

KNOWLEDGE, AWARENESS, AND ATTITUDE OF COLORECTAL CANCER AND ITS SCREENING AMONG GENERAL POPULATION OF SAUDI ARABIA

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ABSTRACT

Colorectal cancer (CRC) is a significant health issue in Saudi Arabia, with an increasing incidence and low survival rates. Previous studies have indicated a lack of awareness and knowledge about CRC and its screening methods among the population. This study aims to address the existing gap by comprehensively assessing the knowledge and awareness of CRC and its screening across all regions of Saudi Arabia. A cross-sectional study was conducted using a structured online questionnaire. The study included individuals aged 18 and above from various regions of Saudi Arabia, excluding healthcare workers, students of health majors, and those with a personal or family history of CRC. The sample size was a minimum of 384 participants, randomly selected through web-based questionnaires distributed via social media. The questionnaire collected sociodemographic data and assessed CRC awareness, knowledge, and attitudes towards screening. Data analysis was performed using SPSS software, including descriptive statistics, chi-square tests, and the calculation of knowledge scores. The study included 1095 participants, 69.7% of them were females and 30.3% were males. 76.1% of respondents have heard of this type of cancer. Only 48% have heard of screening tests to diagnose colon cancer. Generally, 39% of participants had good knowledge of CRC, 36% had moderate knowledge, and 25% had poor knowledge. The study shows that the Saudi general population had inadequate knowledge of CRC. Knowledge scores were significantly associated with age and educational level but, not with gender.

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Introduction

Colorectal cancer (CRC), also referred to as colon cancer or bowel cancer, occurs when there is uncontrolled cell growth in the colon, rectum, or appendix [1]. Cancer poses a significant burden on Saudi Arabia's healthcare system, affecting patients socially and economically. The Saudi cancer registry has observed a rising incidence of all cancers since its initial report in 1994 [2]. Several factors contribute to the development of colon and rectal cancer, including high intake of processed meat, family history, older age, being male, high body mass index (BMI), smoking, and diabetes [3].

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The burden of CRC is expected to increase by 60% by 2030, to more than 2.2 million new cases and 1.1 million deaths [4]. CRC is globally ranked as the fourth leading cause of cancer-related deaths, following lung, liver, and stomach cancers [5]. In Saudi Arabia, of all types of cancer, colon cancer has been ranked first in men and third in women [6]. According to the Surveillance, Epidemiology, and End Results (SEER) Cancer Statistics Review (CSR) 1975–2014, the median age of the diagnosis in Saudi Arabia is 60 for men and 57 for women, compared to the global averages of 68 for men and 72 for women. The survival rate of CRC in Saudi Arabia is 44.6%, which is lower than the 60% survival rate in the United States and other countries [7].

A study that was done in Al-Baha Region, Saudi Arabia, in 2022 revealed that most of those surveyed (78.5%) showed poor levels of knowledge regarding colon and colorectal cancer [8].

A Saudi Arabian study showed that general awareness of colorectal cancer was 50% in the population they studied, and the majority had not heard of any tests or examinations that were utilized in the identification of colorectal cancer [9, 10].

Recently, a study done in Qassim province, Saudi Arabia, found that 50.9 percent of the participants had good knowledge of colorectal cancer's prevalent symptoms. Furthermore, 68.6% were aware of the colorectal cancer screening test [11].

This study is crucial because it addresses an important gap in the existing research on this topic. Several studies have been conducted in different regions, such as Asir in Saudi Arabia [12], Tabuk in Saudi Arabia [13], Kuwait [14], and the United Arab Emirates [15].

These studies have provided valuable insights into the awareness and screening practices of colorectal cancer in specific regions, showing an extreme lack of awareness regarding CRC symptoms, risk factors, and screening modalities among the entire surveyed population. However, a comprehensive assessment of the general population in Saudi Arabia as a whole is lacking.

Since the existing studies were conducted in specific regions of Saudi Arabia, it is important to highlight that no recent study has been published that comprehensively assesses the knowledge and awareness level of colorectal cancer and its screening across all regions of Saudi Arabia. This indicates a significant gap in the literature that needs to be addressed.

Therefore, our research proposal aims to fill this gap by conducting a study with a large sample size that represents all regions of Saudi Arabia. By including participants from various regions, we can ensure that our findings are representative of the entire population and provide a more accurate understanding of the knowledge and awareness levels of colorectal cancer and its screening in the country. Also, this study will help in developing targeted strategies to improve knowledge and awareness of colorectal cancer and its screening, ultimately leading to early detection, better treatment outcomes, and reduced mortality rates. Our study was designed to assess knowledge and awareness of colorectal cancer and its screening among the General population in Saudi Arabia.

Materials and Methods

Study Design

This research involved conducting a cross-sectional study in Saudi Arabia using a structured online questionnaire.

Study Setting: Participants, Recruitment, and Sampling Procedure

This study targeted people aged 18 and above living in Saudi Arabia regardless of gender or ethnicity. The sample population was selected randomly by web-based questionnaire which was distributed in social media during the research period.

Inclusion and Exclusion Criteria

The inclusion criteria for this study were as follows:

Adult males and females who are 18 years old or older within the general Saudi Arabia population.

The general population younger than 18, health care workers, students of health majors, and population with a personal and/or family history of colorectal cancer were excluded.

Sample Size

The sample size was estimated by using the Qualtrics calculator with confidence level of 95%; the minimum sample size was 384.

Method for Data Collection and Instrument (Data Collection Technique and Tools)

The collection of data was conducted using an online self-administered questionnaire that was distributed via social media. Participants were given a validated questionnaire derived from a previously published study done by Khaled M. Alzahrani *et al.* [16] that fit with our study objectives. The questionnaire includes demographic data and quotes to measure awareness and knowledge of CRC risk factors and incidence rates, as well as the importance of screening and its modalities.

Scoring System

The CRC knowledge screening questionnaire contains 20 multiple-choice questions. The first five questions measured sociodemographic data, while the rest assessed awareness of CRC screening, risk factors, prevention strategies, and general knowledge. Each question is scored either 0 with incorrect answers or 1 point based on the correct answers of the response,

while multiple sets of questions are awarded as follows: Q8 (3 points), Q10 (5 points), Q13 (4 points), Q16 (3 points), and Q17 (4 points) based on the correct options selected. The maximum total score is 24 points, with higher scores indicating better overall CRC knowledge. Overall scores are interpreted as percentages of the maximum 24 points, with 59% or lower considered low CRC knowledge, 60%-79% considered moderate knowledge, and 80%-100% considered high CRC knowledge. The questionnaire provides a quantitative approach to evaluating levels of CRC awareness among the target population.

Analyzes and Entry Method

Data is encoded into Microsoft Excel worksheets and imported to Statistical Package for the Social Sciences (SPSS®- version 26) software for analysis. Qualitative variables were represented as percentages and numbers (frequency, median, etc.) and were shown in the figures. The mean and median are calculated for the knowledge score. The chi-square test is used to find out the association of socio-demographic variables with the level of knowledge about CRC. A 0.05 level of significance was used in all tests used in the study.

Results and Discussion

Table 1 shows that the majority of respondents (44.1%) fall within the 20-30 age range, followed by 31-40 (13.7%) and 41-50 (13.6%) age ranges. It is interesting to note that there is a relatively small percentage of respondents over the age of 60 (1.9%). Gender-wise, the data shows that 69.7% of the respondents were female, while 30.3% were male. When it comes to education level, the majority of respondents (38.5%) have a university education, followed by those with a bachelor's degree (28.7%) and secondary education (24.4%). In terms of marital status, the majority of respondents (55.2%) are single, followed by those who are married (41.2%). Divorced and widowed respondents make up a smaller percentage of the sample. The data also provides insight into the distribution of respondents based on their residence. The majority of respondents are from the Eastern Province (20.2%), followed by the Tabuk (20.1%) and Makkah Regions (25.5%).

Table 1. Sociodemographic characteristics of participants (n=1095)

| | Parameter | No. | Percent |
|-----------------|------------------------|-----|---------|
| Age | less than 20 | 182 | 16.6 |
| | 20 30 | 483 | 44.1 |
| | 31 40 | 150 | 13.7 |
| | 41 50 | 149 | 13.6 |
| | 51 60 | 110 | 10.0 |
| | more than 60 | 21 | 1.9 |
| Gender | Male | 332 | 30.3 |
| | Female | 763 | 69.7 |
| Education Level | primary | 10 | .9 |
| | middle | 24 | 2.2 |
| | secondary | 267 | 24.4 |
| | University | 422 | 38.5 |
| | Bachelor's | 314 | 28.7 |
| | Postgraduate | 58 | 5.3 |
| Marital Status | Married | 451 | 41.2 |
| | Single | 604 | 55.2 |
| | Divorced | 22 | 2.0 |
| | Widowed | 18 | 1.6 |
| Residence | Jubail | 6 | .6 |
| | Eastern Province | 221 | 20.2 |
| | Unayzah | 1 | .1 |
| | Al Bahah region | 6 | .5 |
| | Al-Jawf region | 31 | 2.8 |
| | Northern border region | 5 | .5 |
| | Riyadh region | 152 | 13.9 |
| Qassim region | 60 | 5.5 | |

| | | |
|-----------------------------|-----|------|
| Medina region | 40 | 3.7 |
| Tabuk region | 220 | 20.1 |
| Jazan region | 3 | .3 |
| Hail region | 8 | .7 |
| Asir region | 54 | 4.9 |
| Makkah Al-Mukarramah region | 8 | .7 |
| Makkah Region | 279 | 25.5 |
| Najran region | 1 | .1 |

As illustrated in **Figure 1**, 76.1% of respondents have heard of these types of cancer.

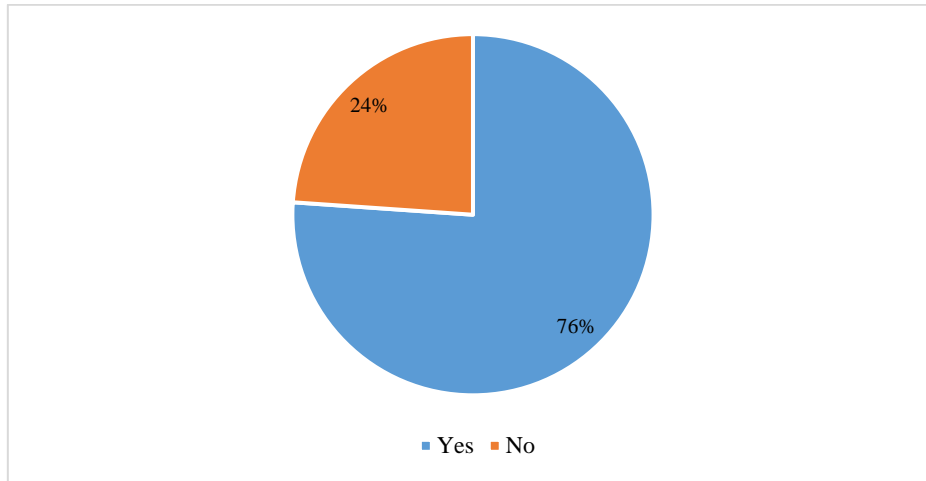


Figure 1. Participants heard of colon and colorectal cancer (n=1095)

According to **Table 2**, only 48% have heard of screening tests to diagnose colon cancer. Additionally, 46.1% of respondents who have heard of screening tests do not know what kind of tests are available, indicating a lack of knowledge on this important topic. 35.7% of respondents believe that screening tests should only be done when symptoms appear, as early detection is crucial in treating colon and rectal cancer. The recommended age for beginning screening tests is 50 years old, according to medical guidelines, but 30.2% of respondents do not know when to begin these tests.

Of the respondents, 84.1% believe that there are ways to prevent colorectal cancer or prevent it from getting worse, while 89.3% believe that screening tests increase the likelihood of detecting colon cancer early. The majority of respondents (66.0%) believe that colorectal cancer initially arises as a benign tumor (polyp) and 62.4% believe that a family member being diagnosed with colorectal cancer increases the risk of the disease developing in another member of the same family.

Table 2. Knowledge of participants of online nutritional applications and tele-dietetics (n=1095)

| Parameter | No. | Percent |
|---|------------------------|----------|
| Have you ever heard of colon and rectal cancer? | Yes | 833 76.1 |
| | no | 262 23.9 |
| Have you ever heard of screening tests to diagnose colon cancer? | Yes | 526 48.0 |
| | no | 569 52.0 |
| If you answered yes to the previous question, what kind of tests have you heard about? | Colonoscopy | 524 47.9 |
| | Fecal tests | 195 17.8 |
| | radiography | 192 17.5 |
| | Computed tomography | 140 12.8 |
| | Blood carcinogens test | 134 12.2 |
| | I don't know | 505 46.1 |
| According to your information, when should an individual begin undergoing screening tests to diagnose colon or rectal cancer? | When symptoms appear | 391 35.7 |
| | At 20 years old | 80 7.3 |
| | At 50 years old | 286 26.1 |
| | At 70 years old | 7 .6 |

| | | | |
|---|--|-----|------|
| | I don't know | 331 | 30.2 |
| | Fear of results | 274 | 25.0 |
| | No symptoms | 441 | 40.3 |
| Which of the following factors might be causing you to refrain from undergoing screening tests? (You can choose more than one answer) | Feeling disgusted just thinking about having an endoscopy | 216 | 19.7 |
| | Endoscope cost | 145 | 13.2 |
| | Fear of colonoscopy | 374 | 34.2 |
| | There is no reason | 235 | 21.5 |
| | I don't know | 187 | 17.1 |
| According to your information, where does colorectal cancer fall on the list of the most common cancers in men in the Kingdom of Saudi Arabia? | the first | 99 | 9.0 |
| | the third | 234 | 21.4 |
| | Seventh | 99 | 9.0 |
| | The tenth | 20 | 1.8 |
| | I don't know | 643 | 58.7 |
| According to your information, where does colorectal cancer fall on the list of the most common cancers in women in the Kingdom of Saudi Arabia? | the first | 26 | 2.4 |
| | the third | 178 | 16.3 |
| | Fifth | 169 | 15.4 |
| | Seventh | 55 | 5.0 |
| | I don't know | 667 | 60.9 |
| What do you think are the symptoms of colorectal cancer? (You can choose more than one answer) | Abdominal pain | 545 | 49.8 |
| | Blood in stool | 677 | 61.8 |
| | Vomiting | 207 | 18.9 |
| | Loss of appetite and weight | 435 | 39.7 |
| | A change in the frequency of defecation (the usual number of times you defecate) | 455 | 41.6 |
| | I don't know | 279 | 25.5 |
| Do you think there are ways to prevent colorectal cancer or prevent it from getting worse? | Yes | 921 | 84.1 |
| | no | 174 | 15.9 |
| Do you think screening tests increase the likelihood of detecting colon cancer early? | Yes | 978 | 89.3 |
| | no | 117 | 10.7 |
| Which of the following habits increases the risk of colorectal cancer? (Bias risk) | Smoking | 621 | 56.7 |
| | Excessive psychological pressure | 597 | 54.5 |
| | Drink alcohol | 486 | 44.4 |
| | Eat large amounts of red meat | 448 | 40.9 |
| | Lack of movement and lack of exercise | 586 | 53.5 |
| | Moderate weight | 47 | 4.3 |
| | Drink alcohol | 211 | 19.3 |
| Which of the following factors increases the risk of colorectal cancer? (Bias risk) | Eat foods low in fat and high in fiber | 185 | 16.9 |
| | Genetic mutations | 447 | 40.8 |
| | the age | 470 | 42.9 |
| | The presence of previous colon diseases | 719 | 65.7 |
| | The presence of polyps in the colon | 492 | 44.9 |
| | Irritable bowel syndrome (irritable bowel syndrome) | 615 | 56.2 |
| | diabetes | 115 | 10.5 |
| Do you think that colorectal cancer initially arises as a benign tumor (polyp)? | Hemorrhoids | 291 | 26.6 |
| | Yes | 723 | 66.0 |
| Do you think that a family member being diagnosed with colorectal cancer increases the risk of the disease developing in another member of the same family? | no | 372 | 34.0 |
| | Yes | 683 | 62.4 |
| | no | 412 | 37.6 |

| | Computed tomography (CT scan) | 134 | 12.2 |
|--|-------------------------------|-----|------|
| What do you think is the best way to look for polyps in the colon? | radiography | 64 | 5.8 |
| | Clinical examination | 37 | 3.4 |
| | Colonoscopy | 484 | 44.2 |
| | I don't know | 376 | 34.3 |

According to **Figure 2**, only 39% of participants had good knowledge of CRC, 36% had moderate knowledge, and 25% had poor knowledge.

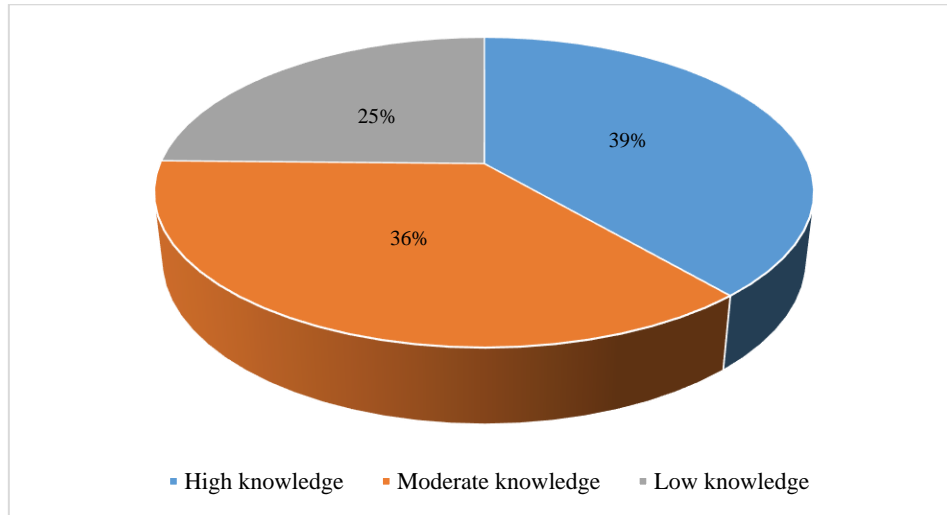


Figure 2. Participants' knowledge scores of CRC

Table 3 shows how different demographics may have varying levels of knowledge. Younger individuals (less than 20 years old) have a significantly lower level of knowledge compared to other age groups. This may be due to their lack of life experience or exposure to certain topics. It is important to note that this finding is statistically significant, with a p-value of 0.001. Gender does not seem to have a significant effect on knowledge scores, as both males and females have similar distributions across good, moderate, and poor knowledge categories. Education level, on the other hand, does seem to have a significant impact on knowledge scores. Individuals with higher levels of education, such as Bachelor's or University degrees, have a higher proportion of good knowledge scores compared to those with lower levels of education. This finding is also statistically significant, with a p-value of 0.001.

Table 3. Participants' knowledge scores of CRC in association with their sociodemographic characters (n=1095)

| | Knowledge scores | | | Total (N=1095) | P value |
|--------|------------------|--------------------|----------------|----------------|--------------|
| | Good knowledge | Moderate knowledge | Poor knowledge | | |
| Age | less than 20 | 60 5.5% | 68 6.2% | 54 4.9% | 182 16.6% |
| | 20 30 | 221 20.2% | 165 15.1% | 97 8.9% | 483 44.1% |
| | 31 40 | 66 6.0% | 58 5.3% | 26 2.4% | 150 13.7% |
| | 41 50 | 45 4.1% | 59 5.4% | 45 4.1% | 149 13.6% |
| | 51 60 | 29 2.6% | 42 3.8% | 39 3.6% | 110 10.0% |
| | more than 60 | 3 0.3% | 9 0.8% | 9 0.8% | 21 1.9% |
| | | | | | |
| Gender | Male | 119 10.9% | 127 11.6% | 86 7.9% | 332 30.3% |
| | Female | 305 27.9% | 274 25.0% | 184 16.8% | 763 69.7% |
| | | | | | 0.435 |

| | | 1 | 3 | 6 | 10 | | |
|-----------------|-----------------------|-------|-------|-------|-------|-------|--|
| Education Level | primary | 0.1% | 0.3% | 0.5% | 0.9% | 0.001 | |
| | middle | 0.5% | 0.9% | 0.7% | 2.2% | | |
| | secondary | 7.2% | 8.7% | 8.5% | 24.4% | | |
| | Bachelor's | 10.8% | 11.3% | 6.6% | 28.7% | | |
| | University | 17.9% | 13.5% | 7.1% | 38.5% | | |
| | Postgraduate | 2.2% | 1.9% | 1.2% | 5.3% | | |
| | I don't have a degree | 25.8% | 33.9% | 23.6% | 83.2% | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Colorectal cancer is a prevalent form of cancer worldwide, and individuals need to be aware of the risk factors, symptoms, and the importance of early detection through screening [2]. In Saudi Arabia, as in many other countries, raising awareness about colorectal cancer and promoting regular screening measures can significantly impact the overall health and well-being of the population. This study was designed to assess knowledge and awareness of colorectal cancer and its screening among the General population in Saudi Arabia.

According to our study results, only 39% of participants had good knowledge of CRC, 36% had moderate knowledge, and 25% had poor knowledge. According to a prior Saudi study, the study population's knowledge about CRC was insufficient. Only 4.2% of respondents were deemed to have a good awareness level, compared to roughly 57.3% who were categorized as having poor awareness and 38.5% as having moderate awareness [17]. In line with these conclusions, several studies [18-20] revealed a low degree of knowledge of colorectal cancer (CRC), including its symptoms, risk factors, and screening procedures. Nonetheless, a Riyadh study with 1,070 people [21] discovered that the population's understanding of CRC was only moderate. A study was conducted in the Riyadh area, where there was a low level of CRC awareness and knowledge [22]. Inadequate awareness of CRC was found in another survey on adult Omani population knowledge [23].

Regarding screening, only 48% have heard of screening tests to diagnose colon cancer. Similar to a prior study, the majority of respondents (59.7%) in this one were unaware of any CRC screening tests or examinations utilized in the diagnosis of CRC [24]. These findings are consistent with previous research that has been published, which showed that most participants were unaware of the several screening tests available for the early diagnosis of colorectal cancer [25-28]. A plausible rationale for the somewhat inadequate understanding of colorectal cancer screening among students pursuing health professions could be attributed only to the deficiencies and insufficiencies in the curriculum for the delivery of community-based health education. Consequently, there are no efficacious promotional initiatives or workshops aimed at acquainting students with a range of CRC screening techniques.

In our study, gender was not statistically significant in participants' knowledge of CRC. This was in contrast to other earlier research that indicated gender to have an impact on knowledge level, with women often possessing a greater understanding of CRC. Similar findings from other research have shown that women knew more about CRC risk factors, symptoms, and the appropriate time for screening [29, 30]. This finding, however, might be the result of the fact that there were more females in our study sample than males in the samples from the two previously mentioned studies [29, 31]. For example, Khayyat and Ibrahim [32] discovered that men are more eager to have colonoscopies and take part in colon cancer screenings; however, other research [32, 33] found no difference in the knowledge and awareness of colorectal cancer between men and women. Education level, on the other hand, does seem to have a significant impact on knowledge scores. Individuals with higher levels of education, such as Bachelor's or University degrees, have a higher proportion of good knowledge scores compared to those with lower levels of education. This finding is also statistically significant, with a p-value of 0.001. In a similar vein, higher-educated individuals typically had superior information about CRC, according to studies by Khayyat and Ibrahim [32] and Al Othmani *et al.* [34]. Additionally, it was discovered by Alsmkari *et al.* [29] that knowledge of CRC symptoms and risk factors was positively correlated with greater education, whereas Galal *et al.* [33] discovered that knowledge of CRC was negatively correlated with having less than a college degree. Nevertheless, one study found no correlation in this area [30]. Taking into account the correlation found in both our and earlier research, we suggest that CRC education initiatives concentrate on those with less education, that educated individuals be motivated to contribute to raising community awareness about CRC, and that CRC awareness initiatives be made mandatory in schools.

In Saudi Arabia, efforts to enhance public understanding of colorectal cancer and its screening methods can be achieved through various channels, including healthcare campaigns, educational programs, and community outreach initiatives. Collaborative efforts between healthcare professionals, government agencies, and non-profit organizations can play a pivotal

role in disseminating accurate information and encouraging individuals to prioritize their health through proactive screening [4, 7].

Using key performance indicators specific to each stage of the procedure, efforts to increase screening uptake must be tracked. This covers factors including acceptability, population acceptance of screening, screening cost and quality, pathology and other supportive service quality, and screening wait times. An electronic health record that allows for analysis of quality control and epidemiology should have participant data. To maintain confidentiality, subjects' identities should also be connected to the national identification system, and all communications with the screening authority should go through a central call center [9].

Moreover, it's essential to address potential barriers to screening, such as cultural beliefs, accessibility to healthcare facilities, and misconceptions about the procedure. By recognizing and addressing these challenges, tailored interventions can be developed to ensure that colorectal cancer screening is accessible and culturally sensitive, ultimately leading to increased participation and early detection.

Conclusion

The study shows that the Saudi general population had inadequate knowledge of CRC. Knowledge scores were significantly associated with age and educational level but not with gender. By fostering awareness, promoting regular screening, and addressing barriers to access, we can make significant strides in reducing the burden of colorectal cancer and improving the overall health outcomes for individuals in Saudi Arabia.

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Conflict of interest: None

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Ethics statement: Ethical approval was obtained from the research ethics committee of Research Committee of the Biomedical Ethics Unit, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia. An informed consent was obtained from each participant after explaining the study in full and clarifying that participation is voluntary. Data collected were securely saved and used for research purposes only.

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