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## Barriers toward Colorectal Cancer Screening among Public in Saudi Arabia

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### ABSTRACT

Colorectal cancer incidence has increased significantly in Saudi Arabia in the last few years. Although protocols and guidelines for colorectal screening programs had been established to start at age 45, adherence to screening remains low. This review aims to identify the potential barriers to participating in the screening program among the public aged over forty-five in Saudi Arabia. A significant lack of awareness about colorectal cancer and screening programs had found among Saudi Arabia's public (SA). The acceptance rate significantly increased due to health care provider recommendations. Knowledge about colorectal cancer and screening program and outcome should be raised among the public through campaigns and physicians by training established for primary health care providers regarding screening programs recommendations.

**Keywords:** Colorectal cancer, CRC, CRCS, Colonoscopy, Barriers, Saudi Arabia, Screening, and FOBT.

### INTRODUCTION:

Colorectal cancer (CRC) is the third most common cancer worldwide and the second leading global cause of mortality (Keum and Giovannucci, 2019). Moreover, it is expected to rise the mortality rate globally to 60% by 2030 (Aziz and Allah-Bakhsh, 2018). In Saudi Arabia (SA), CRC is second-highest cancer. According to Saudi Cancer Registry data, it is the most common cancer among men and the third most common among women (Alsanea *et al.*, 2015). Overall, the incidence of CRC in SA has significantly grown during the last few years to be the highest in the Gulf Cooperation Council (GCC) (Alyabsi *et al.*, 2020).

The most affected age group was over 45, and a quarter had meta-static cancer (>70% diagnosed late). Conversely, other studies showed that around 25% were diagnosed with localized masses. The late-onset presentation group (diagnosed above 45) accounted for

the highest incidence. Due to delays in seeking medical attention, approximately one-quarter of late-onset presentations present distant metastasis. Adenocarcinoma is the most frequent pathological variant, while grade 2 is the most common (Mosli and Al-Ahwal, 2012). More than half of diagnosed cases are sporadic with no predisposing family history or genetics (Keum and Giovannucci, 2019).

Globally, the CRC incidence rate corresponds to growing environmental risk factors such as smoking, sedentary lifestyles, and physical inactivity (Keum and Giovannucci, 2019). As in the GCC, the SA showed the same epidemiological distribution as that occurring globally. Smoking, high caloric intake, and physical inactivity have rapidly increased in the last few years in the KSA, contributing to non-communicable diseases, as cancer is rising parallelly. However, some studies show that consuming sufficient fruits and vege-

tables, black tea, coffee, and olive oil had a protective effect against developing CRC (Allauddin *et al.*, 2021). Yet, other studies showed that a minimum percentage of the Saudi population had consumed five portions of vegetables and fruits. Additionally, increasing red meat consumption due to the availability of fast foods increases the risk of increased caloric intake and thus of CRC (Alyabsi *et al.*, 2020).

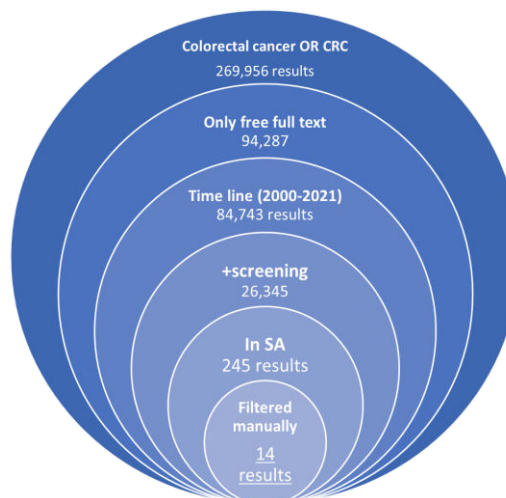
Inflammatory bowel disease (IBD), such as ulcerative colitis (UC) and Crohn’s disease (CD), has a progressive correlation with developing colon cancer. CD patients are 20 times more at risk of developing CRC than similar populations (Freeman, 2008). Similarly, UC increases the risk by 2%, then by 8%, then by 18% every ten years (Lakatos and Lakatos, 2008). The incidence of IBD in SA has not been estimated. Pediatric incidence doubled in the last 20 years, reflected in an increasing adult incidence rate (Saudi *et al.*, 2012). The central area, Makkah City, and the Eastern region reported the highest prevalence in the pediatric age group (El Mouzzan *et al.*, no date). It is noteworthy that the Eastern province may have the highest rate of CRC because of the oil and petrol industries (Alyabsi *et al.*, 2020).

Evidence has indicated that early detection would improve outcomes and reduce mortality (Alduraywish *et al.*, 2020). Since 2015, the Saudi National Program has recommended CRC screening for asymptomatic individuals aged >45. Subsequently, the median age of diagnosed CRC in Saudi males was 60, while it was 55 in Saudi females (Alsanea *et al.*, 2015). A colonoscopy every ten years is the gold standard for CRC screening, and more than 70% of the populations are willing to have one. However, there is a shortage of endoscopists in SA. Flexible sigmoidoscopy (FS) is a cost-effective alternative to colonoscopy and requires no sedation or preparation. However, it carries more risk of complications such as perforation, bleeding, or death. Furthermore, it has limitations regarding detecting right colon polyps or adenocarcinomas (Alsanea *et al.*, 2015). Unlike colonoscopy, FS must be repeated every five years with annual fecal immunochemical testing (FIT) or every three years without annual FIT (Alsanea *et al.*, 2015). In the United States, the most common reason for not using CRC screening is a lack of public awareness of the importance of undergoing screening and

insufficient physician recommendation of CRC scans (Klabunde, Schenck and Davis, 2006). Another cross-sectional study of 660 patients aged over 75, conducted in Virginia, showed that the most common cause is fear of bowel preparation before colonoscopy, followed by an absence of medical advice and lack of knowledge and free time (Jones *et al.*, 2010). Several regional research attempts in the SA were conducted within the last ten years to address knowledge, attitude, and practice (KAP) toward CRC and potential reasons for public and health care providers to resist CRC screening have influenced the marked increase in incidence in the KSA, which has burdened health care. However, to the best of our knowledge, the adherence and acceptance rate of CRC screening remains limited, reflected in an increased incidence of colon cancer. Moreover, data is little concerning potential public barriers to participating in the CRC screening (CRCS) program in SA. Therefore, this review aims to identify the knowledge, borders, and possible challenges concerning CRC screening in the SA population aged over 45 years.

**METHODOLOGY:**

The study has been conducted as a narrative review. For the last 20 years (2000 - 2020), PubMed research has examined using multistage strategies to review all free access published papers on CRC screening in SA. In addition, cross-sectional studies had included assessing the knowledge, attitudes, and practices concerning CRC screening and barriers relating to the public, medical students, and physicians.



**Fig. 1: Sampling Protocol.**

All articles concerning SA have been included that were available as free full text. First, the following search terms had been used: “colorectal cancer” OR “CRC screening” OR “CRCS” and “Saudi” OR “SA” OR “KSA.” The articles were then manually filtered by reviewing the titles and abstracts to select the studies that achieved this review’s purpose, as shown in **Fig. 1**. Finally, the fifteen studies included in this review have been listed and summarized in **Table 1**.

## RESULTS:

### Knowledge about CRC

In the capital city of SA, Riyadh, a cross-sectional study has been conducted of 484 Saudi participants aged over 45, illustrating that about 69% had heard about CRC. Furthermore, of 484 participants, 20.1% had a relative with CRC (Alduraywish *et al.*, 2020). Moreover, in one of the largest oases in the world, in the Eastern province in SA, Al-Ahsa Governorate, a large cross-sectional study (947 participants) was conducted; 77% of participants had heard about CRC, and 12.8% had a family history of CRC (Galal *et al.*, 2016a). Another cross-sectional study was conducted in the Southwestern region of SA, particularly in Asir, to assess public awareness about CRC. However, the mean level of understanding of CRC was 30.5% of a random sample of the Asir population (1,209 people), with approximately one-fifth (21.7%) aged over 40. Another cross-sectional study in the Western region targeted 581 medical students, showing that slightly more than half of those grade 5 and above scored

poorly on knowledge about CRC (54.78%) (Althobaiti and Jradi, 2019). In an additional survey conducted in King Abdulaziz University targeting 525 unregulated students, half in the medical faculty, 82.3% had awareness about CRC, and more than half (68%) thought it was a preventable disease (Imran, 2016; Zubaidi *et al.*, 2015a; Alshammari *et al.*, 2020; Al-Sharif *et al.*, 2018) found that the level of knowledge increased with age (for ages over 50). Furthermore, having a family history of CRC, a higher education level, and being female were positive factors in increasing awareness according to Al-Sharif *et al.* Al-Hajeili *et al.* and another study conducted in Riyadh city by Alshammari *et al.* of 231 subjects ( $p = 0.001$ ) a family history of CRC (Alshammari *et al.*, 2020; Al-Sharif *et al.*, 2018; Al-Hajeili *et al.*, 2019). Conversely, two of the 15 studies showed no relationship between awareness about CRC and a family history of CRC, gender, education level, occupation, and income (Al-Hajeili *et al.*, 2019; Almadi *et al.*, 2015) the level of knowledge did not affect willingness to undergo CRC screening (10.7 vs. 10.0,  $p = 0.13$ ) (Almadi *et al.*, 2015). Nonetheless, as Almadi and Alghamdi *et al.* found in a national survey to assess the gap between knowledge and willingness to undergo CRCS for 5,720 individuals, most of whom were male, there was no significant difference in knowledge between all 13 KSA jurisdictions. Additionally, no significant difference in understanding was found between males and females, nor among those willing and unwilling to undergo CRCS (Almadi and Alghamdi, 2019).

**Table 1:** Summary of Studies.

	Authors	Year	Study design	Sample size	Finding
1	Marwan Al-Hajeili (Al-Hajeili <i>et al.</i> , 2019)	2019	Cross-sectional	422 Saudi residents –Jeddah	The most common cause is fear of the procedure, results, and absence of symptoms.
2	Ahmad M Zubaidi (Zubaidi <i>et al.</i> , 2015a)	2015	survey	1,070	Knowledge about CRC screening, risk factors, and detection is poor, requiring increased public promotion and education.
3	Majid A Almadi(Almadi <i>et al.</i> , 2015)	2015	Cross-sectional	500 participants	More than 70% of the participants were willing to undergo colonoscopy as CRC screening. Only knowledge is a barrier to CRCS.
4	Shatha A Alduraywish (Alduraywish <i>et al.</i> , 2020)	2020	Cross-sectional	484 Saudi participants	Insufficient physician recommendation of CRCS was the main factor hindering screening procedures.
5	Asma Althobaiti (Althobaiti and Jradi, 2019)	2019	Cross-sectional	581 medical students	Insufficient patient and physician awareness about CRC and CRCS program

	Authors	Year	Study design	Sample size	Finding
6	Mahmoud Mosli (Mosli <i>et al.</i> , 2017)	2017	Cross-sectional	127 primary health care (PHC) physicians	PHC physicians untrained in CRCS and low qualifications are a significant health system barrier to CRCS.
7	Eyad Demyati (Demyati, 2014)	2014	Cross-sectional	170 family physicians	The vast majority reported the lack of an alert system as the most common barrier to screening.
8	Majid A. Almadi (Almadi and Alghamdi, 2019)	2019	Cross-sectional	5,720 individuals	There was no correlation between knowledge and willingness to undertake to screen.
9	Sulaiman A. Alshammari (Alshammari, Alenazi and Alshammari, 2020)	2020	Cross-sectional	245 subjects	The majority was not knowledgeable about CRC and CRCS, and the acceptance rate would significantly increase with physician advice.
10	Yasir Mohammed Khayyat (Khayyat & Ibrahim, 2014)	2014	Cross-sectional	313 samples	More knowledge significantly increased willingness to undertake colonoscopy/sigmoidoscopy.
11	Abulaziz K Al-Thafar (Al-Thafar <i>et al.</i> , 2017)	2017	Cross-sectional survey	367 teaching staff	There was inadequate knowledge about CRC risk factors among teaching staff.
12	Muhammad Imran (Imran, 2016)	2016	Cross-sectional	525 undergraduate students	Knowledge about CRC and screening programs was low.
13	Yasmine Samir Galal (Galal <i>et al.</i> , 2016a)	2016	Cross-sectional	884 Saudis and 39 PHC physicians	Insufficient awareness and physician discussion about the CRCS program was significant barrier besides other personal ones.
14	Mohammad Nassir Al-Sharif (Al-Sharif <i>et al.</i> , 2018)	2018	Cross-sectional	1,209 participants	Low level of awareness about CRC risk factors and screening
15	Alnuwaysir, Mohammed (Alnuwaysir, Baral and Alhadhari, 2016)	2016	Cross-sectional	402 participants	Good awareness was found about risk factors of CRC, yet no improvement in the practice of CRCS among the public. Social media has the most influence as an information source.

### Knowledge about Risk Factors

Almadi *et al.* stated that significant percentages of people identified alcohol intake, poor diet, IBD, family history, and smoking as risk factors for developing CRC (62.2%, 54.2%, 50.8%, 37.6%, and 35.3%, respectively) (Almadi *et al.*, 2015). Moreover, obesity (22.1%), age (19.3%), diabetes (7.8%), hypertension (7.4%), and sex (6.8%) were also considered as risk factors. However, 13.9% knew no CRC risk factors (Almadi *et al.*, 2015). Again, in the Western region, a reported family history of CRC (77.59%) and age (67.76%) were considered risk factors for CRC. Furthermore, 61.1% reported diet as another risk factor, followed by smoking (60.96%). Other risks identified as male gender, IBD, and inadequate physical activity (48.79%, 44.79%, and 34.48%, respectively) (Althobaiti and Jradi, 2019). Approximately 50%–60% of students were aware of the risk factors and symptoms of CRC, and nearly 4% had a family history of this cancer (Imran, 2016). Nonetheless, as Alshimmari *et al.* found, approximately 30%–50% of participants correctly identified risk factors of CRC (Alshammari,

Alenazi and Alshammari, 2020). Most of the participants in the Al-Ahsa population did not know about CRC risk factors (66.4%) (24), and a positive relationship found between the experience of CRC screening and knowledge about CRC risk factors ( $p = 0.029$ ) (Lakatos and Lakatos, 2008). However, in the Asir region, 2.9% gave correct answers concerning CRC risk factors (Al-Sharif *et al.*, 2018). Alnuwaysir found in his survey, which had conducted in Dammam City, that more than half of the participants were aware of the risk factors of CRC (Alnuwaysir *et al.* and Marwan *et al.* stated that higher income levels had a statistically significant relationship with age as an important risk factor of CRC (Al-Hajeili *et al.*, 2019). Furthermore, a survey of 1,070 participants in Riyadh indicated that 80.6% did not know that colon polyps and family history increase the risk of developing CRC. However, higher levels of education has linked with better information (Aziz and Allah-Bakhsh).

### Knowledge about the Screening Program

Imran *et al.* stated that most participants (77%) thought early CRC detection could be achieved by screening, and

one-third were aware of screening tests (Imran, 2016). However, Al-Hajeili *et al.* showed that hearing about screening programs and sigmoidoscopy was more likely for those with a higher education level, were female, or had a relative with CRC (Al-Hajeili *et al.*, 2019). In addition, a high percentage of responders (42.9%) thought a CRC screening test has conducted once symptoms started, and around a quarter thought CRC started at age 50, based on a questionnaire conducted in Riyadh in 2015 (Al-Khayal *et al.*, 2016). Similarly, Alshammari *et al.* stated that approximately half the participants had heard about CRCS, nearly half knew about colonoscopy, and about a quarter had heard about blood-based screening tests (Alshammari, Alenazi and Alshammari, 2020). Nevertheless, a quarter of participants was interested in undergoing screening. Although one-fifth thought their knowledge of CRC was insufficient, the acceptance rate would be tripled with a physician's advice (Alshammari, Alenazi and Alshammari, 2020). In the Western region of the KSA, Khayyat and Ibrahim *et al.* found that only one-third of 313 participants had heard about CRCS (Khayyat and Ibrahim, 2014). Almost half the participants (50.56%) knew about colonoscopy, followed by computed tomography colonography (CTC), stool-based screening, and FS (32.7%, 24.7%, and 14.7%, respectively). In addition, some participants thought a complete blood count (CBC) sample could detect the presence of CRC (21.9%), while 19.9% had not previously known about screening tests (Almadi *et al.*, 2015). Most medical students thought the most effective screening method was sigmoidoscopy (71.95%), followed by colonoscopy and FOBT (60.76% and 30%, respectively). However, less than half (41.14%) did not consider a double-contrast enema an effective screening tool (Althobaiti and Jradi, 2019). As Almadi *et al.* mentioned, in the national survey of 5,720 participants, most were over 43, yet less than one-sixth (15.24%) had already screened for CRC (Almadi and Alghamdi, 2019). Nonetheless, colonoscopy was the most used screening tool (72.73%), followed by FOBT (13.94%) and finally FS (4.85%) (Almadi and Alghamdi, 2019). Moreover, most people (75.85%) thought colonoscopy was practical, and more than two-thirds considered CRC curable (63.5%) (Almadi and Alghamdi, 2019). The majority (70.7%) was willing to have a screening test, and the percentage increased for those

having a relative with CRC (83%). Furthermore, knowing the risk factors significantly improved willingness to undergo a colonoscopy (80.6% vs. 68.2%, 95% CI: 1.11–3.40,  $p = 0.02$ , OR 1.95) (Almadi *et al.*, 2015). Alduraywish *et al.* stated that 12.5% of 484 participants had a history of CRCS and found more than a third uptake of CRCS from the 41–50 age group (36.4%). Moreover, most participants had screened once, followed by three times and more, then twice (55%, 22%, and 32.2%, respectively). Furthermore, 55.4% had screening procedures as a routine checkup concerning the reasons for undergoing screening. In comparison, a quarter (26.8%) had abdominal pain or a history of painful defecation. Around one-fifth (21.4%) had IBD history (Alduraywish *et al.*, 2020). Colonoscopy was the most common screening tool used, followed by FOBT (73.2% and 57%, respectively) (Alduraywish *et al.*, 2020). Additionally, most responders in the national survey showed their willingness to undergo CRCS (73%). Having a relative or friend with CRC raised the rate to 80%, with the same acceptance rate of colonoscopy as a screening tool (80%). However, the acceptance rate increased if the procedure was paid for (92%) rather than provided free of charge (56%) (Almadi and Alghamdi, 2019). Conversely, in the Western region of SA, Khyyat and Ibrahim *et al.* responses to questionnaires showed nearly two-thirds (62.9%) were unwilling to undergo any CRCS procedure (Khayyat and Ibrahim, 2014).

Nonetheless, Galal *et al.* indicated a low rate (8.6%) of participants (947) with experience of CRCS (24). Furthermore, being an unmarried female (OR = 0.28;  $p = 0.001$ ; 95% CI = 0.14–0.57), having a lower education level (OR = 0.36;  $p = 0.015$ ; 95% CI = 0.16–0.82), having no family history of CRC had a significant association with refusing screening (OR = 0.30;  $p = 0.001$ ; 95% CI = 0.17–0.56)(24).

### Barriers to Screening

Fear of the result was the most prominent barrier (39%) to colonoscopy. However, most responders disagreed with believing colonoscopy is a harmful procedure. Moreover, the barrier of being an embarrassing technique was not significant among responders in the national survey (Almadi and Alghamdi, 2019). However, regarding CRCS barriers, around a quarter of subjects were unaware of the need to have a screening

test. In contrast, another quarter thought they did not need to undergo it if they were asymptomatic. Additionally, less than a 10<sup>th</sup> mentioned fearing embarrassing procedures or lack of time as a reason to refuse to screen (Alshammari *et al.*, 2020). Additionally, in the Jeddah survey, 2018, the cost of screening tests, discomfort, and even fear about the result were not barriers to screening. However, fear of the procedure was a significant barrier (CI = 0.19–0.75,  $p = 0.005$ ) (Al-Hajeili *et al.*, 2019). However, Almadi *et al.* stated that neither being provided free nor having to pay did not affect acceptance of screening, according to a large cross-sectional study conducted in Riyadh (Almadi *et al.*, 2015). Instead, fear of being harmed or not wanting to know about the presence of cancer were the only factors in refusing a screening test (Almadi *et al.*, 2015). Alduraywish *et al.* found that the primary factor reported as a barrier was insufficient physician recommendation, followed by the absence of worrying signs and symptoms (77.1% and 73.4%, respectively). Lack of knowledge of CRC and the importance of CRCS (51.1% and 19.2%, respectively) were cited together with lack of social support (49.5%) (Alduraywish *et al.*, 2020). It is noteworthy that slightly more than two-thirds of responders cited fear of the procedure (31.7%) and fear of the result (36.4%) as barriers to CRCS (Alduraywish *et al.*, 2020). The majority mentioned lack of knowledge and health provider awareness about the CRCS program, followed by lack of physician recommendation and discussion, as major barriers in the Al-Ahsa community (68.7% and 67.3%, respectively). In addition, a small proportion reported financial burdens and transportation issues (15% and 5.4%, respectively) (24). Moreover, fearing harm (51.6%), followed by inadequate knowledge of who would perform the screening (50.9%) and unknown availability of tests (43.8%) had reported as specific barriers to colonoscopy. However, the absence of FOBT (57.8%) and no time to test (34.2%) were the only issues reported regarding the FOBT screening method (Alduraywish *et al.*, 2020). Moreover, the study by Alduraywish *et al.* supported that being female had a significant association with personal barriers such as lack of knowledge about CRC and fear of the procedure and result ( $p = 0.015$ ). However, no difference was found between males and females regarding religious beliefs, shyness, or lack of trans-

portation ( $p = 0.085$ ;  $p = 0.061$ , respectively) (Alduraywish *et al.*, 2020). Being female had a more significant association than being male with most of the personal barriers, such as shyness (51.4% vs. 23.5%,  $p = 0.001$ ), fear of the result (50.9% vs. 38.6%,  $p = 0.001$ ), fear of a painful screening procedure (41.9% vs. 34.7%,  $p = 0.041$ ), and lack of confidence in health care providers (59.3% vs. 29.3%,  $p = 0.001$ ). However, lacking time was reported more by males (55.8% vs. 43.8%,  $p = 0.001$ ) (24). Moreover, among medical students, the major patient-related factors reported were fear of the result (65.72%), followed by feeling anxious or embarrassed, lacking knowledge, and no symptoms (53.1%, 52.76%, and 51.21%, respectively) (Althobaiti and Jradi, 2019). Among medical student surveys conducted recently in 2019, students reported some health system-related factors such as lack of patient CRC knowledge as the most common barrier to screening (OR = 0.74; 95% CI: 0.40–0.71). In addition, Asma *et al.* suggested unavailability of sufficiently trained endoscopists to follow up the patients was one barrier facing the screening program (OR: 0.58; 95% CI: 0.44–0.78) (Althobaiti and Jradi, 2019).

However, they reported some health system factors such as insufficient attention to guidelines concerning CRCS (57.76%), unavailability of the test (56.38%), lack of health care recommendations (45%), and shortage of trained endoscopists and other health care providers (42.24%) (Althobaiti and Jradi, 2019). In studying physician barriers, Mahmud *et al.* showed that male physicians (OR = 0.44,  $p = 0.05$ , 95% CI = 0.19–0.99) and lower qualified PHC physicians (OR = 0.72,  $p = 0.01$ , 95% CI = 0.55–0.93) were less likely to adhere to CRCS recommendations (Mosli *et al.*, 2017).

The vast majority (80%) of physicians who did not perform screening tests reported lack of time as a significant barrier, followed by 77% reporting difficulty in understanding CRCS recommendations. Approximately (70%) of participant physicians stated that they refused to discuss CRC with patients. Slightly more than half (60.3%) thought patients do not consider it a serious health condition (Demyati, 2014). However, 83.3% of physicians reported the unavailability of clear guidelines in their work. Physicians trained and untrained in CRCS significantly differed

regarding practicing screening (77.8% vs. 54.5%;  $p = 0.04$ ) (Demyati, 2014). While assessing physician-related barriers, Mosli *et al.* conducted cross-sectional studies to determine the knowledge, attitude, and practice of PHC physicians regarding CRCS in Jeddah. The finding showed a significant difference between physicians' knowledge based on having a board grade or Ph.D., being trained in family medicine, and having experience in practicing CRCS ( $p < 0.01$ ). Similarly, following the United States Preventive Services Task Force (USPSTF) also led to a significant difference in knowledge about CRCS ( $4.2 \pm 2.1$  vs.  $3.1 \pm 1.9$ ,  $p < 0.01$ ). However, the availability of a reminder system had no role as a barrier to CRCS (Mosli *et al.*, 2017).

However, Demyati *et al.* conducted another cross-sectional study showing that physicians reporting the absence of a reminder system had a worse attitude toward CRCS ( $p = 0.001$ ) (Demyati, 2014). Although they also showed that men reported a better screening attitude than women physicians ( $p = 0.02$ ), no significant difference was found between men and women in CRC screening ( $p = 0.063$ ) (Demyati, 2014). Moreover, physicians older than 40 showed superior attitudes to younger physicians ( $p = 0.047$ ) (Demyati, 2014).

Moreover, a study by Demyati *et al.* supported a study by Mahmud, indicating that following USPSTF or other recommended guidelines resulted in the better practice of CRCS ( $p = 0.025$ ). Moreover, physicians with board certificates were more knowledgeable than general practitioners ( $p = 0.009$ ) (Demyati, 2014).

#### DISCUSSION:

Studies focusing on addressing the possible barriers to the Saudi population rather than knowledge of the health system were limited. Nonetheless, samples used in the review were not representative of the SA population due to different target age groups, including non-Saudi models. Additionally, some regions of the KSA had not been recruited, such as the Northern region. Thus, further national studies have been required that assists in identifying and understanding the situation to improve the screening program in SA. Moreover, improving health education for PHC physicians and the public is required to remove these barriers to facilitate CRC screening.

#### CONCLUSION:

Although the presence and established screening program in SA to early detection of CRC, it is not well operated. A poor percentage of adherences indicate the need for further health promotion and education to increase awareness for the public and health care providers. The findings of this review advocate increasing health education and public awareness to improve CRCS and general adherence among the target age group in SA. Based on a previous study, lack of knowledge and awareness was the most significant barrier to adherence to screening in the UK, followed by fear of the result and frequency of the procedure, according to a study conducted in 2007 (Austin *et al.*, 2009). Additionally, religious beliefs had a role among females (Austin *et al.*, 2009). Other studies have demonstrated a lack of physician recommendations, social support related to fear of a result, insufficient knowledge about CRC, and negative mindsets regarding screening tools (Ma *et al.*, 2012). Many other studies supported a strong association with health care provider counseling. Short, direct discussions about CRC screening programs and tools positively impacted patients' behaviors and attitudes to CRC screening (Fenton *et al.*, 2011).

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#### CONFLICTS OF INTEREST:

There are no potential conflicts of interest for the authors to disclose.

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