

PUBLIC AWARENESS OF COLORECTAL CANCER AND PERCEIVED BARRIERS TO ITS SCREENING AMONG ATTENDEES OF PRIMARY HEALTH CARE CENTERS IN THE EASTERN PROVINCE OF SAUDI ARABIA, 2017



Medicine

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ABSTRACT

Background: Colorectal cancer (CRC) is the second most common cancer in Saudi Arabia and its incidence is increasing over time. This study assessed the awareness of colorectal cancer (CRC)-related knowledge and perceived barriers to CRC screening.

Methods: The cross-sectional study involved 398 randomly selected participants in 10 health centers. A self-administered questionnaire obtained data on sociodemographics and on CRC awareness, signs, symptoms, risk factors, and screening.

Results: About half of the participants had a low level of awareness of the signs, symptoms, and risk factors of CRC. A high income and a government job were significantly associated with a high level of awareness. Females tended to have a high level of awareness. Overall awareness of and willingness to undergo CRC screening was low. The most perceived barriers were lack of knowledge of CRC and absence of symptoms. Gender was a significantly associated with most of the perceived barriers to CRC screening.

Conclusion: Awareness of CRC and CRC screening program were low among PHC attendees in the eastern province of Saudi Arabia. The lack of awareness was the most perceived barrier preventing individuals from undergoing CRC screening. The Ministry of Health should establish a national program to raise CRC awareness and promote CRC screening.

KEYWORDS

colorectal cancer screening, public awareness, perceived barriers to screening, Saudi Arabia.

1. Introduction

Cancer is one of a leading cause of death worldwide, accounting for 8.8 million deaths in 2015. Colorectal cancer (CRC) ranked as the third most common type of cancer that has caused deaths at about 774,000 worldwide (World health organization, 2017, February).

Although CRC incidence rate varies around the world, the geographical pattern in men and women are similar. Internationally, CRC is the third most common cancer in male and second in the female, with an estimated 1.4 million new cases to have occurred in 2012. The mortality rate is low and a poor survival rate reported in the less developed country (Ferlay J, 2013).

In Saudi Arabia, CRC is considered the second most common type of cancer, ranked first and third among the male and female population, respectively (Alsanea et al., 2015; Saudi Health Council, 2013). The incidence rate was 11.9% (1,387 new cases), according to the 2013 report of the Saudi Cancer Registry. The incidence of CRC is also rising over the time (Mosli & Al-Ahwal, 2012) affecting male more than female with a male to female ratio of 113:100. The age-standardized rate (ASR) was 11.7/100,000 for males and 10.1/100,000 for females. The eastern region had the highest ASR at a rate of 17.6/100,000 in male and 13.1/100,000 in the female. The median age at diagnosis was 60 and 56 years among males and females, respectively (Alsanea et al., 2015; Saudi Health Council, 2013).

Also, in Saudi Arabia, the age of a patient at the time of diagnosis has been lower than that reported in developed countries (Abduljabbar, 2007; Aljebreen, 2007; Mosli & Al-Ahwal, 2012), and patients have been presented at a late stage of the disease, with a distant metastasis in 28.3% of them (Abduljabbar, 2007; Al-Ahwal & Abdo Al-Ghamdi, 2005; Aljebreen, 2007; Amin et al., 2012). In Saudi Arabia, overall five years survival rate is lower than international reported survival

rates (Amin et al., 2012; "First national survival data for colorectal cancer among Saudis between 1994 and 2004: whats next?," 2013).

Staging of disease at diagnosis is important with a relatively five-year survival rate of 90% for localized CRC; thus, when discovered early, it is highly treatable. A curative surgery can be performed, with relatively low mortality and morbidity, for those detected early (American cancer society, March 2, 2017).

The United States Preventive Services Task Force recommended an annual CRC screening in adults beginning at age 50 years and continuing until age 75 years. They recommend screening annually with fecal occult blood testing, or sigmoidoscopy, every five years, combined with fecal occult blood testing every three years, or screening colonoscopy, at intervals of 10 years (U.S. Preventive Services Task Force, July 2015.).

According to the 2008 World Cancer Report, detection of cancer in an early stage could prevent up to one-third of new cases and increase survival for another one-third. To achieve this goal, there are two options. One is either by early diagnosis through improved awareness of early symptoms and risk factors of CRC, leading to taking medical advice early; another is, through improvement of participation in screening program (Boyle & Levin, 2008). Additionally, people who have more awareness of the risk factors of CRC were more likely to undergo a CRC screening (Koo et al., 2012; Oliver, Ewell, Nicholls, Chapman, & Ford, 2016).

2. Aim

Given the gap in the literature, this study aims to assess the knowledge on and awareness of CRC, including its symptoms and risk factors, as well as the perceived barriers to CRC screening among attendees of primary health care (PHC) centers in the eastern province of Saudi Arabia.

3.Methods

3.1 Sampling and study design

A cross-sectional study was conducted among attendees of Ministry of Health Primary health care centers in Dammam and Khobar cities in the eastern province of Saudi Arabia from 1 February to 30 March 2017. The participants were aged 18 years and above; those with history or were currently diagnosed with CRC, employers of PHC centers, and were not willing to participate excluded from the study.

Ten of the 36 centers were selected through cluster sampling technique, according to each city population. Each city represented a cluster. In each cluster, centers were numbered and chosen randomly until it reached the representative number. In total, seven PHC centers in Dammam and 3 in Khobar were selected.

The required sample size was calculated using Epi-Info version 7 with a confidence level of 95% and a confidence interval of 5%. The minimum sample required was 384, with an additional 10%; thus, the final number was 422, with a response rate of 100%. After eliminating all missing data in the questionnaires and the participants not meeting the inclusion criteria, 398 participants were eligible to enter the study.

3.2 Study variables

The dependent variables were the participants' knowledge of CRC symptoms, risk factors, and screening, as well as their perceived barriers to CRC screening. The independent variables included their sociodemographic data (i.e., age, gender, marital status, cultural background, income, occupation, and educational level); family history of CRC and insurance; healthcare providers (i.e., the military, government, or private institutions); and their sources of information on CRC (e.g., social media, TV, or doctor).

3.3 Data collection tool

A questionnaire was constructed based on the literature review, consisting of four sections. Section A included the sociodemographic data, eliciting information on the participants' age, gender, marital status, place of origin, educational level, job, income, insurance, health status, and personal or relative history of any cancer. Section B consisted of questions on their knowledge of CRC symptoms and risk factors, each with ten items. Section C included questions on awareness of CRC screening (four items), willingness to undergo screening (one item), and preferred method for CRC screening (one item). The last section was regarding perceived barriers (16 items). The questionnaire was revised by two family medicine consultants and one biostatistical specialist.

3.4 Pilot study

To ensure the validity of the questionnaire, a pilot study was conducted to test the reliability of the questionnaire in two of the MOH centers, which were excluded from the final study. The questionnaire was distributed to 46 attendees, who met the similar eligible sample criteria, to evaluate clarity, absence of ambiguity, the time needed to complete the questionnaire, and for the training of the data collectors. The reliability of the study questionnaire was tested using Cronbach's alpha, which was found to be 0.82.

3.5 Data analysis

The collected questionnaires that did not meet the inclusion criteria or with missing of two or more items were discarded (n = 24). Finally, 398 questionnaires were eligible for final analysis. The Statistical Package for Social Sciences (SPSS version 21) was used for data entry and analysis. All collected data were checked, coded, and then entered into a personal computer. Responses of the participants to Section B items were transformed from a five-point Likert scale (where "strongly agree" and "agree" were assigned one point, whereas "strongly disagree, disagree, and uncertain" received zero) to a dichotomous variable (where "yes" received one point and "no" received zero). Table 1 shows the scoring of the level of awareness in Section B. In addition, a score for CRC screening was formulated using three questions. If the first question on time of the screening was answered with "50 years," it would receive one point, whereas the others would have nil. The second question was on the method of screening; any answer would receive one point, except for "do not know," which

received zero. The last question was on the curability if detected early; the answer "yes" would receive one point, whereas the others would receive zero. Table 1 shows the scoring in this section. The analyses on continuous variables were presented using the descriptive statistics, such as percentage, means, and standard deviations. The association between the level of awareness of CRC, perceived barriers, and the independent variables were measured using the chi-square; the p-value of less than .05 was considered significant.

Table 1. Scoring of awareness of symptoms, risk factors and screening for colorectal cancer

Awareness of symptoms and risk factors	Lack of knowledge = nothing
	Awareness of 1–3 items = low
	Awareness of 4–6 items = medium
	Awareness of 7–10 items = high
Awareness of CRC screening	Lack of knowledge = nothing
	Aware of 1 item= low
	Aware of 2 items= medium
	Aware of 3 items= high

3.6 Ethical consideration

The approval and permission from the Ministry of Health Research Committee were obtained before conducting the study. All participants had the right to refuse participation in this study at any time, know the purpose of the study, respect their privacy, keep total confidentiality, and be reassured that it will not have any negative effect on them or their physicians. Informed consents were obtained from each participant. The questionnaire introduction explained the purpose of the study and that all collected data from the attendees would be used for research purposes only and handled with confidentiality. This research was self-funded.

4. Results

4.1 Sociodemographic characteristics

A total of 422 questionnaires were distributed to PHC-center attendees, and only 398 participants were enrolled in the study because of certain exclusion criteria and missing data, 24 questionnaires were excluded. The mean age of the participants was 37.1 ± 11.8 years. More than half of them were female 213 (53.5%). The vast majority of participants were Saudis 358 (89.9%), had completed at least a high school education (82%), and about 295 (74.1%) were married. Almost a third of participants had medical insurance, and the other two third received free medical services. Table 2 presents data on the participants' sociodemographic data.

Table 2: Sociodemographic characteristics and related information of study participants (n = 398).

	Number (N=398)	Percentage (%)
Age categories:		
<45	288	72.4
->45	110	27.6
Gender:		
Male	185	46.5
Female	213	53.5
Nationality:		
Saudi	358	89.9
Non-Saudi	40	10.1
Place of growing:		
Bedouins	14	3.5
Rural	54	13.6
Urban	330	82.9
City:		
Dammam	264	66.3
Khobar	112	28.1
Others	22	5.5
Marital status:		
Single	84	21.1
Married	295	74.1
Other (Divorced & Widowed)	19	4.8

Job:		
Unemployed	141	35.4
Student	31	7.8
Governmental	158	39.7
Private sector	47	11.8
retired	21	5.3
Educational level:		
illiterate	26	6.5
primary/intermediate	46	11.6
secondary/ diploma	146	36.7
bachelor an above	180	45.2
Income:		
less than 5000 RS	89	22.4
from 5000-15000	190	47.7
more than 15000	119	29.9
Insurance:		
YES	125	31.4
No	273	68.6

	Number (N=398)	Percentage (%)
Have chronic disease:		
Yes	122	30.7
NO	276	69.3
Smoking:		
Yes	65	16.3
No	308	77.4
EX-smoker	25	6.3
Diagnosis with cancer:		
Yes	3	0.8
NO	395	99.2
Diagnosis of relatives with colorectal cancer:		
YES	32	8.0
NO	366	92.0
Diagnosis of relative with other cancer:		
Yes	131	32.9
No	267	67.1
Type of relative cancer:		
Breast cancer	35	8.8
Blood cancer	26	6.5
Brain cancer	15	3.8
GI cancer	13	3.3
Others	60	15.1
Place of treatment:		
Primary health care	152	38.2
Governmental hospital	89	22.4
Aramco hospital	30	7.5
Military hospital	30	7.5
Private hospital	95	23.9
other	2	0.5

4.2 Awareness of sign and symptoms of colorectal cancer

Table 3. General level of awareness of colorectal cancer among study participants (n = 398)

	Level of awareness	Frequency	Percent
A) Awareness of symptoms	No awareness	101	25.4
	Low awareness	132	33.2
	Moderate awareness	98	24.6
	High awareness	67	16.8
B) Awareness of risk factors	No awareness	52	13.1
	Low awareness	135	33.9
	Moderate awareness	124	31.2
	High awareness	87	21.9
C) Awareness of CRC screening	No awareness	44	11.1
	Low awareness	135	33.9
	Moderate awareness	167	41.9
	High awareness	52	13.1

Of those surveyed, 58% of the participants (n = 233) had a low level of awareness of signs and symptoms of CRC, and nearly half of them (n = 101) had a zero level of awareness. About 24.6% (n = 98) of the participants had a moderate level of awareness, and only 16.8% (n = 67) had a high level of awareness (Table 3).

Although abdominal swelling and weight loss were the most recognized symptoms, only 44.7% and 40.2% of the participants, respectively, identified them correctly. On the other hand, anemia (22.6%) and pain in anal canal (25.1%) were the least recognized symptoms. Moreover, only about 40% of the participants identified correctly bleeding per rectum and blood in stool (36.9%) as symptoms of CRC (Figure 1).

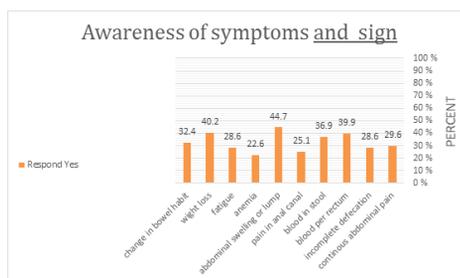


Figure 1. Percentage of colorectal cancer symptoms and signs recognized by study participants (n = 398)

This study tested the association of several sociodemographic and related information of the participants with their level of awareness. A statistically significant association between high level of awareness of symptoms of CRC and job and higher income was found. Those who worked in the government (n = 37 [55.2%], p-value = 0.016) and an income of more than SAR 15,000(n=36 [53.7%], p-value = 0.001) had the highest level of awareness of CRC signs and symptoms. Those who had never heard of CRC screening also had no awareness of CRC symptoms and sign (n = 81 [80.2%], p-value = 0.000) (Table 4).

Table 4. Association between awareness of colorectal symptoms and sociodemographic characteristics of study participants (n = 398)

Awareness of symptoms		No awareness N (%)	Low N (%)	Moderate N (%)	High N (%)	Chi-square p-value
Age	< 45	79(78.2%)	89 (67.4%)	76 (77.6%)	44 (65.7%)	0.104
	>45	22 (21.8%)	43 (32.6%)	22 (22.4%)	23 (34.3%)	
Gender	Male	55 (54.5%)	62 (47%)	39 (39.8%)	29 (43.3%)	0.201
	Female	46 (45.5%)	70 (53%)	59 (60.2%)	38 (56.7%)	
Marital status	Single	21(20.8%)	33(25%)	17(17.3%)	13(19.4%)	0.111
	Married	80(79.2%)	89(67.4%)	75(76.5%)	51(76.1%)	
	Other	0	10(7.6%)	6(6.1%)	3(4.5%)	
Job	Unemployed	25(24.8%)	59(44.7%)	39(39.8%)	17(25.4%)	0.016
	Student	12(11.9%)	10(7.6%)	5(5.1%)	4(6%)	
	Government sector	45(44.6%)	39(29.5%)	38(38.8%)	37(55.2%)	
	Private sector	13(12.9%)	15(11.4%)	14(14.3%)	5(7.5%)	
	Retired	6(5.9%)	9(6.8%)	2(2%)	4(6%)	
Educational level	Illiterate	6 (5.9%)	9 (6.8%)	7 (7.1%)	4 (6%)	0.620
	Primary/intermediate	12 (11.9%)	17 (12.9%)	10 (10.2%)	7 (10.4%)	
	Secondary/diploma	37 (36.6%)	56 (42.4%)	35 (35.7%)	18 (26.9%)	
	Bachelor's degree and above	46 (45.5%)	50 (37.9%)	46 (46.9%)	38 (58.7%)	
Insurance	Yes	25(24.8%)	40(30.3%)	32(32.7%)	28(41.8%)	0.134
	No	76(75.2%)	92(69.7%)	66(67.3%)	39(58.2%)	

Income	Less than SAR 5,000	25(24.8%)	33(25%)	23(23.5%)	8(11.9%)	0.001
	From SAR 5,000–SAR15000	49(48.5%)	65(49.2%)	53(54.1%)	23(34.3%)	
	More than SAR 15, 000	27(26.7%)	34(25.8%)	22(22.4%)	36(53.7%)	
Have chronic disease	Yes	38(37.6%)	33(25%)	29(29.6%)	22(32.8%)	0.213
	No	63(62.4%)	99(75%)	69(70.4%)	45(67.2%)	
Heard of CRC screening	Yes	20 (19.8%)	32 (24.2%)	24 (24.5%)	35 (52.2%)	0.000
	No	81 (80.2%)	100 (75.8%)	74 (75.5%)	32 (47.8%)	

4.2 Awareness of risk factors of CRC

Of those who were enrolled in the study, nearly half of the participants (n = 187, 47%) had a low level of awareness of the risk factors of CRC, and 13.1% (n = 52) had zero level of awareness. Meanwhile, 31.2% (n = 124) and 21.9% (n = 87) of the participants had a moderate and a high level of awareness, respectively (Table 3)

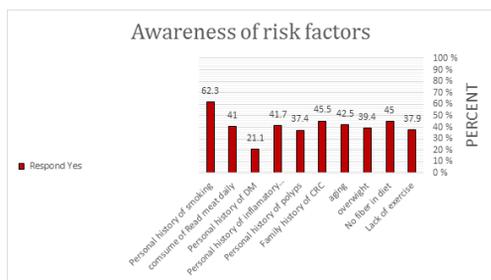


Figure 2. Percentage of colorectal cancer risk factors recognized by study participants (n = 398).

Smoking was the most frequently identified risk factor for CRC, with approximately 62.3% of the participants; 21.1% were aware that diabetes mellitus is a risk factor. Nearly more than a third of the participants knew that colonic polyps (37.4%), physical inactivity (37.9%), and obesity (39.4%) were among the risk factors for CRC. With almost similar percentage, participants could recognize that excessive intake of red meat (41%), inflammatory bowel disease (41.7%), and age of more than 50 years (42.5%) are considered risk factors for CRC. Approximately 45% of the participants were aware that fewer intakes of fibers and that a first-degree relative diagnosed with CRC are among the risk factors for CRC (Figure 2).

This study tested the association of several sociodemographic and related information of participants with the level of awareness. A statistically significant association between level of awareness of risk factors of CRC and gender was found; females had a higher awareness of CRC risk factor than males (n = 54 [62.1%], p-value = 0.005). Those who had never heard of CRC screening had a low level of awareness (n = 44 [84.6%], p-value = 0.001) (Table 5)

Table 5. Association between awareness of colorectal cancer risk factors and sociodemographic characteristics of study participants (n = 398)

Awareness of symptoms		No awareness	low	moderate	High	Chi-square p value
		N (%)	N (%)	N (%)	N (%)	
Age	< 45	79(78.2%)	89 (67.4%)	76 (77.6%)	44 (65.7%)	0.104
	- >45	22 (21.8%)	43 (32.6%)	22 (22.4%)	23 (34.3%)	
Gender	Male	55 (54.5%)	62 (47%)	39 (39.8%)	29 (43.3%)	0.201
	Female	46 (45.5%)	70 (53%)	59 (60.2%)	38 (56.7%)	
Marital status	Single	21(20.8%)	33(25%)	17(17.3%)	13(19.4%)	0.111
	Married	80(79.2%)	89(67.4%)	75(76.5%)	51(76.1%)	
	Other	0	10(7.6%)	6(6.1%)	3(4.5%)	
Job	Unemployed	25(24.8%)	59(44.7%)	39(39.8%)	17(25.4%)	0.016
	Student	12(11.9%)	10(7.6%)	5(5.1%)	4(6%)	
	Governmental	45(44.6%)	39(29.5%)	38(38.8%)	37(55.2%)	
	Private sector	13(12.9%)	15(11.4%)	14(14.3%)	5(7.5%)	
	Retired	6(5.9%)	9(6.8%)	2(2%)	4(6%)	
Educational level:	illiterate	6 (5.9%)	9 (6.8%)	7 (7.1%)	4 (6%)	0.620
	primary/intermediate	12 (11.9%)	17 (12.9%)	10 (10.2%)	7 (10.4%)	
	secondary/ diploma	37 (36.6%)	56 (42.4%)	35 (35.7%)	18 (26.9%)	
	bachelor an above	46 (45.5%)	50 (37.9)	46 (46.9%)	38 (58.7%)	
Insurance:	YES	25(24.8%)	40(30.3%)	32(32.7%)	28(41.8%)	0.134
	No	76(75.2%)	92(69.7%)	66(67.3%)	39(58.2%)	
Income:	less than 5000	25(24.8%)	33(25%)	23(23.5%)	8(11.9%)	0.001
	from 5000-15000	49(48.5%)	65(49.2%)	53(54.1%)	23(34.3%)	
	more than 15000	27(26.7%)	34(25.8%)	22(22.4%)	36(53.7%)	
Have chronic disease:	Yes	38(37.6%)	33(25%)	29(29.6%)	22(32.8%)	0.213
	NO	63(62.4%)	99(75%)	69(70.4%)	45(67.2%)	
Heard about CRC scree	Yes	20 (19.8%)	32 (24.2%)	24 (24.5%)	35 (52.2%)	0.000
	No	81 (80.2%)	100 (75.8%)	74 (75.5%)	32 (47.8%)	

4. 3 Awareness of CRC screening

Table 6. Association between awareness of colorectal cancer screening score and sociodemographic data (n = 398).

Awareness of CRC screening		No awareness	Low	Moderate	High	Chi-square p value
		N (%)	N (%)	N (%)	N (%)	
Age	< 45	38 (86.4%)	96 (71.1%)	120(71.9%)	34 (65.4%)	0.127
	>45	6 (13.6%)	39 (28.9%)	47 (28.1%)	18 (34.6%)	
Gender	Male	22 (50%)	59 (43.7%)	72 (43.1%)	32 (61.5%)	0.105
	Female	22 (50%)	76 (56.3%)	95 (56.9%)	20 (38.5%)	
Marital status	Single	11(25.0%)	26(19.3%)	37(22.2%)	10(19.2%)	0.393
	Married	33(75.0%)	103(76.3%)	118(70.7%)	41(78.8%)	
	Other	0(0%)	6(4.4%)	12(7.2%)	1(1.9%)	
Educational level	Illiterate	3(6.8%)	15(11.1%)	8(4.8%)	0(0%)	0.003
	Primary/intermediate	3(6.8%)	22(16.3%)	19(11.4%)	2(3.8%)	
	Secondary/diploma	19(43.2%)	51(37.8%)	61(36.5%)	15(28.8%)	
	Bachelor's degree and above	19(43.2%)	47(34.8%)	79(47.3%)	35(67.3%)	
Insurance	Yes	17(38.6%)	43(31.9%)	51(30.5%)	14(26.9%)	0.654
	No	27(61.4%)	92(68.1%)	116(69.5%)	38(73.1%)	

Overall awareness of CRC screening in the study participants was low, as nearly half of them (n =179, 45.0%) had a low or zero level of awareness. Approximately 41.9% (n = 167) had a moderate level, and only 13.1% (n= 52) had a high level of awareness. (Table 3) There was a statically significant association between education levels and increased level of awareness (p-value =0.003) (Table 6). Seventy-two percent of the study participants (n = 287) had never heard of CRC screening. For those who had heard of it (n = 111, 27.9%), most of them had heard through the media (38.09%) and their doctors (27.7%).

The results of the analysis showed that those who had a relative who was diagnosed with CRC had statistically significant association with the friends and relatives being their sources of information (p-value = 0.011). Doctors as sources information was significantly associated with job (p-value= 0.003), educational level (p-value = 0.014), income (p-value = 0.004), and insurance (p-value= 0.008) (Table 7).

When the participants were asked when they must start screening for CRC, only 19.6% (n = 78) answered the question correctly. Most of participant (34.2%, n = 136) thought that the screening must start when symptoms appear, and about a quarter had no idea when. The results of the analysis also showed a significant association between awareness and higher educational level (n = 50, 64.1%, p-value= 0.000), having a governmental job (n = 50, 64.1%, p-value = 0.000), being male (n = 47, 60.3%, p-value = 0.007), and having a higher income (n = 37, 47.4%, p-value= 0.000) (Table 7).

Colonoscopy (45.2%, n = 180) was most frequently identified by the participants as a method of CRC screening, whereas barium enema was the least identified (10.1%, n = 40). CT scan of the abdomen and FOBT were known by only 17.6% (n = 70) and 14.8% (n = 59) of the participants respectively. About 31.2% (n = 124) had no knowledge of

CRC screening methods. The participant who had no idea of the method of screening had statistically significant association with PHC centers as health care provider (n = 50 [40.3%], p-value = 0.045) (Table 7).

Most of participants (88.2%, n = 351) had never thought to undergo for CRC screening. There were statistically significant association between willingness to undergo CRC screening and young age (n = 28 [59.6%], p-value = 0.037), governmental job (n = 22 [46.8%], p-value = 0.009), male gender (n = 30 [63.8%], p-value = 0.011), non-smoker (n = 32 [68.1%], p-value = 0.032), and having a chronic disease (n = [24, 51.1%], p-value = 0.001) (Table 7).

Participants of the study were chosen FOBT, CT scan and colonoscopy as preferred methods of screening for CRC with (31.9%), (31.7%) and (30.4%) respectively. However, barium enema was preferred methods only in (6%) of them. There was a statistically significant association between preferred methods of screening, and marital status (P value= 0.011) where the majority of married participants preferred FOBT (n = 103, 34.9%) and singles participants preferred colonoscopy (n = 36, 42.9%). Also, there was a statistically significant association between preferred methods of screening and educational levels (P value= 0.009) (Table 8).

In term of curability of the CRC when early detected, more than two third (68.3%, n = 272) of participants believed that CRC would be cured if detected early. On the other hand, only (2.3%, n = 9) of them thought CRC early detection would not change the prognosis and (29.4%, n = 117) had no idea. There were a statistically significant association between those with higher education level and believing that CRC is curable (n = 133, 48.9%, P value= 0,038) (Table 7).

Table 7. Association between awareness of colorectal cancer screening items* and sociodemographic and related information (n = 398)

	Heard about screening		When to screen		Willing to screening		prognosis	
	Yes n= 111	P- value**	Correct answered n= 78	p-value**	Yes n= 47	p-value**	Curable n= 272	p-value**
Age								
< 45 years	81 (73%)	P= 0.865	52 (66.7%)	P= 0.210	28 (59.6%)	P= 0.037	190 (69.9%)	P= 0.100
Age 45 and more	30 (27%)		26 (33.3%)		19 (40%)		82 (30.1%)	
Gender								
Male	52 (46.8%)	P= 0.928	47 (60.3)	P= 0.007	30 (63.8%)	P= 0.011	122 (44.9%)	P= 0.338
Female	59 (53.2%)		31 (39.7%)		17 (36.2%)		150 (55.1%)	
Educational level								
Illiterate	3 (2.7%)	P= 0.066	0 (0%)	P= 0.000	1 (2.1%)	P= 0.180	18 (6.6%)	P= 0.038
Primary/Intermediate	9 (8.1%)		3 (3.8%)		8 (17%)		34 (12.5%)	
Secondary/Diploma	40 (36%)		25 (32.1%)		13 (27.7%)		87 (32%)	
Bachelor and above	59 (53.2%)		50 (64.1%)		25 (53.2%)		133 (48.9%)	
Job								
Unemployed	34 (30.6%)	P= 0.225	17 (21.8%)	P= 0.000	11 (23.4%)	P= 0.009	96 (35.3%)	P= 0.903
Student	8 (7.2%)		1 (1.3%)		4 (8.5%)		23 (8.5%)	
Governmental	52 (46.8%)		50 (64.1%)		22 (46.8%)		108 (39.7%)	
Private sectors	9 (8.1%)		6 (7.7%)		3 (6.4%)		30 (11%)	
Retired	8 (7.2%)		4 (5.1%)		7 (14.9%)		15 (5.5%)	
Marital stats								
Single	24 (21.6%)	P= 0.484	15 (19.2%)	P= 0.897	8 (17%)	P= 0.466	60 (22.1%)	P= 0.215
Married	34 (75.7%)		59 (75.6%)		38 (80.9%)		196 (72.1%)	
Others (divorced & widowed)	3 (2.7%)		4 (5.1%)		1 (2.1%)		16 (5.9%)	
Income								
< 5000 SR	23 (20.7%)	P= 0.053	7 (9%)	P= 0.000	9 (19.1%)	P= 0.755	65 (23.9%)	P= 0.231
From 5000 to 15000 SR	45 (40.5%)		34 (43.6%)		22 (46.8%)		122 (44.9%)	
>15000 SR	43 (38.7%)		37 (47.4%)		16 (34%)		85 (31.3%)	
insurance								
Yes	36 (32.4%)	P= 0.784	20 (25.6%)	P= 0.221	12 (25.5%)	P= 0.355	84 (30.9%)	P= 0.740
No	75 (67.6%)		58 (74.4%)		35 (74.5%)		188 (69.1%)	
Chronic disease								
Yes	37 (33.3%)	P= 0.471	28 (35.9%)	P= 0.263	24 (51.1%)	P= 0.001	87 (32%)	P= 0.397
No	74 (66.7%)		50 (64.1%)		23 (48.9%)		185 (68%)	
Smoking status								
Yes	18 (16.2%)	P= 0.655	11 (14.1%)	P= 0.250	8 (17%)	P= 0.032	45 (16.5%)	P= 0.391
No	88 (79.3%)		59 (75.6%)		32 (68.1%)		213 (78.3%)	
Ex-smoker	5 (4.5%)		8 (10.3%)		7 (14.9%)		14 (5.1%)	

*CRC items (heard of CRC screening, when to screen, willing to screen, and prognosis of CRC)

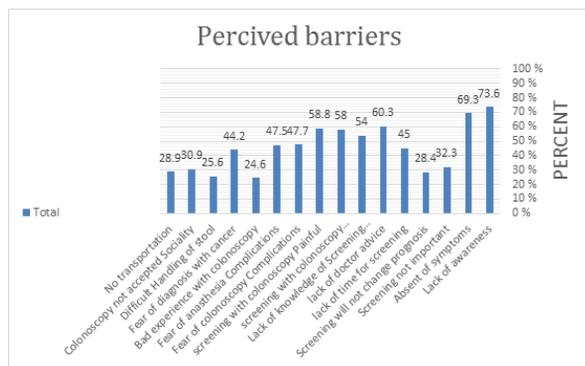
**chi-square

Table 8: Associations between preferred methods of participants and sociodemographic data (n = 398).

	Preferred method				Chi-square p value
	Colonoscopy	CT scan	Stool analysis	Barium enema	
Age					0.057
< 45 years	96(33.3%)	94(32.6%)	82(28.5%)	16(5.6%)	
Age 45 and more	25(22.7%)	32(29.1%)	45(40.9%)	8(7.3%)	
Gender Male	64(34.6%)	59(31.9%)	53(28.6%)	9(4.9%)	0.269
Female	57(26.8%)	67(31.5%)	74(34.7%)	15(7%)	
Educational level					0.009
Illiterate	4(15.4%)	5(19.2%)	15(57.7%)	2(7.7%)	
Primary/intermediate	11(23.9%)	19(41.3%)	11(23.9%)	5(10.9%)	
Secondary/diploma	55(37.7%)	50(34.2%)	35(24.0%)	6(4.1%)	
Bachelor's degree and above	51(28.3%)	52(28.9%)	66(36.7%)	11(6.1%)	
Marital status					0.011
Single	36(42.9%)	27(32.1%)	20(23.8%)	1(1.2%)	
Married	76(25.8%)	95(32.2%)	103(34.9%)	21(7.1%)	
Others (divorced and widowed)	9(47.4%)	4(21.1%)	4(21.1%)	2(10.5)	
Income					0.589
< SAR 5,000	29(32.6%)	23(25.8%)	33(37.1%)	4(4.5%)	
From SAR 5,000 to SAR 15,000	55(28.9%)	62(32.6%)	58(30.5)	15(7.9%)	
> SAR 15, 000	37(31.1%)	41(34.5%)	36(30.3)	5(4.2%)	
Insurance					0.991
Yes	39(31.2%)	39(31.2%)	40(32.0%)	7(5.6%)	
No	82(30.0%)	87(31.9%)	87(31.9%)	17(6.2%)	

4.4 CRC screening perceived barriers

Figure 3: Percentage of perceived barriers to CRC screening among study participants (n= 398).



The most perceived barriers agreed upon by participants were lack of knowledge of CRC (73.6%) and absent of symptoms of the disease (69.3%). On the other hand, the least chosen perceived barriers were the difficult handling of the stool sample (25.6%) and previous bad experience with colonoscopy (24.6%) (Figure 3).

Table 9: Association between perceived barriers to CRC screening and gender among study participants (n= 398).

Barriers	Gender No. (%)			Chi-square p value
	Male (n=185)	Female (n=213)	Total (n=398)	
Lack of awareness	121 (65.4%)	172 (80.8%)	293 (73.6%)	0.002
Absent of symptoms	107 (57.8%)	169 (79.3%)	276 (69.3%)	0.000
Screening not important	71 (38.4%)	57 (26.8%)	128 (32.3%)	0.000
Screening will not change prognosis	63 (43.1%)	50 (23.5%)	113 (28.4%)	0.003
Lack of time for screening	87 (47%)	92 (43.2%)	179 (45%)	0.337
Lack of doctor advice	96 (51.9%)	144 (67.6%)	240 (60.3%)	0.000
Lack of knowledge of Screening place	103 (55.7%)	112 (52.6%)	215 (54%)	0.345

Screening with colonoscopy uncomfortable	101 (54.6%)	130 (61%)	231 (58%)	0.004
screening with colonoscopy Painful	105 (56.8%)	129 (60.6%)	234 (58.8%)	0.049
Fear of colonoscopy Complications	82 (44.3%)	108 (50.7%)	190 (47.7%)	0.006
Fear of anesthesia Complications	75 (40.5%)	114 (53.5%)	189 (47.5%)	0.000
Bad experience with colonoscopy	50 (27%)	48 (22.5%)	98 (24.6%)	0.001
Fear of diagnosis with cancer	75 (40.5%)	101 (47.4%)	176 (44.2%)	0.168
Difficult Handling of stool	50 (27%)	52 (24.4%)	102 (25.6%)	0.015
Colonoscopy not accepted Sociality	62 (33.5%)	61 (28.6%)	123 (30.9%)	0.527
No transportation	43 (23.2%)	72 (33.8%)	115 (28.9%)	0.065

The study showed that there was a statistically significant association between gender and perceived barriers. Significantly, lack of knowledge of CRC was stated as barriers by women rather than men (80.8% vs. 65.4%, P=0.002). Furthermore, a significantly higher percent of women reported that absent of symptoms (79.3% vs. 57.3%, P=0.000), not recommend by doctors (67.6% vs. 51.9%, P=0.000), fear of complication of colonoscopy (50.7% vs. 44.3%, P=0.006) and fear of anesthesia complications (53.5% vs. 40.5%, P= 0.000). Also, fear of colposcopy is uncomfortable and painful higher among women compared to men (61% vs. 54.6%, P=0.004) and (60.6% vs. 56.8%, P=0.049) respectively. On the contrary, only (26.8%) of women thought screening is not important while (38.4%) thought of that with P=0.000. No change in the prognosis of the disease when detected early by screening were perceived as a barrier by men (43.1%), while, (23.5%) in women with a P value of (0.003). In addition, more men stated difficult handling of stool sample than women (27% vs. 24.4%, P=0.015) (Table 9).

5. Discussion

5.1 Awareness of signs, symptoms, and risk factors of CRC

Decision makers need to build a comprehensive program that helps

detect CRC in its early stages, based on research results on the public awareness of the symptoms, signs, and risk factors of CRC, as well as of CRC screening, and on perceived barriers. When discovered early, CRC is highly treatable (American cancer society, March 2, 2017).

In the current study, the level of awareness of CRC among the study participants was low. More than half of the participants (58.6%) were unable to recognize the symptoms and signs of CRC, and nearly half of them had a zero level of awareness. This result is similar to those in national and international studies, which have shown that the level of awareness and knowledge of CRC were low. In a European study of 21 countries, the level of awareness of CRC was low (Keighley et al., 2004). Another study conducted in Malaysia revealed that most of the population was unaware about CRC, and more than 30% of them had zero knowledge of CRC's signs and symptoms (Su et al., 2013).

The evaluation of the individual items of CRC symptoms, signs, and risk factors, showed a clear lack of awareness and knowledge. Nearly 60% of the participants did not know that rectal bleeding and blood in stool are CRC symptoms, whereas three-quarters did not consider anemia as a sign of CRC. This finding is consistent with Almadi's study done in 2015 (Almadi et al., 2015).

As for the awareness level of the risk factors for CRC, it was slightly better than the awareness of CRC signs and symptoms. Approximately half of the participants (47%) were also at a low level of awareness of CRC risk factors. This result is similar to that in most studies in many parts of the world (Gimeno-Garcia, Quintero, Nicolas-Perez, & Jimenez-Sosa, 2011; Keighley et al., 2004; Koo et al., 2012). The Asia-Pacific Working Group on CRC showed a low level of awareness and knowledge about CRC signs, symptoms, and risk factors in research involves different country (Koo et al., 2012). Further, about 60% of the participants had no or low level of awareness of the three most important risk factors for CRC (American cancer society, March 2, 2017) family history of CRC, inflammatory bowel disease, and the presence of adenomatous polyps. Few are also aware that diabetes mellitus could increase the risk of CRC. Likewise, a low number of people could correctly identify that age and obesity are risk factors and that diabetics are more likely to develop CRC (Almadi et al., 2015).

The current Study revealed that high-income participants and those who work in government jobs had a significantly higher level of awareness of CRC signs and symptoms, a consistent finding with two studies in Iran (Bidouei et al., 2014; Mansour-Ghanaei et al., 2015). This finding could be explained by the fact that a higher income and better job play important roles in ensuring access to knowledge. This study also showed that females had a significantly higher level of awareness of CRC risk factors, which was also reported in another study (Zubaidi et al., 2015). However, one study in Saudi Arabia showed a contrasting finding (Al Wutayd, Alamri, Ali, Kassim, & Ibrahim, 2015). Meanwhile, a significant association has been seen between a low level of awareness and participants who had never heard of CRC screening (Almadi et al., 2015).

There was no significant association between age and awareness level which is consistent with a study done in western Saudi Arabia (Khayyat & Ibrahim, 2014). This finding could be because most participants of both studies were young. In contrast, other studies revealed that older people tend to be more aware than younger people (Almadi et al., 2015; Bas, Guler, Gunay, Besim, & Uygur, 2012; Bidouei et al., 2014; Mansour-Ghanaei et al., 2015). Notably, education level had no significant association with level of awareness in contrast to previous findings (Bidouei et al., 2014; Khayyat & Ibrahim, 2014; Mansour-Ghanaei et al., 2015; Su et al., 2013) and in concurrent with one study in Riyadh (Almadi et al., 2015). This finding could be partially explained by the fact that a low level of awareness was found across all levels of education and the majority of participants had at least a high school education (82%), for that a significant association may not be found. Moreover, no significant association was observed between marital status and a higher level of awareness in the current study, in contrast to previous results (Almadi et al., 2015; Bas et al., 2012; Su et al., 2013; Zubaidi et al., 2015).

5.2 Awareness of CRC screening

This section explores participants' awareness of and willingness to participate in CRC screening. Overall, the level of public awareness on CRC screening was low, with nearly half of the participants (45.0%) having a low or zero level of awareness. There was a significant association between education level and increased a level of awareness, whereas age and gender had no statistical significance, consistent with a study conducted in a western region of Saudi Arabia (Khayyat & Ibrahim, 2014).

Almost three-quarters of the study participants had not heard about CRC screening. Most of those (73%) in the target age of CRC screening had not heard about CRC screening. This result is similar to those in a study conducted in Saudi Arabia: about two-thirds of the participants had not heard about CRC screening (Khayyat & Ibrahim, 2014). Of those who had heard about CRC screening, they heard mostly through the media and doctors; this outcome reflects the importance of sources to be targeted in future health education programs. The results showed the positive influence of family and friends on raising awareness of CRC screening, which was statistically significant. The participants who had relatives diagnosed with CRC chose their family and friends as a source of information. Also, those who reported that doctors were the source of their information for CRC screening tended to have insurance, high education level, and high income.

Regarding appropriate age for CRC screening, only one-fifth of the participants knew that the age of 50 years is the appropriate age to start screening, similar to the results in another study (Almadi et al., 2015). This similarity could be explained by the fact that both studies had similar participant characteristics. This result was significantly associated with a high education level. Further, the male gender, a government job, and a high income were significantly associated with recognition of the appropriate age for CRC screening, similar to the findings in local a study (Zubaidi et al., 2015).

In two studies conducted in Saudi Arabia, the colonoscopy was the most recognized method of CRC screening by approximately half of the participants (Almadi et al., 2015; Khayyat & Ibrahim, 2014), similar to the current study's results. Further, in the current work, almost one-third of the participants had no knowledge of CRC screening methods, which is more than that reported in another study (Almadi et al., 2015). This could suggest that physicians are not practicing CRC screening sufficiently (Demyati, 2014).

As mentioned above, CRC, when discovered early, is highly treatable, with relative five-year survival rates of 90% for localized CRC (American cancer society, March 2, 2017). In the current study, more than two-thirds of the participants thought CRC could be curable if detected early, this finding consistent with other studies (Almadi et al., 2015; Keighley et al., 2004) it could be related to the general concept about cancer.

A notable result of this study is that nearly 90% of the participants did not consider CRC screening. This finding is higher than that reported in one local study (Khayyat & Ibrahim, 2014) but contradictory to other local and international figures, in which 70% and 81% were willing to undergo CRC screening, respectively (Almadi et al., 2015; Qumseya et al., 2014). This study showed a significant association between an agreement to undergo CRC screening and multiple variables: those who are older, female, a smoker, and not having chronic diseases were less likely to undergo CRC screening. A fear of colonoscopy and its complication were more frequently stated by a female, which could explain this association.

Regarding the preference methods of CRC screening of participants, three were chosen by almost the same proportion of participants, namely, FOBT, CT of the abdomen, and colonoscopy: each one was chosen by one-third of the participants. On the other hand, barium enema was preferred by only 6% of the participants. These findings suggest that there is no specific method preferred among participants, if we exclude the least chosen method. In other studies (Almadi et al., 2015; Omran, Barakat, Muliira, Bashaireh, & Batiha, 2015; Qumseya et al., 2014), colonoscopy was the preferred method.

5.3 Perceived barriers to CRC

As regards the barriers, the study identified 16 barriers divided into three main categories, namely, patient-related, health care provider-related, and test-related barriers (Almadi et al., 2015; Jones, Woolf, et al., 2010).

In a current study, the most frequently perceived barrier reported was the lack of awareness of CRC (73.6%), which necessitates establishing health education programs to increase awareness of CRC, and in turn, CRC screening uptake. The second highest stated as a barrier was the absence of signs and symptoms of CRC, consistent with in approximately 70% of participant that also have been reported as one of the main barriers in other studies (Bidouei et al., 2014; Galal et al., 1837; Mansour-Ghanaei et al., 2015). The lack of doctor advice was considered one of the important reported barriers in different studies indicating that doctor recommendation plays a major role in CRC screening uptake. (Bidouei et al., 2014; Jones, Woolf, et al., 2010; Omran et al., 2015; Qumseya et al., 2014; Yusoff, Daud, Noor, & Rahim, 2012). In this study, nearly 60% of the participants perceived the lack of doctor advice as one of the main barriers to undergoing CRC screening. Meanwhile, pain and discomfort due to colonoscopy were reported by more than half of the participants as a perceived barrier, as also mentioned by other studies (Jones, Devers, Kuzel, & Woolf, 2010; Mansour-Ghanaei et al., 2015; Yusoff et al., 2012).

Significant associations were seen between most of the perceived barriers and gender (Table 9). Females more frequently perceived the following barriers compared with males: lack of awareness, absence of signs and symptoms, lack of doctor recommendation, fear of colonoscopy complications, fear of anesthesia complications, colonoscopy being uncomfortable, and colonoscopy being painful. Meanwhile, males more often perceived the following barriers than women: screening is not important, screening will not change the prognosis, and difficulty handling the stool sample. Similarly, females also reported colonoscopy being painful as a primary barrier in a study conducted in Al Hassa region (Galal et al., 1837). In contrast to our findings, the lack of awareness was reported more by males than females in different study (Jones, Devers, et al., 2010).

6. Conclusion and recommendations

In conclusion, the study showed that participants had a low level of awareness of CRC signs and symptoms, risk factors, and CRC screening. Such low level of awareness was the highest ranked perceived barrier. Thus, it is vital to establish a national program through the Ministry of Health and in partnership with other health sectors in Saudi Arabia to raise awareness and knowledge about CRC and implement a CRC screening program. We also suggest the designation of an annual day for educational campaigns targeting the public to increase general awareness. The participation of doctors should also be encouraged in terms of enhancing the frequency of the discussion of CRC screening and offering them to the patients.

7- Study limitations:

- Since it is a cross-sectional study causal relationship cannot be established.
- Since it is self-administered questionnaire may be response subjectivity.

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