

Review

Colorectal Awareness in Saudi Arabia: A Systematic Review of Cross-Sectional Studies

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Abstract

Colorectal cancer is the second most common cancer in Saudi Arabia with estimated prevalence rates for males and females at 9.9% and 6.4%, respectively. It is also the most common cancer in males and the third most common cancer in females in the kingdom. In general, the evidence regarding knowledge and awareness of colorectal cancer in Saudi Arabia is conflicting among different studies. Accordingly, we conducted a systematic review that aims to formulate strong evidence regarding the awareness and knowledge of colorectal cancer in Saudi Arabia. A systematic search was conducted through several databases to find the relevant articles. A total of 19 cross-sectional investigations were found fit in our inclusion criteria and were included in the final data. The sample size was hugely variable among these studies, ranging between 127 and 5,720, with a total of 18,525 included participants. Most studies recruited participants from the general population, however, some studies recruited school teachers, medical and university students as well as healthcare workers. Results show that the prevalence of poor awareness levels and inadequate knowledge of colorectal cancer in Saudi Arabia is high. Although the levels of knowledge among healthcare workers was high, most of them did not follow advisable screening protocols for colorectal cancer. Nationwide programs should be inaugurated to increase the level of awareness and knowledge among the Saudi population and enhance the prognosis and outcomes of colorectal cancer across the Kingdom.

Keywords: colorectal cancer, saudi arabia, knowledge, awareness, epidemiology, systematic review.

Introduction

Colorectal cancer (CRC) is the fourth worldwide leading cause of death and the third most common cancer globally. Projections indicate that the prevalence of CRC will increase by 60% by 2030. Evidence from low socioeconomic countries also shows that the prevalence rates are higher in these countries and that the burden rapidly rises due to the growing attitudes toward western lifestyles in these countries (1). Estimates from the Kingdom of Saudi Arabia show that CRC is the second most common cancer, with estimated prevalence rates for males and females at 9.9% and 6.4%, respectively. It is also the most common malignancy in males and the third most common cancer in females in the kingdom (2). Moreover, previous investigations have reported that the rate of CRC doubled between 2015 and 2001, as 9.6 per 100,000 patients were diagnosed with CRC by 2015 (3, 4).

It has also been previously reported that the survival rate from CRC in Saudi Arabia is lower than the previously reported global rates, which may be attributable to the late presentation of the affected patients (5, 6). Patients suffering from CRC usually present with non-specific local and systemic symptoms including fatigue and loss of appetite and weight, and the condition can be mistaken for the symptoms of irritable bowel syndrome (7-9). Therefore, an early diagnosis of the modality is encouraged to achieve better outcomes. Public and routine screening for CRC is recommended to significantly enhance the survival rates among these patients. Screening is also recommended for high-risk groups, including patients with a previous history of polyps and CRC (10, 11).

It has also been demonstrated that screening for CRC is usually favorable and enhances the outcomes of patients with CRC due to the long interval between the early and late stages of the condition (12, 13). Although routine screening is encouraged for patients before the age of 50, it has been reported that patients in Saudi Arabia tend to present late when suffering from conditions that often pose a poor prognosis (3, 14, 15).

This indicates the need to raise the awareness within the general population regarding CRC to enhance the quality of care of CRC and achieve better outcomes.

Although it has been previously reported that Saudi individuals may have enough information about CRC screening, it was also reported that the many factors including reduced knowledge, fear of the screening modalities, and embarrassment were associated with a reduced frequency in seeking CRC screening (10). In general, evidence regarding knowledge and awareness of CRC in Saudi Arabia is conflicting among the different studies. As such, we conducted this systematic review with the aim to formulate strong evidence regarding the awareness and knowledge of CRC in Saudi Arabia.

Methods

Outcomes, inclusion, and exclusion criteria

Our present systematic review aims to provide evidence about the current knowledge and awareness levels of CRC in Saudi Arabia, according to the previously published cross-sectional investigations within the Kingdom.

We included studies that were: 1) cross-sectional in design, 2) recruited patients within Saudi Arabia, including Saudis and non-Saudis, on the condition that it was conducted within a specific region across the Kingdom, 3) human studies, and 4) reported the prevalence of knowledge and awareness levels among such populations or estimated the knowledge and awareness total values using any previously validated assessment tool. Studies were excluded if they: 1) were not cross-sectional, 2) were not conducted in Saudi Arabia, 3) did not recruit patients with CRC and did not investigate the level of knowledge and awareness within the recruited populations, and 4) were not original in design, including thesis, commentary, letters, editorials, or were not human studies.

Search strategy and screening

All of the following steps were undertaken based on the recommendations from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (16). Many databases were searched to find the relevant articles, in addition to manually searching the references of these databases and the relevant reviews to find any potentially missed articles during the electronic database searching and screening of exported results.

The following search term was used for PubMed: (("knowledge" OR "attitude" OR "practice" OR "aware") AND ("colorectal cancer" OR "colon cancer" OR "CRC") AND ("Saudi Arabia" OR "Saudi")). The term was then modified per each database in accordance with their guidelines, in order to achieve the best result. We searched Web of Science, Scopus, Google Scholar, Embase, Cochrane Library, and the Virtual Health Library (17, 18).

Title and abstract screening and full-text screening was then performed to identify the relevant articles according to the inclusion and exclusion criteria, which were designed to find the data relevant to our outcomes. Each step was adequately explained to all members and Endnote and Microsoft Excel programs were used to gather all the search results and to facilitate the process of screening, in addition to the easy identification of duplicates among the different databases.

Data extraction and quality assessment

After adequate screening to ensure that all the relevant studies were included, we moved to the next step by inaugurating data extraction, which was done by all of the study members. First, a senior member was asked to design a suitable sheet that suited all the included articles to be used for easy extraction of the relevant data. Then, piloting of the sheet was undertaken to determine the comprehensiveness. The sheet consisted of three different parts, including one part for the baseline characteristics and methodology of the included investigations, such as the relevant data about the authors, study design, data collection, sample size, region, gender and age of the included population.

The second part consisted of the intended outcomes, including the levels of awareness and knowledge of CRC, knowledge of screening, symptoms and risk factors. However, reporting on these outcomes was inconsistent among the included studies, and therefore, our extraction of these variables was flexible where we included all the relevant information as far as possible. The third part included the domains and results of the quality assessment of the included investigations.

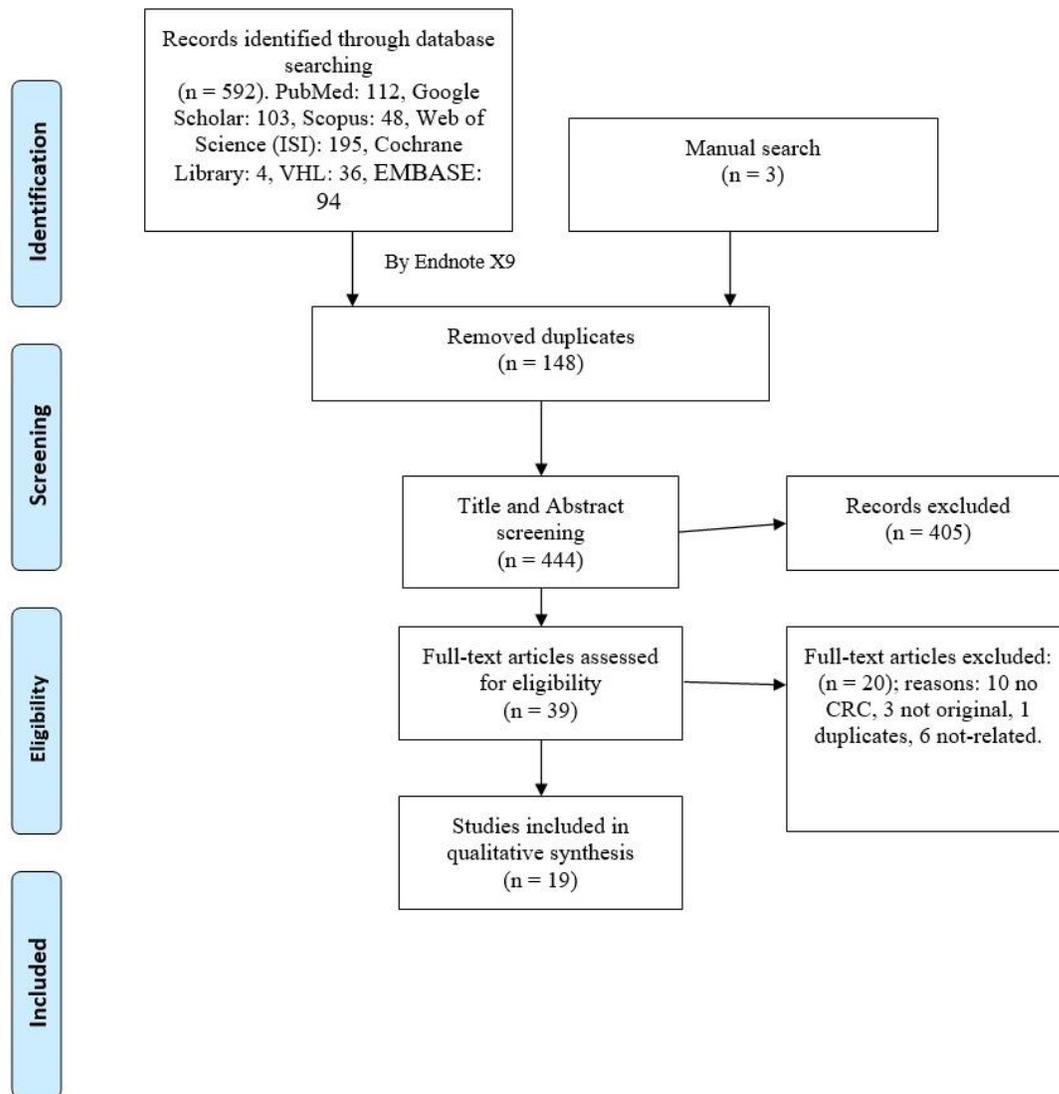
To assess the risk of bias among the included cross-sectional studies, the modified Newcastle-Ottawa Scale (NOS) for cross-sectional studies (19) was utilized and explained for all members in order to properly assess the quality of the included investigations. Three principle domains were used to formulate this tool, including the assessment and compatibility, quality of methods, and outcomes. Each of these steps was marked by a specific score, to grade and classify each article by their estimated quality and risk of bias as: excellent, non-satisfactory, good or satisfactory.

The lowest score was 0, referring to low quality and a high risk of bias, and the largest score was 10, referring to high quality and a low risk of bias. All of the extraction steps were performed by at least two blind reviewers and under the supervision of the senior member, and all discussed all the conflicts and differences until they have finally agreed on a single decision, based on the inclusion and exclusion criteria.

Results

Search results

After searching all of the databases, we managed to retrieve a total of 592 relevant citations that would suit our outcomes, of which 148 duplicates were removed by the Endnote program. This left only 444 citation for title/abstract screening, after which only 39 articles were eligible for full-text downloading and screening. Ultimately, 16 articles were identified, in addition to 3 other articles that were gathered via manual search, leaving us with a final list of 19 relevant articles. These steps are summarized in **Figure 1**.

Figure 1. Flow diagram of the included articles according to the steps of PRISMA.

Risk of bias

Our assessment of the quality of the included studies showed acceptable results with variable degrees of bias in the included studies in the different assessed domains of the mNOS tool and is fully presented in **Table 1**.

In brief, 11 articles were marked ‘good’ with total scores of 7 or 8, while the rest of the articles were marked ‘satisfactory’ with total scores of 5 or 6. This indicates that the risk of bias is relatively acceptable among these investigations.

Table 1.Detailed results of the quality of the included studies according to the modified Newcastle-Ottawa scale (mNOS) for cross-sectional studies

Author	Year	Selection				Comparability	Outcome		Total score	Quality
		Representativeness of the Sample	Sample size	Non Respondents	Ascertainment of the Exposure	The Subjects in Different Outcome Groups are Comparable	Assessment of outcome	Statistical analysis		
Ahmed et al.(20)	2020	+	+	+	+		+		5	Satisfactory
Al-Hajeili et al.(21)	2019	+	+	+	+	+	+	+	7	Good
Alhuzaim et al.(10)	2020	+	+	+	+	++	+	+	8	Good
Alkhayyat et al.(22)	2021	+	+	+		+	+	+	6	Satisfactory
Almadi et al.(23)	2019	+	+		+	+	+	+	6	Satisfactory
Almadi et al.(24)	2015	+	+	+	++	+	+	+	8	Good
Almutairi et al.(25)	2018	+	+	+	++	+	+	+	8	Good
Alotaibi et al.(26)	2020	+	+	+	+	++	+	+	8	Good
Alsayed et al.(27)	2019	+	+	+	+	+		+	5	Satisfactory
Alshammari et al.(28)	2020	+	+	+	+	+	+	+	7	Good
Al-Sharif et al.(29)	2018	+	+	+	+	+	+	+	7	Good
Al-Thafar et al.(30)	2017	+	+	+	+	+	+	+	7	Good
Althobaiti et al.(31)	2019	+	+		+	+	+	+	6	Satisfactory
Demyati(32)	2014	+	+	+	+	+		+	6	Satisfactory
Galal et al.(33)	2016	+	+	+	+	+	+	+	7	Good
Imran et al.(34)	2016	+	+	+	+	+	+	+	7	Good
Khayyat et al.(35)	2014	+	+	+	+	+		+	6	Satisfactory
Mosli et al. (36)	2017	+	+		+	+		+	5	Satisfactory
Zubaidi et al. (37)	2015	+	+	+	++	+	+	+	8	Good

Baseline characteristics

We managed to include 19 cross-sectional studies across the different regions within the Kingdom of Saudi Arabia. The sample size was hugely variable among these studies, ranging between 127 and 5,720, with a total of 18,525 included participants. The age ranges and male/female ratio were also variable and can be seen in **Supplementary Table 1**. Jeddah and Riyadh were the most frequent regions from where participants were recruited, followed by other regions including Al-Hassa or Al-Ahsa, Asir, Dammam, Mekkah, Almadinah and Albaha. This was in addition to the nationwide investigations that did not limit their recruitment target to a certain region. Most studies recruited participants from the general population, however, some studies recruited school teachers, and medical and university students as well as healthcare workers. Details of these characteristics, in addition to a summary of the outcomes and results of each investigation are presented in **Supplementary Table 1**.

Discussion

In Riyadh, an investigation which was conducted in 2021 by Alshammari et al. (28) reported that among their 231 participants, 47% knew about cancer screening, while another 45% and 24.4% knew that colonoscopy and that occult blood in the stools can be used for screening and early detection of CRC, respectively. Up to 50% of the participants knew about the risk factors of CRC and only 6.5% underwent early CRC screening. Another investigation in Riyadh by Almadi et al. (23) that included 5,720 participants in their survey reported that the mean CRC knowledge score among their study participants was 11.05 and that 73% of them were willing to undergo CRC screening. However, they also reported that a significant gap between the knowledge and practice of screening was found among their study participants. Demyati et al. (32) also investigated CRC in Riyadh city to assess the level of knowledge among family physicians in the area. They reported that approximately 95% reported that CRC screening is an effective modality. However, approximately 56% of the participants did not participate in CRC screening and the knowledge scores were higher in physicians that participated in CRC screening than those who did not. Almutairi et al. (25) also reported that the level of knowledge in Riyadh among their 256 adult participants was low, and they reported that most of the study

participants, who were divided into adequate and inadequate illiteracy groups, had low awareness levels of CRC, despite the low estimated illiteracy levels among the included participants. Another big cross-sectional study in Riyadh by Zubaidi et al. (37) reported that the level of awareness and knowledge of CRC was not significant among the included participants. Approximately 43% did not know whether CRC screening should be performed or not when the relevant symptoms start to appear, and between 20% and 35% of the study population did not know that having polyps and a family history of CRC can significantly predict the future development of CRC.

The same study also reported that higher education can significantly enhance the level of awareness of CRC, however, national efforts to increase CRC awareness are needed. On the other hand, Almadi et al. (24) reported that among 500 included participants in their cross-sectional survey, approximately 71% reported that they had the desire to undergo CRC screening. In a separate context, approximately 57% of the participants reported that CRC is fatal, while 73% and 71% reported that CRC can be prevented and cured, respectively. The authors also reported that none of the demographic or social factors were significantly associated with the knowledge levels of the participants.

Among medical students, an investigation by Althobaiti et al. (31) was conducted in Mekkah and Jeddah. It included 581 medical students and found that approximately 58% and 53% of them had poor knowledge about the screening modalities for CRC and the associated risk factors, respectively. The authors also reported that having good attitudes towards CRC screening and higher educational levels were significantly associated with elevated knowledge scores. Conversely, Imran et al. (34) included 525 university students from Jeddah to find that 82.3% of them were aware of CRC and 56.8% reported that CRC could be adequately managed. Moreover, up to 60% of the participants reported that they were aware of the symptoms and risk factors of CRC. The authors also reported that the knowledge levels between the non-medical and medical students were statistically significant. This indicates that medical students may have better knowledge and awareness of the disease.

However, the overall levels of the whole population were not favorable. In Jeddah, Al-Hajeili et al. (21) reported that among 422 participants in their cross-sectional analysis, gender was a significant predictor for knowledge levels, and having a previous family history of CRC and the level of education were the only significant predictors for awareness of CRC screening. Fearing the results, absence of the clinical symptoms and having a fear of the screening process were the most commonly reported factors for not undergoing CRC screening. This was also supported by another investigation in the Al-Hassa region which showed that fear of the screening procedures was the most commonly reported reason for an unwillingness to participate in the CRC screening campaigns (33).

In contrast, in the study by Almadi et al. (24) in Riyadh, the authors reported that knowing that a colonoscopy was the used screening modality was significantly associated with a higher willingness to undergo screening, although stool-based screening modalities were not. Moreover, the study that was conducted in Al-Hassa also reported that from the healthcare physicians' perspectives, a lack of awareness and symptoms of CRC, in addition to having a fear of CRC screening procedures, were the most common factors that were associated with a reduced willingness to attend CRC screening (33). Khayyat et al. (35) also reported that among 321 study participants from Jeddah, only around 37% of them had previously heard of CRC screening, and approximately 55% of them expressed the desire to undergo colonoscopy sigmoidoscopy for CRC. Moreover, they reported that educational levels, but not age or gender, were significantly associated with the awareness levels of the participants. Mosli et al. (36) reported that among 127 primary health physicians who participated in their local survey from Jeddah, 95% reported that CRC screening is an effective modality, but only 45% participated in such campaigns. Moreover, they reported that being male, and holding a bachelor's degree or less were significantly associated with reduced frequencies of recommending CRC screening. Comparing these results to the findings that were previously reported in Riyadh (32) indicates that although the healthcare workers in Saudi Arabia had adequate knowledge of CRC screening, they did not adequately stick to the screening and management protocols and recommendations.

Among 367 school teachers in Al-Ahsa, Al-Thafar et al. (33) reported that 42% and 39% of the female and male participants were not aware of the CRC screening tests, respectively, and higher levels of awareness were associated with higher educational levels. Moreover, the authors reported that most of the participants did not have enough knowledge about CRC or the associated risk factors. In the Asir region, Al-Sharif et al. (29) reported that among 1,209 participants in their cross-sectional investigation, up to 71.6% knew what a colon or rectum is, while around one-third of them reported the right function for the colon and rectum. Moreover, approximately 22% and 23% of the participants reported that they knew the correct timing of CRC screenings and the correct incidence, respectively, and being male with a lower level of education was significantly associated with lower awareness and knowledge levels. This indicates the significantly low knowledge and awareness levels of CRC in their population. In the Al-Hassa region, Galal et al. (33) reported that the level of knowledge among the study participants, which included participants from the general population and family physicians, was low among over two-thirds of the group. Screening for CRC was significantly lower in patients that were unmarried, female, had a lower level of education and with no previous family history of CRC. In Madinah, it was also reported that the levels of knowledge and awareness among the general population were low regarding CRC (27).

Another investigation was also conducted in Saudi Arabia but was confined to a certain region, and the authors reported that among 128 study participants, 57% knew what the colon and its functions are, and approximately 59% reported that they would undergo CRC screening in the event of relevant symptoms, and only 9% and 4% reported that they believed that inflammatory bowel diseases and radiotherapy were significant risk factors for CRC development (20). Alkhayyat et al. (22) managed to include 4,090 individuals from all over the Kingdom of Saudi Arabia and found that approximately 44% of the study participants reported that unintentional weight loss was the main significant sign associated with CRC. Moreover, approximately 61% of the study participants were not aware of the CRC screening methods. A further nationwide investigation was conducted by Alotaibi et al. (26) that reported that the 521 included

participants, approximately 71% had the desire to be screened for CRC. However, the levels of knowledge and awareness were low in approximately half of the participants in this study, as assessed by low knowledge of the symptoms and risk factors for developing CRC. Another nationwide investigation was also conducted in six regions in Saudi Arabia including Jeddah, Makkah, Riyadh, Dammam, Albaha and AlAhsa. The study managed to recruit 925 participants, of whom 95% were adequately aware of CRC, and more than 50% were knowledgeable of the disease. However, not many of them participated in the screening programs (10).

Our findings may be limited by the heterogeneity among the included studies when reporting the outcomes and unification of the methodology. Moreover, the limited sample size also carries another limitation across many of the included studies, and many regions across the Kingdom were not investigated as most of the published investigations were limited to certain regions such as Riyadh and Jeddah. Although the results seem to be conclusive among most of the included investigations, further nationwide large scale research is needed.

Conclusion

Results show that the prevalence of poor awareness levels and inadequate knowledge of CRC in Saudi Arabia is high. Although the levels of knowledge among the healthcare workers were high, most of them did not follow advisable screening protocols for CRC. Nationwide programs should be inaugurated to increase the level of awareness and knowledge among the Saudi population and to enhance the prognosis and outcomes of CRC across the Kingdom.

Disclosure

Statement:

The authors declare that there is no conflict of interest.

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None

Ethical Consideration:

This study was approved by Security Forces Hospital Institutional Review Board (IRB) with approval number H-01-R-069.

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