Colorectal Cancer Knowledge and Awareness among Medical Students in Saudi Arabia: A Cross-Sectional Study

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ABSTRACT

Background: There is limited knowledge of colorectal cancer (CRC) among different segments of the society. We aimed to assess knowledge and awareness of CRC among Saudi Arabian medical students.

Methods: An online survey study was conducted in Riyadh, Saudi Arabia for the duration between May 2023 and April 2024. This study utilized a questionnaire tool that was developed based on extensive literature review in the area of knowledge and awareness of CRC.

Results: A total of 279 students were involved in this study. Overall, the study participants showed moderate level of knowledge of CRC with a mean score of 15.7 (SD: 5.3) out of 23 (equal to 68.3%). Participants aged 21-24 years were more knowledgeable and aware of CRC, with OR = 2.43 (95% CI: 1.39-4.27, p = 0.002). In a similar way, it was noticed that participants aged 25-27 were also more aware with OR = 5.72, 95% CI: 1.51-21.72, p = 0.010. Years of study were important predictors, with students in the second year having OR = 3.64, 95% CI: 1.54-8.61, p = 0.003; third-year students, OR = 5.74, 95% CI: 2.63-12.53, p < 0.001; fourth-year students, OR = 4.72, 95% CI: 1.82-12.20, p = 0.001; fifth-year students, OR = 15.33, 95% CI: 4.38-53.63, p < 0.001; and interns had the highest OR = 18.67, 95% CI: 3.68-94.64, p < 0.001.

Conclusion: Saudi Arabian medical students showed a moderate level of knowledge of CRC. Years of education were the most powerful predictors of CRC awareness and knowledge.

Keywords: Awareness; Cancer; Colorectal; Knowledge; Saudi Arabia; Students

INTRODUCTION

Colorectal cancer (CRC) is a principal reason of cancer-related deaths and the third most common type of cancer globally, accounting for approximately 10% of all cases(1). Over 90% of all cases of CRC occur in individuals above 50 years of age, and that is the highest risk group (2-5). However, there has been an increasing incidence of CRC among younger age population (6, 7). This rising trend has been observed all over the world(6-11). Modifiable risk factors explain more than 50% of CRC mortality and cases (12), including obesity, sedentariness, excessive alcohol use, poor dietary choices, and smoking (12). Addressing these modifiable lifestyle factors could reduce the overall burden of CRC.

The incidence and mortality rates of CRC varied geographically; the trends with time differed, and future projections differed for different parts of the region and country (13, 14). In Saudi Arabia, in 2018, CRC ranked second according to data from the Saudi National Cancer Registry by the Saudi Health Council (15). During that year, 1,908 cases were reported, representing about 12% of all cancer cases. Besides, CRC was found to be the third most common among women and the most common cancer among men in Saudi Arabia (15).

Lack of knowledge and awareness of screening for colon cancer among the population has been identified in several studies carried out in Saudi Arabia (16). The knowledge of CRC preventive measures and risk factors needs to be improved, and most countries lack CRC screening programs (6). Insufficient knowledge about CRC prevention has also been noted among medical students (17, 18). There have been findings from previous research that some of the variables indicated medical and female students were found to have better knowledge. Still, the general situation could be more satisfactory (19). Persons whose doctors advise them to have CRC screening are likely to be up to date in CRC screening compared to the ones without such advice (20). Moreover, most CRC cases and deaths could be prevented if CRC screening, surveillance, and treatment were high quality and regular (21).

Although there has been a significant increase in cases of CRC, and CRC can be prevented through lifestyle changes and screening, there is a lack of knowledge and awareness about CRC among medical students. As future health professionals, medical students play a critical role in encouraging prevention and screening for CRC. Therefore, our study assessed the present knowledge and awareness of CRC among Saudi Arabian medical students. Ultimately, this may aid in detecting

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barriers to practical education and propose strategies to enhance their knowledge and understanding, consequently decreasing the number of CRC cases and mortality in the region. The results of this study may aid in recognizing knowledge level in this critical domain essential for early identification and prevention initiatives. Furthermore, the results of this study evaluate the readiness of future healthcare professionals to teach and advocate for colorectal cancer screening and prevention.

METHODS

Study design:

An online survey study was conducted in Riyadh, Saudi Arabia for the duration between May 2023 and April 2024.

Study population:

The inclusion criteria for the study participants were to be a medical student who is currently studying in Riyadh, Saudi Arabia. There was no restriction on year of study, gender, or region of study. Students who are studying non-medical fields were excluded.

Sampling strategy:

Study participants were recruited using convenience sampling technique were eligible participants who are willing to participate and easily accessible took part in the study. The study participants were invited to participate in the study through social media platforms (Facebook, Instagram, Snapchat, and X). The study inclusion criteria were highlighted in the cover letter of the survey for the study participants together with the study aim and objectives.

Questionnaire tool:

This study utilized a questionnaire tool that was developed based on extensive literature review in the area of knowledge and awareness of CRC. The questionnaire tool examined students' knowledge and awareness of CRC. Specifically, the questionnaire items explored the demographic characteristics including gender, age, marital status, academic performance, year of study, and family history of cancer. Also, the questionnaire administered to the students asked about their understanding of the disease as the leading cause of death in the world, their knowledge about colorectal cancer, their perceptions about the disease being preventable, and their understanding of the mechanisms of detection. Also, participants were asked questions on the importance of screening and the potential treatment of the disease after its early detection. Symptom awareness was tested using multiple-choice questions related to the presence of blood in the stool, changes in bowel movement, sudden weight loss, abdominal pain, anemia symptoms like giddiness and constant fever, polyuria, and weight gain. Also, the identification of sources of information related to colorectal cancer included journals, television, curriculum, social media, and healthcare personnel. The questionnaire also sought the views of the participants regarding the prevalence of colorectal cancer in Saudi Arabia, the influence of genetic determinants and family history, and their knowledge of risk factors such as age, gastrointestinal irritation, previous colonic infections, gender, obesity, dietary factors, physical activity, and diabetes mellitus. Finally, the participants were asked about their knowledge of diagnostic tools used in the diagnosis of colorectal cancer, including liver enzymes, CT colonography, tumor markers, and colonoscopy.

Ethical approval:

The approval of this study was obtained by the institutional review board (IRB) of Imam Mohammad Ibn Saud Islamic University, Riyadh, Saudi Arabia.

Statistical analysis:

The data for this study were analysed using the Statistical Package for Social Science software, version 29 (IBM). Categorical data were presented as frequencies and percentages. Continuous data were presented as mean and standard deviation (SD). Binary logistic regression analysis was used to identify predictors of better knowledgeable and awareness of colorectal cancer. The dummy variable was defined as a mean knowledge score of 15.7. The statistical significance level was assigned as p-value less than 0.05.

RESULTS

A total of 279 students were involved in this study. Most of the participants in this study were male, at 64.9%. Most participants belonged to the age group of 21-24 years, at 68.5%. Other age groups consisted of 18-20 years at 24.7%, 25-27 years at 6.1%, and > 27 years at 0.7%. Almost all participants, at 99.3%, were single. In terms of academic standing, most belonged to the third year of the course, at 37.3%, followed by second year at 18.6%, first year at 15.8%, fourth year at 12.9%, fifth year at 9.7%, and interns at 5.7%. In terms of academic performance, almost half of the students had a GPA between 4.75-5.00 at 47.0%. In the family history of cancers, the history of cancers other than CRC was noted in 32.6%. The most common relatives were grandparents at 31.9%, followed by cousins at 24.2%. The most common reported cancers among family members were breast cancer, at 42.9%, and lymphoma, at 19.8%. CRC was reported among the family members of 11.1% of participants. Among those, most of the members affected were grandparents, at 51.6%. For further details on the demographic characteristics of the study participants refer to Table 1.

Knowledge and awareness profile of colorectal cancer:

Table 2 below presents participants responses to questions that examined their knowledge and awareness of colorectal cancer. Majority respondents thought that cancer is not the leading cause of death worldwide (57.7%), although 79.6% were aware of the existence of colorectal cancer. More than half of the respondents believed that CRC could be prevented and 57.7% mentioned that; the majority (69.2%) also heard about methods of detection; detection is very important in the opinion of 85.3% of the respondents; and in addition, 78.1% agreed that CRC can be cured if detected early. The most known symptoms were blood in stool, 84.9%, changes in bowel habits, 81.7%, sudden weight loss, 79.9%, and abdominal pain, 69.9%. The most common sources of information were the curriculum 71.7%, social media 34.1%, and healthcare personnel, 27.6%. The majority thought that CRC is common in Saudi Arabia, 69.2%, and agreed that it is affected by family history, 68.1%, and genetic predispositions, 63.8%. The most known risk factors were family history, 90.0%, age, 84.2%, gastrointestinal inflammation, 72.0%, and past colonization infections, 67.4%. The most known methods of detection are colonoscopy, 87.5%, and tumor markers, 76.0%.

Predictors of colorectal cancer knowledge and awareness:

Table 3 below presents predictors of colorectal cancer knowledge and awareness. Overall, the study participants showed moderate level of knowledge of CRC with a mean score of 15.7 (SD: 5.3) out of 23 (equal to 68.3%). Participants aged 21-24 years were more knowledgeable and aware of CRC, with OR = 2.43 (95% CI: 1.39-4.27, p = 0.002). In a similar way, it was noticed that participants aged 25-27 were also more aware with OR = 5.72, 95% CI: 1.51-21.72, p = 0.010. Years

Table 1. Participants' demographic characteristics

Variable	Frequency	Percentage
Gender		
Males	181	64.9%
Age category		
18-20 years	69	24.7%
21-24 years	191	68.5%
25-27 years	17	6.1%
Older than 27 years	2	0.7%
Marital status		
Married	2	0.7%
Single	277	99.3%
Year of study		
First year	44	15.8%
Second year	52	18.6%
Third year	104	37.3%
Fourth year	36	12.9%
Fifth year	27	9.7%
Intern	16	5.7%
Academic grade point average (GPA)		
Less than 3.5	22	7.9%
3.5-3.99	19	6.8%
4.0-4.24	21	7.5%
4.25-4.49	19	6.8%
4.50-4.74	67	24.0%
4.75-5.00	131	47.0%
Do you have any family history of any type of cancer other than colorectal cancer? (Yes)	91	32.6%
If yes, who was affected? (n= 91) (Multiple choices question)		
First Degree, Parents	21	23.1%
Second Degree, Grandparents	29	31.9%
Second Degree, Siblings	4	4.4%
Third Degree, Cousins	22	24.2%
Others	21	23.1%
If yes, which cancer was it? (n= 91) (Multiple choices question)		
Bone cancer	1	1.1%
Breast cancer	39	42.9%
Lung cancer	7	7.7%
Central nervous system cancer	9	9.9%
Pancreatic cancer	1	1.1%
Colorectal cancer	1	1.1%
Laryngeal cancer	2	2.2%
Kidney cancer	4	4.4%
Blood cancer	1	1.1%
Liver cancer	3	3.3%
Lymphoma	18	19.8%
Sarcoma	1	1.1%
Thyroid cancer	1	1.1%
Stomach cancer	1	1.1%
Skin cancer	2	2.2%
Uterine cancer	1	1.1%
Do you have anyone in family who was diagnosed with colorectal cancer? (Yes)	31	11.1%
If yes, what was your relation with the colorectal cancer patient? (n= 31) (Multiple choices question)		
First Degree, Parents	5	16.1%
Second Degree, Grandparents	16	51.6%
Second Degree, Siblings	3	9.7%
Third Degree, Cousins	6	19.4%
Others	11	35.5%

Table 2. Participants' responses to questions that examined their knowledge and awareness of colorectal cancer

Variable	Frequency	Percentage
Do you think that cancer is the most top cause of mortality in the world? § (No)	161	57.7%
Are you aware of colorectal cancer? (Yes)	222	79.6%
Can colorectal cancer be avoided? § (Yes)	161	57.7%
Have you ever heard about any test/examination methods that are used in the detection of colorectal cancer? (Yes)	193	69.2%
Do you think it is important to get screened for colorectal cancer? § (Yes)	238	85.3%
Early detection of colorectal cancer can result in a cure for colorectal cancer? § (Yes)	218	78.1%
Which of the following do you think are the symptoms of colorectal cancer? (Multiple choices question)		
Presence of blood in stool **§**	237	84.9%
Changes in bowel habits **§**	228	81.7%
Sudden weight loss **§**	223	79.9%
Abdominal pain **§**	195	69.9%
Anemia symptoms (Light-headedness, Palpitation, Dyspnoea) **§**	162	58.1%
Nausea	129	46.2%
Persistent fever	94	33.7%
Polyuria	56	20.1%
Weight gain	31	11.1%
Regarding the questions above, from where did you get your information about colorectal cancer? (Multiple choices question)		
Curriculum (Lectures, Classes)	200	71.7%
Social media	95	34.1%
Healthcare personnel	77	27.6%
Journals	46	16.5%
Television	24	8.6%
Do you think that colorectal cancer is common in Saudi Arabia? § (Yes)	193	69.2%
Family history influences the predispositions to colorectal cancer? § (Yes)	190	68.1%
Genetic predispositions influence the onset of colorectal cancer? § (Yes)	178	63.8%
Which of the following do you think are the risk factors of developing colorectal cancer?		
Family history of cancer **§** (Yes)	251	90.0%
Age **§** (Yes)	235	84.2%
Inflammation of GIT / Irritable bowel syndrome **§** (Yes)	201	72.0%
Prior colon infection	188	67.4%
Gender **§** (Yes)	172	61.6%
Obesity **§** (Yes)	171	61.3%
Low dietary intake of vegetables & fruits **§** (Yes)	134	48.0%
Lack of exercise **§** (Yes)	119	42.7%
Diabetes mellitus **§** (Yes)	101	36.2%
Active lifestyle	49	17.6%
High dietary fiber intake	47	16.8%
Which of the following tools can be used to detect colorectal cancer?		
Colonoscopy **§** (Yes)	244	87.5%
Tumor markers **§** (Yes)	212	76.0%
Computed Tomography) colonography **§** (Yes)	150	53.8%
Abdominal Ultrasound	98	35.1%
Liver enzymes	54	19.4%

of study were important predictors, with students in the second year having OR = 3.64, 95% CI: 1.54-8.61, p = 0.003; third-year students, OR = 5.74, 95% CI: 2.63-12.53, p < 0.001; fourth-year students, OR = 4.72, 95% CI: 1.82-12.20, p = 0.001; fifth-year students, OR = 15.33, 95% CI: 4.38-53.63, p < 0.001; and interns had the highest OR = 18.67, 95% CI: 3.68-94.64, p < 0.001. These results indicate the higher age groups and more advanced years of study increased the knowledge and awareness of CRC.

Discussion:

Our results indicate that awareness of the prevention and detection of CRC was very high, and attitudes were all positive; more than half of the respondents thought that CRC could be prevented, with 57.7% indicating so. In addition, 69.2% of the respondents also had heard of the methods of CRC detection, 85.3% believed that detection is very important, and 78.1% agreed that CRC can be cured if detected early. Our results align with multiple prior studies that underline that the incidence and mortality of CRC can be reduced when people adopt healthy lifestyles(22-27), including a balanced diet, limiting alcohol consumption, and maintaining a healthy weight and exercise. Such lifestyles, in addition to smoking cessation(28), are essential prevention practices and well-known. In a Greek study, 95% of the medical students reported that they were knowledgeable that CRC incidence and mortality can be reduced significantly via screening(29). Such a wide recognition of the importance of screening is vital because the

Table 3. Predictors of colorectal cancer knowledge and awareness

Variable	Odds ratio of being more knowledgeable and aware of colorectal cancer (95% confidence interval)	P-value
Gender		
Females (Reference category)	1.00	
Males	0.61 (0.36-1.03)	0.063
Age category		
18-20 years (Reference category)	1.00	
21-24 years	2.43 (1.39-4.27)	0.002**
25-27 years	5.72 (1.51-21.72)	0.010*
Older than 27 years	1.23 (0.07-20.40)	0.887
Marital status		
Married (Reference category)	1.00	
Single	0.61 (0.04-9.86)	0.728
Year of study		
First year (Reference category)	1.00	
Second year	3.64 (1.54-8.61)	0.003**
Third year	5.74 (2.63-12.53)	<0.001***
Fourth year	4.72 (1.82-12.20	0.001***
Fifth year	15.33 (4.38-53.63)	<0.001***
Intern	18.67 (3.68-94.64)	<0.001***
Academic grade point average (GPA)		
Less than 3.5 (Reference category)	1.00	
3.5-3.99	1.19 (0.34-4.19)	0.790
4.0-4.24	1.39 (0.40-4.80)	0.608
4.25-4.49	0.62 (0.18-2.15)	0.454
4.50-4.74	1.52 (0.56-4.10)	0.412
4.75-5.00	1.05 (0.42-2.64)	0.914
Do you have any family history of any type of cancer other than colorectal cancer?		
No (Reference category)	1.00	
Yes	0.91 (0.54-1.52)	0.707
Do you have anyone in family who was diagnosed with colorectal cancer?		
No (Reference category)	1.00	
Yes	1.57 (0.69-3.55)	0.279

*p<0.05; **p<0.01; ***p<0.001

principal objective of CRC screening is to lower the incidence and mortality of CRC by identifying precancerous lesions and early-stage malignancies in otherwise healthy people(30, 31). In an earlier study among undergraduate students in Jeddah, Saudi Arabia, 68% believed that CRC was a preventable disorder, and 84% believed that it was curable(32). These underscore that early detection is required to enhance CRC prognosis and survival rates.

Despite these positive findings, there is still a need for improvement. Over 40% of our respondents did not consider CRC as a preventable disease, and slightly over 30% did not know how to detect CRC. In constant with these findings, among undergraduate students in Jeddah, Saudi Arabia, only 33% had concrete knowledge about CRC screening tests(32). The surveyed medical students from two medical schools in Saudi Arabia showed low knowledge about CRC screening methods and attitudes toward screening, with more than half displaying this lack of knowledge(33). These findings indicated that the education and training on CRC preventability and methods of CRC detection need to be increased, regardless of reasonable general understanding. The promotion of healthy lifestyles and education on the nature of screening tests are now key steps toward further reducing CRC incidence and mortality(34). If combined with periodic endoscopic screening, the education effort may achieve even more significant CRC prevention, especially for proximal colon cancer, than would be achieved with endoscopic screening alone(35).

The most known symptoms of CRC among the participants in our study were blood in stool (84.9%), changes in bowel habits (81.7%), sudden weight loss (79.9%), and abdominal pain (69.9%). The results indicated a relatively high level of awareness regarding the key symptoms of CRC among our respondents. Common symptoms of CRC, as identified in the literature, are unexplained weight loss, diarrhea, constipation, rectal bleeding (being significant), altered bowel habits, etc(36). Most participants were aware of these symptoms, a good indicator of knowledge. In line with our findings, in India, there was a high level of knowledge about CRC symptoms among medical students and interns; 95% of respondents were aware of the condition's symptoms(37).

This finding contrasts with many prior studies, for instance, among Jordanian university students: only about 33% had adequate knowledge about the symptoms of CRC, about 53% had acceptable, and 14% had insufficient knowledge(38). Abdominal pain was the symptom most known of this disease among the Jordanian participants(38). Likewise, among science students in Turkey, the accurately determining rate of CRC symptoms varied from 50% to 73%, which was lower than expected, possibly because many were in their first or second year of study(39). Similar knowledge gaps were reported by American and Greek students(29, 40). In Jeddah, Saudi

Arabia, undergraduate students only 50% were able to identify the symptoms of CRC, and over 45% of the respondents were unable to identify CRC signs(32). Medical students in Poland were found to have unsatisfactory knowledge about the signs of CRC, for instance, on changes in stool consistency(41). This implies that our respondents were relatively more knowledgeable regarding CRC symptoms than these groups. These differences determine the variation in awareness among different educational backgrounds.

Despite the awareness seen to a relative degree, it must be understood that in most cases, CRC patients do not develop prominent symptoms in the early stages of the disease(42). Therefore, diagnosis at an early stage is relatively low(42). Most often, the symptoms appear after cancer has gone into advanced stages, giving little room for proper treatment(43). This underlines the importance of routine screening for early detection since most patients are diagnosed too late for radical treatment. While our study participants showed commendable awareness of CRC symptoms, it is obvious that targeted educational initiatives are needed for specific populations to be aware of knowledge gaps. The development of a better perception of less obvious symptoms and the need for early diagnosis using regular screening can significantly lead to better treatment outcomes and early diagnosis of CRC.

In our study, most participants agreed that CRC is affected by family history, 68.1%, and genetic predispositions, 63.8%. This finding is very influential, as family history and genetics are established risk factors for CRC(44-48). The two principal genetic predisposing conditions are familial adenomatous polyposis and Lynch syndrome(46). Recognition of these factors is critical for risk examination among patients and the application of appropriate screening protocols.

The most common risk factors reported by our study participants are family history (90.0%), age (84.2%), gastrointestinal inflammation (72.0%), and prior colonization infections (67.4%). These findings correlate to the current medical understanding; age is the chief risk factor for CRC, and most cases are above 50 years(9). Chronic gastrointestinal inflammation, such as inflammatory bowel diseases, also increases the risk of CRC(49-52). Past colonization infections(53, 54), such as with the pathogen Streptococcus bovis (55), have been associated with an increased risk of CRC.

This would show a high level of awareness regarding the risk factors of CRC among medical students, which is promising. This may mean that in Saudi Arabia, the critical aspects of CRC risk are well covered, and future health providers can identify individuals at high risk who might benefit from preventive measures.

The most common CRC detection methods reported by our respondents were through colonoscopy, 87.5%, and tumor markers, 76.0%. The gold standard for CRC screening and diagnosis is colonoscopy(56-59). It allows for a complete examination and direct visualization of the whole colon and rectum, so early lesions of CRC are easier to identify(56). It is very promising that the awareness about colonoscopy is high among medical students, indicating an excellent understanding of its significance and effectiveness for CRC prevention and early detection.

Tumor markers are also involved in the detection and treatment of CRC. Common tumor markers for CRC are serum CA19-9 and carcinoembryonic antigen (CEA)(60). Serum tumor markers can verify the diagnosis of a specific type of cancer, especially when the primary tumor is unknown, or can establish the suspicion of cancer recurrence(61). The sensitivity levels of preoperative CA19-9 and preoperative CEA vary in CRC patients according to the CRC stage, although it is maintained at about 90%(60). The level of knowledge of tumor markers among medical students may reflect an awareness of their complementing role in CRC management.

In our study, in general, the study participants demonstrated a moderate knowledge level regarding CRC with a mean score of 15.7 (SD: 5.3) out of 23 items equal to 68.3%. These findings suggest that although the existing medical education system in Saudi Arabia provides a solid foundation, it may be improved to cover all CRC aspects. Cancer education at the medical college level is associated with more intentions to carry out preventive strategies in future medical practices, more practice during clinical rotations, positive self-reported thoughts, and attitudes with knowledge retention over time(40, 62, 63).

The standard deviation in the knowledge scores reflects disparities in individual understanding among the students. This could be due to differences in experiences regarding education, exposure to resources, and personal interest in the topic. Targeted educational interventions, such as education sessions, could enhance the general level of knowledge(64).

Early detection and prevention of CRC can help reduce mortality rates(65), given the rising incidence of CRC in Saudi Arabia(66). Therefore, improving knowledge of CRC among medical students is crucial. In that respect, the educational effort should emphasize the depth of risk factors, symptoms, screening methods, and treatment approaches that equip future healthcare professionals with knowledge and skills for the management of CRC efficiently.

In our study, participants aged 21-24 years were more knowledgeable and aware of CRC. Similarly, it was noticed that participants aged 25-27 were also more aware compared to younger students. We also found that years of study were important predictors of CRC knowledge and awareness. These results indicate the higher age groups and more advanced years of study increased the knowledge and awareness of CRC.

Our findings were consistent with the results of a previous study that indicated that fourth-grade nursing students were more knowledgeable of CRC risk factors than students in the lower grades(39). This heightened CRC knowledge and awareness among the students may be from increased exposure to clinical learning and access to the relevant literature and guidance made by professional societies, which students in advanced or clinical years have(19). Moreover, several prior studies have indicated clinical lessons are more effective than theoretical lessons to enhance students' performance and medical education(17, 67-69).

These findings highlight the necessity for a better comprehensive commission of CRC education early in the medical curriculum with satisfactory knowledge and training for all medical students, regardless of the year of study. It may enable medical schools to narrow the knowledge gap between younger and older students and develop uniformly high competence and preparation for future health professionals.

This study has limitations. This is an online cross-sectional survey study that is limited to the study population who have access to social media platforms which might restrict the generalizability of our study findings. The convenience sampling technique is a type of non-probability sampling which might also restrict the generalisability of the study findings. The cross-sectional study design has limited ability to examine causality among the study variables. In addition, there is a possibility for non-response bias as in this study we were not able to estimate the number of participants who were invited to take part in this

study. Another potential limitation was reporting bias. Therefore, the study findings should be interpreted carefully.

Further research is recommended to develop education interventions that aims to enhance medical students' knowledge of CRC and examine the effectiveness of these interventions. Besides, future studies should examine CRC knowledge across students from different medical fields to examine the variability of knowledge and identify area of improvement in medical curricula.

CONCLUSION

Medical students in Saudi Arabia showed moderate level of knowledge of CRC. Older students were more knowledgeable of CRC compared to younger students. Years of study were important predictors of CRC knowledge and awareness. Education should be expanded and CRC prevented by supporting education, advocating for the use of regular screening techniques like colonoscopy, introduction of CRC education into academic curricula and encouraging discussions between patients and healthcare providers in relation to family history and genetic predisposition.

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