

Assessing knowledge on preventive colorectal cancer screening in Saudi Arabia: A cross-sectional study

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ABSTRACT

Context: According to the Saudi Cancer Registry's 2014 Cancer Incidence Report, colorectal cancer (CRC) is the leading form of malignant cancer among Saudi men and ranks third among women. Raising awareness about CRC risk factors could lead to a significant decline in incidence of disease. **Aims:** To assess CRC awareness and evaluate the main barriers that might prevent individuals' participation in screening. **Settings and Design:** A self-administered survey was conducted over two days as part of a CRC awareness campaign in Jeddah, Saudi Arabia in March, 2018. **Methods and Materials:** The survey addressed issues regarding knowledge of CRC and available screening methods. The survey also examined barriers that might make one reluctant to undergo preventative screening. Stata/SE 15.0 was used for all statistical analyses. **Statistical Analyses:** Continuous variables were described with frequencies and percentages. Stepwise linear regression models were constructed to predict CRC knowledge and barriers. **Results:** Out of 422 participants, 50.2% were men. Most respondents were between 15–35 years old (65.8%). Multivariate analysis revealed that gender was a significant predictor of CRC knowledge. Furthermore, the variables of education and family history of CRC significantly predicted subjects' awareness of colonoscopic screenings. The most common barriers for seeking screening included fear of the procedure, absence of clinical symptoms, and fear of the results. **Conclusions:** Our results highlight deficits in public CRC knowledge and their awareness of preventative measures. These shortcomings were found to be mainly related to education level. Specific barriers affecting screening decisions were also identified; intensive efforts on awareness to overcome these obstacles will be required.

Keywords: Awareness, colon cancer, colonoscopy, colorectal cancer, Saudi Arabia, screening

Introduction

According to the Saudi Cancer Registry's 2014 Cancer Incidence Report, colorectal cancer (CRC) is the leading form of malignant cancer among Saudi men and ranks third among women. Thus, CRC poses a significant health risk to Saudi nationals, who constitute 11.5% of newly diagnosed cancer cases in 2014.^[1] CRC is the third-most common form of malignant cancer among men, and the second among women

worldwide, leading to approximately 694,000 deaths annually.^[2] Men are predominantly affected with an age-standardized rate (ASR) of 10.6/100,000 as compared with 8.2/100,000 among women with a ratio of 127:100, respectively. Variations within Saudi Arabia reveal that the highest rates are in the Eastern region, followed by Riyadh, Makkah, Qassim, and Tabuk. The median age at diagnosis in Saudi Arabia is 60 for men and 57 for women, as compared with worldwide figures of 68 for men and 72 for women (for colon cancer) and 63 for both men and women (for rectal cancer) according to the SEER Cancer Statistics Review (CSR) 1975–2014.^[3] The overall CRC survival rate among Saudi residents is 44.6%,

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which is lower than in many other countries (i.e., 60% in the United States).^[4]

Raising awareness about CRC risk factors could lead the general population to be more involved in screening as a result of increased knowledge about the disease itself.^[5,6] Factors leading to incremental risk include a sedentary lifestyle, obesity, excessive alcoholism, smoking, a low fiber diet, red and processed meat consumption, age, and a family history of CRC.^[7-10] The inadequacy of public knowledge regarding CRC has been shown to contribute to the disease's manifestation and severity. It delays a patient's presentation time which can worsen outcomes.^[7,11] It has been noted that an impediment to this timing is linked to a lack of public knowledge regarding clinical CRC symptoms.^[12] Identifiable symptoms include alterations in bowel habits, hematochezia, melena, abdominal discomfort, fatigue, and an unexplained reduction in weight.^[7] Other attributable factors include certain beliefs and financial barriers.^[12] Disease prevention in the form of screening substantially limits CRC development via early recognition of precancerous polyps.^[13,14] Among several suggested screening programs for various diseases, CRC is an optimal candidate for early screening programs considering its common presentation and protracted disease course.^[15] Available methods include direct visualization of lesions through a flexible sigmoidoscopy and colonoscopy and secondary methods such as a fecal occult blood test.^[16-19] Owing to variation in the median age at presentation in Saudi Arabia, screening should begin when residents are 45 years old. This contrasts with the globally recommended age of 55 years for men and 60 years for women.^[20,21]

In recent years, primary care physicians have played an important role in the diagnosis and prevention of several disorders in the gastrointestinal tract. The role of primary care physicians is also of importance in the case of CRC. With proper screening programs, the rate of CRC could be markedly reduced.^[22]

National screening programs are one key way to prevent disease. In Czech Republic, for example, a general trend toward earlier CRC detection developed after an organized screening program was implemented in 2000.^[23]

The goals of this study were to assess knowledge about CRC in Saudi Arabia, gauge awareness of screening methods, and identify the main barriers that might prevent individuals from participating in screening programs.

Subjects and Methods

We conducted a cross-sectional study with a representative random sample of 422 Saudi residents in the city of Jeddah. A survey was conducted with visitors of the largest shopping mall in the western region of Saudi Arabia over a two-day period. This was part of a colorectal cancer awareness campaign during March 2018. The survey was in Arabic and completed before respondents entered the campaign exhibit. The questions were

designed by members of the Gastrointestinal Oncology Unit in King Abdulaziz University Hospital (KAUH) in consultation with relevant literature.^[24]

A scoring system was designed to assess participants' CRC knowledge and relevant lifestyle choices that impact CRC risk. Correct answers were given one point. A questionnaire consisting of 14 items assessing the prevalence of CRC in Saudi Arabia, risk factors, symptoms, and other factors was administered [Table 1]. Some items had more than one right answer. For example, each correct risk factor for CRC identified (e.g. age, polyps) by the participant was awarded one point with a maximum score of 26 points indicating the highest score in CRC knowledge. Predictors of CRC knowledge included socio-demographic data (age, nationality, gender, education level, income, and place of residence) and a presence of personal or family history of CRC. Barriers hindering screening included fear of the procedure, fear of the results, discomfort, cost, and absence of symptoms.

Before the analysis, the dataset was prepared and checked for missing data. The analyses of the present study were performed using Stata/SE 15.0. Continuous variables were described with frequencies and percentages. Stepwise linear regression models were run to predict knowledge of CRC knowledge and barriers for seeking screening. A *P* value of less than 0.05 was determined to be statistically significant.

This study was approved (Reference No. 379-18) by the Research Committee of the Unit of Biomedical Ethics of King Abdul-Aziz University (28/5/2018). Oral consent to use data for research purposes was obtained from all participants.

Results

As shown in Table 2, 212 study participants (50.24%) were men and most of our respondents (65.8%) participants were between 15 and 35 years old. Of these, 342 respondents (80.85%) were Saudi nationals. Most participants, 348 (83.05%) worked in a nonmedical field. The majority reported having a bachelor's degree (63.83%). In terms of health insurance, 210 (49.65%) had insurance coverage, 141 (33.34%) dealt with medical expenses privately, and 72 (17.02%) were covered by the government. Most participants, 68.72% lived in the western region, followed by 18.96% in the north, 5.69% in the central regions, 4.03% in the south, and 2.61% in the east.

Table 3 illustrates multivariate analyses predicting CRC knowledge. Gender emerged as a significant predictor ($P = 0.02$) for determining whether individuals had knowledge of CRC as a medical disease. In terms of screening test knowledge, there was a significant association between education level ($P = 0.001$) and region of residence ($P = 0.022$). However, specific knowledge about colonoscopies, per se, was associated with gender ($P = 0.038$), an education level ($P < 0.001$), and a family history of CRC ($P = 0.004$). Regarding fecal blood test knowledge, education level was a

Table 1: Questionnaire items

Question	No (%)
Have you ever heard of CRC?	
Yes	317 (74.94)
No	106 (25.06)
Have you ever heard of any screening tests that are used to detect colon cancer?	
Yes	151 (35.78)
No	271 (64.22)
If you answered yes to the previous question, what type of screening test have you heard of?	
Colonoscopy	168 (47.59)
Fecal testing	69 (19.55)
CT scan	44 (12.46)
X-ray	26 (7.37)
Blood carcinogenic test	29 (8.22)
Don't know	167 (47.31)
When do you think CRC screening starts?	
20	20 (4.73)
30	44 (10.40)
50	84 (19.86)
70	0
Don't know	275 (65.01)
Which of the following could prevent you from performing a screening? (more than one answer is acceptable)	
Fear of colonoscopy	111 (26.81)
Fear of results	60 (14.49)
Disgust at the thought of the procedure	15 (3.62)
Cost of the procedure	14 (3.38)
Absence of symptoms	74 (17.87)
Nothing	97 (23.43)
Don't know	105 (25.36)
Where does CRC rank among the most commonly occurring cancers in men in Saudi Arabia?	
First	75 (17.73)
Third	82 (19.39)
Seventh	8 (1.89)
Tenth	4 (0.95)
Don't know	254 (60.05)
Where does CRC rank among the most commonly occurring cancers in women in Saudi Arabia?	
First	17 (4.02)
Third	86 (20.33)
Fifth	42 (9.93)
Seventh	10 (2.36)
Don't know	268 (63.36)
What do you think are the symptoms of CRC? (more than one answer is acceptable)	
Blood with stool	175 (42.07)
Vomiting	53 (12.74)
Loss of appetite and weight	121 (29.09)
Change in bowel habits	103 (24.76)
Abdominal pain	130 (31.25)
I Don't know	179 (43.03)
Do you think there are ways to prevent the occurrence or progression of CRC?	
Yes	188 (44.44)
No	235 (55.56)
Do you think that screening tests increase the likelihood of detecting colon cancer early?	
Yes	308 (72.81)
No	115 (27.19)
If your doctor recommended performing a colonoscopy, which would you prefer?	
Paying and performing colonoscopy at the earliest time possible	302 (71.39)
Waiting until your free appointment	106 (25.06)
I prefer not to answer	15 (3.55)

Contd...

Table 1: Contd...

Question	No (%)
Which of the following lifestyle choices increases the risk of developing CRC (more than one answer is acceptable)	
Smoking	244 (59.95)
Alcohol consumption	196 (48.16)
Eating lots of red meat	174 (42.75)
Physical inactivity and decreased exercise	167 (41.03)
Eating foods low in fat and with lots of fiber	70 (17.20)
Excessive stress	128 (31.45)
Average weight	29 (7.13)
Which of the following increases the risk of CRC? (more than one answer is accepted)	
Age	177 (43.70)
The presence of polyps in the colon	174 (42.96)
Genetic mutations	82 (20.25)
Diabetes mellitus	37 (9.14)
Irritable bowel syndrome	157 (38.77)
Previous disease (pathology) in the colon	160 (39.51)
Hemorrhoids	59 (14.57)
Do you think CRC starts as a benign tumor (polyp)?	
Yes	149 (35.22)
No	274 (64.78)
Do you think having a family member diagnosed with CRC increases the risk of another family member developing the disease?	
Yes	177 (41.84)
No	246 (58.16)
What do you think is the best way to look for polyps in the colon?	
Colonoscopy	187 (44.21)
CT scan	24 (5.67)
X-ray	7 (1.65)
Clinical examination	17 (4.02)
Don't know	188 (44.44)

significant predictor ($P = 0.038$). For knowledge of risk factors, income predicted the likelihood of identifying age as a risk factor ($P = 0.008$) and nationality predicted the knowledge of genetic mutations as a risk factor ($P = 0.022$).

Knowledge about additional symptoms (i.e. blood in stool, change in bowel habits, loss of appetite, and abdominal pain) and the remaining risk factors (polyps, alcohol consumption, red meat, low fiber diet, Inflammatory Bowel Disease (IBD), and leading a sedentary lifestyle) were not significantly predicted by our selected factors. Table 4 presents the regression analysis for predicting barriers in undergoing a colonoscopy. Nationality was the only variable that predicted fear of the procedure ($P = 0.005$) while age was the only predictor for fearing the test results ($P = 0.053$). The absence of any barrier in performing preventative screening was influenced by one's education level ($P = 0.032$). No significant predictors were observed for cost, discomfort, and absence of symptoms.

Discussion

According to our results, women had more knowledge of CRC as a disease and colonoscopies as a screening method than men which is consistent with past studies.^[4,7] In terms of education level, results revealed that higher educational attainment was predictive of CRC knowledge and its screening modalities. Additionally, the absence of any barriers in performing preventative screening was highly influenced by one's education

level. These results are consistent with past research.^[20,25,26] Furthermore, CRC knowledge was assessed using a scoring system with mean knowledge of 8.05 out of 26 across our sample—which is rather low. However, this result is consistent with other studies, namely, Koo *et al.*^[27] This study showed a low mean knowledge of symptoms and risk factors in countries across Asia with the lowest knowledge scores in India, Malaysia, and Singapore (mean = 0.00 from 9), and lowest risk factor knowledge scores in India, Malaysia, Singapore, Korea, and Brunei (mean = 0.00 from 9). We also observed that the most relevant factor for predicting knowledge was education level. Higher education levels predicted an increase in knowledge score of 0.566 and a P value of 0.073. This corresponds to a study from Wardle *et al.* revealed that participants with higher education attainment demonstrated great knowledge scores about CRC ($P \leq 0.001$).^[28]

The presence of a personal or family history of CRC was predictive of knowing that a colonoscopy as a key screening method. This could be because having a relative with CRC would make someone more likely to gain knowledge about the disease and its prevention. In our study, age had a significant impact on one's hesitance to receive a colonoscopy out of fear of its results while in a study from Galal *et al.*, fear of the result was significantly associated with gender, which was not the case in the present study.^[15] Furthermore, higher CRC knowledge was significantly related to higher income. This could be attributed to respondents having easier access to information. In the present

Table 2: Participants' socio-demographic data

Characteristic	Number	Percent
Total	423	100
Age (in years)		
15-25	139	32.94
25-35	139	32.94
35-45	81	19.19
45-55	36	8.53
55-65	19	4.50
>65	8	1.90
Gender		
Male	212	50.24
Female	210	49.76
Nationality		
Saudi	342	80.85
NonSaudi	81	19.15
Education level		
High school and below	81	19.15
Bachelor's degree	270	63.83
Master's degree	52	12.29
Doctorate degree	20	4.73
Income (Saudi Riyal)		
<5000	95	22.57
5000-10000	95	22.57
10000-20000	98	23.28
>20000	61	14.49
N/A	72	17.10
Health provider		
Insurance	210	49.64
Government/NA	72	17.02
Private	141	33.34
Region of residence		
North	80	18.96
South	17	4.03
Middle	24	5.69
West	290	68.72
East	11	2.61
Profession		
Medical	71	16.95
NonMedical	348	83.05

study, the majority of participants (71%) stated a willingness to pay for screening based on a physician's recommendation. This is in contrast to what was observed by Deng *et al.* where only 37.5% of patients agreed to be screened voluntarily, 41.3% reported that they would be screened after a doctor's recommendation, and 21.3% refused to be screened.^[29] Furthermore, our study revealed an association between the geographical region of residence and a willingness to be screened at one's own expense. While other studies found that participation in a screening program is directly related to disease awareness.^[27]

It is well-known that primary care physicians play a major role in disease prevention and prompt diagnosis.^[30] Our findings should help primary care physicians in Saudi Arabia to target patients that are expected to have less knowledge about CRC, namely, low-income patients and patients with lower educational levels. Primary care physicians should take more time with those patients to educate them about the risks and prevention of CRC. Moreover, talking to older patients and exploring their fears about the colonoscopy procedure

Table 3: Multivariate analysis predicting CRC knowledge

Variables	Have you ever heard about CRC		Do you think having a family member diagnosed with CRC increases the risk of another family member developing the disease?		Have you ever heard of any screening test that is used in detecting colon cancer?		Heard about colposcopy as a screening test?		Heard about fecal testing as a screening test?		Age as a risk factor for CRC?		Genetic mutations as a risk factor for CRC?	
	OR (95%CI)	P	OR (95%CI)	P	OR (95%CI)	P	OR (95%CI)	P	OR (95%CI)	P	OR (95%CI)	P	OR (95%CI)	P
Age	-	-	1.16 (0.99-1.37)	0.072	-	-	-	-	-	-	-	-	0.85 (0.68-1.05)	0.33
Nationality	-	-	-	-	0.66 (0.38-1.15)	0.143	-	-	1.62 (0.83-3.17)	0.158	-	-	0.40 (0.18-0.88)	0.022
Gender	1.73 (1.09-2.77)	0.021	-	-	-	-	1.62 (1.02-2.57)	0.038	-	-	-	-	-	-
Education level	1.51 (1.05-2.18)	0.025	-	-	1.69 (1.26-2.27)	0.001	2.12 (1.50-2.98)	0.000	1.46 (1.02-2.09)	0.038	-	-	-	-
Income	1.35 (1.13-1.60)	0.001	0.90 (0.78-1.04)	0.170	-	-	-	-	1.18 (0.97-1.44)	0.101	1.22 (1.05-1.41)	0.008	-	-
Health provider	0.81 (0.66-1.00)	0.056	-	-	0.84 (0.68-1.02)	0.085	-	-	-	-	-	-	-	-
Region of residence	-	-	0.85 (0.66-1.09)	0.199	0.72 (0.54-0.95)	0.022	0.81 (0.61-1.08)	0.155	-	-	-	-	-	-
Have you or a relative ever been diagnosed with CRC?	1.93 (0.99-3.74)	0.053	-	-	1.67 (0.99-2.81)	0.054	2.37 (1.32-4.25)	0.004	-	-	-	-	-	-

Table 4: Multivariate analysis predicting colonoscopy barriers

Variables	Cost		Discomfort		Fear of procedure		Fear of result		Absence of symptoms		None	
	OR (95%CI)	P	OR (95%CI)	P	OR (95%CI)	P	OR (95%CI)	P	OR (95%CI)	P	OR (95%CI)	P
Age	-	-	-	-	-	-	1.24 (0.99-1.53)	0.053	0.86 (0.68-1.07)	0.178	-	-
Nationality	-	-	-	-	0.37 (0.19-0.75)	0.005	-	-	1.53 (0.82-2.87)	0.182	-	-
Gender	-	-	-	-	1.42 (0.91-2.21)	0.124	-	-	-	-	0.63 (0.39-1.02)	0.060
Education level	-	-	-	-	-	-	-	-	-	-	1.42 (1.03-1.96)	0.032
Income	-	-	-	-	0.89 (0.76-1.04)	0.153	-	-	-	-	1.13 (0.95-1.35)	0.159
Health provider	1.36 (0.85-2.17)	0.196	-	-	-	-	1.23 (0.95-1.59)	0.110	1.19 (0.94-1.51)	0.144	-	-
Region of residence	0.49 (0.20-1.23)	0.127	0.52 (0.22-1.24)	0.138	-	-	-	-	-	-	-	-

is essential since we found that older patients fear the results of the colonoscopy and this stops them from pursuing it.

An assessment of the effects of educational campaigns on CRC awareness could have been better evaluated if participants' knowledge had been resurveyed after the campaign (not just before) to assess the effectiveness of the campaign.

While there are clear guidelines for CRC screening in Saudi Arabia, there is no organized national screening program. Thus, we encourage policymakers to consider implementing a unified national program for educating the public about CRC.

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Conflicts of interest

There is no conflicts of interest.

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