



Research Article

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## ***Public Awareness of Colon Cancer Symptoms, Risk Factor, and Screening at Madinah- KSA***

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### **ABSTRACT**

Colon cancer ranks as one of the most incidental and death malignancies worldwide representing 9% of all new cancer cases worldwide and affecting more than 1 million people every year. Colon cancer is the best-understood tumor from a genetic perspective. In Saudi Arabia, CRC is the second most prevalent kind of cancer, which has been ranked as the first among men (10.6%) and the third among women (8.9%). In 2004, the World Health Organization (WHO) reported a mortality rate of CRC in Saudi Arabia as 8.3%. Colon cancer screening has proven to be beneficial in terms of occurrence and reduction of mortality in randomized controlled trials, and it has been recommended by medical organizations either in vulnerable groups or in populations at risk because of their family background. Although population-based CRC screening has been suggested emphatically in the average-risk population, compliance rates have not reached to the desirable rates, yet. In order to accomplish the screening campaign successfully, the target population should be very compliant. There are various factors which affect the colorectal cancer screening uptake, including 'socio-demographic', provider and health care system factors, and also psychosocial factors. For increasing the screening participation rate, the target population should be aware of the benefits of colorectal cancer screening. Information about this disease and the ways to prevent it, has been considered as a measure of public awareness in several studies. In some examinations, a positive relationship has been found between knowledge about colorectal cancer, risk perception, and attitudes (advantages and disadvantages of screening) and the population's inclination to take part in the colorectal cancer screening campaign. The factors listed are therefore subject to interference. In fact, intervention studies focusing on the average population have attempted to increase the risk of colorectal cancer absorption by improving general knowledge and adjusting attitudes. In this paper, the factors that influence the targeting participants' adherence to colorectal cancer screening and interventions in order to increase screening uptake, have been reviewed.

**Key words:** Awareness, Cancer symptoms, Colorectal Cancer, Colon

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### **INTRODUCTION**

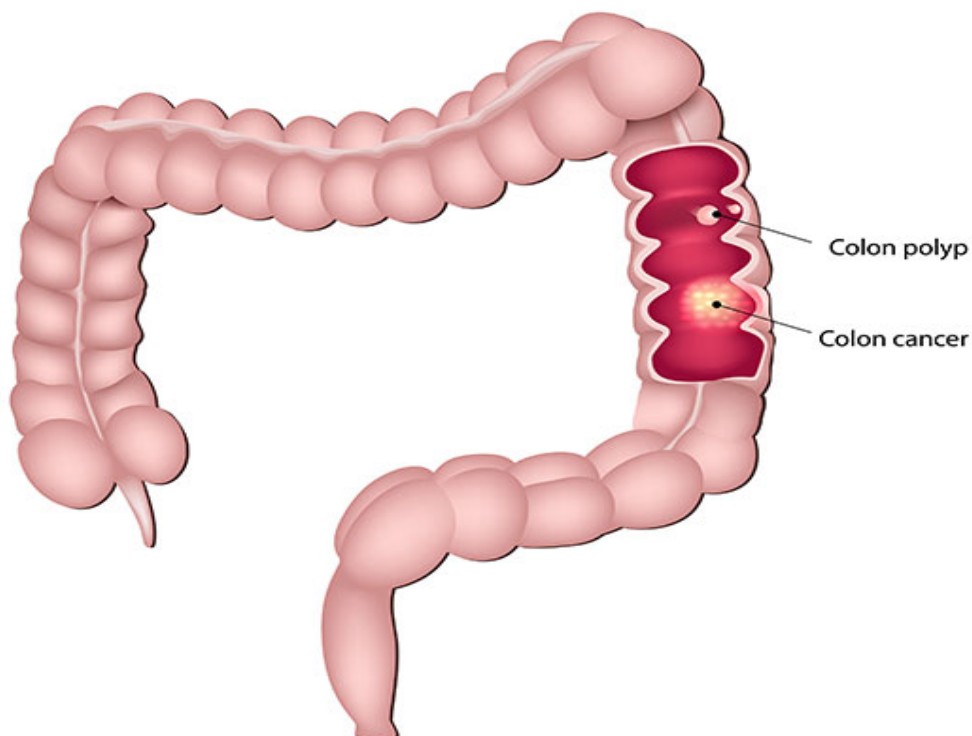
Colon cancer is the third most prevalent cancer in the world, nearly one million new cases of colon cancer are diagnosed annually, and about one million deaths are caused by it each year [1, 2]. The disease is the third most deadly cancer among the males in the world, and the fourth most common cancer among females [3]. In 2012, the CRC was the third most prevalent cancer in the world, with 1.4 million cases [6]. In Saudi Arabia, colon cancer is the most common among males, and the third most common among females (10.6%) and (8.9%) ; respectively [7]. This disease is the second most common cancer in Saudi Arabia after breast cancer. The spread of the disease has increased in Saudi Arabia between 2001 and 2006; therefore, the number of cases was increasing for both sexes and at different ages [6]. Colon cancer has been ranked the first among males, and the third in females in

Saudi Arabia among all the other cancers. Saudi Arabia has had a low percentage of colon cancer, but over the past ten years, the number of colon cancer patients has increased significantly [4,5].

Colon cancer is the leading cause of morbidity and increased mortality worldwide [2]. Developed countries such as Australia, New Zealand, USA, Canada, and Western Europe have been found to be a large part including the diagnosis of colon cancer and the mortality caused by it, while countries such as China, India, Africa, and South America have been found to be at a lower risk in the case of colorectal cancer. In 2004, the WHO reported the mortality rate of CRC in Saudi Arabia as 8.3% [8]. Moreover, the data indicated that the incidence record of cancer (SCR; <http://www.scr.org.sa/>) in Saudi Arabia has increased between 2001 and 2006, and almost doubled between 1994 and 2003 [9]. Saudi patients have been more likely to be afflicted with a more advanced stage [10], and at a younger age compared with Western countries [11,12].

CRC survival is associated with clinical and pathological stages of diagnosis, and many reports have indicated that CRC at an early age is associated with a more severe disease and higher mortality, which is of particular importance to the population of Saudi Arabia [11,12]. CRC in Saudi Arabia is 44.6%, which is much less than American patients (about 60%) [7]. The increasing incidence, and the fact that early childhood' cancerous tumors and the underlying stages which often appear without symptoms, confirm the importance of the preventive screening program in Saudi Arabia. However, the rates of participation in colorectal cancer screening programs are much lower than breast or cervical cancer screening programs [13]. In addition, the knowledge on the disease has been found to be directly related to program participation in screening [14].

## COLON CANCER AND POLYP



**Figure 1.**colon cancer

### Objectives

This study aimed to measure the level of awareness of colon cancer among the adult population in Almadinah city regarding risk factors, symptoms, signs, test used to screen, and the barriers existing for conducting the test.

## **METHODS**

This was a cross-sectional descriptive study in Al Madinah Al Monawarrah, Saudi Arabia. The study was started during the period from June 2018 – December 2018.

### **Sample size**

In order to calculate the sample size, it was assumed that the knowledge must be about 18% between the cohort studies. This was assumed from a previous study on the level of knowledge among Saudis about cancer [15]. The size of the sample was determined using the online sample size program [16] in studies done on the prevalence of the Infinite Population assuming knowledge at 18% with a 95% confidence interval. These inputs resulted in a sample size of at least 227 participants. To compensate for the non-response, 100 participants were added, and 327 participants were appointed.

**Inclusive criteria:** included 20 years of age or older; with no prior history of CRC or inflammatory bowel disease in al-madinah Almonawarah.

**Exclusive criteria:** Adults with mental illnesses, and children.

### **Data collection:**

The study population included all males and females, aged 20 years or over who lived in Medina. They were randomly selected through a web-based questionnaire conducted through social media during the study period. A validated comprehensive questionnaire was prepared in accordance with relevant literature including questions which were designed to determine the community knowledge about Colon screening, symptoms and risk factors of colon cancer awareness. The questionnaire included 28 questions in 4 sections, the first section included questions about socio-demographics. The second section included questions about the risk factors of colon cancer. The third section-included questions related to the awareness of symptoms, and the fourth section included questions about knowledge and attitude towards colon cancer screening. For the awareness of early symptoms (6 points), and risk factors (10 points): correct responses were assigned one point while do not know or incorrect responses received nil. For grades of knowledge, 9 points (out of 16 points, 75% of the score) were obtained as knowledge, while those who received <9 points were assigned to not being familiar with.

### **Data analysis**

The collected data was checked for accuracy and completeness, and was coded and entered into the statistical version of Social Sciences program package (SPSS) 23. The procedure was followed by an illustrative analysis of preferential statistics. The percentages, methods and standard deviations of the qualitative and quantitative data were calculated; respectively. The Kai-square test (X<sup>2</sup>) and Fisher's exact test were used to conduct the statistical analysis of qualitative data. The t-test and ANOVA were used to compare the quantitative data instruments when needed. AP value at 0.05 points was considered the level of importance.

### **Ethical Considerations**

The study approval was obtained from the research ethics boards of Taibah University. Informed consent was obtained from the subjects before the collection of data, and the confidentiality of participants was preserved.

## **RESULTS:**

### **Background characteristics of the study population:**

This section included the statistical analysis and results, which were obtained to study Public Awareness of colon cancer symptoms, risk factor, and screening at Madinah- KSA.

### **Population & Sample of the Study:**

The study population included all males and females aged 20 years who lived in the city. A sample of (518) was selected randomly. The following table shows their characteristics according to their personal data.

**Table 1.** Distribution of the sample study to the demographic data.

Variable		Frequency	Percent
Gender	Male	92	17.8
	Female	426	82.2
Age	20-29	234	45.2
	30-39	117	22.6
	40_49	114	22.0
	50-59	47	9.1
	60-69	6	1.2
	Marital status	Single	199
Married		293	56.6
Absolute		22	4.2
Widowed		4	.8
Do you have any relatives of the first degree who have been diagnosed with any of the following	Colon Cancer	13	2.5
	Lynch syndrome, HNPCC	1	.2
	Colon polyps	5	1.0
	Rectal cancer	5	1.0
	nothing	494	95.4
<b>Total</b>		518	100.0

The above table shows that 82.2% of the participants were female, and while 18% of males aged between 20 and 69 years, and the majority aged 20-29. Considering marital status, 38.4% were single, 56.6% were married.

## Part II: Risk Factors

The following table shows the participants' distribution according to the risk factors related to the Incidence of colon cancer.

**Table 2.** shows the participants' distribution according to risk factors for Incidence of colon cancer.

	Yes (%)#	No # (%)	Don't know # (%)
Do you think people over the age of 50 are more likely to develop colon cancer?	216 (41.7)	79 (15.3)	223 (43.1)
Do you think men are more likely to have colon cancer	144 (27.8)	116 (22.4)	258 (49.8)
Do you think that lack of exercise is a contributing factor to colon cancer	272 (52.5)	96 (18.5)	150 (29.0)
Do you think that diet and eating red meat are factors contributing to colon cancer	297 (57.3)	65 (12.5)	156 (30.1)
Do you think the lack of eating fruits and vegetables have a role in colon cancer	357 (68.9)	55 (10.6)	106 (20.5)
Do you think that obesity has a relation to colon cancer	244 (47.1)	116 (22.4)	158 (30.5)
Do you think that heredity has a role in colon cancer	277 (53.5)	126 (24.3)	115 (22.2)
Do you think smoking is a factor in colon cancer	322 (62.2)	79 (15.3)	117 (22.6)
Do you think there are diseases such as colon polyp, chronic colitis intestinal ulcers that can lead to colon cancer	296 (57.1)	22 (4.2)	200. (38.6)

From the above table it can be noted that: 41.7% of the participants believed that people over the age of 50 years were more likely to have colon cancer, 27.8% of the participants were more likely to have colon cancer, while 52.5% of the participants did not exercise. 57.3% of the participants believed that diet and eating red meat are the factors contributing to colon cancer, and 68.9% of the participants believed that the lack of fruit and vegetable intake has a role to play. Of colon cancer, 47.1% of respondents believed that obesity is associated with colon cancer, 53.5% of respondents believed that genetics have a role in colon cancer, 62.2% of respondents believed that smoking is a factor in colon cancer, 57.1% of respondents believed that diseases such as colon tumor and chronic ulcerative colitis can lead to colon cancer.

The following table shows the participants' distribution considering type 2 diabetes, where in this study it was noted that 6.2% of participants had type II diabetes, while 93.8% of them were not diabetic type II.

**Table 3.** shows the participants' distribution according to type 2 diabetes.

	Frequency	Percent
Yes	32	6.2
No	486	93.8
Total	518	100.0

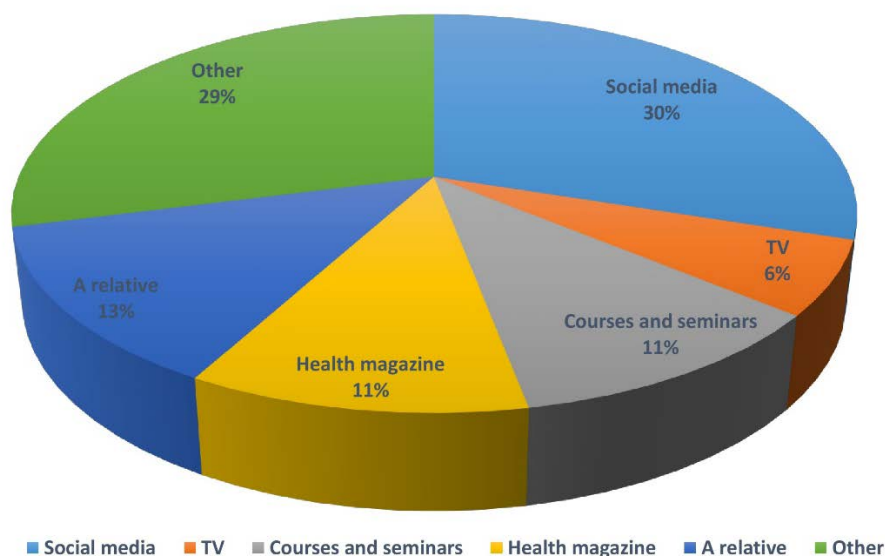
**Part III: Symptoms of colon cancer**

The following table shows the distribution of participants according to their knowledge of the symptoms associated with colon cancer, with 21.6% of them aware of the symptoms associated with colon cancer, while 78.4% of them were not familiar with the symptoms associated with colon cancer.

**Table 4.**shows the participants’ distribution according to their knowledge of the symptoms associated with colon cancer.

	Frequency	Percent
Yes	112	21.6
No	406	78.4
Total	518	100.0

The following figure shows the most important ways participants learned about the symptoms of colon cancer. The most important of these methods were social media, health magazine, a relative, courses, and seminars.



**Figure 2.**shows the most important means by which participants learn about the symptoms of colon cancer.

The following figure shows the most important symptoms of colon cancer, the most important of these symptoms included: blood in the stool/increase in stool color, weight loss, abdominal pain, constipation, and diarrhea.

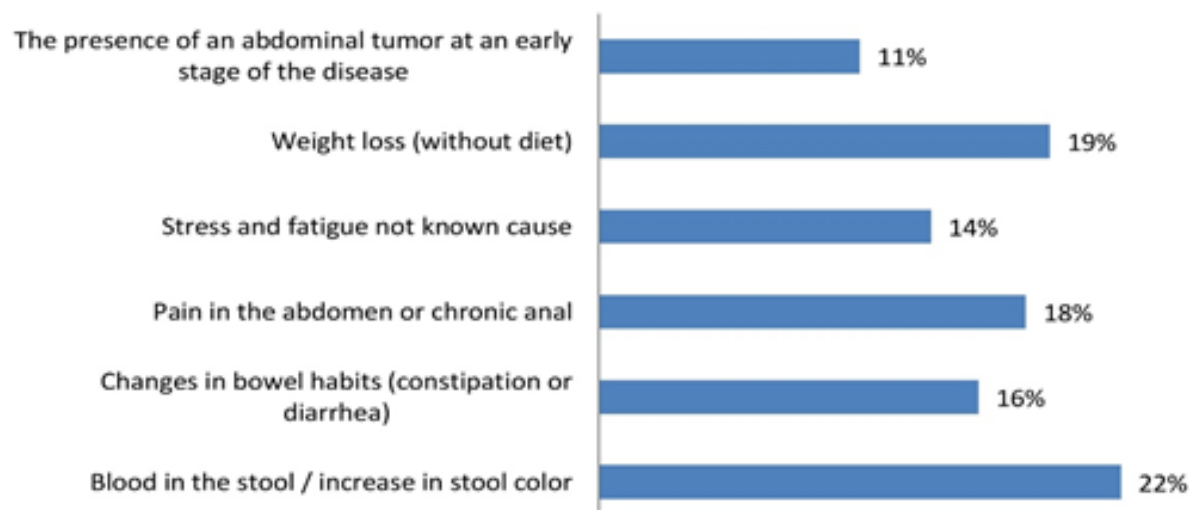


Figure 3.shows the most important symptoms of colon cancer

#### Part IV: Early screening of colon cancer:

The following table shows the distribution of participants according to the early screening of colon cancer. 38% of them had heard of early detection of colon cancer, while 62% had not heard of early detection of colon cancer.

Table 5.shows the participants' distribution according to hearing about early screening for colon cancer.

	Frequency	Percent
Yes	197	38.0
No	321	62.0
Total	518	100.0

The following table shows the participants' distribution according to their beliefs about the importance of early screening of colon cancer.

Table 6.shows the participants' distribution according to their beliefs about the importance of early screening of colon cancer.

	Yes # (%)	No # (%)	Don't know # (%)
Do you think that laparoscopy contributes to the early detection of colon cancer?	367 (70.8)	21 (4.1)	130 (25.1)
Do you think it can be early detection of colon cancer before the onset of symptoms?	322 (62.2)	68 (13.1)	128 (24.7)
Do you think colon cancer can be treated if it is detected early?	441 (85.1)	16 (3.1)	61 (11.8)

In the previous table, 70.8% of the participants believed that laparoscopy contributes to the early detection of colon cancer. 62.2% of the participants believed that early colon cancer can be detected before the onset of symptoms.

The following table shows the distribution of participants according to their age-appropriate view of colon cancer, with 41.3% believing that the appropriate age for colon cancer screening is 26-35 years. ), While 45.6% of them believed that the appropriate age for screening colon cancer is (36-50) years, and 13.1% of them believed that the appropriate age for screening colon cancer is after the age of 50 years.

**Table 7.** shows the participants’ distribution according to their point of view about the appropriate age for a screening of colon cancer.

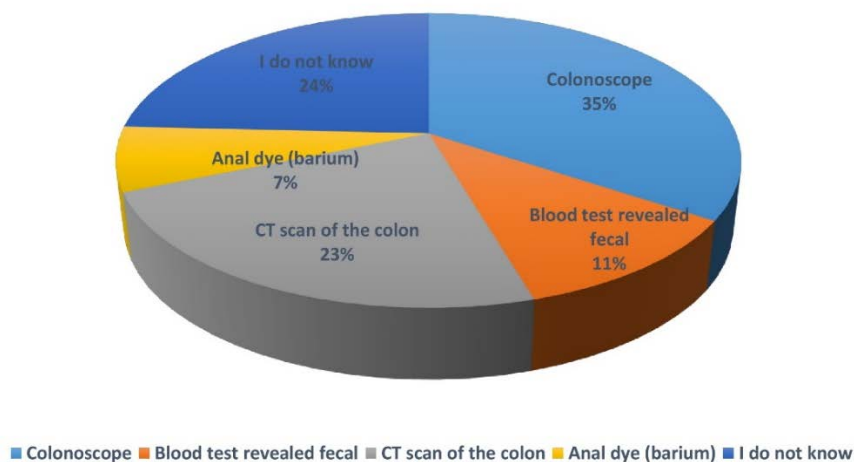
	Frequency	Percent
26-35	214	41.3
36-50	236	45.6
More than 50	68	13.1
Total	518	100.0

The following table shows the distribution of participants who believed that people over the age of 50 years should be screened for colon cancer regularly, noting that 83.2% of respondents saw the need for this, while 3.3% did not see a need for it.

**Table 8.** shows the participants’ distribution according to their belief that people over the age of (50) years should be screened for colon cancer regularly.

	Frequency	Percent
Yes	431	83.2
No	17	3.3
Don't know	70	13.5
Total	518	100.0

The following figure shows the most important methods of examination, where the most important of these methods were: a colonoscopy, a CT scan of the colon, and blood test revealed fecal.



**Figure 4.** shows the most important methods of examination



The following table shows the distribution of participants according to whether they had previously considered early screening for colorectal cancer. 20.8% of participants had already considered early screening for colon cancer, while 79.2% did not think so.

**Table 9.** shows the participants' distribution according to whether they had previously thought of early screening for colon cancer

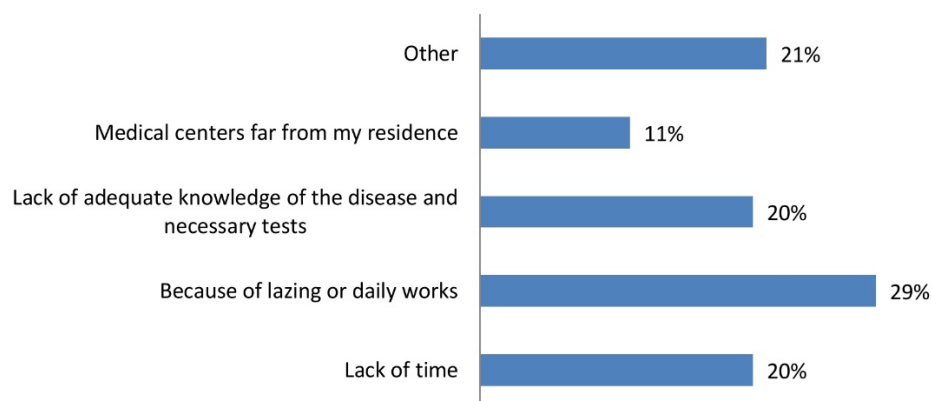
	Frequency	Percent
Yes	108	20.8
No	410	79.2
Total	518	100.0

The following table shows the participants' distribution according to whether there was a reason to prevent the early screening of colon cancer, where 29.9% of the participants had a reason to prevent the early screening of colon cancer, while 70.1% had no reason to prevent the early screening of colon cancer.

**Table 10.** shows the participants' distribution according to whether there is a reason to prevent early screening of colon cancer.

	Frequency	Percent
Yes	155	29.9
No	363	70.1
Total	518	100.0

The following figure shows the most important reasons that prevented the participants from conducting an early examination of colon cancer. The most important of these reasons were laziness or daily work, lack of adequate knowledge of the disease, and lack of time.



**Figure 5.** shows the most important reasons that prevent participants from conducting an early examination of colon cancer.

**Table 11.** The relationship between knowledge of risk factors for Incidence of colon cancer and gender, and age.

		Gender		p-value	Age					p-value
		Male	Female		20-29	30-39	40-49	50-59	60-69	
Do you think people over the age of 50 are more likely to develop colon cancer?	No	69	10	0.307	35	26	15	3	0	.007**
	Don't know	178	45		84	49	60	27	3	
	Yes	179	37		115	42	39	17	3	
Do you think men are more likely to have colon cancer	No	107	9	.001**	53	29	28	6	0	0.27
	Don't know	211	47		107	59	60	29	3	
	Yes	108	36		74	29	26	12	3	
Do you think that lack of exercise is a contributing factor to colon cancer	No	88	8	.016*	37	24	26	9	0	0.157
	Don't know	124	26		61	30	41	15	3	
	Yes	214	58		136	63	47	23	3	
Do you think that diet and eating red meat are factors contributing to colon cancer	No	51	14	0.5	35	16	10	4	0	0.311
	Don't know	126	30		67	33	40	12	4	
	Yes	249	48		132	68	64	31	2	
Do you think the lack of eating fruits and vegetables have a role in colon cancer	No	49	6	0.235	29	10	13	3	0	0.389
	Don't know	83	23		50	18	24	11	3	
	Yes	294	63		155	89	77	33	3	
Do you think that obesity has a relation to colon cancer	No	105	11	.008**	42	30	35	8	1	.003**
	Don't know	120	38		61	34	37	23	3	
	Yes	201	43		131	53	42	16	2	
Do you think that heredity has a role in colon cancer	No	112	14	.039*	46	37	32	11	0	.002**
	Don't know	88	27		42	21	36	13	3	
	Yes	226	51		146	59	46	23	3	
Do you think smoking is a factor in colon cancer	No	69	10	0.241	28	20	22	9	0	0.139
	Don't know	99	18		52	24	23	17	1	
	Yes	258	64		154	73	69	21	5	
Do you think there are diseases such as colon polyp, chronic colitis intestinal ulcers that can lead to colon cancer	No	20	2	.003**	13	6	2	1	0	0.616
	Don't know	150	50		85	48	45	18	4	
	Yes	256	40		136	63	67	28	2	

\*\*Significant at the 0.01 level \*Significant at the 0.05 level

There was a relationship between the sex of the participants and their belief that men are more likely to develop colorectal cancer, and that their belief that non-exercise is a contributing factor to colon cancer, and their belief that obesity is related to colon cancer, their beliefs that genetics have a role in colon cancer, Chronic colitis, gastrointestinal colitis which can lead to colon cancer.

On the other hand, there was a relationship between the age of the participants and their beliefs. People over the age of fifty were more likely to have colon cancer, and their belief that obesity is related to colon cancer and their belief that genetics have a role in colon cancer.

**Table 12.**The relationship between the importance of early screening of colon cancer and gender, and age.

		Gender		p-value	Age					p-value
		Male	Female		20-29	30-39	40-49	50-59	60-69	
Do you think that laparoscopy contributes to the early detection of colon cancer?	No	18	3	.284	6	6	8	1	0	.481
	Don't know	101	29		58	31	28	13	0	
	Yes	307	60		170	80	78	33	6	
Do you think it can be early detection of colon cancer before the onset of symptoms?	No	58	10	.701	19	23	21	4	1	.043*
	Don't know	103	25		58	29	24	16	1	
	Yes	265	57		157	65	69	27	4	
Do you think colon cancer can be treated if it is detected early?	No	12	4	.721	5	5	5	1	0	.793
	Don't know	51	10		31	10	14	6	0	
	Yes	363	78		198	102	95	40	6	

\*Significant at the 0.05 level

There was a relationship between the age of participants and their beliefs that colon cancer can be detected early before the onset of symptoms.

## DISCUSSION

Colon cancer has been classified as the third most common cancer in both sexes worldwide only after prostate cancer, lung cancer in men, and breast cancer and lung cancer in women. Worldwide, the incidence of the CRC disease has been about 8% between men and women [17-18]. In Saudi Arabia, colon cancer has been the most common among men, and the third most common cancer among women [19]. The Convention on the Rights of the Child has been considered the second leading cause of death worldwide. CRC mortality rate has been about 8% of all cancer-related deaths [20]. It represents a significant burden throughout the world [21]. Therefore, the prevention and diagnosis of CRC is of great importance to reduce the burden and mortality rates [22]. There have been several factors attributed to the increased risk of the Convention on the Rights of the Child; some are adjustable to factors such as obesity, sedentary life, high-fat diets, high-meat diets, fiber-deficient diets, smoking, and alcohol consumption. Others are adjustable to the age over 50 years, family history of CRC or colon polyps, and personal history of inflammatory bowel disease, diabetes type 2, the syndrome genetics and between the colon and rectum, such as Lynch syndrome [23]. In this study in Madinah, most female participants aged 20-69; the majority of patients ranged from 20-29 years. It was found that the majority of the respondents believed that the age of more than 50 years, men, obesity, lack of exercise, smoking, diet, eating red meat and not eating fruits and vegetables play a role in increasing the risks of developing the Convention on the Rights of the Child. In addition, genetic diseases can increase diseases such as colon cancer and chronic colitis in the intestine ulcers from the risk of cancer and cirrhosis. These findings indicated inadequate knowledge and awareness about CRC among adult populations in Saudi Arabia.

Through published literature, several studies have been conducted to assess the awareness and knowledge of the Convention on the Rights of the Child among the population of Saudi Arabia. Khayyat et al., who conducted a

survey in the western region of Saudi Arabia, reported that there was a lack of knowledge on the Convention on the Rights of the Child and that the degree of knowledge varied depending on the educational level and not on gender or age [24]. In addition, Imran et al conducted a cross-sectional study. To assess the knowledge and awareness of the CRC among the university students at King Abdul-Aziz University, Jeddah, Saudi Arabia, it was shown that the medical students had better non-medical knowledge, and there was no significant difference between the genders considering the knowledge. However, general knowledge and awareness was insufficient [25].

In assessing the participants' knowledge of the symptoms associated with colon cancer, it was found that 21.6% were aware of the symptoms associated with colon cancer, while 78.4% were unaware of symptoms associated with colon cancer. The most common symptoms of colon cancer were: Blood in the stool (22%), weight loss (19%), abdominal pain (18%), constipation and diarrhea (16%). In agreement with the findings of this study, there was a cross-sectional study which was done by Nasaif et al., in which The Kingdom of Bahrain evaluated the symptoms and risk factors of CRC, poor knowledge and awareness among Bahrainis about the symptoms and risk factors of CRC [26]. Similarly, Muhaidat et al., who conducted a cross-sectional study in Jordan to assess the level of awareness about the warning signs and risk factors of the Convention on the Rights of the Child among university students, concluded that the level of awareness among university students about the Convention on the Rights of the Child is weak [27].

In addition, Saeed and his colleagues, who conducted a survey in Quito State, assessed the level of knowledge and awareness of risk factors and general syndromes of CRC. Common CRC symptoms were blood stools, low abdominal pain, and poor intestines, and change in bowel habits. They also found that public awareness of symptoms and risk factors was higher than that of other countries in the region. The authors explained that was because of the access to information dissemination across the country because of its small area [28]. With regard to early detection of CRC, only 38% of participants had heard of early detection of colon cancer, while 62% had not heard of early screening for colon cancer. The most important screening methods were colonoscopy, CT colonoscopy, blood screening, and stool detection.

In addition, 62.2% of the participants believed that early colon cancer could be detected before the onset of symptoms, and 85% of the participants believed that the colon could be cured if detected early. Most participants believed that people should reach the age of 50 years to check colon cancer regularly. In addition, most of them did not consider early examination of the Convention on the Rights of the Child without reason to prevent early examination. The reasons which were reported to prevent participants from conducting an early examination of the Committee on the Rights of the Child included laziness or daily work, insufficient knowledge of the disease, and lack of time. A similar study by Green et al. [29] from 21 clinics conducted in Washington State to increase the CRC screening rate showed that people who were less educated were tobacco smokers, and had less prophylaxis and were not likely to participate in the screening. The reasons for preventing their participation were; cost, fear of risk actions, and they did not want to review their medical records. In Imran et al., study, there were only 33% of the students who had knowledge about CRC screening tests [25].

Moreover, Zubaidi et al.'s survey in Riyadh assessing the public awareness found that most participants believed that the intended screening should be performed at the age of 50 years, and screening for cancer colon should begin at the onset of symptoms. The knowledge of the participants was varying significantly according to the educational level [30]. Contrarily, Brandt et al., found that the majority of the participants (96%) had a high level of knowledge and awareness about CRC, therefore, there was a high rate of being screened (74%),  $p < 0.001$  [31].

## CONCLUSION

People with an average risk of colorectal cancer can take the test at age 50. But people with increased risks, such as those with a family history of colon cancer, should consider early screening. Your initial step in preventing colorectal cancer is to talk to your doctor about when you should be examined, whether with a laparoscopy or a stool-based test. Depending on your risk factors, such as your age and whether you have a family history of colon cancer or benign tumors, the doctor would determine when the test should begin. Maintaining a healthy weight, regular exercise, reducing your intake of red meat, treatment and avoiding excessive alcohol intake are also

important ways to reduce the risk of developing this disease. In the end, knowing the causes and risk factors for colon cancer can help you understand the importance of routine screening for colon cancer, as well as whether you are someone who should start testing at an early age.

## REFERENCES

- 1-Harris R. Epidemiology of chronic disease. 1st ed. Burlington, MA: Jones and Bartlett Learning; 2013;9781449653286.
- 2-GLOBOCAN. Fact Sheets by Cancer. Available from: [http://globocan.iarc.fr/Pages/fact\\_sheets\\_cancer.aspx?cancer=Colon](http://globocan.iarc.fr/Pages/fact_sheets_cancer.aspx?cancer=Colon) [Accessed 18 April 2017].
- 3-Folprecht G. PG 1.1 Epidemiology of Colon cancer: Risk factors, genetic predisposition. European Journal of Cancer. 2014; 50: S1.
- 4-Goel S, Negassa A, Khot A, Goyal D, Guo S, Nandikolla A. Comparative Effectiveness Research: The Impact of Biologic Agents in Ethnic Minorities With Metastatic Colon Cancer. Clinical Colon Cancer. Clin Colorectal Cancer. 2017. pii: S1533-0028:30187-6.
- 5-Al-Sheikh Y, Shaik A, Shaik A. Colon cancer: A review of the genome-wide association studies in the kingdom of Saudi Arabia. Saudi Journal of Gastroenterology. 2015;21:123.
- 6-<https://www.omicsonline.org/open-access/colorectal-cancer-awareness-and-attitude-among-adult-aldammam-saudi-arabia-2472-0429-1000117.php?aid=80833>
- 7-Al-Ahwal MS, Shafik YH, Al-Ahwal HM. First national survival data for colorectal cancer among Saudis between 1994 and 2004: What's next? BMC Public Health. 2013;13:73. [PMC free article][PubMed]
- 8-Colon Cancer Dubai. UAE: Centre for Arab Genomic Studies; [Last cited on 2014 Jul 11]. Studies CfAG. Available from: <http://www.cags.org.ae/gme2cancersencolon.pdf>.
- 9-Ibrahim EM, Zeeneldin AA, El-Khodary TR, Al-Gahmi AM, Bin Sadiq BM. Past, present and future of colorectal cancer in the Kingdom of Saudi Arabia. Saudi J Gastroenterol. 2008;14:178–82.[PMC free article] [PubMed]
- 10-Aljebreen AM. Clinicopathological patterns of colorectal cancer in Saudi Arabia: Younger with an advanced stage presentation. Saudi J Gastroenterol. 2007;13:84–7. [PubMed]
- 11-Mosli MH, Al-Ahwal MS. Colorectal cancer in the Kingdom of Saudi Arabia: Need for screening. Asian Pac J Cancer Prev. 2012;13:3809–13. [PubMed]
- 12-Sibiani AR, Fallatah HI, Akbar HO, Qari YA, Bazaraa S, Mehrdad A, et al. Colorectal Cancer in Saudi Arabia King Abdul Aziz University Hospital: A Five Year Experience. J Med Med Sci. 2011;2:1126–30.
- 13-Klabunde CN, Lanier D, Breslau ES, Zapka JG, Fletcher RH, Ransohoff DF, et al. Improving colorectal cancer screening in primary care practice: Innovative strategies and future directions. J Gen Intern Med. 2007;22:1195–205. [PMC free article] [PubMed]
- 14-Koo JH, Leong RW, Ching J, Yeoh KG, Wu DC, Murdani A, et al. Knowledge of, attitudes toward, and barriers to the participation of colorectal cancer screening tests in the Asia-Pacific region: A multicenter study. Gastrointest Endosc. 2012;76:126–35. [PubMed]
- 15-Ravichandran, K., N. Al-Hamdan, and G. Mohamed, Knowledge, attitude, and behavior among Saudis toward cancer preventive practice. J Family Community Med, 2011.18(3): p.135-42.
- 16-amp size. The Sample size for a prevalence survey, with finite population correction. Available at <http://sampsiz.sourceforge.net/iface/#prevaccessed 7/4/2018>
- 17-World Cancer Research Fund AI for CR. Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective; Continuous Update Project. Washington DC AICR. 2012;
- 18-American Cancer Society. Cancer Facts & Figures 2016. Am Cancer Soc. 2016;1–9.
- 19-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. Ann Saudi Med. 2015;35(3):196–202.
- 20-Bingham SA. Cancer | Epidemiology of colorectal cancer. In: Encyclopedia of Human Nutrition. 2010. p. 230–5.

- 21-Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM. Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. *Int J Cancer*. 2010;127(12):2893–917.
- 22-Bhat SK, East JE. Colorectal cancer: Prevention and early diagnosis. *Med (United Kingdom)*. 2015;43(6):295–8.
- 23-Simon K. Colorectal cancer development and advances in screening. Vol. 11, *Clinical Interventions in Aging*. 2016. p. 967–76.
- 24-Khayyat YM, Ibrahim EM. Public awareness of colon cancer screening among the general population: A study from the Western Region of Saudi Arabia. *Qatar Med J*. 2014;2014(1).
- 25-Imran M, Sayedalamin Z, Alsulami SS, Atta M, Baig M. Knowledge and Awareness of Colorectal Cancer among Undergraduate Students at King Abdulaziz University, Jeddah, Saudi Arabia: a Survey-Based Study. *Asian Pac J Cancer Prev*. 2016;17(5):2479–83.
- 26-Nasaif HA, Al Qallaf SM. 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.
- 27-Mhaidat NM, Al-Husein BA, Alzoubi KH, Hatamleh DI, Khader Y, Matalqah S, et al. Knowledge and Awareness of Colorectal Cancer Early Warning Signs and Risk Factors among University Students in Jordan. *J Cancer Educ*. 2018;33(2):448–56.
- 28-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.
- 29-Green BB, Bogart A, Chubak J, Vernon SW, Morales LS, Meenan RT, et al. Nonparticipation in a population-based trial to increase colorectal cancer screening. *Am J Prev Med*. 2012;42(4):390–7.
- 30-Zubaidi A, Humaid A, AlKhayal K, AlObeed O, AlSubaie N, Shaik S. Public awareness of colorectal cancer in Saudi Arabia: A survey of 1070 participants in Riyadh. *Saudi J Gastroenterol*. 2015;21(2):78.
- 31- Brandt HM, Dolinger HR, Sharpe PA, Hardin JW, Berger FG. Relationship of colorectal cancer awareness and knowledge with colorectal cancer screening. *Colon cancer*. 2012;1(5):383–96.