Journal of Medical Research and Health Sciences

ORIGINAL ARTICLE

Level of Awareness of Colorectal Cancer Among Patients Attending Primary Care in Single Center: A Cross-Sectional Study in Saudi Arabia

Afnan Nasser Alhemiddi[1*] | Abdulhalim Alharbi[2]

[1]Family medicine resident, Security forces hospital, Riyadh, Saudi Arabia

[2]Family medicine consultant, security forces hospital, Riyadh, Saudi Arabia

Abstract

BACKGROUND: Globally, colorectal cancer (CRC) is the third most common cancer diagnosed and the second leading cause of cancer deaths **OBJECTIVES**: this study aims to evaluate the knowledge level of colorectal cancer risk factors, symptoms, and screening modalities among patients attending Primary Care Center to identify the population that might benefit from targeted future health education programs **METHOD**: This was a cross-sectional survey study that has been conducted at the primary care centers at Security Forces Hospital (SFH), Riyadh, Saudi Arabia. The study participants were patients attending the primary care center at Security Forces Hospital during the study period from January 1st, 2020 To April 30th,2020 **RESULTS**: A total of 384 patients participated in the study, 57.6%of them were females, the highest percentage (40.6%) were in the age group of 30-39 years old, and 60.9% were married. Almost half (49.2%) of the participants reported having educational level as college and above. A 49.1% of the respondents correctly know what is the colon, Only 12.8% correctly know that screening for colorectal cancer is at the age of 50, 83.5% of the respondents know that family history of CRC is a risk factor, 56% scored colonoscopy as the screening tool, while only 6.5% scored the microscopic stool examination. the mean (±SD) of the overall knowledge score was 4.63(±2.26) out of 10, The results revealed no significant differences (P>0.05) in the total knowledge score by gender, age, or marital status, being higher among females, those aged 50-59 years, and single participants. In contrast, lower educational level subjects are almost four folds at increased risk of poor knowledge about CRC, with OR=3.84, and a P-value of <0.001. **CONCLUSION**: this study indicate gaps in the awareness of CRC Among Patients Attending Primary Care Canters in Riyadh, Saudi Arabia. Increasing patient knowledge may promote lifestyle changes and appropriate screening behavior that could reduce individual risk of CRC.

Keywords: colorectal cancer (CRC), risk factors, symptoms, screening modalities, primary care, cross-sectional

1 | INTRODUCTION:

Globally, colorectal cancer (CRC) is the third most common cancer diagnosed and the second leading cause of cancer deaths (1). CRC, also known as colorectal adenocarcinoma, is a type of cancer that develops in the glandular, epithelial cells of the large intestine. Cancer develops when specific epithelial cells acquire a succession of genetic or epigenetic alterations that give them a selective advantage (2). With abnormally heightened replication and survival, these hyper-proliferative cells give rise to a benign adenoma, which may then evolve into carcinoma and metastasize over decades (3). CRC arises from the epithelium (lining) of the colon or rectum, and as a result of tumor growth, the intestine starts bleeding and gets obstructed.

Globally, the regional incidence of CRC varies by a factor of ten. Australia and New Zealand, Europe, and North America have the greatest incidence rates, whereas Africa and South-Central Asia have the lowest (4). These geographic differences appear to be due to differences in dietary and environmental exposures imposed on a background of genetically determined susceptibility. During 2018, there were nearly 1.8 million new cases of CRC and 860 000 deaths. The global burden of CRC is expected to rise by 60% by 2030, resulting in more than 2.2 million new cases and 1.1 million deaths (5). Furthermore, CRC incidence and mortality have increased rapidly in several middle- to high-income countries in Asia, Eastern Europe, and South America (6). In Saudi Arabia, CRC is the second most common type of cancer in Saudi Arabia, according to the Saudi Cancer Registry (SCR) in 2014. Furthermore, it was the most common cancer among Saudi males and the third most common cancer among Saudi females. Although Saudi Arabia has a low incidence rate of colorectal cancer in comparison to other countries, the incidence rate and cancer-related deaths have increased significantly over the last ten years (7, 8).

For risk factors, both genetic and environmental factors play an important part in the etiology of colorectal cancer. Elderly people above 50 years, male gender, People with first-degree relatives who were diagnosed with CRC, and high red meat diet, and low fiber intake diet (9). This is in addition to smoking, high alcohol consumption, certain medication, diabetes, being overweight, and an inactive lifestyle (9).

Colorectal cancer patients may be symptomatic for many months before presentation. They may experience multiple symptoms including a change in bowel habitus such as diarrhea, constipation that lasts for more than a few days, rectal bleeding, weakness and fatigue, unintended weight loss, cramping or abdominal pain, and the desire to have a bowel movement when the bowel is empty (10, 11). A diagnosis of colorectal cancer either results from an assessment of a patient presenting with symptoms or as a result of screening. With the widespread introduction of population screening for colorectal cancer, many individuals are diagnosed at a pre-clinical stage. In symptomatic patients, colonoscopy is the preferred method of investigation, but other endoscopic methods are also available (9). For population screening, a range of other methods can be used for primary assessment, followed by colonoscopy in case of a positive test (9). Colonoscopy is the gold standard for CRC diagnosis; it has high diagnostic accuracy and can assess tumor location. Notably, the technique allows for simultaneous biopsy sampling and, as a result, histological confirmation of the diagnosis as well as material for molecular profiling. Colonoscopy is also the only screening technique that can be used for both diagnostic and therapeutic purposes (9).

Globally, many research studies have evaluated the public knowledge of CRC. A study from Chinese, Korean, and Vietnamese Americans aged 50-75 years old a good knowledge score was reported (12). In the Kingdom of Bahrain, a study was conducted and showed that the most frequently chosen risk

Corresponding Author: *Afnan Nasser Alhemiddi*
Family medicine resident, Security forces hospital, Riyadh, Saudi Arabia

factor for CRC was family history (38%) and smoking (28%). In addition, changes in bowel movement was the most recognized symptom (46%) and lower abdominal pain came next (44%),and Female participant were having more knowledge regarding colorectal cancer in comparison to male participants (13). In comparison, a study was conducted in Kuwait showed that the genetic predisposition and family history were the most frequently chosen risk factors by, and the most commonly selected symptoms were bloody stool, abdominal pain, and intestinal obstruction. Also, MRI was the most frequently recognized screening test by respondents and followed by CT scan. However, most of the participants have no idea about the screening modalities of colorectal cancer (14). In the United Arab Emirates, a study showed that most of the participants have no knowledge regarding colorectal cancer risk factors (59.4%), and its symptoms (74.8%) or screening modalities (53.5%) (15). locally, a study was conducted in Asir region revealed that a limited percentage of participants know the symptoms, risks factors, and screening tests of colorectal cancer (16). Another study was conducted in Riyadh city showed that most of the participants were having inadequate knowledge about CRC screening methods (17).

We conducted this study to evaluate the knowledge level of colorectal cancer including risk factors, symptoms, and screening modalities among patients attending Primary Care Center to identify the population that might benefit from targeted future health education programs.

2 | METHODS:

This was a cross-sectional survey study that has been conducted at the primary care centers at Security Forces Hospital (SFH), Riyadh, Saudi Arabia. The study participants were patients attending the primary care center at Security Forces Hospital during the study period from …. To …….The study included patients from both genders, aged 18 – 80 years who agreed to participate, while those in other age groups, or who have a prior history of colorectal cancer or inflammatory bowel disease and those who refused to participate were excluded.

Data was collected using a validated and reliable self-administered questionnaire that was constructed to evaluate the level of awareness of colorectal cancer. The questionnaire consists of 10 multiple choice questions related to the risk factors, symptoms, and screening modalities.

The sample size was calculated using the Raosoft calculator. Assuming the target population to be studied is more than 20,000 subjects using a confidence level of 95%, and a margin of error of 5% a minimum sample size required for this study is 377. A Convenience sampling technique was used in this study, which is a type of non-probability sampling technique. A hard copy of the questionnaire was distributed among patients in waiting areas in the Primary Care Center at Security Forces Hospital, Riyadh, Saudi Arabia.

The study has been conducted after taking ethical approval from the Research Ethics Committee at Security Forces Hospital, Riyadh, Saudi Arabia. Confidentiality was considered by keeping participants' data secured and private. A consent form was taken after explaining the aims and objectives of the study to the participants without any ambiguity, and they were informed that they have the right to withdraw at any time.

Statistical analysis:

Data were analyzed by using Statistical Package for Social Studies (SPSS 22; IBM Corp., New York, NY, USA). Continuous variables were expressed as mean ± standard deviation and categorical variables were expressed as percentages. The t-test and one-way ANOVA were used for continuous variables. Univariate and multivariate logistic regression was used to assess the associated factors with the low level of knowledge. A p-value <0.05 was considered statistically significant

3 | RESULTS

The baseline characteristics of the study participants are shown in table (1). A total of 384 patients attending primary care centers at SFH participated in the current study, more than half of them were females at 57.6%, the highest percentage (40.6%) were in the

age group of 30-39 years old, and 60.9% were married. Almost half (49.2%) of the participants reported having educational level as college and above.

Table1 : Characteristics of the participants

		Number	%
gender	Male	163	42.4
	Female	221	57.6
age	18-29	141	36.7
	30-39	156	40.6
	40-49	49	12.8
	50-59	32	8.3
	60-69	6	1.6
social state	Single	150	39.1
	Married	234	60.9
educational level	Below Highschool	44	11.5
	Highschool	151	39.3
	College and above	189	49.2

Participants' answers for the questions of knowledge of colorectal cancer risk factors and symptoms and the percentage of correct answers are shown in tables (2 and 3). A percentage of 49.1% of the respondents correctly know what is the colon, while only 38% know that the rectum is the last part of the large intestine. Participants showed poor knowledge re-garding the colon function as only 21.6% and 11.2% know that it is responsible for waste storage and wa-ter reabsorptions, respectively. The highest percent-age (43.8%) of the participated patients knows that the incidence of colorectal cancer is average. Only 12.8% correctly know that screening for colorectal cancer is at the age of 50, while the majority (75%) think that it should be at the onset of symptoms. Par-ticipants showed a good knowledge level in regards to colorectal cancer symptoms, where 77.9%, 73.7%, and 58.1% identified blood in stool, nausea, and vomiting, and change in bowel habits as symptoms of CRC, respectively. For CRC risk factors, 83.5% of the respondents know that family history of CRC is a risk factor, 65.9% reported smoking and 50.8% reported inflammatory bowel disease as risk factors. While the majority (>80%) thought that fatty food and colon polyps are risk factors for CRC. For CRC screening modalities, 56% scored colonoscopy as the one, while only a very low percentage (6.5%) know that microscopic stool examination is one of the used modalities. CRC is a curable disease and this was knowledgeable by 63.3% of the participants. There

is no relation between irritable bowel syndrome and CRC, and 33.6% of the participated patients know this, while 24.2% thought that they are correlated.

Table2 : Answers for the questions of knowledge of colorectal cancer risk factors and symptoms

		Number	%
The Colon is	The large intestine	188	49.1
	The small intestine	38	9.9
	The stomach	43	11.2
	Stomach and small intestine	44	11.5
	I don't know	70	18.3
The rectum is	The last part of the stomach	109	28.4
	The last part of the small intestine	37	9.6
	The last part of the large intestine	146	38.0
	I don't know	92	24.0
Colon function is	Digestion of food	124	32.3
	Waste storage	83	21.6
	Water reabsorption	43	11.2
	Does not have function	20	5.2
	I don't know	114	29.7
The incidence of colon cancer is	High	72	18.8
	Average	168	43.8
	Rare	59	15.4
	I don't know	85	22.1
When do you screen for colorectal cancer	At the onset of symptoms	288	75.0
	At the age of 20 years	34	8.9
	At the age of 50 years	49	12.8
	At the age of 70 years	13	3.4
What are the symptoms of colon cancer?	Abdominal pain	219	57.0
	Change in the bowel habits	223	58.1
	Nausea and vomiting	283	73.7
	Yellow discoloration of the eyes and skin	326	84.9
	Presence of blood in stool	299	77.9
	Does not have any symptoms	376	97.9
	I don't know	274	71.4
What are the risk factors for colon cancer	Smoking	253	65.9
	Inflammatory bowel disease	195	50.8
	Family history of colon cancer	321	83.6
	Fatty food	317	82.6
	Colon polyps	329	85.7
	I don't know	291	75.8
What is the screening modality for colon cancer	Microscopic stool examination	25	6.5
	Colonoscopy	215	56.0
	X-ray	9	2.3
	Ultrasound	3	.8
	CT scan	23	6.0

Table3 : Percentages of correct answers of knowl-edge of colorectal cancer risk factors and symp-toms

	Correct Answers	
	Number	%
The Colon is	188	48.96
The rectum is	146	38.02
Colon function is	126	32.81
The incidence of colon cancer is	168	43.75
When do you screen for colorectal cancer	49	12.76
What are the symptoms of colon cancer?	216	56.25
What are the risk factors for colon cancer	272	70.83
What is the screening modality for colon cancer	240	62.50
Is it possible to be cured from colorectal cancer	243	63.28
Is there a relationship between colon cancer and irritable bowel syndrome	129	33.59

Table (4) shows the mean and standard deviation of the total score of knowledge of colorectal cancer risk factors and symptoms by characteristics of the participants. the mean (±SD) of the overall knowl-edge score was 4.63(±2.26) out of 10, indicating poor knowledge. The results revealed no significant differences (P>0.05) in the total knowledge score by gender, age, or marital status, being higher among females, those aged 50-59 years, and single par-ticipants. In contrast, the knowledge score differed significantly by the educational level, and it was the highest among those who have college and above at 5.10(±2.08).

Table4 : Mean and standard deviation of the total score of knowledge of colorectal cancer risk factors and symptoms by characteristics of the participants

		Mean**	SD	P value
gender	Male	4.60	2.28	0.860
	Female	4.64	2.24	
age	18-29	4.43	2.18	0.201
	30-39	4.88	2.13	
	40-49	4.29	2.65	
	50-59	4.94	2.30	
	60-69	3.67	3.20	
social state	Single	4.69	2.23	0.635
	Married	4.58	2.28	
educational level	Below Highschool	3.34	2.30	<0.001*
	Highschool	4.40	2.29	
	College and above	5.10	2.08	
Over all			4.63	2.26	

* Significant p value

** out of 10

Likert scale was used with total score of 10 (0 = false answer , 1 = correct answer)

Univariate logistic regression for the associated factors with a low level of knowledge of colorectal cancer showed that low educational level subjects are almost four folds at increased risk of poor knowledge

about CRC, with OR=3.84, and a P-value of <0.001, as shown in table (5).

Table5 : Univariate logistic regression for the associated factors with low level of knowledge of colorectal cancer

		Odds Ratio	95% CI		P value
			Lower	Upper	
gender	Male	0.94	0.62	1.43	0.779
	Female	1.00**			
age	18-29	1.00			
	30-39	0.56	0.35	0.91	0.018*
	40-49	1.00**	0.50	2.00	0.997
	50-59	0.62	0.28	1.36	0.235
	60-69	0.97	0.17	5.48	0.971
social state	Single	1.13	0.74	1.72	0.578
	Married	1.00**			
educational level	Below Highschool	3.84	1.69	8.70	0.001*
	Highschool	1.49	0.96	2.31	0.075
	College and above	1.00**			

* Significant p value

** used as a reference

4 | DISCUSSION

Patient awareness of CRC has not been well de-scribed in Saudi Arabia. Understanding and recog-nizing public awareness regarding CRC may pro-vide valuable information to incorporate the policy decision for prevention, early diagnosis, and im-provement of survival for CRC. Therefore, this study aimed to assess and identify the level of knowledge and awareness of CRC with regards to its risk factors, symptoms, and screening/imaging procedures. The results of the current study revealed an overall poor knowledge about CRC among patients attending pri-mary care centers in Riyadh, Saudi Arabia

The current study finding of poor knowledge about CRC is in line with previous similar local, national, and international studies (18–21). In contrast, a re-cently published Chinese study revealed a good knowledge of CRC and its screening among people aged 50–75 years (22)

Environmental and genetic factors can increase the likelihood of developing CRC (23). Although in-herited susceptibility results in the most striking in-creases in risk, the majority of CRCs are sporadic

rather than familial (23). In Bahrain, a previous study found that changes in bowel habits (46%) and family history (38%) were the most often reported symptoms of CRC (19), in the current study, blood in the stool (77.9%), and nausea and vomiting (73.7%) were the ones.

For CRC risk factors knowledge, a previous study from Kuwait showed that the most frequent risk factor that was chosen by the participants was the genetic factors and family history (73.5%) (24), while in our case, family history of CRC was the most frequently chosen risk factor at 83.6%. People with first-degree relatives who were diagnosed with CRC have a greater risk of developing the disease by 2 to 3 times, compared to individuals with no family history (24). In general, elderly people above 50 years have a higher chance of developing CRC (25), however, only 12.8% of the res[pendent patients in the current study know that they should screen for CRC at the age of 50. However, CRC incidence is rising in persons under age 50, and a thorough diagnostic evaluation of young persons with suspected colorectal bleeding is recommended [25].

It was noticed that almost half of the participants' knowledge know colonoscopy as a screening modality for CRC. Advantages/benefits of the entire procedure of colonoscopy on detecting CRC at an early stage should exist. In addition, knowledge of various diagnostic procedures should be reinforced during public campaigns, and educational programs are needed to raise public awareness on the imaging modalities focusing on the advantages and disadvantages of each.

A lower educational level has been found to have significant negative associations with knowledge and practice towards CRC screening (22). Similar findings were reported in the current study. Subjects who attained lower education had poorer knowledge related to CRC and CRC screening (22). Understandably, those who have a lower educational level may need more support to understand the content of CRC screening programs. Additionally, those people are usually situated at a lower socioeconomic level and have more difficulties in obtaining adequate knowledge through new media. When low educated subjects do not receive adequate information, their intention or motivation to participate in the screening programs will be reduced (26, 27).

CRC is a disease that everyone tries to avoid. As a result, increasing public awareness in the community is critical. This could be accomplished by exposing the public to more educational resources, such as TV show posters, information leaflets distributed in public places, and the continuation of public seminars. According to the guidelines, general practitioners should routinely monitor patients' BMIs, assess risky behavior, promote healthy eating, drinking, and physical activity, and recommend appropriate CRC screening (28).

5 | CONCLUSION

Our results indicate gaps in the awareness of CRC Among Patients Attending Primary Care Canters in Riyadh, Saudi Arabia. Increasing patient knowledge may promote lifestyle changes and appropriate screening behavior that could reduce individual risk of CRC.

This manuscript has been read and approved by all the authors, the requirements for authorship have been met, and each author believes that the manuscript represents honest work.

REFERENCES

1. 1.Colorectal Cancer Facts & Figures | Facts About Colon Cancer [Internet]. [cited 2021 Jun 8]. ;. Available from: https://www.cancer.org/research/cancer-facts-statistics/colorectal-cancer-facts-figures.html.

2. Ewing I, Hurley JJ, Josephides E, Millar A. The molecular genetics of colorectal cancer. Frontline Gastroenterology. 2014;5(1):26–30. Available from: https://dx.doi.org/10.1136/flgastro-

2013-100329. doi:10.1136/flgastro-2013-100329.

3. Vogelstein B, Fearon ER, Hamilton SR, Kern SE, Preisinger AC, Leppert M, et al. Genetic Alterations during Colorectal-Tumor Development. New England Journal of Medicine. 1988;319(9):525–532. Available from: https://dx.doi.org/10.1056/nejm198809013190901. doi:10.1056/nejm198809013190901.

4. Global Burden of Disease Cancer Collaboration, Fitzmaurice C, Allen C, et al. Global, Regional, and National Cancer Incidence, Mortality, Years of Life Lost, Years Lived With Disability, and Disability-Adjusted Life-years for 32 Cancer Groups, 1990 to 2015: A Systematic Analysis for the Global Burden of Disease Study. JAMA Oncol 2017; 3:524

5. Colorectal cancer statistics | World Cancer Research Fund International [Internet]. WCRF International. [cited 2021 Jun 12]. Available from: https://www.wcrf.org/dietandcancer/colorectal-cancer-statistics/.

6. Center MM, Jemal A, Smith RA, Ward E. Worldwide Variations in Colorectal Cancer. CA: A Cancer Journal for Clinicians. 2009;59(6):366–378. Available from: https://dx.doi.org/10.3322/caac.20038. doi:10.3322/caac.20038.

7. Al Eid, Haya & Quindo, Manuel. (2014). Cancer Incidence Report Saudi Arabia 2010

8. Alsanea N, Abduljabbar AS, Alhomoud S, Ashari LH, Hibbert D, Bazarbashi S. Colorectal cancer in Saudi Arabia: incidence, survival, demographics and implications for national policies. Annals of Saudi Medicine. 2015;35(3):196–202. Available from: https://dx.doi.org/10.5144/0256-4947.2015.196. doi:10.5144/0256-4947.2015.196.

9. Kuipers EJ, Grady WM, Lieberman D, Seufferlein T, Sung JJ, Boelens PG, et al. Colorectal cancer. Nature Reviews Disease Primers. 2015;1(1):15065–15065. Available from: https://dx.doi.org/10.1038/nrdp.2015.65. doi:10.1038/nrdp.2015.65.

10. Rasmussen S, Larsen PV, Søndergaard J, El-negaard S, Svendsen RP, Jarbøl DE. Specific and non-specific symptoms of colorectal cancer and contact to general practice. Family Prac-tice. 2015;32:cmv032–cmv032. Available from: https://dx.doi.org/10.1093/ fampra/cmv032. doi: 10.1093/ fampra/cmv032.

11. Hamilton W, Round A, Sharp D, Peters TJ. Clinical features of colorectal cancer before di-agnosis: a population-based case–control study. British Journal of Cancer. 2005;93(4):399–405. Available from: https://dx.doi.org/10.1038/sj.bjc.6602714.doi:10.1038/sj.bjc.6602714.

12. Juon HS, Guo J, Kim J, Lee S. Predictors of Colorectal Cancer Knowledge and Screening Among Asian Americans Aged 50–75 years old. Springer Science and Business Media LLC; 2018. Available from: https://dx.doi.org/10.1007/s40615-017-0398-1.doi:10.1007/s406 15-017-0398-1.

13. Nasaif HA, Qallaf A, M S. Knowledge of Colorectal Cancer Symptoms and Risk Fac-tors in the Kingdom of Bahrain: a Cross-Sectional Study. Asian Pac J Cancer Prev. 2018;19(8):2299–304.

14. Saeed RS, Bakir YY, Alkhalifah KH, Ali LM. Knowledge and Awareness of Colorectal Cancer among General Public of Kuwait. Asian Pac J Cancer Prev. 2018;19(9):2455–60.

15. Predictors of Colorectal Cancer Knowledge among Adults in the United Arab Emirates [Internet]. [cited 2021 Jun 12].;. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5720636/.

16. Awareness of colorectal cancer among public in Asir region Al-Sharif MN, Fayi KA, Alobaidi AA, Alshamrani BA - J Family Med Prim Care [Internet]. [cited 2021 Jun 12].Available from: https://www. jfmpc.com/article.asp?issn=2249-4863.

 |

17. Almutairi KM, Alonazi WB, Alodhayani A, Vinluan JM, Ahmad M, Alhurishi SA. A Cross-Sectional Assessment of Literacy and Awareness, Attitudes, and Beliefs About Colorectal Cancer and Its Screening in Riyadh Region. J Cancer Educ. 2018;33(3):660–667.

18. Wutayd OA. Colorectal Cancer Risk Factors: A Study of Knowledge, Attitude and Practice Among Adults in Riyadh, Saudi Arabia. Cancer Research Journal. 2015;3(5):94–94. Available from: https://dx.doi.org/10.11648/j.crj.20150305.11. doi:10.11648/j.crj.20150305.11.

19. Nasaif HA, Qallaf A, M S. Knowledge of Colorectal Cancer Symptoms and Risk Factors in the Kingdom of Bahrain: a Cross-Sectional Study. Asian Pac J Cancer Prev. 2018;19(8):2299–304.

20. Wong M, Hirai H, Luk A. The knowledge of colorectal cancer symptoms and risk factors among 10,078 screening participants: are high-risk individuals more knowledgeable. PLoS One. 2013;4:1–8.

21. Su TT, Goh JY, Tan J. Level of colorectal cancer awareness: a cross sectional exploratory study among multi-ethnic rural population in Malaysia. BMC Cancer. 2013;13:376–376.

22. Wong F. Factors Associated with Knowledge, Attitudes, and Practice towards Colorectal Cancer and Its Screening among People Aged 50-75 Years. Int J Environ Res Public Health 2021;13(8).

23. Chan AT, Giovannucci EL. Primary Prevention of Colorectal Cancer. Gastroenterology. 2010;138(6):2029–2043.e10. Available from: https://dx.doi.org/10.1053/j.gastro.2010.01.057. doi:10.1053/j.gastro.2010.01.057.

24. Saeed RS, Bakir YY, Alkhalifah KH, Ali LM. Knowledge and Awareness of Colorectal Cancer among General Public of Kuwait. Asian Pac J Cancer Prev. 2018;19(9):2455–60.

25. Rex DK, Boland RC, Dominitz JA, Giardiello FM, Johnson DA, Kaltenbach T, et al. Colorectal Cancer Screening: Recommendations for Physicians and Patients from the U.S. Multi-Society Task Force on Colorectal Cancer. American Journal of Gastroenterology. 2017;112(7):1016–1030. Available from: https://dx.doi.org/10.1038/ajg.2017.174. doi:10.1038/ajg.2017.174.

26. Wong GCY, Lee KY, Lam KF, Fan SY. Community-based survey of knowledge of, attitudes to and practice of colorectal cancer screening in Hong Kong. J Dig Dis. 2017;18:582–590.

27. Guessous I, Dash C, Lapin P, Doroshenk M, Smith RA, Klabunde CN. Colorectal cancer screening barriers and facilitators in older persons. Preventive Medicine. 2010;50(1-2):3–10. Available from: https://dx.doi.org/10.1016/j.ypmed.2009.12.005. doi:10.1016/j.ypmed.2009.12.005.

28. & Rock C, & Thomson C, & Gansler T, & Gapstur S, & Mccullough M, Patel, et al. American Cancer Society Guideline for Diet and Physical Activity for cancer prevention. CA: A Cancer Journal for Clinicians. 2020;.