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### AWARENESS OF COLORECTAL SCREENING METHODS IN SAUDI ARABIA, A SYSTEMATIC REVIEW

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**Abstract:**

**Background:** Colorectal cancer (CRC) is the second cancer-related cause of death worldwide following lung cancer. In order to reduce the incidence and mortality of CRC, CRC screening aims to identify precancerous lesions and early-stage cancers in people who appear to be in good health.

**Objectives:** This study aims to summarize and evaluate prior research assessing and evaluating awareness of colorectal cancer screening methods among Saudi general population.

**Methods:** For article selection, the PubMed database and EBSCO Information Services were used. All relevant articles relevant with our topic and other articles were used in our review. Other articles that were not related to this field were excluded. The data was extracted in a specific format that was reviewed by the group members.

**Conclusion:** The study included 19 studies conducted in Saudi Arabia describing awareness of colorectal cancer screening. The concept of CRC screening is less widely known and understood than what has been reported internationally.

**Keywords:** colorectal cancer, screening, prevention, awareness, Saudi Arabia

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**INTRODUCTION:**

Colorectal cancer (CRC) is the second cancer-related cause of death worldwide following lung cancer. It would increase by 60% by the year 2030 [1]. Although CRC is most common in Western countries, an increase in incidence has been noted in the Middle East, particularly in the nations along the Eastern Mediterranean coast [2]. According to the age-standardized rate of CRC in the Saudi population, the rate in 2015 was 9.6 per 100,000 people, which was almost double the rate in 2001 [3].

The most common causes of CRC are combination of genetic and environmental factors, but 70% of cases develop without clear reason, 10% from inherited family, and 20% in family clusters [4].

In order to reduce the incidence and mortality of CRC, CRC screening aims to identify precancerous lesions and early-stage cancers in people who appear to be in good health [5]. Although there are different screening recommendations for CRC in different nations and regions, the majority of professional societies agree that colonoscopy, faecal immunochemical test (FIT), computed tomography (CT) colonography, FIT-fecal DNA, and flexible sigmoidoscopy are all reliable screening methods [6].

All people over the age of 50 should undergo a CRC screening, which is both necessary and advised. In particular, it is advised that everyone receive screening via sigmoidoscopy or colonoscopy every 10 or 5 years, respectively [7]. When it comes to CRC screening, it is advised to begin at age 50 for those without a family history of the disease, and to begin earlier at age 40 for those with a positive family history. In a recent update to its screening recommendations, the American Cancer Association lowered the starting age for colorectal cancer screening for people of average risk from 50 to 45 [8].

The Saudi guidelines suggested starting CRC screening for people with average risk at age 45. Colonoscopy was the preferred screening method; if not available, flexible sigmoidoscopy every five years with an annual guaiac faecal occult blood test (FOBT) or faecal immunochemical testing was advised [9]. This variation in advice between guidelines reflects the variation in the resources and baseline risks available for such programs. Although the Saudi guidelines for CRC screening have been widely shared, opportunistic screening has taken the place of on-going national screening [10].

Low levels of CRC awareness among populations were reported in a number of Middle Eastern studies. Nevertheless, these studies found that a lot of people have a favourable attitude toward screening. Higher income, higher education, and employment were all linked to better knowledge. Additionally, going for routine checkups and family doctor visits helped to increase the willingness to undergo screening [11]. This study aims to summarize and evaluate current prior research assessing and evaluating awareness of colorectal cancer screening methods among Saudi general population.

**METHODS:****Study design**

A systematic review of the current evidence on awareness of colorectal cancer screening methods in Saudi Arabia is considered a robust way of identifying and synthesizing the peer reviewed articles for evidence in this area to define a cohesive empirical research agenda that builds on prior knowledge. This review will include qualitative evidence only to produce an interpretation. Further, a synthesis of qualitative data aims to generate findings that are meaningful, relevant and appropriate to individuals, to inform a research agenda and ultimately to more effectively practices on awareness of colorectal cancer screening methods in Saudi Arabia. The review will use methods of qualitative synthesis to combine, integrate and interpret, where possible, the evidence from the included papers.

The review aims to move beyond the aggregation of available data to provide further interpretive insights into awareness of colorectal cancer screening methods in Saudi Arabia and define where future research can add to what is known.

**Study eligibility criteria**

The review will include qualitative peer-appraised studies. Qualitative data from mixed methods-studies will be screened for inclusion and included if the qualitative element is pertinent. We will include those studies that have been conducted in Saudi Arabia. All peer-reviewed articles published in English, reporting awareness of colorectal cancer screening methods from general population and healthcare worker perspective and healthcare delivery system will be included.

To be included for the review, the studies should have been published from January 2002 up to August 2022 to ensure the currency of the work while enabling a broad view of the emerging issues to be identified.

### **Study Inclusion and Exclusion criteria**

The articles will be selected based on the relevance to the project, English language and geographical restriction to Saudi Arabia will be considered. All other articles which do not have one of these topics as their primary end, or repeated studies, and reviews studies were excluded. The reviewers will exclude any studies not available in English, conference abstracts, books or grey literature and editorial comments. Studies reporting only qualitative data will be excluded.

### **Search strategy**

A systematic search strategy will be developed using a combination of Medical Subject Headings (MeSH) and controlled vocabulary to identify peer-reviewed articles on awareness of colorectal cancer screening methods in Saudi Arabia. The databases will be PubMed/MEDLINE, Scopus/Embase (Elsevier), EbscoHost, and Google Scholar. We will limit our search from January 2002 to August 2022.

### **Selection of study**

The ENTREQ guidelines for reporting qualitative systematic reviews will be used to demonstrate the selection processes and results. All retrieved studies will initially be imported into Endnote library to assist removing duplicates. After removing the duplicates, the Endnote library will be shared between the two reviewers to independently screen the articles by title and abstract, guided by the eligibility criteria. The studies which the two reviewers would have agreed on will be subjected to the full-text review. A third reviewer will adjudicate any discrepancies between the two reviewers. The two reviewers will independently review the full text of all eligible studies. In the case where there are differences between the two reviewers, consensus will be sought through discussion on the differences with the third reviewer. Finally, the full texts of all relevant studies found to meet the inclusion criteria will be retained for the final framework synthesis.

### **Data extraction**

Data will be independently extracted by two reviewers from eligible studies onto a customised data extraction form and populated with variables pertaining to the study population and phenomena of interest. Double checking and verification of extracted articles will be done by the third review author. Study characteristics that will be extracted will include name of the first author and year of publication, data collection period and region in which the study was conducted. Specific study details including the study design, study

population, sample size, sampling procedures and data collection procedures will then be captured.

### **Data synthesis and analysis**

No software will be utilized to analyze the data. The reviewers will sort the data by theme and present the themes in the form of an analysis table (chart). The columns and rows of the table will reflect the studies, and related themes and will enable us to compare findings of the studies across different themes and subthemes.

### **Mapping and interpretation**

The reviewers will use charts to define the identified concepts and map the range and nature of the phenomena. Our review will explore associations between the themes to help clarify the findings. Our review will map and interpret findings in line with the review objectives and emerging themes.

## **RESULTS:**

Figure 1 shows the selection and identification of studies. The search of the mentioned databases returned a total of 314 studies that were included for title screening. 213 of them were included for abstract screening, which lead to the exclusion of 67 articles. The remaining 146 publications full-texts were reviewed. The full-text revision led to the exclusion of 130 studies due to difference in study objectives, and 19 were enrolled for final data extraction (**Table 1**). 6 studies report awareness of CRC in Riyadh region, 4 studies in Jeddah, 2 studies in western region, 2 in Al-Ahsaa region, 1 in eastern region, 1 in Tabuk, 1 in Makkah, 1 in Qassim, and 1 in Asir region.

The Saudi population show lack of awareness of CRC screening and its importance. The highest percentages of awareness were reported in a study in Riyadh as most of the participants about had heard of cancer screening, and were aware that colonoscopies are frequently used for such purposes [23]. Another study in Riyadh [12] found a deficiency of knowledge of CRC screening that was influenced by an individual's level of education and not by age or gender. The endoscopic modality was primarily chosen as a screening method by people who were aware of CRC screening.

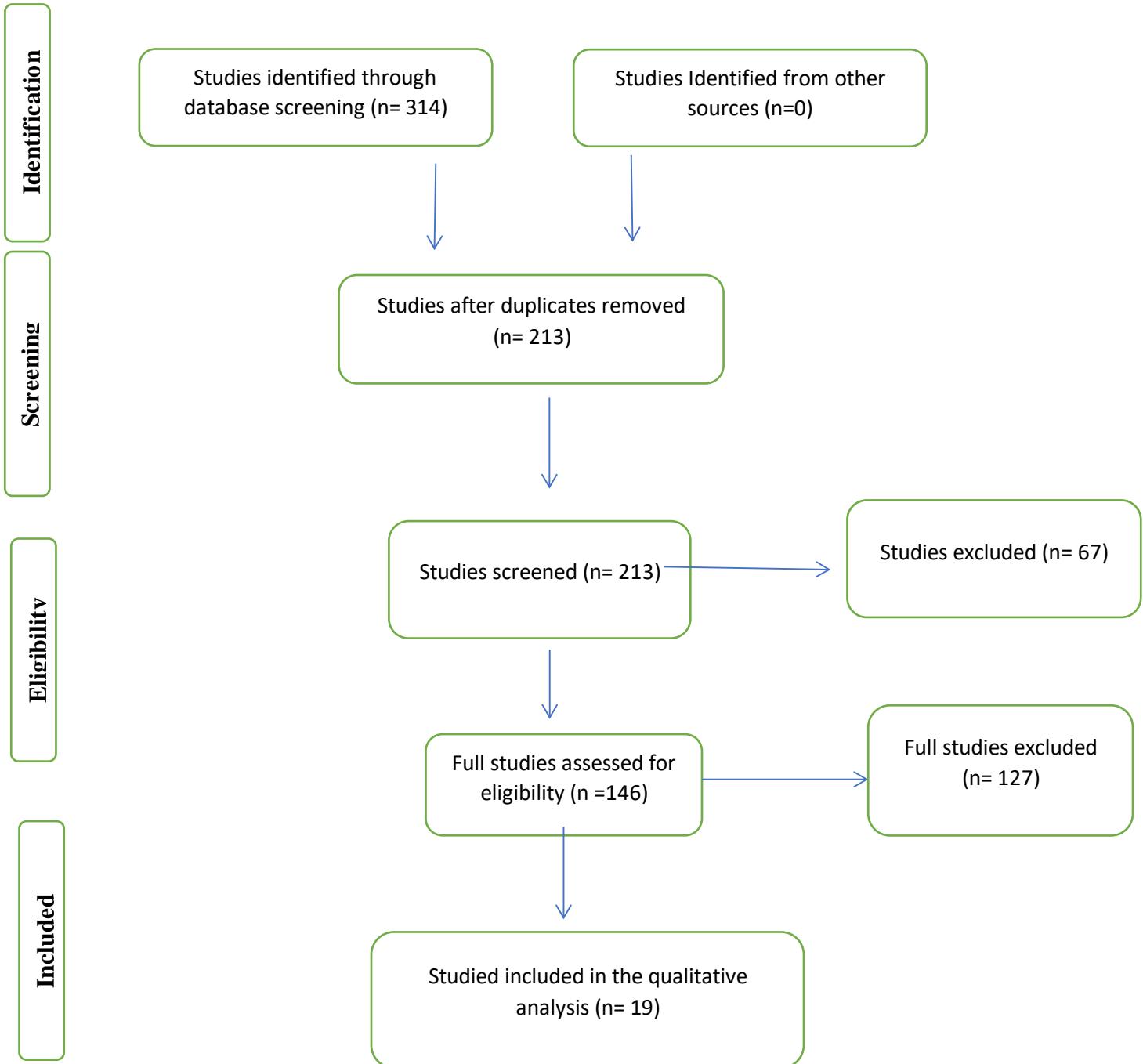
In a survey of the general public conducted in Riyadh,[24] about 70.7% of respondents said they would be open to getting screened for CRC; this number rose to 83% in those who had a family history of the disease. 69% of people approved of colonoscopy as a screening method. However, only 6.7% of those aged 50 to 55 had undergone CRC

screening, which was significantly lower than the global average of screened people. In a third study in Riyadh,[13] 43% of the participants agreed that screening for colon cancer should begin as soon as symptoms appear. Less than 20% of respondents were

aware that polyps could increase one's risk of developing CRC.

Lack of a doctor's recommendation was generally the biggest barrier to CRC screening (77.1%) [17] and fear of the procedure [16]

The included studies had different study designs.



**Table 1: Author, country, year of publication, methodology and outcome:**

<b>Author, Publishing Year</b>	<b>Study region</b>	<b>Methodology</b>	<b>Outcome</b>
<b>Khayyat, Y. M., &amp; Ibrahim, E. M. (2014) [12].</b>	Western Region	A cross-sectional study	There was a significant impact of education on awareness of CRC. 55.3% of those who agreed to go through screening were also willing to have a colonoscopy or sigmoidoscopy. On the other hand, of the group who declined to be screened, 77.4% agreed to radiological screening, which included an abdominal computed tomography (CT) scan and/or a barium enema.
<b>Zubaidi, Ahmad M et al. (2015) [13]</b>	Riyadh	A cross-sectional study	The majority of respondents (42.9%) think that screening for colon cancer should start as soon as symptoms appear. Even the most educated respondents, who made up less than 50% of all respondents, believed that polyps are a risk factor for CRC, with responses varying significantly by level of education. Less than 20% of all respondents held this belief. Only 34.8% of all respondents were aware that having a family history of CRC increased one's risk for developing the disease.
<b>Al-Hajeili, Marwan et al. (2019) [14]</b>	Jeddah	A cross-sectional study	A significant predictor of CRC knowledge was gender. Additionally, a significant correlation was found between the variables of education and family history of CRC and the subjects' knowledge of colonoscopic screenings. Fear of the procedure, lack of clinical symptoms, and fear of the results were the most frequent obstacles to getting screened.
<b>Alaqel, Maram Abdullah et al. (2012) [15]</b>	Riyadh	A cross-sectional study	57% of people knew that the rectum was the end of the large intestine, while 51.7% knew that the colon was the large intestine. The most popular screening method (72.8%) was colonoscopy. The majority of respondents thought colonoscopy-based early CRC detection was linked to high survival rates. But 65.7% of the participants said they would prefer not to have a CRC screening done. With postgraduates being the most likely to know that CRC can develop asymptotically ( $P = 0.032$ ), higher education level was also associated with this knowledge.
<b>Alzahrani, Khalid M et al. (2022) [16]</b>	Western Region	A cross-sectional study	The primary reason given by study respondents for not getting a colonoscopy was fear of the procedure. The majority of participants (63.4%) exhibited inadequate knowledge. The participants' knowledge of CRC was significantly correlated with their age ( $p=0.001$ ), level of education ( $p=.002$ ), and employment in the healthcare sector ( $p=.002$ ).
<b>Alduraywish, Shatha A et al. (2020) [17]</b>	Riyadh	A cross-sectional study	Lack of a doctor's recommendation was generally the biggest hindrance to CRC screening (77.1%). In addition, patients reported 51.6% and 57.8% lack of knowledge about the availability of the faecal occult blood test (FOBT) and painful colonoscopy procedures, respectively. Significant differences between the sexes were found, with women reporting more obstacles to CRC screening than men. In comparison to participants who had previously undergone a CRC screening, those who had not reported significantly more barriers.
<b>Al-Thafar, Abulaziz K et al. (2017) [18]</b>	Al-Ahsa	A cross-sectional study	Most people didn't know enough about the risk factors for colon cancer. Regarding knowledge of colorectal cancer risk factors, there was no discernible difference between residents of urban and rural areas ( $p=0.05$ ). 39% of men and 42% of women were unaware of colorectal cancer screening tests, but 12.8% of participants said their families had a history of the disease. Participants with higher levels of education were generally more aware of colon cancer.
<b>Imran, Muhammad et al. (2016) [19]</b>	Jeddah	A cross-sectional study	68% of the students believed that CRC is a disease that can be prevented, and the majority of students (82.3%) were aware of the condition. Only 33% of students had actual knowledge of colorectal cancer screening procedures, but the majority of them (77.0%) believed that such procedures existed. There was a family history of CRC in only 4% of the participants. Most participants (84%) believed that CRC is a disease that is curable. Between 50 and 60 percent of participants had a high level of knowledge about risk factors, symptoms, and signs. Participant responses to knowledge questions varied for family history (52%), age (59%), chronic colon

			infection (72%), obesity, and lack of exercise (66%). When it came to a few CRC-related questions, female participants were noticeably more knowledgeable.
Aga, Syed Sameer et al. (2021) [20]	Jeddah	A cross-sectional study	The students lacked any understanding of Saudi Arabia's CRC epidemiology. Only a small percentage of them (34.4%) were able to correctly identify 5 out of the 12 CRC risk factors, demonstrating how poorly informed they were about the various risk factors for the disease. The majority of students (76.1%) were aware that people should get screened for CRC, but 59.7% of them had no idea about the test/examination methods used in the screening and detection of CRC.
Al-Sharif, Mohammad Nassir et al. (2018) [21]	Asir	A cross-sectional study	The majority of respondents (51% and 71.6%) were aware of the terms colon and rectum. 33.8% of people can correctly identify the function of the colon, while 22.5% and 22.1% can identify the incidence and timing of CRC screening, respectively. Few respondents are familiar with the signs, dangers, and screening methods for CRC.
Althobaiti, Asma, and Hoda Jradi. (2019) [22]	Riyadh	A cross-sectional study	Medical students who participated in the survey had poor attitudes toward screening and little knowledge of CRC risk factors and screening techniques, respectively (52.47% and 578.3%). Higher medical education levels and support for CRC screening were independent predictors of knowledge levels. A barrier to low knowledge levels was the lack of patient awareness of CRC and screening methods, as well as the scarcity of specialised healthcare providers.
Alshammari, Sulaiman A et al (2020) [23]	Riyadh	A cross-sectional study	Most of the participants—about 47%—had heard of cancer screening, and 45% were aware that colonoscopies are frequently used for such purposes. Another 24.2% were aware that a test for hidden blood in the stool can help detect colon cancer early. Between 40% and 50% of the subjects knew something about risk factors and warning signs for CRC. Only 6.5% of the participants underwent early CRC screening, but 82.9% said they would if their doctor recommended it.
Almadi, Majid A et al. (2015) [24]	Riyadh	A cross-sectional study	The willingness to submit to CRC screening was 70.7%. Additionally, 56.7% believed that CRC was a fatal illness, while 70.5% believed that it was curable and 73.3% that it was preventable. The willingness to undergo CRC screening was not found to be correlated with gender, level of education, occupation, income, marital status, or general knowledge of CRC. Recognizing colonoscopy as a screening test was linked to a strong desire to have CRC screening performed, whereas opting for a stool-based test was linked to a weak desire to have CRC screening performed.
Galal, Yasmine Samir et al. (2016) [25]	Al Hassa region	A cross-sectional study	Over 66% of participants lacked basic knowledge of CRC. Participants who had more education, had heard of CRC before, or had relatives who had the disease were significantly more aware of the condition. (8.6%) Few CRCS cases were reported. Significantly lower CRCS uptake was associated with female gender, being single, having less education, and not having any CRC relatives. Personal fear was identified as the primary impediment to CRCS with high loading in exploratory factor analysis. The lack of public awareness, the absence of symptoms and signs, and the fear of painful procedures were the most frequently cited obstacles to CRCS from the viewpoints of the physicians.
Ahmed, G.Y., Al Mutair, A., Bashir, S. et al. (2022) [26]	Eastern Province	A cross-sectional study	The overall rate of belief in the significance of routine cancer screening was high—91.4%—regardless of gender, profession, or age. Participants who did not screen for a colonoscopy outnumbered those who did by a large margin.
Othmani, M. A. A., et al. (2017) [27]	Tabuk	A cross-sectional study	78% of the participants—78 in all—performed the screening tests after learning about CRC screening. Knowledge of CRC is significantly correlated with educational level. The majority of those with higher education (67.2%) are aware of the screening techniques, while only 10.4% of those with lower education have heard of them ( $p = 0.001$ ). Both gender ( $p=0.006$ ) and educational attainment ( $p=0.015$ ) were significantly correlated with knowledge of preventive measures.

<b>Alkhayyat, Sh, et al. (2021) [28]</b>	Jeddah	A cross-sectional study	Unintentional weight loss was named the most well-known CRC symptom by 43.7% of respondents. The majority of participants were not familiar with CRC Screening procedures, and social media was the most popular means of raising awareness.
<b>Barasheed, Osamah Abdullah A., et al. (2020) [29]</b>	Makkah	A cross-sectional study	The majority of participants (73.2%) and 87 (10.5%) had not heard of CRC screening. Males were significantly less knowledgeable about CRC screening than females (19.6% versus 12.3%, p = 0.015). Only 43 (16.9%) of the participants, or 1 in 3 (254/832), were aware that the screening was being done. Only 13 (1.6%) of the 136/832 people who had heard about screening had actually taken the test. The two most frequently mentioned screening procedures were colonoscopy and faecal occult blood test (24.2% and 8.2%, respectively).
<b>AlSulaim, Lamees, et al. (2021) [30]</b>	Qassim	A cross-sectional study	The average level of public knowledge about CRC in the Qassim region was 3.5573 1.2664. Blood in the stool and abdominal pain were the two CRC-related symptoms that participants most frequently reported, while history of prior CRC was the most common risk factor. Age, social standing, and educational attainment all significantly correlated with knowledge level.

## DISCUSSION:

CRC is one of the main reasons for cancer-related deaths in the US, according to the American Cancer Society. However, a full recovery is frequently the result of an early diagnosis. According to the American Cancer Society's estimates, there were 39220 new cases of rectal cancer and 95270 new cases of colon cancer in the United States in 2016 [31].

According to a report from the Saudi National Cancer Registry from 2004, CRC accounted for 9.3% of all newly diagnosed cases in SA, ranking first and third among Saudi male and female populations, respectively, with an overall, female, and male age-standardized rate (ASR) of 7.3, 6.3, and 8.3 per 100,000 population, respectively [32]. But according to the most recent report from SA, the prevalence of CRC has increased while maintaining the same rank in both males and females. With a male to female ratio of 110:100, there were 1033 cases of CRC in 2010, accounting for 10.4% of all newly diagnosed cases. The overall ASR increased to 9.6/100,000 (the ASR for men was 9.9/100,000 and the ASR for women was 9.2/100,000) [33].

Retrospective analysis of all CRC cases from the SCR between January 2001 and December 2006 revealed that the incidence of CRC in South Africa was increasing and that the age at diagnosis was lower than in developed nations [34].

The primary prevention strategy aims to reduce the likelihood of CRC development. According to concepts of person-centered medicine, the primary prevention of CRC should best take place at the individual and community levels and should make use of educational measures (PCM). The PCM suggests

community- and individual-level health promotion strategies [35].

CRC screening can both detect CRC at an early stage and prevent cancer by removing polyps. According to the US National Polyp Study, polypectomy can reduce the risk of CRC by up to 76% [35]. However, the reduction in CRC incidence was less pronounced in subsequent studies that supported these findings [36, 37]. The US National Polyp study estimated that polypectomy caused a 53% decrease in CRC deaths [38]. Screening has been linked to lower mortality in numerous other studies [39]. Combining data points to a decrease in incidence and mortality rate with CRC screening [40].

The Saudi population show lack of awareness of CRC screening and its importance. The highest percentages of awareness were reported in a study in Riyadh as most of the participants about had heard of cancer screening, and were aware that colonoscopies are frequently used for such purposes [23]. Another study in Riyadh [12] found a deficiency of knowledge of CRC screening that was influenced by an individual's level of education and not by age or gender. The endoscopic modality was primarily chosen as a screening method by people who were aware of CRC screening.

The implementation of CRC screening at the population level is difficult, though. Numerous factors, such as race, socioeconomic status (SES), health insurance coverage, the availability of a regular source of care, communication with the provider, level of CRC screening knowledge, rural residence, and ease of access to screening facilities geographically, are linked to the use of CRC screening [41, 42]. People

from minority groups, those with lower SES, and those with less access to healthcare are less likely to undergo screening than their white counterparts are [41]. Rural residents also have a 17% lower likelihood than urban residents of being informed about general CRC screening [43]. Additionally, remote rural residents have the lowest rates of CRC screening among urban and rural residents.

While creating an efficient screening programme is important, healthcare providers must support its successful implementation. A well-established factor linked to a rise in the uptake of CRC screening is the availability of a regular source of care, which is ensured by a primary care physician (PCP) [41]. The patient's primary care provider (PCP), such as a general practitioner, family physician, internist, or general paediatrician, is their point of contact with the healthcare system [43].

PCP visits have been linked to positive CRC outcomes. The availability of PCPs is inversely correlated with improved outcomes, including a decreased incidence of late-stage CRC and a higher survival rate [44, 45]. The probability of receiving a diagnosis of late-stage CRC is decreased by 5% for every 10% increase in PCPs as expressed by the ratio of PCPs per 105 individuals. On the other hand, a 5% increase in the diagnosis of late-stage CRC is linked to every 10% increase in the supply of specialists like gastroenterologists, general surgeons, or colorectal surgeons. This may be due to the nature of the relationships between PCPs and patients, which tend to be longer and involve more comprehensive healthcare than the limited contact that specialists have with their patients [46].

### CONCLUSION:

The study included 19 studies conducted in Saudi Arabia describing awareness of colorectal cancer screening. The concept of CRC screening is less widely known and understood than what has been reported internationally. This emphasises the requirement for a screening programme and a nationwide education campaign.

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