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Original Article

Knowledge, Attitude, and Practice toward Colorectal Cancer Screening among Primary Health-care Physicians in Alhasa Area, 2018

Mohammed R. Al Mutawah[1], Mousa Al Jassim[1], Essa Al Saleh[2]

[1]Senior Resident, Postgraduate Center of Family Medicine, Ministry of Health, Saudi Board of Family Medicine, Al Ahsa Province, Saudi Arabia, [2]Consultant, Postgraduate of Preventive Medicine Center, Ministry of Health, Saudi Board of Preventive Medicine, Al Ahsa Province, Saudi Arabia

Abstract

Background: Worldwide, the third most common cancer diagnosed in males and the second in females is colorectal cancer (CRC). CRC is a common, invasive, and preventable disease if detected in premalignant stage and screening by physician enables detection in an early stage to decrease morbidity and mortality. CRC in Saudi Arabia is a rising disease, and screening by physicians is overlooked due to multiple obstacles. The aim of this study was to assess the current knowledge, attitude, and practice of primary health-care physicians in Alhasa toward CRC screening and to identify the barriers of the screening.

Methodology: A cross-sectional study was conducted in Alhasa area during the period from April to June 2018. A comprehensive validated self-administered questionnaire previously used in the published study was used to collect the data.

Results: The total number of the participant was 128. 75% of the participant was a general physician without any specialty, while 21% had a diploma or master degree in family medicine. Of 128 participants, 122 (95.3%) considered that CRC screening for asymptomatic average-risk patient aged 50 years and more is effective, while only 43.8% of the participants practice screening for asymptomatic average-risk patients aged 50 years or more. Participants who have a higher level of postgraduate education have higher knowledge compared to the general physician. Most of the physician reported that there is no reminder system in their workplace and lake of patient awareness as a barrier for CRC screening.

Conclusion: CRC screening is underutilized by primary health-care physicians despite their beliefs of the effectiveness of CRC screening. Most of the physician reported that there is no reminder system in their workplace and lake of patient awareness as a barrier for CRC screening.

Key words: Al Ahsa, Cancer, Colorectal, General practitioners, Knowledge; Attitude; Practice, Primary health-care physicians, Saudi Arabia, Screening

INTRODUCTION

Cancer can be defined as abnormal cells that grow out of control and have the ability to invade different parts of the body and affect many organs.[1] Cancer is one of the common causes of death worldwide and was responsible for 8.8 million deaths in 2015.[2] The most common causes of cancer death are lung (1.69 million deaths), liver (7,88,000 deaths), colorectal (7,74,000 deaths), stomach (7,54,000 deaths), and breast (5,71,000 deaths).[1] The annual cost of cancer in 2010 was around 1.16 trillion of the US dollar.[3]

The incidence of cancer in Saudi Arabia was 9.81, and the most common types of cancers were colorectal, non-Hodgkin lymphoma, lung, liver, and thyroid.[4] The mortality from all cancers in Saudi Arabia among both the sexes was 6.[4] On the next 20 years, the number of new cases is expected to rise by about 70%.

The overall age-standardized cancer incidence rate is almost 25% higher in men than in women,[4] with rates of 205 and

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Corresponding Author: Dr. Mohammed R. Al Mutawah, Al Bustan City, Al Ahsa, Saudi Arabia. Phone: +966564998900. E-mail: moh4ed@hotmail.com

165/1,00,000, respectively. The incidence rates of cancer vary nearly five-fold across the different regions of the world.[3]

The term colorectal cancer (CRC) is a slowly developing cancer that begins on the inner lining of the rectum or different parts of the colon as an abnormal growth. The common sites of colon cancer are involved in the large intestine and distributed approximately in the rectum as 25%, sigmoid colon 22%, descending colon 6%, transverse colon 11%, ascending colon 17%, and cecum 19%.[5]

If this abnormal growth (known as the adenomatous polyp) becomes cancerous, it can spread by lymphatic and hematogenous dissemination, as well as by contiguous and transperitoneal routes. Regional lymph nodes, liver, lungs, and peritoneum are the most common metastatic sites. The presentation of signs and symptoms may differ depending on any of these areas.[5,6]

CRC in both developed and developing countries considered one of the leading causes of cancer death.[2,7] CRC, worldwide, is the third most common cancer diagnosed in males and the second in females.[8] The likelihood of developing CRC can increase with environmental and genetic factors.[9]

Age is considered a significant risk factor for CRC. Before the age of 40 years, cancer of large bowel is uncommon. The incidence is significantly increased between the ages of 40 and 50, and increase as age progress.[10] In patients at average risk, the lifetime incidence of CRC is about 5%, with 90% of cases occurring after the age of 50.[10] In patients with specific inherited conditions, the incidence is higher.[10]

In 2012, CRC global death reached approximately 7,00,000 deaths/year.[11] Worldwide, the mortality rates in males are higher than females with 10.5 and 9.2 deaths/1,00,000 deaths, respectively.[11,12]

The global incidence rate of CRC is different in between countries due to different cultures and exposures to environmental factors and dietary habits for each nation with maximum rate in North America, Australia, and Northern and Western Europe, while the minimum rate is noticed in Africa and Asia.[13]

CRC considered the third deadliest of all cancer in the United States. According to the American Cancer Society in the United States, there were 1,34,490 new CRC cases diagnosed (70,820 in males and 63,670 in females) with a total of 49,190 CRC deaths (26,020 in men and 23,170 in women).[5]

In 2013, the number of U.S. residents living with CRC was 1,177,556 of total population.[14]

In Australia and New Zealand population, the studies observed that the estimated age-standardized incidence rates of CRC are the highest with 44.8/1,00,000 in men and 32.2 in women, while in Africa population are the lowest at only 3.5/1,00,000 in men compared to 3.0 in women.[11,15,16]

While there are highest incidence rates in North America, Europe, and Australia, other countries are experiencing rapid increases in CRC incidence such as Japan, Thailand, Philippines, and Iran.[11,17-19]

In the Middle East region, the rate of CRC is also increasing, and this is mainly due to the increased risk factors for CRC and unhealthy changes in lifestyle such as increased tobacco use, physical inactivity, and consumption of unhealthy food.[11,20] The age-standardized rate is 17.6/1,00,000 in men and 12.4/1,00,000 in women.[11]

In the Gulf region, reports show that only 20.7% of CRC cases present to hospitals with localized disease.[21] Moreover, a significant percentage (79%) of CRC cases is hospitalized with advanced stages of the disease, and this could be due to the absence of initial screening, early detection, and inappropriate diagnosis services.[21]

In the Kingdom of Saudi Arabia (KSA), CRC ranks second in the most common cancers among Saudis with a higher incidence in males than in females.[22] According to the WHO, the total number of CRC in Saudi Arabia 2014 was 1168 and 879 in male and female, respectively.[23]

Studies showed that the incidence rate would continue to increase in KSA four-fold in both genders by the year 2030 due to the increasing prevalence of risk factors for CRC.[22,24]

Around 60 and 55 years are the mean age of CRC for men and women, respectively, which is lower than in developed countries.[22,24-26] In addition, 28.4% of the patients are found to have distant metastasis and obstruction at the time of presentation.[27]

Screening methods have been proven to be effective measures for preventing CRC through early detection and removal of premalignant adenomas and thereby achieve the goals for the reduction of mortality.[13,28] Studies have revealed that screening can lead to a 53% decrease in the rate of mortality to CRC based on statistics from the United States.[28]

The US Preventive Services Task Force (USPSTF) guidelines recommend annual screening for CRC with high-sensitivity fecal occult blood testing (FOBT), or sigmoidoscopy every

5 years, with high-sensitivity FOBT every 3 years, or full colonoscopy every 10 years for adults between 50 and 75 years old.[29]

The Canadian guidelines recommend screening adults aged 60–74 years for CRC with FOBT every 2 years or flexible sigmoidoscopy (FS) every 10 years and recommended against colonoscopy as a routine screening test.[30]

The Saudi guidelines recommend offering CRC screening for those above the age of 45 years (strong recommendation; low-quality evidence).[27]

FOBT can detect the presence of heme (blood hemoglobin) in stool samples. Application of hydrogen peroxide onto guaiac paper causes alpha-guaiaconic acid to oxidise and turns blue. This method has become the most frequently used screen for CRC worldwide.[31] A disadvantage of the test is that sensitivity for advanced adenoma is relatively low.[32]

FS can help the physician to visualize the distal gastrointestinal tract up to the splenic flexure, using a flexible, 60 cm long endoscope.[33] This test seemed to reduce CRC incidence and mortality by 32% and 50%, respectively.[34]

The gold standard screening method for CRC is colonoscopy mainly due to its high sensitivity and specificity for detecting the cancerous and precancerous lesion. It provides visualization of the whole colon and the distal part of the small intestine using a flexible, 120-cm–160-cm long endoscope.[35]

Objectives

The objectives of this study were as follows:

- To assess knowledge of PHC physicians at Alhasa region about CRC screening
- To determine attitudes of PHC physicians at Alhasa region toward CRC screening
- To evaluate knowledge of the best practice of PHC physicians at Alhasa region towards CRC screening
- To describe sources of CRC screening information of PHC physicians at Alhasa region.

Rational

CRC is a common, invasive, and preventable disease if detected in premalignant stage, and screening by primary health-care (PHC) physician enables detection in an early stage to decrease morbidity and mortality. Unfortunately, CRC screening by physicians is overlooked due to multiple obstacles.

Up to the researchers' knowledge, no similar study has been conducted in Alhasa region to evaluate physicians' knowledge, attitude, and practice toward CRC screening by PHC physicians.

METHODOLOGY

Study Design

The study has been conducted as a descriptive cross-sectional study in Alhasa region of Saudi Arabia.

Study Area

The study has been conducted in Alhasa region which is one of the largest districts of the Eastern Province of Saudi Arabia with a population of 1,150,000 people.[36,37] The surface area of Alhasa region is 860 km^2. Alhasa consists of five cities, many villages, and Hijras. The cities are Al Hofuf, Al-Mubaraz, Al Oyun, Al Taraf, and Al Omaran. The health-care system in Alhasa is provided to people as free from the Saudi Government through hospitals and primary health-care centers. The primary health-care centers are divided into three sectors: Al Hofuf, Al Mubaraz, and Al Omaran. Each sector consists of around 20–25 primary health-care center.[37]

Study Population

The study included all primary health-care physicians working in the seventy primary health care facilities of the Ministry of Health,[37] Alhasa, between April and June 2018. All general physicians regardless of their age or gender were included in the study. The dentists, interns, pediatrician, ophthalmologist, ENT specialist, primary health-care physicians working in the administration, and terminal PHC centers (Hujrah) were excluded from the study.

Sampling

All primary health-care physicians who fulfilled the inclusion criteria and agreed to participate in the study were included, due to the small number of the study population. Therefore, there was no sampling.

Data Collection

A validated self-administered questionnaire accepted by the National Cancer Institute in the USA and previously used in the published study[38] was used to collect data. The questionnaire was distributed to all physicians in the primary health care during working hours after taken a verbal consent. The questionnaire distributed as package anonymously through PHC administration. The questionnaire took about 7–10 min to fill it. Then, the survey was collected on the same day by an assigned person from the PHC administration. The questionnaire included demographic characteristics, questions to assess the knowledge, attitude, and current practice, and barriers to CRC screening. A pilot study was conducted over one of the PHCs that helped in the adaptation of the study.

Data Analysis

The software that was used for data collection, management, and statistical analysis is the Statistical Package for the Social Sciences v25.0. Variables that are categorical were presented as percentages and frequencies. Independent *t*-test and one-way ANOVA were used to compare means of scores between groups. Correlation between the dependent variable and one or more independent variables was explored by linear regression. $P \leq 0.05$ was considered to be statistically significant.

Ethical Considerations

The study was approved by the ethical committee and head of the health directorate of public health. The participation is voluntary with no harm to those who refuse to participate, and no identity was collected for participants even for publication. Furthermore, there was no benefit to the participants. Instructions and objectives of the study were explained to participants through information sheet that was distributed. Filling the questionnaire was considered as an official consent for participation in the study.

RESULTS

Participant Characteristics

The total number of the participant was 128. The age of participant ranged from 25 to 60 years with a mean of 34 ± 7.45 years. The majority of the participant was of the same nationality (78%). 62.5% of participant physician were male, and the vast majority of them were married (85.2%). 75% of the participant was a general physician without any specialty, while 21% had a diploma or master degree in family medicine [Table 1].

Approximately half of the participant had an experience of 3–10 years (48.4%). 28.9% had experience of fewer than 2 years, and 22.7% showed an experience of >10 years. 46.9% of the participant were from Omran sector, 32% from Mubaraz sector, 21.1% from Hofuf sector [Table 1].

Knowledge

The majority of participant doctors (71.1%) know the beginning age of the screening for the asymptomatic average-risk patient (71.1%); however, less than half of the participant (40.6%) know that the age at which no longer recommended screening for healthy patients. 35.9% of participants were aware of guaiac FOBT. A small minority of the respondents were knowledgeable about fecal immunochemical testing [Table 2].

29.7% of the participants were aware of the means of conducting FOBT card in the office during a digital rectal examination, and 20.3% were aware of giving patient FOBT kits to complete at home. Only 14.1% of the participants know how many samples used for CRC screening with FOBT [Table 2].

45.3% of the participants answered correctly for the frequency of screening with FOBT. More than half of the participants did not know the frequency of screening with sigmoidoscopy (62.5%). In addition, only 23.4% know the frequency of screening with colonoscopy [Table 2].

Table 1: Physicians' characteristics of primary health-care physician in Alhasa area

Variables	Categorical	Frequency (%)
Age	Mean, standard deviation	34 (7.45)
	(Minimum, Maximum)	25 (60)
Age (group)	< 34	73 (57)
	34 or more	55 (43)
Nationality	Non-Saudi	28 (21.9)
	Saudi	100 (78.1)
Gender	Female	48 (37.5)
	Male	80 (62.5)
Marital status	Divorced	1 (0.8)
	Married	109 (85.2)
	Single	18 (14.1)
Medical qualifications of physicians	Board or Ph.D. (family medicine)	2 (1.6)
	Diploma or master (family medicine)	27 (21)
	High diploma of surgery	1 (0.8)
	MBBS	96 (75)
	MBBS; Diploma of derma	1 (0.8)
	Obstetrics and gynecology	1 (0.8)
Years of experience	<2 Years	37 (28.9)
	3–10 Years	62 (48.4)
	>10 Years	29 (22.7)
Sector	Hofuf sector	27 (21.1)
	Mubaraz sector	41 (32)
	Omran sector	60 (46.9)

Attitude

The responses concerning the attitudes of primary health-care physicians toward CRC screening are reported in Tables 3-6. Of 128 participants, 122 (95.3%) considered that CRC screening for asymptomatic average-risk patient aged 50 years and more are effective, while only 65.6% of them preferred structured screening program as a way of conducting CRC screening [Table 3].

FOBT was considered as an effective method for screening procedures in reducing CRC mortality in an average-risk patient aged 50 years and more by 82.8%, while 77.3% considered FS as a method of choices. 91.4% considered colonoscopy as an effective method, 45.3% believed double-contrast barium enema as an effective method, and 60.2% thought a CT colonography as an effective method [Table 4].

76.6% of the physicians believe that clinical evidence in the published literature influence their recommendation toward CRC screening, 57.8% believe in USPSTF recommendations, while 70.3% considered the American Cancer Society guidelines as influential. The availability of providers to whom refer the patient for screening other than FOBT was considered influential for their recommendation. 58.6% influenced by their colleague in practice and 53.1% influenced by patients' preferences [Table 5].

Regarding CRC screening with colonoscopy for asymptomatic average-risk patients, 72.7% agree that it is readily available for patients and 40.6% agree that the performing specialist is busy and cannot do it for screening purposes [Table 6].

Practice

Participant's responses regarding their practice about CRC screening to minimize the risk of CRC are reported in Tables 7-8. Only 43.8% of the participants practice screening for asymptomatic average-risk patients aged 50 years or more. There were various ways of conducting FOBT for screening; 43% used a method of asking a patient to give a stool sample to the laboratory, and 33.6% did not use FOBT in their practice. More than half of the participants did not advise the patient for any preparation. During the atypical month, 37.5% of the participants ordered FOBT (screening test) 1–10 times, 55.5% did not order any screening any test, and only minority (1.6%) ordered the test 21–40 [Table **7**].

Table 2: Knowledge of primary health-care physician in Alhasa area

Knowledge	Categorical	Frequency (%)
For the majority of your asymptomatic average-risk patients, you will start screening at the age of:	Not sure	7 (5.5)
	40 years	14 (10.9)
	50 years	91 (71.1)
	60 years	16 (12.5)
Is there an age at which you no longer recommend screening for healthy patients?	No	76 (59.4)
	Yes	52 (40.6)
The frequency of screening with FOBT is every:	Not sure	30 (23.4)
	1 year	58 (45.3)
	2 years	22 (17.2)
	3 years	18 (14.1)
Are you aware of the following types of FOBT? A: Guaiac FOBT	No	82 (64.1)
	Yes	46 (35.9)
Are you aware of the following types of FOBT? B: Fecal Immunochemical Testing	No	91 (71.1)
	Yes	37 (28.9)
Are you aware of the following means of conducting FOBT? A: FOBT card in the office during a digital rectal exam	No	90 (70.3)
	Yes	38 (29.7)
Are you aware of the following means of conducting FOBT? B: Give patients FOBT kits to complete at home	No	102 (79.7)
	Yes	26 (20.3)
For colorectal cancer screening using FOBT, how many samples do you suppose to order?	Not sure	59 (46.1)
	One	20 (15.6)
	Two	31 (24.2)
	Three	18 (14.1)
The frequency of screening with sigmoidoscopy is every	1 year	12 (9.4)
	3 years	41 (32)
	5 years	48 (37.5)
	10 years	4 (3.1)
	Not sure	23 (18)
The frequency of screening with colonoscopy is every	1 year	12 (9.4)
	3 years	23 (18)
	5 years	37 (28.9)
	10 years	30 (23.4)
	Not sure	26 (20.3)

Table 3: Attitudes of primary health-care physician in Alhasa area

Attitude	Categorical	Frequency (%)
Do you think that colorectal cancer screening for asymptomatic average-risk patients aged 50 years and older is effective?	No	6 (4.7)
	Yes	122 (95.3)
Which one of the following ways of conducting colorectal cancer screening do you prefer?	Opportunistic screening	44 (34.4)
	Structured screening program.	84 (65.6)

Table 4: Attitudes of primary health-care physician in Alhasa area

How effective do you believe the following screening procedures are in reducing colorectal cancer mortality in average-risk patients aged 50 years and older?

Question no	Not effective	Don't know	Effective	Mean	Direction
	Count (%)	Count (%)	Count (%)		
Fecal occult blood testing	12 (9.4)	10 (7.8)	106 (82.8)	2.73	Effective
Flexible sigmoidoscopy	7 (5.5)	22 (17.2)	99 (77.3)	2.72	Effective
Colonoscopy	4 (3.1)	7 (5.5)	117 (91.4)	2.88	Effective
Double-contrast barium enema	29 (22.7)	41 (32)	58 (45.3)	2.23	Don't know
CT-colonography	21 (16.4)	30 (23.4)	77 (60.2)	2.44	Effective
Total	73 (11.41)	110 (17.19)	457 (71.41)	2.6	Effective

CT: Computed tomography

Table 5: Attitudes of primary healthcare physician in Alhasa area

To what extent, the following factors influence your recommendations for colorectal cancer screening:

Question no	Not Applicable	Not Influential	Influential	Mean	Direction
	Count (%)	Count (%)	Count (%)		
Clinical evidence in the published literature	22 (17.2)	8 (6.3)	98 (76.6)	2.59	Influential
U.S. Preventive Services Task Force recommendations	41 (32)	13 (10.2)	74 (57.8)	2.26	Not Influential
American Cancer Society guidelines	33 (25.8)	5 (3.9)	90 (70.3)	2.45	Influential
Availability of providers to whom I can refer my patients for screening other than FOBT	26 (20.3)	10 (7.8)	92 (71.9)	2.52	Influential
How colleagues in our practice or local community provide colorectal cancer screening for their patients	24 (18.8)	29 (22.7)	75 (58.6)	2.4	Influential
Our patients' preferences for colorectal cancer screening	26 (20.3)	34 (26.6)	68 (53.1)	2.33	Not Influential
Total	172 (22.93)	99 (13.2)	479 (63.87)	2.4232	Influential

FOBT: Fecal occult blood test

Table 6: Attitudes of primary health-care physician in Alhasa area

How effective do you believe the following screening procedures are in reducing colorectal cancer mortality in average-risk patients aged 50 years and older?

Question no	Not applicable	Disagree	Agree	Mean	Direction
	Count (%)	Count (%)	Count (%)		
It is the best available screening test	14 (10.9)	21 (16.4)	93 (72.7)	2.62	Agree
It is readily available for my patient	34 (26.6)	54 (42.2)	40 (31.3)	2.05	Disagree
The performing specialist is busy and cannot do it for screening purposes	34 (26.6)	42 (32.8)	52 (40.6)	2.14	Disagree
Total	82 (21.35)	117 (30.47)	185 (48.18)	2.2682	Disagree

Regarding a healthy average-risk patient as initial follow-up to a positive FOBT, 32.8% of the participants recommended colonoscopy, 32.8% repeated FOBT, and 14.1% recommended FS. The minority of physicians had a mechanism to ensure that patients with positive FOBT complete initial follow-up testing by 14.1%. The majority of participants (64.8%) did not refer patients during a typical month for screening with sigmoidoscopy, and 42.2% refers the patient for colonoscopy screening 1–5 times. The majority (75.8%) refer the patient to a gastroenterologist for colonoscopy screening. 81.3% did not refer patients to do a double-contrast barium enema, and 77.3% also did not refer the patient to do CT colonography [Table 7].

Table 7: Practice of primary health-care physician in Alhasa area

Practice	Categorical	Frequency (%)
Do you perform colorectal cancer screening for asymptomatic average-risk patients aged 50 years and older?	No	72 (56.3)
	Yes	56 (43.8)
By what means do you conduct FOBT for screening purposes? (check all)	Ask patients to give a stool sample to the laboratory for FOBT.	55 (43)
	Ask patients to give a stool sample to the laboratory for FOBT.; Give patients FOBT kits to complete at home.	4 (3.1)
	Ask patients to give a stool sample to the laboratory for FOBT; I do not use FOBT in my practice	7 (5.5)
	Complete a single FOBT card in the office during a digital rectal examination.	3 (2.3)
	Complete a single FOBT card in the office during a digital rectal examination; Ask patients to give a stool sample to the laboratory	4 (3.1)
	Complete a single FOBT card in the office during a digital rectal examination; Ask patients to give a stool sample to the laboratory	4 (3.1)
	Complete a single FOBT card in the office during a digital rectal examination; Ask patients to give a stool sample to the laboratory	2 (1.6)
	Complete a single FOBT card in the office during a digital rectal examination; Ask patients to give a stool sample to the laboratory	1 (0.8)
	Give patients FOBT kits to complete at home.	5 (3.9)
	I do not use FOBT in my practice	43 (33.6)
Before conducting FOBT, do you advise your patient any preparations?	No	74 (57.8)
	Yes	54 (42.2)
During a typical month, how many times do you order or perform this screening test (FOBT)?	0 times	71 (55.5)
	1–10 times	48 (37.5)
	11–20 times	7 (5.5)
	21–40 times	2 (1.6)
Which of the following do you usually recommend to a healthy, average-risk patient as an initial follow-up step to a positive FOBT?	Colonoscopy.	42 (32.8)
	Double-contrast barium enema.	2 (1.6)
	Flexible sigmoidoscopy.	18 (14.1)
	Flexible sigmoidoscopy; colonoscopy.	1 (0.8)
	Repeat FOBT	42 (32.8)
	Repeat FOBT; Colonoscopy.	8 (6.3)
	Repeat FOBT; colonoscopy.; virtual colonoscopy (e.g., CT colonography).	2 (1.6)
	Repeat FOBT; flexible sigmoidoscopy.	5 (3.9)
	Repeat FOBT; flexible sigmoidoscopy.; Colonoscopy.	2 (1.6)
	Repeat FOBT; flexible sigmoidoscopy.; colonoscopy.; double-contrast barium enema.	1 (0.8)
	Repeat FOBT; flexible sigmoidoscopy.; colonoscopy.; double-contrast barium enema.; virtual colonoscopy (e.g., CT colonography	1 (0.8)
	Repeat FOBT; flexible sigmoidoscopy.; double-contrast barium enema.	1 (0.8)
	Virtual colonoscopy (e.g., CT colonography).	3 (2.3)
Do you have a mechanism (such as reminder calls or mailings, case management, or a tracking system) to ensure that patients with positive FOBT result in complete initial follow-up testing?	No	76 (59.4)
	Don't know	34 (26.6)
	Yes	18 (14.1)
During a typical month, how many times do you refer asymptomatic, average-risk patients for screening sigmoidoscopy?	>20 times	1 (0.8)
	0 times	83 (64.8)
	1–5 times	40 (31.3)

(Contd...)

Table 7: (Continued)

Practice	Categorical	Frequency (%)
	11–20 times	3 (2.3)
	6–10 times	1 (0.8)
During a typical month, how many times do you refer asymptomatic, average-risk patients for screening colonoscopy?	0 times	70 (54.7)
	1–5 times	54 (42.2)
	6–10 times	3 (2.3)
	11–20 times	1 (0.8)
To whom do you usually refer your patients for screening colonoscopy?	Gastroenterologist	97 (75.8)
	Internist	7 (5.5)
	Surgeon	24 (18.8)
During a typical month, how many times do you refer your patients to do: A: Double-contrast barium enema	0 times	104 (81.3)
	1–5 times	22 (17.2)
	6–10 times	2 (1.6)
During a typical month, how many times do you refer your patients to do: B: Virtual colonoscopy (CT Colonography)	0 times	99 (77.3)
	1–5 times	26 (20.3)
	6–10 times	2 (1.6)
	11–20 times	1 (0.8)

FOBT: Fecal occult blood testing, CT: Computed tomography

Table 8: Practice of primary health-care physician in Alhasa area

When you talk to your asymptomatic, average-risk patients about colorectal cancer screening, how often do you encounter the following

Question no	Never	Rarely	Sometimes	Usually	Mean	Direction
	Count (%)	Count (%)	Count (%)	Count (%)		
Not having enough time to discuss screening with my patients	11 (8.6)	26 (20.3)	63 (49.2)	28 (21.9)	2.84	Sometimes
Our patients do not want to discuss colorectal cancer screening	14 (10.9)	43 (33.6)	52 (40.6)	19 (14.8)	2.59	Sometimes
Our patients have difficulty understanding the information I present about colorectal cancer screening	15 (11.7)	46 (35.9)	55 (43)	12 (9.4)	2.5	Sometimes
Our patients are unaware of colorectal cancer screening	5 (3.9)	21 (16.4)	46 (35.9)	56 (43.8)	3.2	Usually
Our patients do not perceive colorectal cancer as a serious health threat	14 (10.9)	38 (29.7)	44 (34.4)	32 (25)	2.73	Sometimes
Total	59 (9.58)	150 (24.35)	260 (42.21)	147 (23.86)	2.7734	Sometimes

49.2% of the participants encounter (sometimes) when talking to asymptomatic, average-risk patients about CRC screening as not having enough time to discuss screening with patients. Most of the physicians reported that lake of patient awareness and unavailability of reminder system in their workplace as a barrier for CRC screening [Tables 8 and 9].

Among the participants, those who have a diploma or master degree in family medicine have higher knowledge compared to the general physician ($P = 0.016$) [Table 10]. No statistical significant difference was recognized between male and female in KAP ($P = 0.206$, 0.253, and 0.666, respectively) [Table 11].

There was no statistically significant difference between age regarding knowledge and practice; however, there was a difference between attitude and age (P = 0.05) although it is statistically insignificant [Table 12].

There was no statistical significant difference between KAP and nationality ($P = 0.668$, 0.147, and 0.432, respectively) [Table 13]. No statistically significant difference was recognized between marital status, years of experience, and KAP [Tables 14 and 15]. In spite of that Hofuf sector showed higher knowledge than those in Mubaraz and Omran sector, it was statistically insignificant (P = 0.086) [Table 16], and also attitude and practice showed no significant association with sector group ($P = 0.479$, 0.106 respectively) [Table 16].

The linear regression showed no significant association between the independent variables such as gender, age, nationality, marital status, years of experience, sectors, and KAP [Tables 17-20].

DISCUSSION

Several studies have been conducted in Saudi Arabia to evaluate the knowledge, attitude, practice, and perceived

Table 9: Practice of primary health-care physician in Alhasa area

How often do you encounter the following barriers to colorectal cancer screening for asymptomatic, average-risk patients in your practice?						
Question no	**Never**	**Rarely**	**Sometimes**	**Usually**	**Mean**	**Direction**
	Count (%)	**Count (%)**	**Count (%)**	**Count (%)**		
There is no policy and procedure in our workplace for screening	22 (17.2)	13 (10.2)	26 (20.3)	67 (52.3)	3.08	Sometimes
There is no reminder system in our workplace	7 (5.5)	12 (9.4)	30 (23.4)	79 (61.7)	3.41	Usually
Our patients do not follow through to complete colorectal cancer screening tests	3 (2.3)	23 (18)	60 (46.9)	42 (32.8)	3.1	Sometimes
There is a shortage of trained providers to conduct screening other than FOBT	9 (7)	12 (9.4)	46 (35.9)	61 (47.7)	3.24	Sometimes
There is a shortage of trained providers to conduct follow-up of the positive screening test with invasive endoscopic procedures	11 (8.6)	16 (12.5)	45 (35.2)	56 (43.8)	3.14	Sometimes
Total	52 (8.13)	76 (11.88)	207 (32.34)	305 (47.66)	3.1953	Sometimes

FOBT: Fecal occult blood testing

Table 10: Difference between medical degrees regarding knowledge, attitude, and practice

Section	Master of diploma family (*n*=27)	MBBS (*n*=96)	Independent sample *t*-test	
	Mean (SD)	**Mean (SD)**	***t***	***P* value**
Knowledge	0.831 (0.19)	0.72 (0.211)	2.45	0.016
Attitude	2.18 (0.209)	2.16 (0.234)	0.36	0.72
Practice	1.7 (0.373)	1.74 (0.316)	−0.68	0.498

SD: Standard deviation

Table 11: Difference between gender regarding knowledge, attitude, and practice

Section	Female (*n*=48)	Male (*n*=80)	Independent sample *t*-test	
	Mean (SD)	**Mean (SD)**	***t***	***P* value**
Knowledge	0.779 (0.224)	0.731 (0.2)	1.271	0.206
Attitude	2.15 (0.243)	2.198 (0.21)	−1.149	0.253
Practice	1.76 (0.321)	1.73 (0.355)	0.432	0.666

Table 12: Difference between age regarding knowledge, attitude, and practice

Section	<35 years (*n*=73)	35 years or more (*n*=55)	Independent sample *t*-test	
	Mean (SD)	**Mean (SD)**	***t***	***P* value**
Knowledge	0.742 (0.201)	0.761 (0.226)	−0.507	0.613
Attitude	2.14 (0.24)	2.23 (0.196)	−1.98	0.05
Practice	1.73 (0.277)	1.77 (0.43)	−0.586	0.560

barriers to CRC screening.[38,22] The previous studies which conducted in Riyadh and Jeddah found that more than half of the physicians (56% and 55%, respectively) did not practice CRC screening although they were considering CRC screening which is effective (95%).[38,22]

Correspondingly, the present study showed that 56.3% of physicians did not practice CRC screening despite 95.3% believe that CRC screening is effective.

Table 13: Difference between nationality regarding knowledge, attitude, and practice

Section	Non-Saudi (*n*=28)	Saudi (*n*=100)	Independent sample *t*-test	
	Mean (SD)	**Mean (SD)**	***t***	***P* value**
Knowledge	0.734 (0.212)	0.753 (0.21)	−0.429	0.668
Attitude	2.23 (0.206)	2.164 (0.232)	1.458	0.147
Practice	1.801 (0.447)	1.729 (0.307)	0.796	0.432

Table 14: Difference between marital status regarding knowledge, attitude, and practice

Section	Married (*n*=109)	Single (*n*=18)	Independent sample *t*-test	
	Mean (SD)	**Mean (SD)**	***t***	***P* value**
Knowledge	0.74 (0.211)	0.76 (0.209)	−0.268	0.789
Attitude	2.19 (0.205)	2.08 (0.326)	1.397	0.178
Practice	1.76 (0.358)	1.66 (0.204)	1.562	0.127

Participant physicians in the current study who have a higher level of postgraduate education have higher knowledge compared to the general physician, and these findings were similar to other researches.[38,22] This present study showed that 23.4% of the physicians correctly answered the interval for colonoscopy compared to other literature 38%,[22] 40%,[12] and 43.8%.[38]

Although statistically insignificant, the attitude of physicians aged 35 years and above is better than younger physicians, which may be due to the years of experience, and there is similar finding in previous studies.[38,38] Male physicians have a higher attitude than female in a previous study,[38] while the current study showed no difference.

91.4% of the physicians believe colonoscopy to be the most effective screening test, followed by FOBT (82.8%) and FS (77.3%) compared to what is reported by Demyati

(2014) colonoscopy to be the most effective screening test, followed by FS. FOBT reported being very effective by only one-third of physicians.[38]

Table 15: Difference between years of experiences regarding knowledge, attitude, and practice

Section	One-way ANOVA (years of experience)	
	F	*P* value
Knowledge	2.016	0.138
Attitude	0.903	0.408
Practice	1.044	0.355

Table 16: The difference between sectors regarding knowledge, attitude, and practice

Section	One-way ANOVA (sector)	
	F	*P* value
Knowledge	2.498	0.086
Attitude	0.741	0.479
Practice	2.287	0.106

Table 17: Relationship between gender, age, nationality, marital status, and years of experience and KAP

Linear regression model	R-square	F	*P* value
Model 1: Knowledge	0.06	1.285	0.269
Model 2: Attitude	0.091	2.010	0.069
Model 3: Practice	0.042	0.867	0.521

In the current study, most of the physicians reported that there is no reminder system in their workplace and lake of patient awareness as a barrier for CRC screening, and there is similar finding in previous studies.[38] Affording a reminder system and extensive health promotion might improve the CRC screening.

The application of a structured screening program achieves the most effective reduction in cancer-related mortality.[39] However, in the current study, only 65.6% of the participants prefer a structured screening program over opportunistic screening compared to what is reported by Demyati (2014) (81%).[38]

Study Limitations

The main limitation of this study was the cross-sectional design, limited to one region, small sample size of the study and the self-administered questionnaire.

CONCLUSION

CRC screening is underutilized by primary health-care physicians despite their beliefs of the effectiveness of CRC screening. Lack of patient awareness was one of the most reported barriers to CRC screening. Another study is needed to be done which will include all the primary health-care physicians in the Eastern Province of Saudi Arabia to have a large sample size and get more reliable results.

Table 18: Relationship between gender, age, nationality, marital status, and years of experience and knowledge

Model 1: Knowledge	Unstandardized coefficients		Standardized coefficients	*t*	*P* value
	B	Standard error	Beta		
Constant	0.441	0.251		1.762	0.081
Gender	−0.072	0.042	−0.165	−1.716	0.089
Sector	−0.021	0.025	−0.079	−0.858	0.392
Nationality	0.118	0.063	0.229	1.878	0.063
Marital status	0.051	0.058	0.085	0.88	0.38
Years of experience	0.053	0.043	0.18	1.24	0.217
Age	0.002	0.005	0.075	0.458	0.648

Table 19: Relationship between gender, age, nationality, marital status, and years of experience and attitude

Model 2: Attitude	Unstandardized coefficients		Standardized coefficients	*t*	*P* value
	B	Standard error	Beta		
Constant	2.237	0.267		8.373	0.001
Gender	0.046	0.045	0.097	1.027	0.307
Sector	−0.011	0.026	−0.036	−0.396	0.692
Nationality	−0.018	0.067	−0.032	−0.266	0.79
Marital status	−0.12	0.062	−0.184	−1.93	0.056
Years of experience	−0.066	0.046	−0.207	−1.447	0.151
Age	0.009	0.005	0.305	1.907	0.059

Table 20: Relationship between gender, age, nationality, marital status, and years of experience and practice

Model 3: Practice	Unstandardized coefficients		Standardized coefficients	*t*	*P* value
	B	Standard error	Beta		
Constant	1.706	0.411		4.156	0.001
Gender	−0.052	0.069	−0.074	−0.765	0.446
Sector	0.048	0.041	0.11	1.18	0.241
Nationality	−0.012	0.103	−0.014	−0.113	0.91
Marital status	−0.115	0.095	−0.118	−1.203	0.231
Years of experience	−0.053	0.07	−0.112	−0.761	0.448
Age	0.01	0.008	0.219	1.331	0.186

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