

ORIGINAL ARTICLE

# Knowledge and barriers to screening for colorectal cancer among Saudis in Riyadh city using health belief model

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## ABSTRACT

**Background:** Despite the availability of different effective screening tools for colorectal cancer, the compliance to screening remains a huge issue. Thereby, the study aimed to explore the level of knowledge about colorectal cancer, its screening tools and the possible barriers associated with poor compliance to screening.

**Methodology:** It is a questionnaire-based cross-sectional study conducted amongst 200 adults aging at least 40 years. Questionnaire assessed demographic data, knowledge about signs and symptoms, risk factors of colorectal cancer, and barriers to screening in a health belief model approach.

**Results:** Out of total 200 individuals, there were 156 females (78%) and 44 males (22%). The overall mean age was  $55.76 \pm 8.23$ . Almost 11.5% participants reported a family history of colorectal cancer (CRC). The Fecal Occult Blood Test (FOBT) and colonoscopy for screening were requested for only 26.5% and 12% participants, respectively. No statistical difference was reported between females and males when it came to knowledge about CRC. High fiber diet, having diabetes and hypertension increase the risk of developing colorectal cancer. Majority of participants perceived the value of colonoscopy and FOBT; however, they reported the following barriers for screening: painful procedure of colonoscopy (42%), fear of the results (40%), and fear of cancer therapy (38%).

**Conclusion:** Despite the availability of effective tools for CRC screening, FOBT and colonoscopy are not used the way they should be, which results in underscreening of the population.

**Keywords:** Colorectal cancer, screening, Saudi Arabia, knowledge, barriers, survey.

## Introduction

Colorectal cancer (CRC) is a serious disease which causes substantial morbidity and mortality, ranking the third most common malignancy in the world [1]. A recent analysis of data from the National Cancer Institute's Surveillance Epidemiology and End Results program suggested that the incidence of CRC might be increasing among adults younger than 50 years of age as compared to old times [2].

In Saudi Arabia, CRC ranks the second among all the cancers [3], while it ranked the first among males and third among females. The latest report of the Saudi Cancer Registry in 2013, documented 1,387 cases of CRC, this accounted for 11.9% of all newly diagnosed cases in the same year. The number of cases among males was 736 (53.1%) as compared to 651 (46.9 %) among females, with a male-to-female ratio of 1.13:1.00. The age-standardized incidence rate was 11.7/100,000 in males and 10.1/ 100,000 in females [3]. This incidence

rate exceeded the rate reported in 2010 (9.6/10,000), which indicated an increase in the trend of such a serious disease that might remain silent for years [3].

Among Saudis, CRC often presents at an early age, and in an advanced stage of cancer leading to increased rate of disease morbidity and mortality [3–9]. As per the World Health Organization, the death rate from CRC in Saudi Arabia was estimated to be 8.3% [10]. In addition,

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a study conducted in 2015 for cases diagnosed with CRC in Saudi Arabia within the period of 1994–2004 reported that the overall survival of CRC patients during this period was only 44.6% [11].

Screening tests help to diagnose the disease at an early stage. Thus, they improve life expectancy, avert severe morbidity, and save health expenditures considerably. Stool-based screening tests include the guaiac-based fecal occult blood test (gFOBT), Fecal immunochemical tests (FITs)—which identifies intact human hemoglobin in the stool—and the multi-targeted stool DNA testing (FIT-DNA) which demonstrates changed DNA biomarkers in cells that are shed into the stool. Despite the variability in sensitivity and specificity of the aforementioned tests, screening programs using any of them reduced the cancer death rate [12,13]. Biannual stool examination using FOBT decreased the risk of CRC death by about 9% to 22%, while annual screening reduced it by 32% [14].

Concerning the imaging technique, sigmoidoscopy, colonoscopy, and virtual colonoscopy are all useful tools for early detection of CRC. Screening with flexible sigmoidoscopy lowered the risk of death due to CRC by 27% after about 11 to 12 years of follow-up. These invasive techniques are cumbersome for many people and expensive unless covered by insurance, but fortunately, they are only required every 5–10 years [14].

Despite health insurance coverage packages coupled with well-established awareness programs targeting CRC, the compliance to screening in Western countries is less beyond expectations. One study reported that nearly one-third of eligible adults have never been screened [15]. In the Eastern countries, the compliance rate is evidently lower as compared to the Western countries [16]. Furthermore, compliance rates are even lower in Saudi Arabia; for example, in Riyadh City, uptake of any CRC screening tool was only 6.7% among individuals aged between 50 and 55 years [17]. Of note, the majority of studies found that the females are less likely to participate in CRC screening programs as compared to males [18]. Barriers to screening are multifactorial, including fear from invasive modalities, fear from the test results, not requested by physicians, inadequate knowledge, and cost and time issues [17–19]. Also, low education level and low household income have been reported as major barriers to comply with CRC screening [20].

Lack of knowledge about CRC is considered as a major stumbling block to comply with screening program [21]. A previous study conducted in Saudi Arabia highlighted poor level of knowledge and misinformation. As much as 42.9% of respondents believed that screening for CRC should commence with the inception of symptoms, and most respondents did recognize that a family history could increase the risk of CRC [22]. These data reflected the need for further studies focusing on the target population to shed light on the different barriers to CRC screening. Therefore, this study investigated the level of knowledge among a sample of Saudi population about CRC and its

screening tests, and to understand factors associated with poor adherence to comply with screening programs.

## Subjects and Methods

It was a questionnaire-based cross sectional study, done using a convenient sampling technique, conducted in King Salman Social Center in Riyadh city, Saudi Arabia, in March and April 2018. Both male and female subjects of age 40 years and above were included in the study. However, individuals with the history of blood diathesis, impaired cognitive function, and colorectal cancer were excluded.

Data were collected through a self-administered questionnaire consisting of following sections (1) socio-demographic data, including age, gender, marital status, and income; (2) medical and family history, including health insurance, history of inflammatory bowel disease (IBD), routine checkup, screening, and family history of CRC; (3) assessment of knowledge about CRC and screening tools, including 22 questions about CRC signs, symptoms, risk factors, and screening tools (FOBT & Colonoscopy). Question's responses were formatted as yes, no, and don't know. Total knowledge score equaled 22. (4) Barriers to CRC screening included 15 questions adapted from Almadi et al. [17], questions were designed to assess barriers to screening following the health belief model—perceived seriousness, perceived barriers, and perceived benefits. Responses were formatted in a five-point Likert scale ranging from strongly agree (positive perception) to strongly disagree (negative perception). Out of total 15 questions, eight questions assessing the perceived barriers were coded in a reverse order. To compute the subscale and the total perception scores, responses were categorized into two categories to reflect positive and negative perceptions. So, the total perception score equaled 15, higher values favored positive perception.

Sample size was calculated with Stata 14 software; assuming a 15% compliance to FOBT and colorectal screening,  $\pm 10\%$  level of precision, at 95% level of confidence ( $\alpha = 0.05$ ) and the power of study of 0.8 (beta error = 0.2); the computed minimal sample size was 148, to compensate for incomplete data sets, the sample size was increased to 200. Data were analyzed using IBM SPSS statistics 20. Variables were described as percentages, means, standard deviations, and medians. Differences between means were tested statistically using student *t*-test or analysis of variance as appropriate, while the association between qualitative variables was tested by chi-square test. A *p*-value of less than 0.05 was considered as statistically significant.

## Results

The study included 200 individuals, 156 females (78%), and 44 males (22%). The overall mean age was  $55.76 \pm 8.23$ . Housewives accounted for 78.2% of females, 12.5 were retired, and only 1.3% worked in the medical field. As for males, 52.3% were retired, and no one worked in

the medical field. Only 18% of participants were illiterate, 25% had primary education, and 57% had secondary or university education. Majority of participants were married (75%), 9.5% were divorced, and 15% were widows (Table 1).

Overall, 85.5% had medical insurance; and 36% of participants had routine medical checkup during previous year. In addition, 16.5% participants reported IBD (20.5% in males and 15.4% in females, with no statistical difference,  $p < 0.05$ ). Family history of CRC was reported by 11.5%. Despite the age eligibility of all participants for CRC screening, yet FOBT and colonoscopy were requested by physicians for only 26.5% and 12%, respectively.

The total knowledge score equaled 22, with a mean of only  $8.77 \pm 4.36$  and a median of 9, independent  $t$ -test revealed no statistical difference according to gender or age category. The association between knowledge score and IBD or any of the sociodemographic variable were not statistically significant. The study demonstrated misinformation about CRC for the following questions: food rich in fibers (5.5%), hypertension (19%), diabetes (25%), increase the risk of CRC, and CRC can be without symptoms (29%) (Table 2). Despite more than 60% of participants realized the value of colonoscopy and FOBT in screening, only 5% had correct information about the frequency of screening (Table 3).

For the perception about CRC and the screening tests, 47% were scared of just thinking of the disease, and the majority of participants perceived the value of FOBT and colonoscopy in screening for CRC, 82% and 81%, respectively. However, a substantial proportion of participants reported the following barriers: painful procedure of colonoscopy (42.5%), fear of FOBT, and colonoscopy results (41% and 38.5%, respectively), fear of cancer therapy (38%), not having enough time to go for screening (24.5%), and being embarrassed to perform FOBT and colonoscopy (18%, 35.5%, respectively). Money was not a barrier to screen for CRC in about 80% of the study sample (Table 4).

Regarding the perceived susceptibility, only 14.5% viewed themselves at higher risk of getting CRC in the future despite their old age. The total perception score was significantly higher among males,  $11 \pm 1.88$  versus  $9.3 \pm 2.02$  ( $p < 0.001$ ). Males demonstrated more positive perception regarding barriers to screening, self-efficacy, and perceived seriousness ( $p < 0.001$ ). However, the perceived seriousness was significantly higher among females. But, there was no statistical difference in the perceived benefit score according to gender (Table 5).

**Discussion**

Overall, most respondents were knowledgeable about the available screening tools for CRC screening, they realized

**Table 1.** Sociodemographic characteristics of the study participants, medical history relevant to CRC, and physicians' request of screening for CRC (n =200).

Sociodemographic	Number	Percent % (mean ± SD)
Gender		
Male	44	22.0
Female	156	78.0
Age	200	(55.76 ± 8.23)
Age category		
40-< 50	47	23.5
≥50	153	76.5
Education		
Illiterate	36	18.0
Primary & secondary	121	60.5
University and above	43	21.5
Income		
Not enough	21	10.5
Just enough	109	54.5
Allow for saving	70	39.9
Occupation		
Non-medical field	33	16.5
Medical field	2	1.0
House wife	122	61.0
Retired	43	21.5
Marital status		
Married	151	75.5
Divorced and widow	49	24.5
Medical history		
A Family history of CRC	23	11.5
Having medical insurance	171	85.5
Having IBD	33*	16.5
Physicians requested FOB	53	26.5
Physicians requested colonoscopy	24	12.0
Performed Routine check during the previous year	33	16.5
Ever performed FOBT screening	54	27.0
Having IBD & Ever performed FOBT	14	42.4
Not Having IBD & ever performed FOBT	40	24.0
Ever performed colonoscopy screening	15	7.5
Having IBD & Ever performed colonoscopy	8	24.2
Not Having IBD & ever performed colonoscopy	7	4.2

\*9 males (20.5%) & 24 females (15.4%).

**Table 2.** Percent of correct Knowledge about CRC among adult Saudis aged  $\geq 40$  years ( $n = 200$ ).

Item	Correct answer	
	Number	Percent%
CRC is common	110	55.0
CRC could be asymptomatic	58	29.0
Blood in stool is one of CRC manifestations	96	48.0
Alternating bowel movements is one of CRC manifestations	77	38.5
Abdominal pain is one of CRC manifestations	82	41.0
CRC can lead to loss of weight	81	40.5
Old age increases the risk of CRC	95	47.7
CRC is more common in females than males	43	21.5
Food rich in fibers increases the risk of CRC	121	60.5
Obesity increases the risk of CRC	94	47
IBD increases the risk of CRC	115	57.5
Family history increases the risk of CRC	69	34.5
Diabetes increases the risk of CRC	150	75.0
Hypertension increases the risk of CRC	162	81.0
Daily exercising decreases the risk of CRC	120	60.0
Daily aspirin decreases the risk of CRC	45	22.5
CRC could be diagnosed in early stages	111	55.5
FOBT is one of the screening tools for CRC	127	63.5
Colonoscopy is one of the screening tools for CRC	148	74.5
Recommended age for CRC screening	25	12.5
The frequency of FOBT	21	10.5
The frequency of colonoscopy	10	5.0
<b>Knowledge based on score 22 questions:</b>		
<b>Total:</b> Mean: $8.77 \pm 4.36$ , median: 9		
<b>Male:</b> mean = $8.39 \pm 4.68$ , median = 9		
<b>Females:</b> mean $8.88 \pm 4.28$ , median = 9		

that colonoscopy and FOBT were used to screen for CRC and can identify the disease early if screening protocol is followed properly, but there was a lack of knowledge regarding CRC symptoms, risk factors, and frequency of screening. Overall, there was misinformation about CRC where participants thought that high fiber diet is a risk factor for developing CRC (55%) even though it is a protective factor, as a large prospective study suggested that individuals consuming the highest intakes of dietary fiber have lower risks of incident colorectal adenoma and distal CRC [23]. Additional misinformation about CRC included that hypertension increases the risk of CRC (19%) and diabetes (25%) increases the risk of CRC.

The lack of knowledge about CRC has also been identified in previous studies where over a thousand people participated in a survey and the vast majority of them believed that screening for CRC should begin only at the symptom onset (43%) [22], and over 50% of respondents did not know that history of colon polyps or a family history of CRC were actually major risk factors for CRC [22]. Furthermore, it has been proposed that knowledge of disease is a main factor

influencing the adherence to screening programs [21]. A study involving nearly 8,000 people in the Asia Pacific region found that respondents from countries with low-participation in CRC screening programs had the least knowledge of screening tests, symptoms and risk factors [21].

When evaluating the presence of risk factors for CRC within our participants having IBD (20.5% in males and 15.4% in females, with no statistical difference). Only seven participants (representing 4.2% of the total sample size) do not have IBD and have had a colonoscopy done before as a screening method.

In regard to the barriers for CRC screening, the financial burden in some studies was considered as one of the main known barriers to CRC screening programs. Lack of health insurance for Cambodians, Korean, and Chinese was reported to be a significant barrier to screening [24], but this was not observed in this present study, as 85.5% of all participants had medical insurance, and for others health care is freely accessible in government hospitals. Nevertheless, majority of this study's participants did not undergo CRC screening, which makes financial aspect

**Table 3.** Distribution of knowledge scores according to sociodemographic and relevant medical variables.

Variable	N = 200 (%)	Mean knowledge score	p value
Age Category			0.24
<50	76.5	8.91 ± 4.74	
50–	23.5	8.31 ± 4.25	
Gender			0.27
Males	78.0	8.39 ± 4.68	
Females	22.0	8.88 ± 4.28	
Education			0.46
Below secondary	43.0	9.14 ± 3.90	
Secondary	35.5	8.27 ± 4.99	
University	21.5	8.86 ± 4.16	
Marital status			0.87
Married	75.5	8.80 ± 4.11	
Not married	24.5	8.67 ± 5.10	
Having IBD			0.13
Yes	16.5	8.70 ± 4.35	
No	73.5	9.03 ± 4.28	
Don't know	10.0	6.95 ± 78	
Routine checkup			0.49
At least once during the previous year	64.0	8.93 ± 4.97	
No	36.0	8.4p ± 3.98	

not as one of the cornerstone barriers to CRC screening here in Saudi Arabia. Of note, participants in this study accepted to perform FOBT (79%) and colonoscopy (68%), even if they had to pay for it. In agreement, the results generated by another local study done earlier in 2015 revealed that the cost of screening tools was not perceived as a significant barrier to screening [17]. This was also noticed in a similar study involving Palestinians suggesting that the financial cost for CRC screening tests did not affect the willingness to have a screening test if medically needed [25]. In contrast to African Americans and Asian Americans where financial burden appeared to be a major barrier to CRC screening [24–26].

It is worth mentioning that factors such as fear of pain during the colonoscopy, embarrassment from doing the screening tests, and worrying about the test results were found to be the driving factors to poor compliance in the present study. Participants in this study were most likely to perform FOBT than colonoscopy, in contrast to a study where urban African Americans were found to have a negative attitude about using FOBT, and felt colonoscopy was the superior screening modality [27]. Regarding the perceived seriousness and susceptibility, 47% of participants were scared of just thinking of the disease, but only 14.5% viewed themselves at higher risk of getting CRC in the future despite their old age. In general, males in this study were found to have a significantly higher positive perception score than

**Table 4.** Perceived barriers of screening for CRC among Saudis aged ≥ 40 years (n = 200).

Perceived barriers	Agree No (%)	Strongly agree No (%)
Perceived susceptibility		
I'm more susceptible than others to get CRC	15 (7.5)	14 (7.0)
Perceived seriousness		
Thinking of CRC scares me	66 (33.0)	28 (14.0)
Perceived benefits of screening tools		
FBOT helps to detect CRC early	72 (36.0)	92 (46.0)
Colonoscopy helps to detect small tumors	82 (41.0)	80 (40.0)
Perceived barriers		
I'm afraid to perform FOBT	43 (21.5)	39 (19.5)
I don't have enough time to go for FOBT	22 (11.0)	29 (14.5)
FOBT is embarrassing	34 (17.0)	2 (1.0)
Colonoscopy is painful	51 (25.5)	34 (17.0)
Colonoscopy is embarrassing	43 (21.5)	28 (14.0)
Fear of colonoscopy results	32 (16.0)	33 (16.5)
Lack of enough knowledge about colonoscopy procedure	53 (26.5)	24 (12.0)
Treatment of cancer is more serious than the disease itself	44 (22.0)	32 (16.0)
Self-efficacy		
I'll go for FBOT screening if medically requested	59 (29.5)	105 (52.5)
I'll perform FOBT even if I have to pay for it	73 (36.5)	85 (42.5)
I'll perform colonoscopy even if I have to pay for it	69 (34.5)	67 (33.5)
<b>Perception score based on 15 questions:</b>		
<b>Total:</b> mean: 9.7 ± 2.1, median: 10		

**Table 5.** Gender difference in perception about colorectal cancer screening among adult Saudis.

Perception	Mean ± SD		p value
	Males	Females	
Perceived susceptibility 48	0.05 ± 0.21	0.17 ± 0.38	0.004
Perceived seriousness 50	0.75 ± 0.44	0.47 ± 0.50	<0.001
Perceived benefits of screening	1.66 ± 0.64	1.62 ± 0.61	0.73
Perceived barriers	5.89 ± 1.53	4.88 ± 1.67	<0.001
Self-efficacy	2.66 ± 0.68	2.19 ± 0.92	< 0.001
Total score	11 ± 1.88	9.3 ± 2.02	<0.001

females,  $p < 0.01$ . The conservative culture in Saudi Arabia might explain this observation.

Some studies suggested that primary care physician screening recommendations have a strong influence on patient screening behaviors [28,29]. Nevertheless, in the present study, only 26.5%, and only 12% participants were offered FOBT and colonoscopy respectively, by their physicians to screen for CRC. This can be linked to a study done in Jeddah involving 127 primary care physicians who found that as much as 55% reported that they did not practice CRC screening despite a strong belief that it is effective [30], which may contribute to the reduced uptake of CRC screening tools.

This observation calls for further investigation to explore factors determining reluctance of healthcare professionals to recommend screening for CRC in Saudi Arabia. This study results were limited to residents of cities, and cannot be generalized to the whole Saudi nation. The unequal number of male and female participants made it difficult to compare and contrast the knowledge level and perception about CRC of both genders.

**Conclusion**

The study highlighted the lack of proper knowledge about CRC despite recognizing it as one of the most prevalent cancers in Saudi Arabia. Although the majority of the sample population realized the importance of colonoscopy and FOBT as screening tools, but had not got them done yet for a variety of reasons as lack of knowledge, fear of the procedure itself or worrying about the test results, and reluctance of healthcare professionals to schedule CRC screening. So, effective measures could be taken to implement strong educational programs so that the uptake of CRC screening tools can be increased to subsequently prevent CRC and detect CRC early.

**List of Abbreviations**

CRC Colorectal cancer

FITs Fecal immunochemical tests  
 gFOBT Guaiac-based fecal occult blood test  
 IBD Inflammatory bowel disease

**Conflict of interests**

The authors declared that there is no conflict of interest regarding the publication of this article.

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**Consent for publication**

Informed consent was obtained from all participants.

**Ethical approval**

The research was approved from the IRB of Princess Nourah Bint Abdulrahman University [H-01-R-059] on 2nd November 2017.

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