

Colorectal cancer related Knowledge, Attitude, and Practice among adult Saudis in Jeddah city

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Abstract

Background: Colorectal cancer (CRC) is the third most common malignancy and the fourth leading cause of mortality worldwide. CRC has been the most common cancer among men and the third commonest among women since 2002 in Saudi Arabia (SA).

Objectives: To study the pattern of Knowledge, Attitude, and Practice (KAP), regarding CRC in Jeddah city, SA.

Methods: A cross-sectional survey was conducted on online using Google forms sent to residents in Jeddah, SA. The total number enrolled was 364 subjects. Data was collected using a questionnaire which provided information on the socio-demographic characteristics, and KAP of the subjects about CRC. SPSS version 23 was used; Multi-nominal logistic regression was used and the OR and 95% CI were calculated. The level of significance was 0.05.

Results: The mean scores of knowledge was 13.21 (out of 36), of attitude was 32.8 (out of 40), and that of practice was 3.59 (out of 9). The knowledge score was positively associated with the attitude score ($r = .174, p < 0.001$), and the practice ($r = 0.221, p < 0.000$). Those with clerical jobs, were two times more likely to have higher KAP score compared to manual workers (OR: 2.04; 95% CI: 1.03, 4.05; $p < 0.04$). Subjects who had ever heard about CRC, were three times more likely to have higher KAP score than those who hadn't (OR: 0.282; 95% CI: 0.141, 0.563; $p < 0.000$).

Subjects who had ever heard about CRC screening were three times more likely to have higher KAP score than those who hadn't (OR: 0.328; 95% CI: 0.199, 0.539; $p < 0.000$).

Conclusions: Although CRC is a major cause of morbidity and mortality in KSA, yet the KAP of the studied subjects were defective. There is an urgent need to implement health education programs to raise the KAP standards of the community about CRC. More research, about this issue, in different regions of the Kingdom needs to be conducted.

Key words: Colorectal cancer, KAP, Saudi Arabia.

Introduction

Colorectal Cancer is an adenocarcinoma, which may start as a benign polyp, but then becomes malignant, and invades and destroys healthy tissue, which extends into the surrounding structures [1]. Colorectal cancer is the third most common malignancy and the fourth leading cause of mortality worldwide, accounting for 8% of all cancer deaths [2]. Based on a cancer registry report, CRC was the most common cancer among male nationals of the Gulf Cooperation Countries (GCC) aged between 45-59 years (12.8%), in the period between 1998 and 2007 [3]. The incidence rate of CRC in the Kingdom of Saudi Arabia (KSA) has increased over the past decade reaching 14.5/100,000 in 2010 [4]. The most common CRC risk factors include increased age, smoking, diabetes, and obesity; high red meat diet (e.g. beef, pork, lamb or liver), and low fiber intake diet was found to stimulate the growth of CRC. Overall, CRC incidence and mortality rates are higher in males than in females [5, 6]. People with first degree relatives who were diagnosed with CRC, have a greater risk of developing the disease by 2 to 3 times, compared to individuals with no family history [6]. Identifiable symptoms include alterations in bowel habits, hematochezia, melena, abdominal discomfort, fatigue, and an unexplained reduction in weight [7]. The guidelines for CRC screening, including those from Saudi Arabia [8], vary in the screening method recommended, how frequent to repeat the tests, as well as the ages at which to start and stop screening [9]. The Saudi guidelines recommended CRC screening for average risk individuals to start from the age of 45 years, and colonoscopy was the recommended modality for screening; when not available, flexible sigmoidoscopy every 5 years with an annual guaiac fecal occult blood test (FOBT), or fecal immunochemical testing was recommended. This variability in recommendation between guidelines reflects the variability in baseline risks and resources available for such programs. Although the Saudi guidelines for CRC screening have been disseminated, screening has been performed on an opportunistic basis rather than a national level [10, 11]. Awareness and preventive screening programs play a vital role in early diagnosis and improving the survival rate of such patients. It has been reported that the awareness of a disease among the public is directly related to the screening program participation. Zubaidi et al. reported a lack of correct knowledge and presence of misconceptions regarding the understanding of CRC in the general public of Riyadh region [12]. The information about knowledge, attitude and practice about CRC in the Western region of KSA is deficient, therefore, the aim of this study was to explore the pattern of the knowledge, attitude, and practice about CRC, among the adult Saudi population in Jeddah, SA.

Subjects and Methods

It was a cross-sectional study; where an online survey using Google form questionnaire was sent via email to the residents of Jeddah, Saudi Arabia. Sampling method was a non-probability convenient one. Sample size for the present study was determined using G*power software [13] where, $\alpha = 0.05$, Power = 0.95, effect size = 0.3 and degree of freedom = 5. The sample size required was 277. The total number of subjects who responded was 367, however, only 364 were enrolled in the study (age: 18 years through to 69 years). Three subjects refused to answer the questions and were removed (as answers of all questions was a pre-request for the form to be submitted). Data was collected using the questionnaire which included the following sections: Personal questionnaire which provided information about socio demographic characteristics, hobbies, habits and clinical aspects of participants; and a knowledge attitude and practice questionnaire toward colorectal cancer contained three sections of 34 closed-ended questions on knowledge, and 8 questions on attitude, and 9 questions on practice. The questions on the knowledge about CRC was given responses of yes, no and don't know. Correct answer was given 1 and total score was 34. Questions on attitude were in the form of Likert scale, and were given a score out of 40. Questions on practice were each, scored 1 for the best practice and total score was 9. Validity of the questionnaire: reliability study was conducted on the questionnaire responses and Cronbach's alpha was calculated. The reliability index for the Knowledge questions was 0.947, for the attitude questions was 0.724 and for the practice questions was 0.279.

Data analysis and statistical tests: Statistical Package for Social Sciences (IBM SPSS, version 23, Armonk, NY: IBM Corp.) was used. Multi-nominal Logistic regression method, reliability studies and Chi square tests were used. Odds ratios (OR), 95% confidence interval (95% CI), and p values were calculated. The level of significance was 0.05.

Ethical considerations

Ethical clearance was obtained from the institutional review board (IRB). In order to keep confidentiality of any information provided by study participants, the data collection procedure was anonymous. Availability of the data: the raw data is available at the research center of ISNC and all results of the data are included in the paper.

Results

The total subjects for the present study was 364 (66.5% males and 33.5% females). Mean age was 40.9 years (SD is 11.7). 72.5% were younger than 50 years and 27.5% were older than 50 years. The majority of the subjects were married 80.1%, and a greater proportion had university or above education (72%). About 60% of the subjects had clerical jobs and 55% earned SR 10,000 or more per month.

The mean score on the knowledge questions was 13.21 (SD: 9.71) out of 36; the mean score on the attitude questions was 32.8 (SD: 4.02) out of 40, and the mean score on the practice questions was 3.59 (SD: 1.41) out of 9 (Table 1). The score on knowledge questions was positively associated with the score on attitude questions ($r = .174$, $p < 0.001$), and the score on practice questions ($r = 0.221$, $p < 0.000$). These associations were statistically significant (Table 1).

Table 2 shows the correct answers on the knowledge questions about CRC by age groups. Although the answers on the question about hearing of cancer colon was correct among about 80% of the subjects particularly those younger than 50 years old compared to the older ones (56.3% and 25%, $p < 0.004$), the correct answers on the majority of the other knowledge questions, were below 40%. Those who are younger than 50 years old gave the correct answers on some of the questions compared to the older ones, e.g. relationship between consumption of red meat and CRC (20.6% and 14.6% respectively, $p < 0.000$), relationship between colon polyps and CRC (20.3% and 12.1% respectively, $p < 0.003$) and relationship between diabetes mellitus and CRC (19.2% and 11.5% respectively, $p < 0.002$).

Table 3 shows the questions on the attitude towards CRC by age groups. The majority of the responses which showed a positive attitude towards CRC accounted for about 50% of the responses. Those who were younger than 50 years old had more positive attitude towards CRC compared to those older than 50 years old, particularly on questions addressing importance to know about CRC ($p < 0.003$), and that addressing the importance of regular physical examination in detecting CRC at early stages ($p < 0.031$).

Table 4 displays the practice of the subjects regarding CRC by age groups. Only 16.5% of the subjects thought about undergoing screening for early detection of CRC, and only 2.2% of those who took part in CRC screening were older than 50 years. 67% of the subjects were smokers, particularly those younger than 50 years old ($p < 0.011$). A minority of the subjects (17%) searched for information about CRC prevention, and were more encountered among those younger than 50 years old ($p < 0.002$). About 40% of the subjects eat fatty food on a daily basis, particularly among those younger than 50 years old ($p < 0.001$).

The mean knowledge score was significantly higher among those whose education is university or higher compared to those who had lower educational level ($b = -2.635$). The mean knowledge score was also significantly higher among those who had a relative with CRC, or inflammatory bowel disease compared to those who had not ($b = -4.22$, and $b = -1.44$ respectively). The mean score of knowledge was significantly higher among those who ever heard about CRC screening ($b = -4.933$) compared to those who had not. Attitude score was significantly increased among males compared to females ($b = 1.397$).

On the other hand the attitude score increased in those with lower education level compared to those with university education ($b = 1.501$). The mean attitude score was higher among those who ever heard about CRC screening ($b = 0.928$) compared with those who had not. The mean practice score was significantly higher among males compared to the females; it also increased among those who had relatives with CRC or IBD ($b = -0.576$ and -0.496 respectively) compared with those who had not. Those who had heard about CRC screening had higher mean practice score ($b = -0.692$), compared with those who had not (Table 5).

Table 6 shows the results of multi-nominal logistic regression of factors which predict KAP score. Those with clerical jobs, were two times more likely to have higher KAP score compared to manual workers (OR: 2.04; 95% CI: 1.03, 4.05; $p < 0.04$). Subjects who had ever heard about CRC, were three times more likely to have higher KAP score than those who hadn't (OR: 0.282; 95% CI: 0.141, 0.563; $p < 0.000$). Subjects who had ever heard about CRC screening were three times more likely to have higher KAP score than those who hadn't (OR: 0.328; 95% CI: 0.199, 0.539; $p < 0.000$).

Table 1: Mean values and Correlation matrix of the scores of Knowledge, Attitude, and Practice about CRC among studied subjects

Variables	Statistics	Knowledge score	Attitude score
Knowledge score	Pearson Correlation	1	-
	Significance (2-tailed)	-	-
	Total score	36	-
	Mean	13.21	-
	Standard deviation	9.71	-
Attitude score	Pearson Correlation	.174**	1
	Significance (2-tailed)	.001	-
	Total score	40	-
	Mean	32.85	-
	Standard deviation	4.02	-
Practice score	Pearson Correlation	.221**	.223**
	Significance (2-tailed)	.000	.000
	Total score	9	-
	Mean	3.59	-
	Standard deviation	1.41	-

Table 2: Distribution of studied subjects according to correct answers about knowledge on CRC by age group

Variable	Frequency of correct answers			X ² (p-value)
	<50 years	≥ 50 years	Total	
Have you ever heard of colorectal cancer, sometimes called colon cancer?	56.3%	25.0%	81.3%	8.507 (p < 0.004)
Have you ever heard of colorectal cancer screening?	25.3%	12.4%	37.6%	3.184 (p < 0.074)
At what age do you think colorectal cancer screening should start?	21.4%	11.0%	32.4%	10.119 (p < 0.038)
Where does colorectal cancer rank amongst the most commonly occurring cancers in men in Saudi Arabia?	9.1%	2.7%	11.8%	6.107 (p < 0.191)
Where does colorectal cancer rank amongst the most commonly occurring cancers in women in Saudi Arabia?	13.5%	4.9%	18.4%	2.508 (p < 0.643)
Is colonoscopy used as a screening test for colorectal cancer?	26.9%	12.6%	39.6%	2.879 (p < 0.24)
Is fecal testing used as a screening test for colorectal cancer?	20.6%	10.4%	31.0%	3.572 (p < 0.168)
Is X-ray with barium used as a screening test for colorectal cancer?	17.0%	8.5%	25.5%	5.303 (p < 0.071)
Is CT used as a screening test for colorectal cancer?	24.5%	9.6%	34.1%	0.414 (p < 0.813)
Is blood testing used as a screening test for colorectal cancer?	17.6%	7.1%	24.7%	0.121 (p < 0.941)
Is abdominal pain one of the symptoms of colorectal cancer	29.4%	12.1%	41.5%	0.396 (p < 0.821)
Is weight loss one of the symptoms of colorectal cancer	32.7%	15.4%	48.1%	5.009 (p < 0.082)
Is blood in stool one of the symptoms of colorectal cancer	27.5%	12.6%	40.1%	2.294 (p < 0.318)
Is vomiting one of the symptoms of colorectal cancer?	14.0%	4.7%	18.7%	0.433 (p < 0.805)
Is a change in bowel habits one of the symptoms of colorectal cancer?	25.0%	8.5%	33.5%	0.936 (p < 0.626)
Do people with colorectal cancer have symptoms before being diagnosed?	2.5%	0.8%	3.3%	0.360 (p < 0.835)
Does colorectal cancer usually develop over several years?	36.8%	16.5%	53.3%	3.051 (p < 0.217)
Are there ways to stop the development of colorectal cancer?	25.3%	10.4%	35.7%	0.400 (p < 0.82)
Is colon cancer most often caused by a person's behavior or lifestyle?	6.6%	2.7%	9.3%	1.456 (p < 0.483)
Generally, colorectal cancer screening should start at age 50?	23.6%	12.4%	36.0%	4.866 (p < 0.088)
Does colorectal cancer start as a polyp, which is a small growth found in the colon?	14.6%	8.5%	23.1%	5.478 (p < 0.065)
Is colonoscopy the most accurate test to check for polyps in the colon and rectum?	26.9%	12.9%	39.8%	2.957 (p < 0.23)
Do people eating a low-fat and high-fiber diet seem to have a lower risk of colon cancer?	32.1%	15.4%	47.5%	5.187 (p < 0.075)
Do people with high alcohol consumption seem to have a lower risk of colorectal cancer?	23.1%	11.8%	34.9%	4.611 (p < 0.100)
Do people who do not exercise seem to have a lower risk of colorectal cancer?	23.4%	10.7%	34.1%	2.076 (p < 0.354)

Table 2: Distribution of studied subjects according to correct answers about knowledge on CRC by age group (continued)

Do people who have high levels of stress tend to have a lower risk of colorectal cancer?	28.6%	11.5%	40.1%	1.755 (p <0.416)
Do people who are overweight tend to have a lower risk of colorectal cancer?	28.3%	12.6%	40.9%	3.906 (p <0.142)
Do people who have a family history of colorectal cancer tend to have a lower risk of colon cancer?	25.5%	12.4%	37.9%	3.841 (p <0.146)
Do smokers have a lower risk of colorectal cancer?	32.1%	15.7%	47.8%	4.850 (p <0.088)
Do people who eat a lot of red meat tend to have a lower risk of colorectal cancer?	20.6%	14.6%	35.2%	19.273 (p <0.000)
Do people who have colon polyps tend to have a lower risk of colorectal cancer?	20.3%	12.1%	32.4%	11.608 (p <0.003)
Do people of old age tend to have a lower risk of colorectal cancer?	29.7%	13.7%	43.4%	2.449 (p <0.294)
Do people who have diabetes tend to have a lower risk of colorectal cancer?	19.2%	11.5%	30.8%	12.591 (p <0.002)
Do people who have inflammatory bowel disease tend to have a lower risk of colorectal cancer?	25.5%	12.4%	37.9%	4.928 (p <0.085)
Do people who have irritable bowel syndrome tend to have a lower risk of colorectal cancer?	25.5%	13.2%	38.7%	5.598 (p <0.061)
Do people who have hemorrhoids tend to have a lower risk of colorectal cancer?	23.4%	11.0%	34.3%	4.050 (p <0.132)

Table 3: Distribution of studied subjects according to Correct answers about Attitude on CRC by age groups

Attitude		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	X2 (p-value)
It's important for me to know about cancer	<50 years	43.1%	24.2%	3.8%	1.4%	0.0%	14.107 (p <0.003)
	≥ 50 years	12.4%	11.0%	4.1%	0.0%	0.0%	
	Total	55.5%	35.2%	8.0%	1.4%	0.0%	
It's just misfortune that someone has cancer	<50 years	6.0%	8.8%	18.4%	27.5%	11.8%	9.324 (p <0.053)
	≥ 50 years	0.8%	1.6%	9.9%	11.5%	3.6%	
	Total	6.9%	10.4%	28.3%	39.0%	15.4%	
Colorectal cancer diagnosed in an early stage can be treated better	<50 years	41.5%	24.7%	5.5%	0.8%	0.0%	0.427 (p <0.935)
	≥ 50 years	15.7%	9.3%	1.9%	0.5%	0.0%	
	Total	57.1%	34.1%	7.4%	1.4%	0.0%	
The regular physical examination can find cancer at an early stage	<50 years	40.9%	20.9%	9.6%	1.1%	0.0%	10.614 (p <0.031)
	≥ 50 years	12.4%	9.6%	4.9%	0.0%	0.5%	
	Total	53.3%	30.5%	14.6%	1.1%	0.5%	
I will take physical examination regularly	<50 years	22.3%	26.1%	20.9%	3.0%	0.3%	3.392 (p <0.495)
	≥ 50 years	9.9%	8.0%	8.8%	0.5%	0.3%	
	Total	32.1%	34.1%	29.7%	3.6%	0.5%	
I will try to stop smoking and alcohol abuse	<50 years	42.3%	14.8%	9.3%	1.9%	4.1%	1.854 (p <0.763)
	≥ 50 years	15.4%	5.2%	4.7%	1.1%	1.1%	
	Total	57.7%	20.1%	14.0%	3.0%	5.2%	
Colorectal cancer screening tests are effective	<50 years	42.6%	24.2%	4.9%	0.8%	0.0%	7.296 (p <0.121)
	≥ 50 years	14.0%	9.1%	3.3%	0.8%	0.3%	
	Total	56.6%	33.2%	8.2%	1.6%	0.3%	
Cancer screening should be widely implemented	<50 years	39.8%	26.4%	6.0%	0.3%	0.0%	3.961 (p <0.411)
	≥ 50 years	14.8%	9.1%	3.0%	0.3%	0.3%	
	Total	54.7%	35.4%	9.1%	0.5%	0.3%	

Table 4: Distribution of studied subjects according to Correct answers about practice on CRC by age groups

Practice		<50 years	≥ 50 years	Total	X ² (p-value)
Have you ever thought about undergoing screening for early detection of colorectal cancer?	Yes	11.3%	5.2%	16.5%	0.634 (p <0.426)
	No	61.3%	22.3%	83.5%	
Have you ever taken part in a colorectal cancer screening?	Yes	3.0%	2.2%	5.2%	5.712 (p <0.058)
	No	62.9%	24.5%	87.4%	
	Not sure	6.6%	0.8%	7.4%	
Are you a smoker?	Smoker	51.4%	15.7%	67.0%	9.005 (p <0.011)
	Ex-smoker	8.2%	6.3%	14.6%	
	Non-smoker	12.9%	5.5%	18.4%	
Have you ever searched for information about cancer prevention intentionally?	Yes	9.6%	7.4%	17.0%	9.692 (p <0.002)
	No	62.9%	20.1%	83.0%	
I go to see the doctor if I am not feeling well.	Yes definitely	40.4%	19.8%	60.2%	10.637 (p <0.005)
	Definitely not	7.1%	0.5%	7.7%	
	Probably	25.0%	7.1%	32.1%	
Do you intend to take up a Fecal occult blood test?	Yes definitely	17.6%	9.1%	26.6%	4.425 (p <0.109)
	Definitely not	15.9%	3.8%	19.8%	
	Probably	39.0%	14.6%	53.6%	
Do you drink alcohol?	Yes	0.3%	0.8%	1.1%	4.585 (p <0.032)
	No	72.3%	26.6%	98.9%	
On average, how many times do you eat spicy food?	Daily	13.7%	3.3%	17.0%	6.025 (p <0.110)
	Twice a week	25.0%	9.1%	34.1%	
	Twice a month	14.6%	8.5%	23.1%	
	I don't eat it	19.2%	6.6%	25.8%	
On average, how many times do you eat fruits and vegetables?	Daily	25.0%	9.9%	34.9%	8.020 (p <0.046)
	Twice a week	29.9%	13.5%	43.4%	
	Twice a month	11.0%	3.8%	14.8%	
	I don't eat it	6.6%	0.3%	6.9%	
On average, how many times do you eat fatty food?	Daily	32.4%	6.9%	39.3%	17.366 (p <0.001)
	Twice a week	29.1%	17.3%	46.4%	
	Twice a month	4.9%	2.2%	7.1%	
	I don't eat it	6.0%	1.1%	7.1%	

Table 5: Linear multiple regression relationship between knowledge, attitude and practice scores with sociodemographic factors

Independent variables	Knowledge score	Attitude score	Practice score
(Constant)	40.163***	35.291***	5.641***
Gender	1.175	1.397**	.391*
Age	.042	-.014	.009
Marital status	-.385	-.565	-.140
Education	-2.635*	1.501**	.129
Occupation	-.284	.393	.044
Income	1.552	-.290	-.087
Have any of your relatives been diagnosed with colorectal cancer?	-4.870**	-.802	-.576*
Have any of your relatives been diagnosed with inflammatory bowel disease?	-1.422	-.950	-.496*
Have you ever heard of colorectal cancer, sometimes called colon cancer?	-7.092***	-.174	.254
Have you ever heard of colorectal cancer screening?	-4.933***	-.928*	-.692***

Table 6: Multi-nominal logistic regression of factors which predict KAP score.

Dependent variable (KAP Score < 60%) [reference value set 1]	B	Sig.	Exp (B)	95% Confidence Interval for Exp (B)	
				Lower Bound	Upper Bound
Intercept	.137	.672			
Age group (less than 50 years)	.273	.342	1.314	.748	2.311
Gender (Female)	.302	.287	1.353	.776	2.359
Education University or above)	-.161	.554	.851	.499	1.453
Occupation Unemployed	.320	.308	1.377	.744	2.551
Manual worker	.713	.042	2.040	1.028	4.048
Income 10,000 SR or more	.116	.665	1.122	.666	1.893
Have any of your relatives been diagnosed with colorectal cancer?	-.868	.081	.420	.159	1.112
Have any of your relatives been diagnosed with inflammatory bowel disease?	-.398	.269	.672	.332	1.361
Have you ever heard of colorectal cancer, sometimes called colon cancer?	-1.265	.000	.282	.141	.563
Have you ever heard of colorectal cancer screening?	-1.116	.000	.328	.199	.539

Discussion

Colorectal cancer is the most common cancer in the world; and locally it is the second most prevalent type of cancer in the Kingdom of Saudi Arabia [14]. There is a scarcity of research of KAP of the population, about CRC and CRC screening, in the Western region of Saudi Arabia; thus in the present study, we explored the KAP about CRC among Saudi subjects residing in Jeddah city.

This study indicates that among the subjects we studied, general awareness of CRC and CRC screening was low. Most had heard about CRC, but were not able to describe any particular detail of what it was or what polyps were, and the vast majority had not heard of bowel cancer screening or the FOBT test. This is consistent with findings of other research [15, 16]. CRC ranks first in males and third in females among all cancers in Saudi Arabia. Genetic and environmental factors may have played important roles in the increase in CRC incidence in Saudi Arabia [17]. In the present study a minority of the studied subjects had known about the morbidity information about CRC, particularly among females, older individuals and those with lower educational level. Regular screening for CRC, beginning at age 50, is the key to preventing colorectal cancer. The U.S. Preventive Services Task Force (USPSTF) recommends that adults age 50 to 75 be screened for colorectal cancer [18]. However, in the present study, about 90% of the subjects aged 50 years or more had not known the recommended beginning of colorectal cancer screening. This is consistent with other studies [15,16]. While colorectal adenoma is the most frequent precancerous lesion, other potentially premalignant conditions, including chronic inflammatory bowel diseases and hereditary syndromes, such as familial adenomatous polyposis, are also reported as risk factors for CRC [20]. In the present study the majority of the subjects, particularly, those aged 50 years or more, had not heard about these risk factors. This is similar to findings from other studies [15, 16]. CRC is preventable and curable by an early diagnosis, and with the removal of premalignant polyps. There are a variety of methods and tests for the detection of CRC such as colonoscopy, sigmoidoscopy, fecal occult blood test (FOBT), fecal immunochemical test (FIT), double contrast barium enema (DCBE) and computerized tomography, as well as blood tests [20]. The majority of the subjects in the present study had not heard about these screening methods. Similar findings were reported by other studies [21-26]. About 57% of the respondents in the present study knew the importance of early detection. Previous reports, however, showed better rates [21, 24]. The most frequently mentioned screening methods, in the present study, were colonoscopy, CT scan of the abdomen, and FOBT (39.6%, 34.1% and 31 % respectively). This is consistent with other studies [21, 25, 26]. About 40% the participants had not heard about CRC screening methods before. Berkowitz et al. also surveyed respondents who had not heard of CRC screening methods, and, compared to our study, their rate was higher (42.0%) [25]; while Ged et al. revealed rates lower than the present study (27%) [21]. Previous qualitative research [27], reported that

people who had been diagnosed with adenomas gave little thought as to what might have caused the adenoma, and in those who gave possible explanations, these tended to relate to age, genetics or chance. Similar findings have been reported from studies of cancer survivors where genetic factors, smoking and environmental factors (e.g., pollutants or occupation), and psychosocial factors are the most frequently quoted causes of cancer [28]. Lifestyle factors that may contribute to an increased risk of colorectal cancer include: lack of regular physical activity; a diet low in fruit and vegetables; a low-fiber and high-fat diet, or a diet high in processed meats; overweight and obesity; alcohol consumption and tobacco use [29]. In the present study 91% of the respondents were not well-informed about the risk factors. In a previous study, this rate was more than

90.0% [26]. In the present study the majority of the respondents were not well informed about the symptoms. Other studies revealed similar high rates among the subjects they investigated [21,26]. In the present study, the knowledge, attitude and practice scores were significantly associated with each other. The males had significantly better knowledge score compared to the females. Those who had had relatives with CRC or inflammatory bowel disease, or had heard about CRC screening significantly increased their knowledge, attitude and practice scores.

Conclusions

The decisive majority of respondents did not know the CRC screening guideline and did not have accurate information about CRC risk factors and symptoms. Furthermore, a significant number of respondents had not heard about CRC screening methods. This lack of information can result in a low rate of participation in CRC screenings, since adequate knowledge is essential for participation. Most of the respondents were open to new information. To broaden people's awareness of this topic, health promotion programs should focus on females, relatively old people, and those who have a relatively low level of educational attainment. Health workers and the internet have a significant role in mediating information. Consequently, these sources of information should be strengthened.

Limitations

Several limitations to this study must be noted. As our sampling strategy was non-random, the results of this study cannot be considered representative of all Saudi population. Participants were recruited through online Google forms and are therefore likely to be more health connected, proactive in their health behavior, better informed about health issues and have greater exposure to prevention messages. Furthermore, participants use the internet, so results may not reflect the views of those unfamiliar with the internet, and living in very remote regions and living traditional/nomadic lifestyles. Our main outcome measure was largely hypothetical, asking participants on their future 'intention' to take up CRC screening. Such questions may not translate or predict real life behaviors, so results need

to be interpreted with caution. Nevertheless, considering undertaking a preventive behavior is a first step towards behavior modification and therefore remains important. Despite these limitations, our results have generated important information on Saudi views of bowel cancer and bowel cancer screening in an otherwise unexplored area of health care.

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