.1	
Lack of time	Male	46.7	48.3	1.7	3.3	0.633
	Female	40.4	55.2	1.4	3	
	Total	42	53.5	1.4	3.1	
Screening for colorectal cancer is too expensive	Male	40	30	28.3	1.7	0.89
	Female	41	27.6	28.7	2.7	
	Total	40.7	28.2	28.6	2.5	

over 50 are more open to screening in the future (68.7%) compared to people under 50. They also agree with the opinion of friends and relatives about screening (57.3%) compared to young age (36.6%).

In table 5, we performed multiple linear regression in association with age. The results showed that there is a statistically significant relationship between age and the variable “Do you plan to get tested for colorectal cancer in the future?” ($p=0.005$) and “My friends and family advocate that I get tested” ($p=0.003$).

Discussion

Screening for colorectal cancer has been introduced in Kazakhstan since 2011. Screening for CRC in Kazakhstan is carried out in two stages, the first stage is a hemocultivation test, and if the results are positive, the next step is a general colonoscopy. The early stage of detection is carried out by city and district polyclinics. The main risk group is patients aged 50-70 years of both sexes. In city and district polyclinics there are screening

rooms that keep records of indicators, and local nurses and doctors examine patients. Each regional cancer center has a screening room that monitors the screening procedure and keeps a general record of detected cases of CRC. The large number of identified cases of CRC indicates the need for additional screening programs (Zhylkaidarova et al., 2021).

Since the introduction of screening, the incidence of CRC has increased. Such an increase indicates a positive result of CRC screening, which is associated with a positive economic effect, since treatment of stages I and II is cheaper than III and IV. In addition, the reduction in the number of primary cases of CRC is the result of timely detection of precancerous bowel diseases during colonoscopy and subsequent treatment. Despite this, there are barriers to screening on the part of the population, although the state policy is aimed at early detection and reduction of morbidity and mortality from CRC. Also, it has to be noted that population of environmentally disadvantaged areas shows higher rates of mental distress and this might affect the uptake of existing cancer services

Table 4. Altitude towards Colorectal Cancer Screening According to Age (%) (n=486)

Items	< 29	30-49	> 50	χ^2	p
Can screening provide timely and effective treatment of CRC?					
Yes	66	73.3	82.4	9.821	0.044
No	3.9	3	2.3		
I don't know	30.1	23.7	15.3		
Do you plan to be screened for colorectal cancer in the future?					
Yes	49	49	68.7	14.948	0.001
No	51	51	31.3		
The screening procedure for CRC is unsafe					
I agree	27.5	35.6	45	15.64	0.016
I don't agree	39.9	34.2	34.4		
I don't know	29.4	29.7	19.8		
Other	3.2	0.5	0.8		
My friends and family are in favor of me getting tested					
I agree	36.6	40.6	57.3	22.918	0.001
I don't agree	55.6	47.5	29.8		
I don't know	2	6.5	5.3		
Other	5.8	5.4	7.6		

(Semenova et al., 2019).

A cross-sectional study in Karachi, Pakistan identified the main obstacles on the way to screening: “lack of knowledge about the screening procedure”, “lack of funds for screening” and “the screening procedure is too expensive” (Hasan et al., 2017).

Another qualitative study was conducted with the help of individual interviews of 33 Koreans aged 50 years and older, which is the criterion for screening the CRC of the National Cancer Screening Program in the Republic of Korea. The results showed that all study participants relied more on primary prevention, including a healthy lifestyle, rather than secondary prevention, i.e. screening. This study showed that the constitution of the body is the cause of CRC and the emphasis is on primary prevention, indicating that traditional Korean medicine and ideas about CRC were embedded in the participants. It is noteworthy that about 80% of respondents had no more than a high school diploma (Lee, 2018). According to our study 71.8% of the participants had a higher education. At the same time, many participants showed a lack of knowledge about CRC screening. 65.2% of respondents believe that their lack of knowledge about CRC also represents an obstacle to screening.

However, a study conducted among the urban population of Malaysia showed that respondents with a higher level of education have a higher level of knowledge about the alarming signs of CRC (Sindhu et al., 2019).

According to the data obtained from our study the variable “Education” has a statistically significant relationship with such variables as: “Have relatives been tested for colorectal cancer?” (0.024), “I would be embarrassed if I were checked for CRC” (0.008) and “There is no equipment for inspection” (0.042).

Participants’ knowledge of CRC and screening was insufficient, which was similar to studies conducted in Hong Kong and Saudi Arabia (Wong et al., 2013; Almutairi et al., 2018). Analysis of the 2nd section of the questionnaire in our study on the assessment of knowledge and perception of CRC showed that the majority of respondents do not know whether CRC can proceed without symptoms – 50.4%; whether this disease is common – 53.3% and whether CRC is curable – 47.7% participants.

Another qualitative study conducted in Mexico City examined the barriers and intermediaries to screening for CRC in a low-income urban community. The main obstacles at the social level were poverty, health literacy, community health and gender beliefs. At the level of healthcare organizations, there were: lack of knowledge about CRC among medical workers and a general perception of the poor quality of medical services provided in public institutions. At the individual level, they identified insufficient awareness of the risk of CRC and fear of serious illness as the main obstacles. The main intermediaries, according to the participants, were the

Table 5. Multiple Linear Regression of Age Associated with Colorectal Cancer Screening (n=486)

Items	B	95%CI	t	P
Can screening provide timely and effective treatment of CRC?	0.062	-0.203	1.192	0.234
Do you plan to be screened for colorectal cancer in the future?	0.197	0.059-0.334	2.801	0.005
The screening procedure for CRC is unsafe	-0.066	-0.168	-1.544	0.123
My friends and family are in favor of me getting tested	0.129	0.044-0.213	3	0.003

screening information of the CRC and the free provision of screening tests (Unger-Saldaña et al., 2020). In our study, the main obstacles to screening were identified: fear of getting unfavorable results during the examination (59, 9%); fear of getting sick in the future (61, 3%) and lack of knowledge about CRC (65, 2%).

In fact, the lack of knowledge that it is necessary to undergo an examination turned out to be one of the most common obstacles to screening for CRC (Klabunde et al., 2005; Honein-AbouHaidar et al., 2016; Cooper and Gelb, 2016; Galal et al., 2016; Hasan et al., 2017). According to the results of our survey, 65.2% believe that their lack of knowledge about CRC is an obstacle to screening.

In a study conducted in Lebanon, the results showed that only 31.5% and 17.2% of participants were aware of the warning signs and risk factors of CRC, respectively (Tfaily et al., 2019). These low percentages correspond to previous studies conducted in the MENA region (Middle East and North Africa). In these studies, it was found that more than 60% of the Lebanese population had never heard of the CRC (Nemer et al., 2016). Section 3 of the questionnaire of our study included questions about the main barriers to screening. To the question “*The screening procedure for CRC is unsafe*”, the distribution of responses was almost uniform: 35.6% agree, 36.0% disagree with this statement and 27.0% do not know about it. The remaining participants - 1.4% refrained from answering. More than half of respondents (57.4%) disagree with the point that the screening procedure for CRC is ineffective.

Another study was conducted among 684 people at high risk of developing CRC from nine hospitals in Hunan Province, China. Less than half of the participants identified risk factors such as smoking, old age, overweight or obesity, hereditary syndrome and diabetes. This result indicates that people are not familiar with the risk factors associated with cancer. It is important to note that less than half of the participants knew that CRC could be asymptomatic (Huang et al., 2021). Similar results were obtained in our study (the majority of respondents) do not know whether CRC can proceed without symptoms - 50.4%.

According to a survey of the UAE population, the overall assessment of responses revealed a low level of knowledge about the risk factors of CRC, and only 40% correctly identified hidden blood in the stool as the main test for the prevention of CRC. 95% of the participants noted that CRC screening was not recommended by their doctor. And also the majority (379, 64%) believed that CRC is rare, and had not heard of a screening test for CRC (401, 67%) (Abdouli et al., 2018).

In study conducted in the Czech Republic among the target group (asymptomatic persons over 50 years of age), it was revealed that lack of interest or time and fear of colonoscopy or positive results were indicated as reasons for refusal. Respondents suggested that providing more detailed explanations regarding screening procedures could improve the use of CRC screening (Kroupa et al., 2019).

The majority respondents (76, 1%) of our study would agree to participate in screening if they were recommended by a doctor and if there were medical indications for this.

In six studies, the medical costs associated with screening were an obstacle, Huang (2019) reported that the cost of screening is too high and accounts for 50% of the barriers to screening.

Strengths and limitations

In Kazakhstan, the colorectal cancer screening program has been implemented since 2011, but we didn't find any information about study of barriers to screening and awareness of CRC. We tried to clear this question. Our study has some limitations. This study was conducted using a voluntary convenient sampling method, so the number of respondents who agreed to the survey was not so large, although we tried to cover the whole of Kazakhstan. This research was conducted within the framework of a doctoral dissertation, in the future we plan to conduct a large study at the national level, which will help eliminate these limitations.

In conclusion, consequently, the results of our study indicate that we still have a lack of knowledge on the perception of CRC, the participants' perception of risk factors, signs and symptoms of CRC, as well as screening methods. And the main obstacles to screening are: fear of getting unfavorable results during the examination; fear of getting sick in the future and lack of knowledge about CRC. As people become more aware of the risk factors of CRC, their participation in screening programs increases. In this regard, we need to develop measures to raise awareness about the CRC. Public awareness campaigns should be intensified, which emphasize that screening for CRC is recommended for everyone, not just for those with a family history, since screening leads to early detection and prevention of disease progression, therefore, to a reduction in mortality. It is expected that correcting this misconception will help people overcome fear and stigma towards colorectal cancer.

Author Contribution Statement

Dina Toleutayeva initiated the research and prepared the manuscript. The data was obtained by Nazym Kudaibergenova. Gulnar Shalgumbayeva contributed to the data analysis. Tolegen Toleutayev contributed to critical evaluation and revisions of the manuscript. Dina Toleutayeva and Gulnar Shalgumbayeva are the guarantors of the paper.

Acknowledgements

The authors would like to thank the administration of the Semey Medical University. We thank the study participants for taking time to complete our questionnaire.

Scientific Approval

This research is carried out within the framework of the approved topic of the doctoral dissertation of a 2-year doctoral student of the specialty “Public Health” of the Semey Medical University, Kazakhstan.

Ethics approval

Prior to data collection, the study received approval

from the Semey Medical University Ethics Committee (Protocol № 2, October 28, 2020).

Conflict of interest

The authors have stated that there are no competing interests.

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